SIEMENS

SIMODRIVE POSMO A

User Manual **08.2013 Edition**

Distributed Positioning Motor on PROFIBUS–DP

Manufacturer/Service Documentation

SIEMENS

SIMODRIVE POSMO A

Distributed Positioning Motor on PROFIBUS DP

User Manual

Valid for

Unit	*Software version*
SIMODRIVE POSMO A	
– 75 W motor	Version Q (3.2)
– 300 W motor	Version J (3.2)

08/2013 Edition

SIMODRIVE® documentation

Printing history
Brief details of this edition and previous editions are listed below.

The status of each edition is shown by the code in the ”Remarks” column.

Status code in the ”Remarks” column:

A.... New documentation

B.... Unrevised reprint with new Order No.

C.... Revised edition with new status

If factual changes have been made on the page since the last edition, this is indicated by a new edition coding in the header on that page.

Edition	Order No.	Remarks
02.99	6SN2197–0AA00–0BP0	**A**
02.00	6SN2197–0AA00–0BP1	**C**
04.01	6SN2197–0AA00–0BP2	**C**
08.01	6SN2197–0AA00–0BP3	**C**
08.02	6SN2197–0AA00–0BP4	**C**
05.03	6SN2197–0AA00–0BP5	**C**
08.03	6SN2197–0AA00–0BP6	**C**
08.04	6SN2197–0AA00–0BP7	**C**
06.05	6SN2197–0AA00–0BP8	**C**
08.06	6SN2197–0AA00–1BP0	**C**
10.07	6SN2197–0AA00–1BP1	**C**
08.13	6SN2197–0AA00–1BP2	**C**

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Foreword

Instructions when reading

Structure of the documentation

This User Manual is a part of the documentation for SIMODRIVE 611, which is sub–divided into 2 levels:

- General Documentation/Catalogs
- Manufacturer/Service Documentation

An overview of publications, which is updated monthly and also provides information about the language versions available, can be found on the Internet at:
http://www.siemens.com/motioncontrol
Select the menu items ”Support” —> ”Technical Documentation” —> ”Publications Overview”

The Internet version of DOConCD (DOConWEB) is available at:
http://www.automation.siemens.com/doconweb

Information about training courses and FAQs (Frequently Asked Questions) can be found on the Internet at:
http://www.siemens.com/motioncontrol under menu option ”Support”

Target group

This document addresses engineers and technologists (employed with the machinery construction OEM), commissioning engineers (commissioning the system/machine), programmers

Benefits

This publication describes the functions so that the target group understands these functions and can appropriately select them. It provides the target group with the information required to implement the appropriate functions.

Should you wish for additional information or should exceptional problems arise that are not addressed in sufficient detail in this manual, you can request the required information from your local Siemens office.

Standard version

The scope of the functionality described in this document can differ from the scope of the functionality of the drive system that is actually supplied. Other functions not described in this documentation might be able to be executed in the drive system. However, no claim can be made regarding the availability of these functions when the equipment is first supplied or in the event of servicing. Additions or revisions made by the machine manufacturer are documented by the machine manufacturer.

This document does not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

The contents of this document are not part of an earlier or existing contract or agreement nor do they change this. The sales contract contains the entire obligation of Siemens. The warranty conditions specified in the contract between the parties is the sole warranty of Siemens. Any statements contained herein neither create new warranties nor modify the existing warranty.

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Questions on Documentation

If you have any queries (suggestions, corrections) in relation to this documentation, please fax or e–mail us:

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Internet address SIMODRIVE

http://www.siemens.com/simodrive

Certificates

You will find the certificates for the products described in this documentation in the Internet: http://www.support.automation.siemens.com

under Product/Order No. 15257461
or obtained from the relevant branch office of the A&D MC Division of Siemens AG.

Information about using this manual

The following should be observed when using this manual:

1. Help: The following help is available for the reader:

- Complete table of contents
- Header line (as orientation):

  the main chapter is in the upper header line
  the sub–chapter is in the lower header line
- Appendix with
  - Abbreviations and List of References
  - Index

    If you require information on a specific term, look in the Appendix under ”Index” for this term.

    The Chapter number as well as the page number is specified where information on this term can be found.

2. Identifying ”new” or ”revised” information

   The documentation 02.99 edition is the first edition.

   How is the ”new” or ”revised” information identified for the other editions?

- This is specified directly next to the information ”from SW x.y”.
- The edition is in the header line on the respective page > 02.99.

3. Notation

- ≙ means ”corresponds to”
- Numerical representation (examples)
  - $FFFF_{hex}$ Hexadecimal number
  - 0101_{bin} Binary number
  - 100_{dec} Decimal number
- PROFIBUS signals (examples)
  - STW.3 Control word bit 3
  - ZSW.11 Status word bit 11
- Parameter (examples)
  - P10 Parameter 10 without index
  - P82:28 Parameter 82 with index 0, 1, ... 27 (28 indices)
  - P82:13 Parameter 82 with index 13
  - P82:x Parameter with undefined index x
  - P56.2 Parameter 56 bit 2

Edition of the documentation?

There is a fixed relationship between the edition of the documentation and positioning motor software release.

Software release?

The first edition 02.99 describes the functionality of SW 1.0.

02.00 edition describes the functionality of SW 1.0 to 1.2.

What is new?

What are the essential new functions for SW 1.2 in comparison to SW 1.0?

- Run up mode can be set when the unit is powered up again (P56)
- Stand–alone mode (without bus communication, P100, P101)
- Skip block
- Program stop via traversing block
- Set actual position via traversing block

04.01 edition describes the functionality of SW 1.0 to 1.5.

What are the essential new functions for SW 1.3 in comparison to SW 1.2?

- Rotary axis: Signal position with modulo evaluation
- Direction of rotation of the motor shaft can be reversed (P3)
- Holding controller (P56.2, P57)
- Status bit ZSW.15: Modified behavior
- Behavior when shutting down supplemented
- FB 12 ”PARAMETERIZE_ALL_POSMO_A” (from 05.00)

  Reading and writing the parameter set of a drive

What are the essential new functions for SW 1.4 in comparison to SW 1.3?

- Worm gear SG 75
- Resetting the ”reference point set” status via P98
- Checkback signal, status of the input/output terminals 1 and 2
- Brake sequence control
- Additional diagnostics via P954
- Jogging without PROFIBUS and parameterization
- Backlash compensation with correction direction
- Flying measurement/actual value setting

What are the essential new functions for SW 1.5 in comparison to SW 1.4?

- First software for 300 W motors
- Shared software for 75 W and 300 W motors
- Different union nuts for the connection cover for 75 W and 300 W motors.
- ”SimoCom A” parameterizing and start–up tool
- PROFIBUS: Initiating a POWER ON–RESET via P97

08.01 edition describes the functionality of SW 1.0 to 1.5.

– This edition contains troubleshooting information and updates which have been obtained since the 04.01 edition.

08.02 edition describes the functionality of SW 1.0 to 1.6.

– This edition contains troubleshooting information and updates which have been obtained since the 08.01 edition.

05.03 edition describes the functionality of SW 1.0 to 2.0.

– This edition contains troubleshooting information and updates which have been obtained since the 08.02 edition.

What are the essential new functions for SW 2.0 in comparison to SW 1.6?

– Speed setpoint interface
– Choice of positioning or speed setpoint operating mode (P700)
– Hardware limit switches

08.03 edition describes the functionality of SW 1.0 to 2.0.

– This edition contains troubleshooting information and updates which have been obtained since the 05.03 edition.
– The same connection union for connection covers for 75 W and 300 W motors.

08.04 edition describes the functionality of SW 1.0 to 2.1.

What are the essential new functions for SW 2.1 in comparison to SW 2.0?

– Reference to occurring zero mark
– Defined delay before next traversing block
– New order numbers (MLFB) for replacement parts
– New order numbers (MLFB) for UL certification of the 75W and 300 W motor

06.05 edition describes the functionality of SW 1.0 to 3.0.

What are the essential new functions for SW 3.0 in comparison to SW 2.1?

– POSMO A – 300 W with extended temperature range
– Separate version, POSMO A – 300 W (being prepared)
– Telegram substitution function

08.06 edition describes the functionality of SW 1.0 to 3.1.

What are the essential new functions for SW 3.1 in comparison to SW 3.0?

– Traversing range adaptation for wide traversing ranges

10.07 edition describes the functionality of SW 1.0 to 3.2.

What are the essential new functions for SW 3.2 in comparison to SW 3.1?

– None, contains only troubleshooting information

08.13 edition describes the functionality of SW 1.0 to 3.2.

This edition contains troubleshooting information and adaption to new operating systems.

– No new software version, but a new SimoCom A version

UL certification

SIMODRIVE POSMO A – 75W and – 300W have received UL certification. The UL file number is ”E192450”.

Motor version, software version, motor type, SimoCom A

The following inter–relationships exist between the version of the positioning motor, drive software release, motor type and SimoCom A:

Table 1-1 Version, software release, motor type, SimoCom A

Motor version (stamped on the motor)		Software release	Use		SimoCom A	
75 W motor	300 W motor		75 W motor	300 W motor	can be replaced	Version
A	–	1.0	yes	no	no	–
B	–	1.1	yes	no	no	–
C	–	1.1	yes	no	no	–
D	–	1.2	yes	no	no	–
E	–	1.2	yes	no	no	–
F	–	1.3	yes	no	no	–
G, H	A	1.4	yes	yes	no	–
J, K	B, C	1.5	yes	yes	yes	1.0, 2.0, 3.0
L	D	1.6	yes	yes	yes	3.0
M	E	2.0	yes	yes	yes	4.0
N	F	2.1	yes	yes	yes	4.2
O	G	3.0	yes	yes	yes	4.3
P	H	3.1	yes	yes	yes	4.5
Q	J	3.2	yes	yes	yes	4.5, 5.2, 5.3

Information about the positioning motor can be read from the following parameters:

P0052	HW version	
P0053	SW version	
P0964 (from SW 1.4)	Device identification	(refer to Section 5.6.2)

Definition: Who are qualified personnel?

Startup and operation of the device/equipment/system in question must only be performed using this documentation. Only **qualified personnel** should be allowed to commission and operate the device/system. Qualified personnel as referred to in the safety instructions in this documentation are persons authorized to start up, ground, and label devices, systems, and circuits in accordance with the relevant safety standards.

Safety information/ instructions

This manual contains information which you should observe in order to ensure your own personal safety, as well to avoid material damage. The instructions for your personal safety are marked by a warning triangle. Instructions relating solely to material damage are not marked by a warning triangle. Depending on the degree of hazard, the warning information is shown as follows in decreasing sequence:

Danger

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

Warning

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

Caution

With a warning triangle indicates that minor personal injury **can** result if proper precautions are not taken.

Caution

Without warning triangle indicates that material damage **can** result if proper precautions are not taken.

Notice

indicates that an undesirable result or state **may** arise if the relevant note is not observed.

Proper use

Note the following:

Warning

Siemens products may only be used for the applications specified in the catalog and in the associated technical documentation. If third–party products and components are used, 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 complied with. The information in the relevant documentation must be observed.

Further information

Note

This symbol indicates important information about the product or part of the document, where the reader should take special note.

Reader’s note

This symbol is shown, if it relates to important information which the reader must observe.

Technical information

Warning

When electrical equipment is operated, certain parts of this equipment are inevitably under dangerous voltage.

Incorrect handling of these units, i.e. not observing the warning information, can therefore lead to death, severe bodily injury or significant material damage.

Only appropriately qualified personnel may commission/start up this equipment.

This personnel must have in–depth knowledge regarding all of the warning information and service measures according to this operating instructions.

Perfect, safe and reliable operation of the equipment assumes that it has been professionally transported, stored, mounted and installed as well as carefully operated and serviced.

Hazardous axis motion can occur when working with the equipment.

Note

When handling cables, observe the following:

- They are not damaged,
- they are not stressed,
- they may not come into contact with rotating components.

Warning

When testing the voltage of the electrical equipment of the machines on the system side, all of the SIMODRIVE drive unit connections must be withdrawn or disconnected (EN 60204–1 (VDE 0113–1), Pt. 20.4).

This is necessary, as the SIMODRIVE insulation has already been tested, and should not be subject to a new test (additional voltage stressing).

Warning

Start–up/commissioning is absolutely prohibited until it has been ensured that the machine in which the components described here are to be installed, fulfills the regulations/specifications of the Directive 98/37/EC.

Warning

The information and instructions in all of the documentation supplied and any other instructions must always be observed to eliminate hazardous situations and damage.

- For implementing special versions of machines and equipment, the data and specifications in the Catalogs and quotations additionally apply
- Further, all of the relevant national, local land plant/system–specific regulations and specifications must be taken into account.
- All work should be undertaken with the system in a no–voltage condition!

Caution

When using mobile radio equipment (e.g. cellular phones, walkie–talkies) with a transmitting power of > 1 W close to SIMODRIVE POSMO A (< 1.5 m), this can have a negative impact on the functioning of the SIMODRIVE POSMO A.

ESDS information and instructions

Electro**S**tatic **D**ischarge **S**ensitive Devices

Note

Components, which can be destroyed by electrostatic discharge are individual components, integrated circuits, or boards, which when handled, tested, or transported, could be destroyed by electrostatic fields or electrostatic discharge. In English, these components are referred to as **ESDS** (**E**lectro**S**tatic **D**ischarge **S**ensitive Devices).

Handling ESDS boards:

- When handling devices which can be damaged by electrostatic discharge, personnel, workstations and packaging must be well grounded!
- Electronic components should only be touched when absolutely necessary.
- Personnel may only come into contact with the components, if
  - they are continuously grounded through ESDS wristlets,
  - they wear ESDS shoes, ESDS shoe grounding strips in conjunction with an ESDS floor surface.
- Boards/modules must only be placed on conductive surfaces (table with ESDS surface, conductive ESDS foam, ESDS packaging, ESDS transport container).
- Boards may not be brought close to data terminals, monitors or television sets (minimum clearance to the screen > 10 cm).
- Boards may not be brought into contact with highly insulating materials which can be statically charged, e.g. plastic foils, insulating desktops, clothing manufactured from man–made fibers.
- Measuring work may only be carried out on the components if
  - the measuring unit is grounded (e.g. via protective conductor), or
  - for floating measuring equipment, the probe is briefly discharged before making measurements (e.g. a bare–metal control housing is touched).
- Only touch control components, option modules and memory modules at the front panel or at the edge of the PC boards.

Residual risks

When carrying out a risk assessment of the machine in accordance with the EU Machinery Directive, the machine manufacturer must consider the following residual risks associated with the control and drive components of a power drive system (PDS).

1. Unintentional movements of driven machine components during commissioning, operation, maintenance, and repairs caused by, for example:
   - Hardware defects and/or software errors in the sensors, controllers, actuators, and connection technology
   - Response times of the controller and drive
   - Operation outside the specification
   - Errors when parameterizing, programming and wiring
   - Use of radio devices/cellular phones in the immediate vicinity of the controller
   - External effects
2. Exceptional temperatures as well as emissions of light, noise, particles, or gas caused by, for example:
   - Component malfunctions
   - Software errors
   - Operation outside the specification
   - External effects
3. Hazardous shock voltages caused by, for example:
   - Component malfunctions
   - Static charges
   - Operation outside the specification
   - Condensation/conductive contamination
   - External effects
4. Electrical, magnetic, and electromagnetic fields that can pose a risk to people with a pacemaker and/or implants if they are too close.
5. Emission of pollutants if components or packaging are not disposed of properly.

An assessment of the residual risks (see points 1 to 5 above) established that these risks do not exceed the specified limit values (risk priority number in accordance with EN 60812 RPZ = 100).
For additional information, refer to the relevant sections of the Function Manual.

At the present time, other known residual risks are:

- Acceleration of the spindle or axes due to:
  - Encoder errors, e.g., errors in the absolute measuring system (CD track), loose contacts in encoder cables or unsuitable encoders.
  - Cyclically interchanged phases of the motor connections (V–W–U instead of U–V–W).
  - Interchanged control sense.
  - Electric faults (defective components, etc.).
  - Transfer of an incorrect, but plausible actual value in absolute measuring systems (encoder does not signal an error).
- For a 1-encoder system, encoder faults are detected by various HW and SW monitoring functions. It is not permissible that these monitoring functions are de–activated and they must be parameterized carefully.
- Stop function Category 0 according to EN 60204-1 means that the spindles/axes are not braked. Depending on the kinetic energy involved, they can coast–down for a long time.

  This must be integrated in the logic of the protective door interlocking.
- When a limit value is violated, higher speeds than have been set can briefly occur or the specified position position can be exceeded to some degree from between the error being detected and the system responding. This depends on the dynamic response of the drive and the parameter settings (MD).
- Parameterization and programming errors made by the machinery construction OEM cannot be identified. The required level of safety can only be assured by a thorough and careful acceptance testing.
- When replacing the drive unit or motor, the same type must always be used as otherwise the selected parameters may result in different responses.
  When an encoder is replaced, the axis involved must be re–calibrated.

■

Table of Contents

1 Product Brief

1.1 General information about SIMODRIVE POSMO A

Intelligent positioning motor

SIMODRIVE POSMO A is an intelligent distributed positioning motor connected as node to the PROFIBUS–DP field bus.

SIMODRIVE POSMO A can be operated via PROFIBUS–DP. This means that all of the signals and data required to commission (start–up) and operate the drive and also to evaluate faults are transferred via PROFIBUS.

Further, the positioning motor can be operated in the standalone mode. This means that in this case, bus communications are not required in order to move the positioning motor.

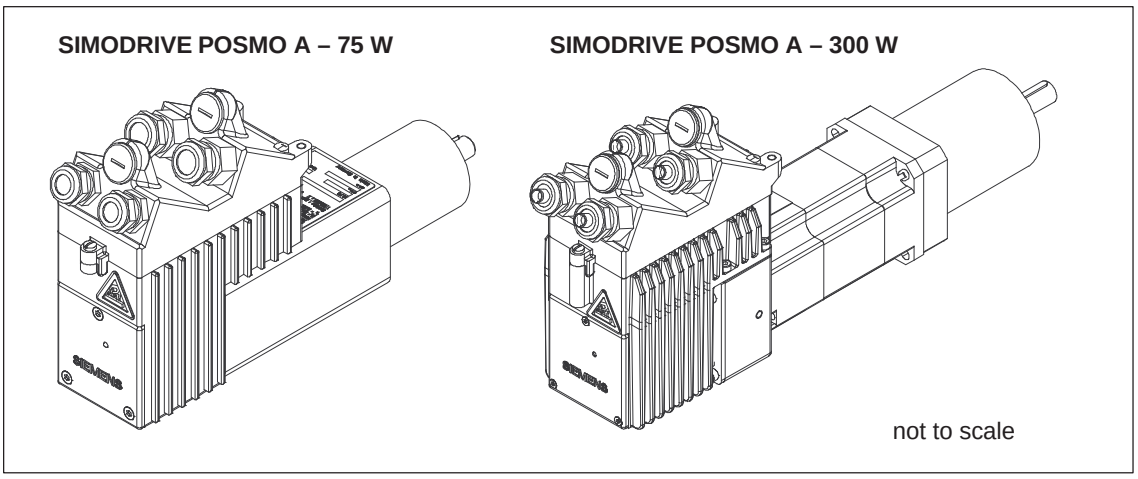


Fig. 1-1 SIMODRIVE POSMO A positioning motor with connection cover and gearbox

Reader's note

The following catalog is available for SIMODRIVE POSMO A:

References: /KT654/ Catalog DA 65.4

Main features

The main features are:

- Power module and complete motion control in the motor
- Coupled using a communication and power bus
- PROFIBUS–DP Standard slave
- Positioning functionality which is easy to handle
- Modular gearbox system with different ratios

Applications

SIMODRIVE POSMO A can be used in almost all industry sectors, such as:

- For production machines in packaging, woodworking, glass, printing, plastics
- For machine tools and transfer lines
- In medical diagnostics – for example to move examination tables and X–ray equipment

Typical applications

Here are two typical applications from many:

- Adjusting formats or endstops
- Setting process quantities (e.g. via valves)

Design

The positioning motor is a 1–axis actuating drive with low envelope dimensions and compact power connection, drive converter power section, closed–loop motor control, positioning control (open–loop), communication and bus connection on the motor.

A 24 V supply voltage for the 75 W motor and 48 V for the 300 W motor supply the drive power.

Reference: /KT101/ SITOP power, power supplies Catalog

Gearbox selection

The motor can be equipped and operated without a gearbox or with a gearbox from a modular gearbox system.

- 75 W motor: Modular gearbox system, refer to Chapter 2.5.1
- 300 W motor: Modular gearbox system, refer to Chapter 2.5.2

Cables

Standard cables are used for all connections.

Extension set, ”separate version” POSMO A – 300 W

If mounting space is restricted, it is possible to separate the drive unit from the motor. With the extension set ”separate version” for SIMODRIVE POSMO A – 300 W the drive unit can be mounted separately from the motor.

The power and signal cables required (draggable) are supplied pre–fabricated as the extension set ”separate version” (refer to Table 1-1).

Traversing possibilities (examples)

The positioning motor can be traversed as follows:

- Traverse to an end position with a velocity and acceleration which can be overridden.
- Traverse through a distance in a direction with velocity and acceleration which can be overridden.
- Traverse with a speed and acceleration which can be overridden, direction is defined by the sign, as long as a time of logic condition is fulfilled.
- Traverse as soon as an additional time or logic condition is fulfilled.
- Traverse as long as a time or logic condition is fulfilled.

Traversing blocks and programs

There are a total of 27 traversing blocks, which can be used as individual blocks or as program.

The traversing blocks are subdivided as follows:

Trav. block	Use
• 1 and 2	Reserved for jogging
• 3 – 12	Individual traversing blocks
• 13 – 17	Program 1 (standard, can be freely parameterized)
• 18 – 22	Program 2 (standard, can be freely parameterized)
• 23 – 27	Program 3 (standard, can be freely parameterized)

This setting is used as standard. Blocks 3 to 27 can be freely used as single blocks or programs.

Communications

The PROFIBUS–DP field bus allows fast, cyclic data transfer between the individual DP slaves and the higher–level DP master.

DP masters include, for example:

- Central controller of SIMATIC S7
- Master–capable communication processes (e.g. CP 5613)
- Communications modules (e.g. CP 342–5)
- Standard masters from other manufacturers

Reference: /IKPI/ Industrial Communications and Field Devices, Catalog

Diagnostics

Local diagnostics using LEDs for Fault/Ready.

The DP master can read–out and evaluate positioning motor faults and warnings via PROFIBUS.

Two freely parameterizable analog test outputs for measurements when service is required.

1.2 Function overview and differences between 75 W/300 W

Function overview An overview of the features and functions of SIMODRIVE POSMO A is provided in the following diagram.

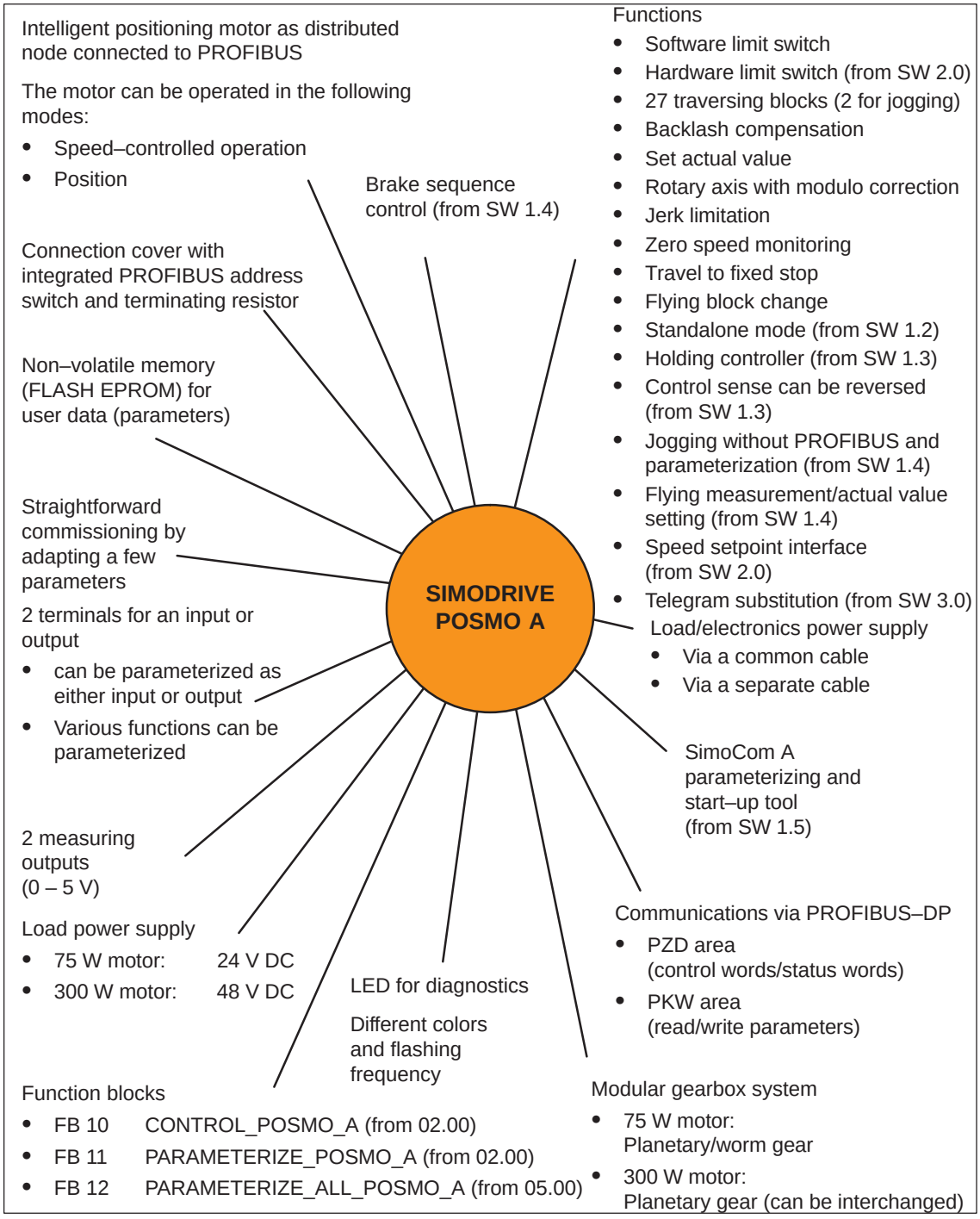


Fig. 1-2 Overview of SIMODRIVE POSMO A functions

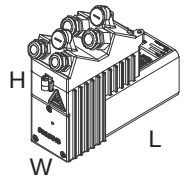
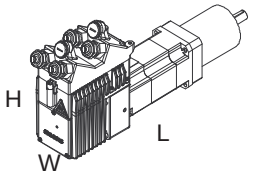
Differentiating features of the motor types

There are the following basic differences between POSMO A with 75 W and POSMO A with 300 W:

Table 1-1 Difference: POSMO A with 75 W and 300 W

Designation	SIMODRIVE POSMO A	
	75 W	**300 W**
Order No. (MLFB)	6SN2132–□□□11–1BA1	6SN2155–□□□xy–1BA1 x = 1 —> Motor/drive unit IP64 Gearbox IP54 x = 2 —> Degree of protection IP65 y = 1 —> with motor holding brake y = 0 —> without motor holding brake
Extension set "separate version"	not possible	Outlet direction, side A: Length1 m: 6FX8002–6AA00–1AB0 3 m: 6FX8002–6AA00–1AD0 5 m: 6FX8002–6AA00–1AF0 Outlet direction, side B: Length1 m: 6FX8002–6AA10–1AB0 3 m: 6FX8002–6AA10–1AD0 5 m: 6FX8002–6AA10–1AF0
Software	all available versions possible	from version A (SW 1.5)
Supply voltages	24 V DC ±20 %	48 V DC ±20 %
Rated output	62.5 W (S1) 75 W (S3, 25 %, 1 min)	176 W (S1) 300 W (S3, 25 %, 4 min)
Rated speed	3,300 rpm (S1) 2,000 rpm (S3, 25 %, 1 min)	3500 rpm (S1) 3000 rpm (S3, 25 %, 4 min)
Rated torque	0.18 Nm (S1) 0.36 Nm (S3, 25 %, 1 min)	0.48 Nm (S1) 0.95 Nm (S3, 25 %, 4 min)
Meas. system	integrated 816 increments/motor revolution	integrated 4096 increments/motor revolution
Ambient temperature	0...45 °C	–20...45 °C
Gearboxes	without gearbox Planetary gearbox 1–stage Planetary gearbox 2–stage Planetary gearbox 3–stage Worm gearbox	without gearbox Planetary gearbox 1–stage Planetary gearbox 2–stage Planetary gearbox, 3–stage (from SW 2.0) **Note:** The gearbox can be interchanged
Connection cover	The connecting cover for POSMO A – 75 W does not fit on the POSMO A – 300 W and vice versa, i.e. they cannot be interchanged.	

Table 1-1 Difference: POSMO A with 75 W and 300 W, continued

Designation	SIMODRIVE POSMO A	
	75 W	**300 W**
Dimensions (without gearbox) (approximate data)	 L = 202, W = 71, H = 163 [mm]	 L = 254, W = 80, H = 172 [mm]
Weights (approximate data)	Motor without gearbox: 3.1 kg Motor with 1–stage gearbox: 3.5 kg Motor with 2–stage gearbox: 3.7 kg Motor with 3–stage gearbox: 3.9 kg Motor with worm gear: 3.5 kg	Motor without gearbox: 3.9 kg Motor with 1–stage gearbox: 5.1 kg Motor with 2–stage gearbox: 5.4 kg Motor with 3–stage gearbox: 8.2 kg
Shaft end (motor)	Without keyway	Without keyway or with keyway
Technical data	—> Refer to Chapter 2.6.1	—> Refer to Chapter 2.6.2

1.3 Safety guidelines

Reader's note

In addition to the technical information/instructions specified in the foreword to this documentation, the following danger and warning information/instructions should be carefully observed when using SIMODRIVE POSMO A!

Danger

1. In order to avoid danger and damage, the data and instructions in all of the documentation associated with this product should be carefully observed. Please refer to the Catalogs or contact your local SIEMENS office for the ordering data.
2. All of the work must be carried out by qualified, appropriately trained personnel.
3. Before starting any work on SIMODRIVE POSMO A, the motor must be disconnected in–line with the regulations according to the 5 safety rules. In addition to the main circuits, it is important to observe if there are any supplementary or auxiliary circuits.

   The "5 safety rules" according to DIN VDE 0105:
   Disconnect, lock–out to prevent reclosure, ensure that the equipment actually is in a no–voltage condition, ground and short–circuit and cover or partition off adjacent parts under voltage.

   The previously mentioned measures may only be reversed/restored after all of the work has been completed and the motor has been completely installed.
4. All of the rating plates, warning labels and information labels on the SIMODRIVE POSMO A must be carefully observed!
5. Commissioning is prohibited until it has been clearly identified that the machine, in which this component is to be installed, fulfills the conditions of Directive 98/37/EC.
6. Caution when coming into contact! When SIMODRIVE POSMO A is operational, surface temperatures of over 100 °C can occur! Danger of fire!
7. Use in hazardous areas is not permitted.
8. The load power supply (48 V/24 V) and electronics power supply (24 V) are not galvanically isolated.

Warning

9. Never disable protective functions and devices even for trial operation.
10. For shaft ends with key, the key must be secured when operated under trial conditions without drive–out element.
11. Check the direction of rotation with the motor uncoupled.

Caution

12. Suitable equipment must be used when mounting withdrawing drive–out elements (e.g. coupling disk, belt pulley, gear, ...).
13. The motor may not be used as a step.
14. The valid national, local and plant/system–specific regulations and requirements must be carefully observed.

Caution

15. It is not permissible to connect the unit to the three–phase line supply as this could destroy the unit.
16. When mounting SIMODRIVE POSMO A with the shaft end facing upwards, it must be guaranteed that no liquid can penetrate into the upper bearing.
17. Ensure that the unit is correctly mounted at its flange and is precisely aligned. If increased noise/vibration/temperatures occur, if in doubt, power down.
18. If large amounts of dirt accumulate, the air ducts should be regularly cleaned.
19. Axial forces are not permissible for SIMODRIVE POSMO A – 300 W with integrated holding brake.

    After the motor has been mounted, the brake should be checked to ensure that it functions perfectly.

    The brake is only designed for a limited number of emergency braking operations. It is not permissible to use the brake as operating brake.
20. Supporting SIMODRIVE POSMO A 300 W

    If the motor is subject to extreme vibration/shock loads, then it must be supported using the three M5 threaded holes and an appropriate bracket.
21. Degree of protection

    It is not permissible that foreign bodies, dirt or moisture accumulate at the connections.

    Cable entry glands that are not used must be sealed so that they are dust–tight and watertight!

    In order to guarantee the degree of protection, all of the connections must be sealed using plugs or with an appropriate PG gland.
22. When mounting and withdrawing drive–out elements at the output shaft, it is neither permissible to apply heavy knocks (e.g. using a hammer) to the shaft end nor exceed the maximum permissible axial or radial load at the shaft end.
23. The motors must be stored under the following ambient conditions: Dry, dust–free and low vibration levels ($v_{rms} \leq 0.2$ mm/s).

Notice

24. When using SIMODRIVE POSMO A in UL–certified systems, a UL–certified varistor with the following properties is required in the power supply cable.
    for 24 V —> V_N = 38 V DC / I_{max} = 2000 A
    e.g. SIOV–S20–K30 from EPCOS
    for 48 V —> V_N = 65 V DC / I_{max} = 6500 A
    e.g. SIOV–S20–K50 from EPCOS
    This circuit is not required when using the DC–PMM (refer to Chapter 2.2.3).
25. If changes occur with respect to the normal operating condition, e.g. increased temperatures, noise or oscillation, if in doubt, power down the motor. The cause should then be determined and if necessary a SIEMENS Service Center should be contacted.
26. Machines and systems equipped with SIMODRIVE POSMO A must be in full compliance with the protective requirements of the EMC Directive.
    The plant/machine manufacturer is responsible in ensuring this.

Note

27. It is not permitted to open up the drive units! We recommend that a SIEMENS Service Center carries–out any repair or service work.
28. The connection covers for POSMO A – 75 W and POSMO A – 300 W cannot be interchanged. This means that the connection cover for the 75 W motor does not fit on the 300 W motor and vice versa.
29. At the end of the product lifetime, the individual parts and components should be disposed of according to the regulations of the particular country.
30. Possible special versions (including connection systems) and types of construction can differ regarding the technical details! If there is any uncertainty, we urgently recommend that you contact the manufacturer (specifying the type designation and serial number) or have the equipment repaired by a SIEMENS Service Center.
31. Immediately contact the transport company if damage is identified after the equipment has been shipped. In case of damage, the drive units should not be commissioned.
32. When connecting–up, it should be ensured that the connecting cables are protected against torsional stressing, strain and pressure; it should also be ensured that cables cannot kink.
33. Cables listed in the Siemens Catalog NC Z should be used when connecting–up SIMODRIVE POSMO A.
34. Observe the rating plate data regarding type of construction and degree of protection to ensure that they coincide with the conditions at the point of installation!
35. The equipment must be mounted so that any thermal power loss is adequately dissipated.

■

Space for your notes

Installing and Connecting–Up

2.1 System overview of SIMODRIVE POSMO A

System overview and components

SIMODRIVE POSMO A positioning motor comprises the following components:

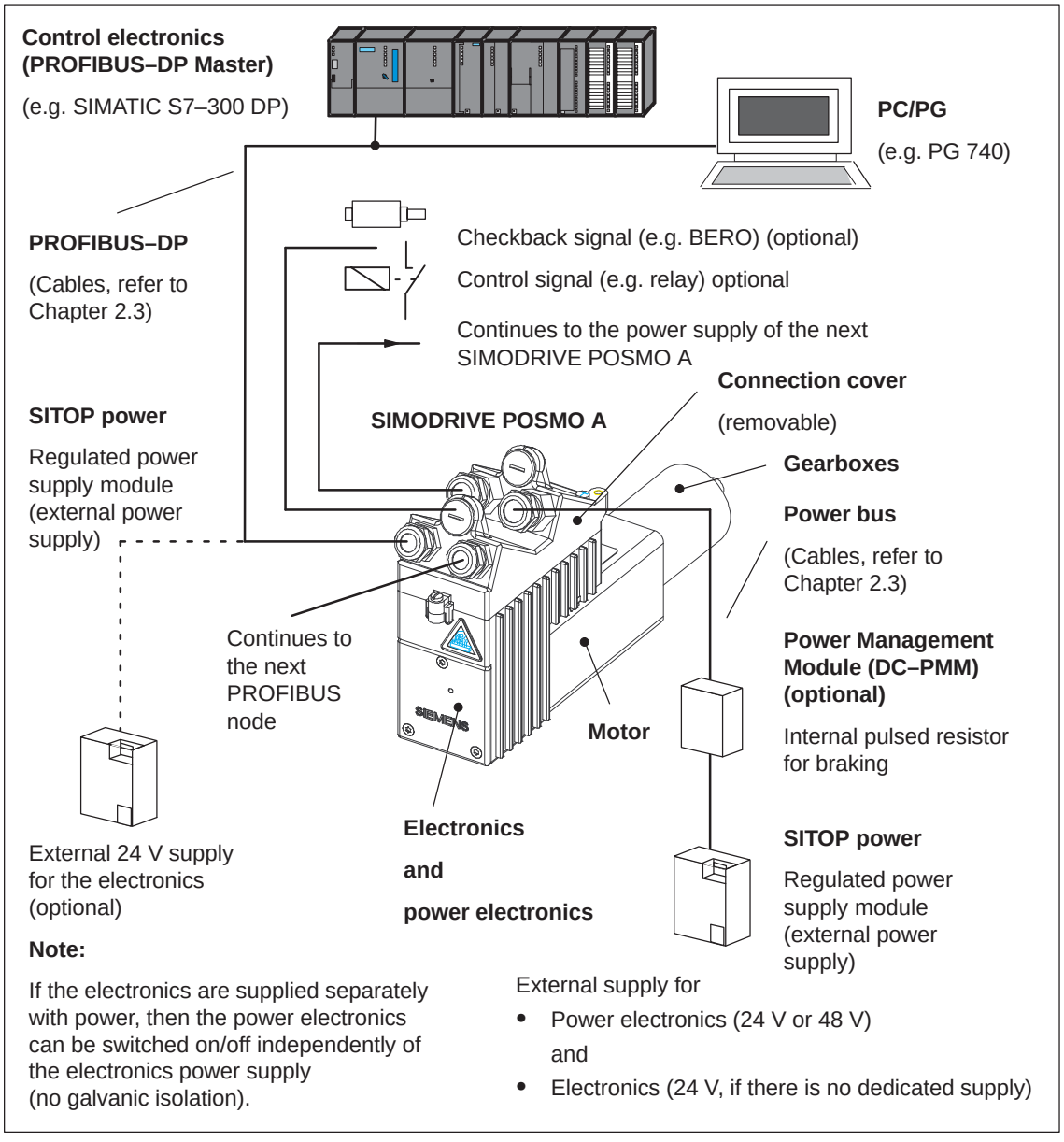


Fig. 2-1 System overview of SIMODRIVE POSMO A

2.2 Electrical system requirements

2.2.1 General electrical requirements

General requirements

The following general requirements must be observed:

- The PROFIBUS–DP is coupled in conformance with the Standard. A standard PROFIBUS cable can be used. In order to loop in the optional electronics power supply, the same bus cable can be used that is used in the distributed ET 200X I/O device.

  References: /ET200X/ Distributed ET 200X I/O

- All of the bus nodes should be certified for PROFIBUS use.

Note

When using connector couplings for PROFIBUS, at higher data transfer rates (> 1.5 Mbaud), perfect functioning is no longer guaranteed (cable reflection).

- An external power supply is required (24 V for a 75 W motor and 48 V for a 300 W motor, refer to Chapter 2.6.1 or 2.6.2 for technical data).
- The maximum conductor cross–section for the load power supply is 4 mm^2. If the power supply being used can supply more current than is permissible for the cable, then the appropriate slow–acting fuses must be provided (e.g. Neozed fuse).
- A power management module (DC PMM) can optionally be connected between the external load power supply and the input terminals of the SIMODRIVE POSMO A. The DC PMM serves to eliminate the regenerative feedback energy and to limit the conducted noise. For higher levels of regenerative feedback energy, a Power Management Module Extension (DC–PMM_E/48 V) can be connected (refer to Chapter 2.2.3).
- If the bus communications and position sensing are to remain active even with the load power supply switched–out, then an optional electronics power supply (24 V $\pm$20 %) can be used. The cables are routed in the ET 200X bus cable (distributed peripheral system).
- A BERO can only be connected as type 3–wire PNP.
- The length of the I/O cables, their ground cables as well as their 24 V power supply cables may be a maximum of 30 m long (refer to Table 2-2).
- The grounding concept is specified corresponding to the data provided in Chapter 2.3.
- The signal and power cables should be routed with a minimum 20 cm clearance between them and as close as possible to grounded parts.

- When using a contactor in the load power supply, before opening the contactor, it must be ensured that the pulses have been canceled via PROFIBUS (OFF 1).
- All of the power supplies must have ”protective separation”.
- When using SIMODRIVE POSMO A in UL–certified systems, a UL–certified varistor with the following properties is required in the power supply cable:

  24 V —> V_N = 31 V DC, I_{max} = 2000 A
  e.g. SIOV–S20–K30 from EPCOS

  48 V —> V_N = 65 V DC, I_{max} = 6500 A
  e.g. SIOV–S20–K50 from EPCOS

  This circuit is not required when using the DC–PMM (refer to Chapter 2.2.3).
- When using POSMO A – 300 W in the temperature range –20...0 °C it should be ensured that all of the system components are certified for this temperature range.

2.2.2 DC power supply (24 V, 48 V)

General information on the power supply

The load power supply must be dimensioned as a function of the number of positioning motors SIMODRIVE POSMO A and the coincidence factor.

Note

If possible, the load power supply should be switched–in/switched–out on the primary side.

If this is not possible for technical reasons, a power management module (DC PMM) must be connected between the switch element and the SIMODRIVE POSMO A, refer to Chapter 2.2.3.

- Switching–in and switching–out the 24 V/48 V load power supply on the primary side (line–specific)

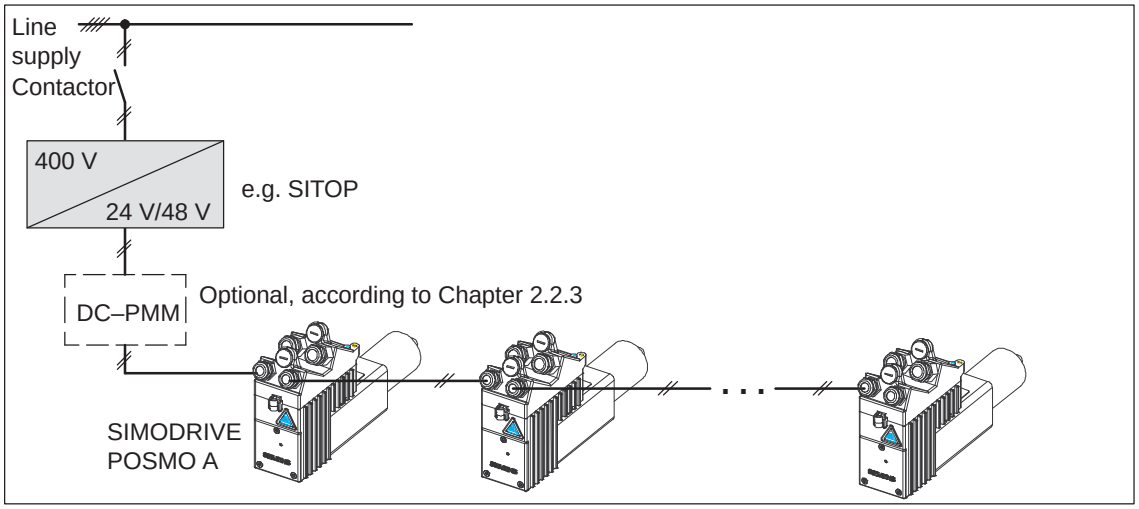


Fig. 2-2 Switching–in and switching–out the 24 V/48 V on the primary side

- Switching–in/switching–out the 24 V/48 V load power supply on the primary side (line–specific)

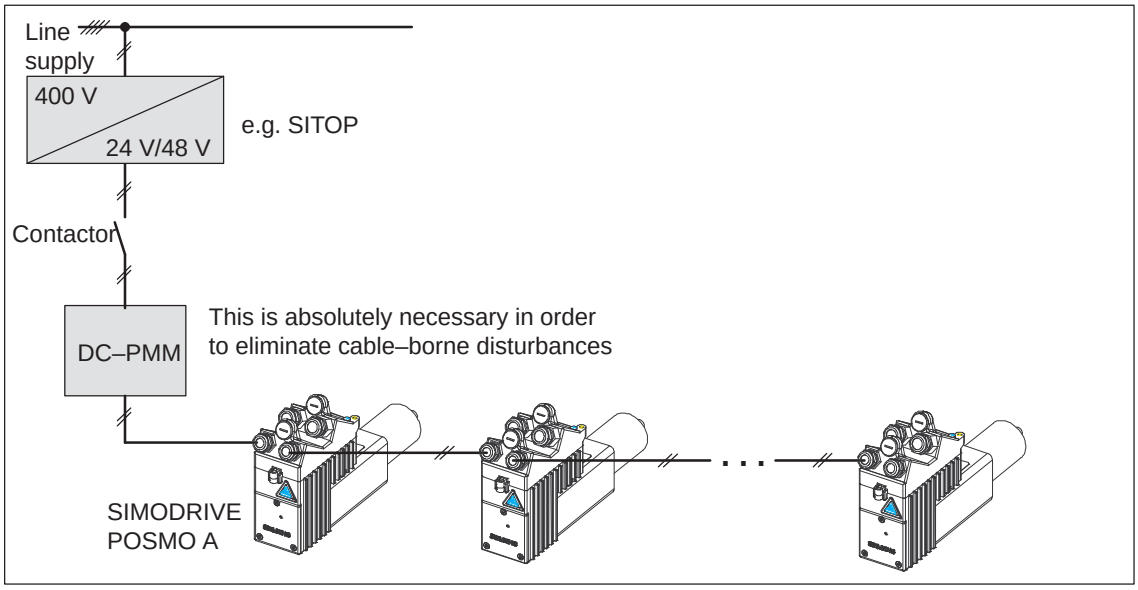


Fig. 2-3 Switching–in/switching–out the 24 V/48 V load power supply on the secondary side

- Switching–in/switching–out the 24 V/48 V load power supply on the primary side (line–specific) with a POSMO A which is to be separately switched

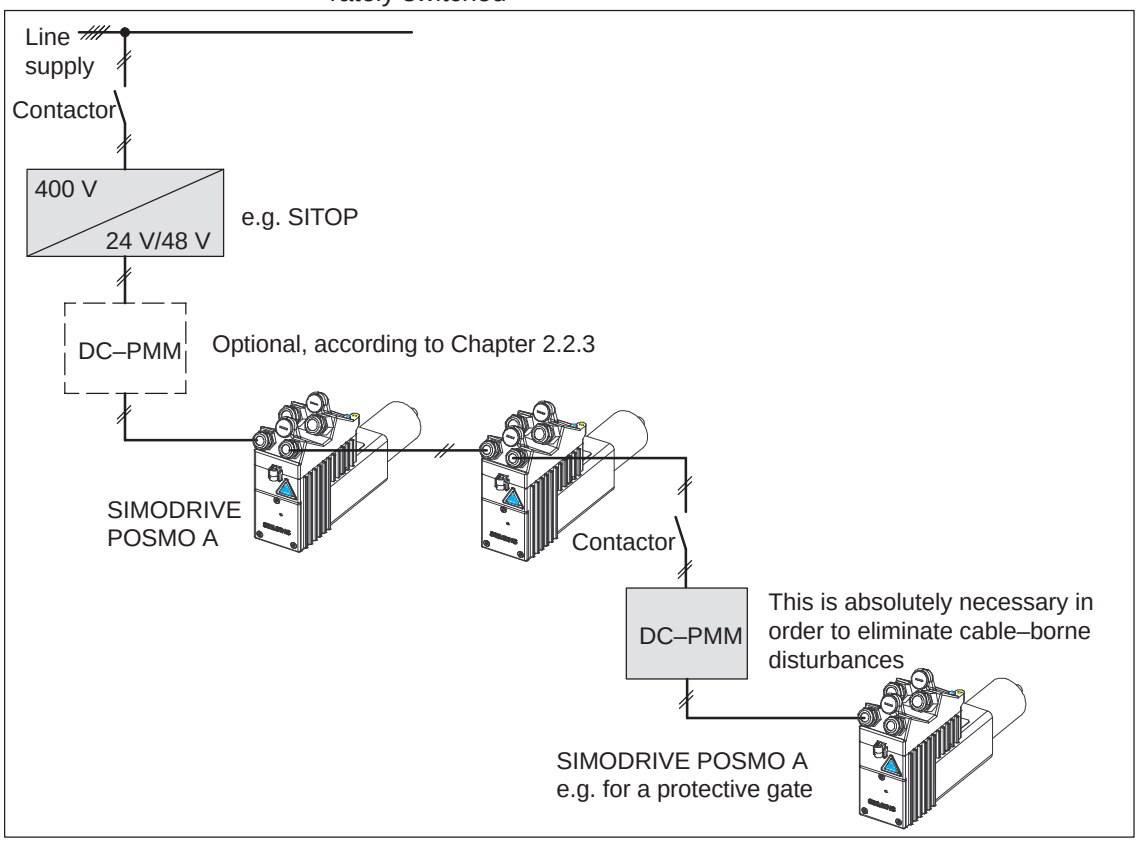


Fig. 2-4 Switching–in/switching–out 24 V/48 V on the primary side with a POSMO A to be separately switched

24 V supply (75 W motor)

Technical data for the 24 V supply: refer to Chapter 2.6.1

Recommendation for the 24 V power supply:

Use a regulated SITOP power, power supply module to provide the 24 V power supply.

There are units with current ratings of 10 A, 20 A and 40 A.

Reference: /KT101/ SITOP power, power supplies Catalog

Regenerative feedback protection when braking the motor refer to Chapter 2.2.3

48 V supply (300 W motor)

Technical data for the 48 V supply: refer to Chapter 2.6.2

First recommendation for the 48 V power supply:

Use a regulated SITOP modular 48V/20A power supply module to provide the 48V load power supply. The SITOP 48 V/20 A power supply is a chassis unit.

- Order No.: 6EP1 457–3BA00

Table 2-1 Technical data, SITOP modular 48V/20A

Designation	Description
Input voltage	3–ph 230/400 V ... 288/500 V AC
Frequency	50 ... 60 Hz (47 ... 63 Hz)
Output voltage (setting range)	48 V DC ±3 %
Output current	DC 0 ... 20 A
Degree of protection	IP20 acc. to IEC 529
Protection class	I
Dimensions (W x H x D) in mm	240 x 125 x 125

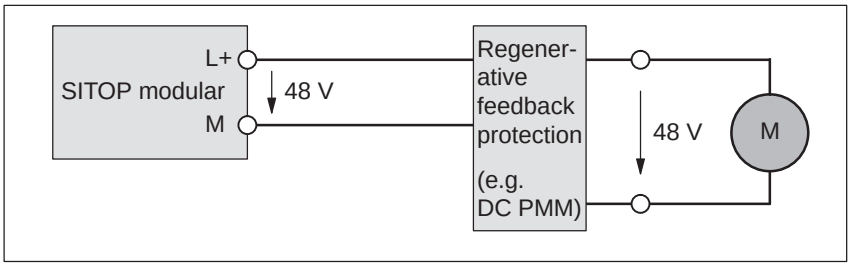


Fig. 2-5 SITOP modular 48 V/20 A with regenerative feedback protection

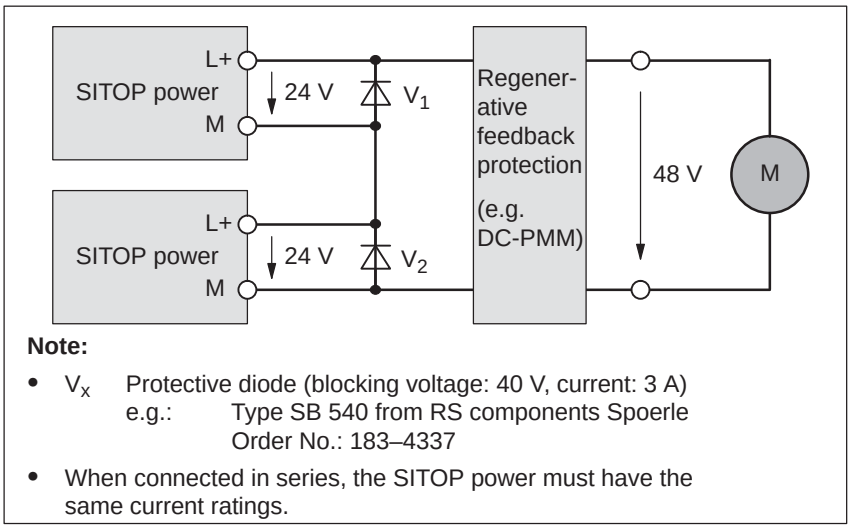
Reference: /SI1/ SITOP modular 48 V/20 A power supplies Operating Instructions

Regenerative feedback protection when braking the motor refer to Chapter 2.2.3

Our second recommendation for the 48 V power supply:

Use two SITOP power regulated power supply modules connected in series to provide the 48 V load power supply.

There are units with current ratings of 10 A, 20 A and 40 A.



Note:

- V_x Protective diode (blocking voltage: 40 V, current: 3 A)
  e.g.: Type SB 540 from RS components Spoerle
  Order No.: 183–4337
- When connected in series, the SITOP power must have the same current ratings.

Fig. 2-6 Two SITOP power connected in series to double the voltage

Reference: /KT101/ SITOP power, power supplies Catalog

Regenerative feedback protection when braking the motor (refer to Chapter 2.2.3)

Coincidence factor

If several SIMODRIVE POSMO A are used but they are not all simultaneously operational, then a lower rating load power supply can be used.

However, a short–term overload capability must be guaranteed as otherwise when voltage dips occur the SIMODRIVE POSMO A electronics would detect an undervoltage condition and subsequently trip (shut–down).

- Example 1: 3 SIMODRIVE POSMO A – 75 W
  - Coincidence factor = 1
  - Rated output, full speed

    —> 3 • 4.5 A • 1 = 13.5 A —> SITOP power 20 A
- Example 2: 3 SIMODRIVE POSMO A – 75 W
  - Coincidence factor = 0.7 (not all drives are simultaneously operational)
  - Rated output, full speed

    —> 3 • 4.5 A • 0.7 = 9.45 A —> SITOP power 10 A
- Example 3: 3 SIMODRIVE POSMO A – 300 W
  - Coincidence factor = 1
  - Rated output, full speed

    —> 3 • 5.25 A • 1 = 15.75 A —> SITOP power 20 A
- Example 4: 3 SIMODRIVE POSMO A – 300 W
  - Coincidence factor = 0.5 (not all drives are simultaneously operational)
  - Rated output, full speed

    —> 3 • 5.25 A • 0.5 = 7.875 A —> SITOP power 10 A

Withdrawing/ inserting the connection cover under voltage

The connection cover can be withdrawn and inserted under voltage with the motor stationary (OFF 1).

If the PROFIBUS terminating resistor is not switched in on this node, i.e. if this drive is not the first or last node, then communications to the other bus nodes is not interrupted.

Notice

When the connection is withdrawn, the actual position is not saved. This means that the drive must be re–referenced after the cover has been inserted.

i^2t limitation

This limiting function protects the positioning motor against permanent overload.

If the positioning motor is operated for an excessive time over the permissible load limit, then the available motor current is automatically limited according to a characteristic.

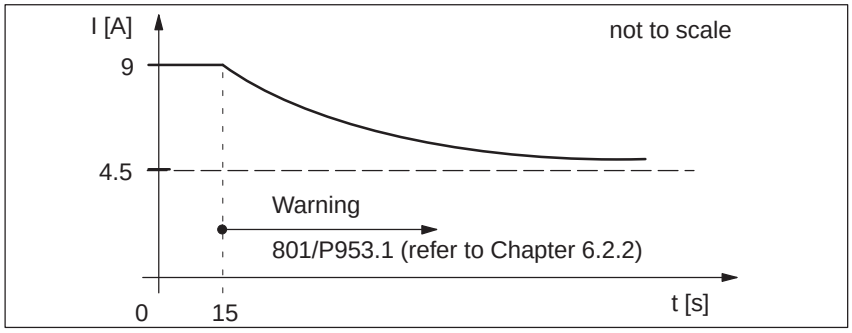


Fig. 2-7 i^2t characteristic with 75 W motor

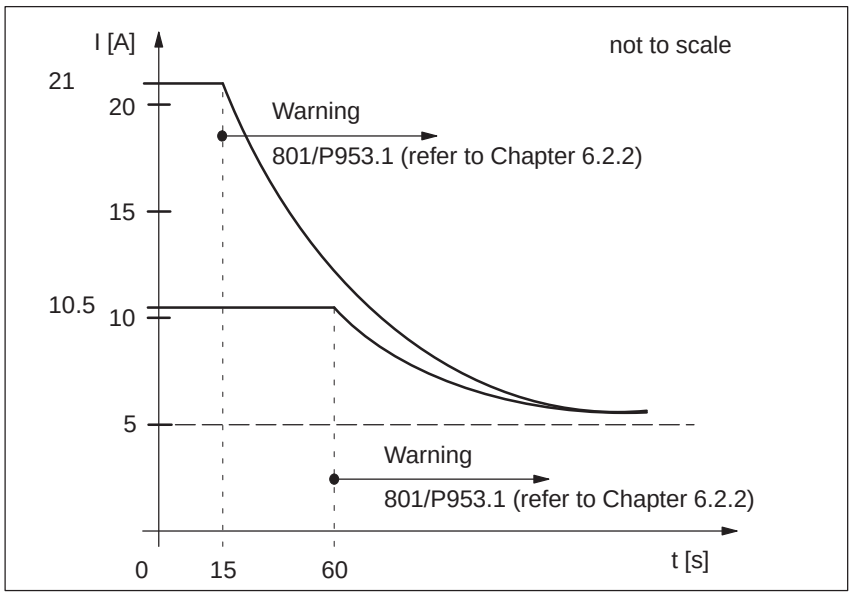


Fig. 2-8 i^2t characteristic with 300 W motor

2.2.3 Regenerative feedback protection when the motor brakes

General information on regenerative feedback protection

If SIMODRIVE POSMO A is used in a system with low mechanical friction, then the electrical energy, regenerated when braking, can influence the load power supply. In cases such as these, regenerative feedback protection must be used.

The regenerative feedback protection is dependent on the following:

- The coincidence factor on the line–up of POSMO A drives
- The number of positioning motors operated on one line
- The degree of efficiency of the mechanical system
- The friction
- The moments of inertia
- The regenerative energy of a drive is calculated as follows (without taking into account the losses):

$$W = {}^{1}/_{2} \bullet J \bullet \omega^2$$

W:	Braking energy [Ws = (kgm^2/s^2)]		
J:	Moment of inertia [kgm^2]		
ω:	Angular frequency = (2 • π • n) / 60	[1/s]	with n [rpm]

Braking energy

Under the specified conditions, the following typical braking energy per drive is obtained:

- Conditions
  - Braking from rated speed in S3 duty
  - Effective overall moment of inertia = 1 motor moment of inertia
- Braking energy (in consideration of typically arising losses)
  - 1.0 Ws —> SIMODRIVE POSMO A – 75 W
  - 2.5 Ws —> SIMODRIVE POSMO A – 300 W

The effective total moment of inertia and the braking energy have a linear interrelationship, i.e. for twice the moment of inertia, twice the braking energy is generated when the motor brakes.

Rules when using regenerative feedback protection

The following rules must be observed for regenerative feedback protection:

- Regenerative feedback protection must be used when using a clocked load power supply (e.g. SITOP power).
- If the regenerative feedback energy is unknown, then regenerative feedback protection should always be used.

Power Management Module (DC PMM)

If multiple axes are braked simultaneously in a system for operational reasons, e.g. in the event of an EMERGENCY STOP or quasi–simultaneous traversing, a power management module (DC PMM) must be used in order to convert the regenerative feedback energy.

The DC PMM is connected between the load power supply and the first positioning motor SIMODRIVE POSMO A.

Type	Order No. (MLFB)
DC–PMM/24V	9AL2137–1AA00–1AA0
DC–PMM/48V	9AL2137–1BA00–1AA0

Note:

Operating Instructions in German and English are provided with the power management module (DC PMM).

Fig. 2-9 Power Management Module (DC–PMM)

Functions, features and technical data:

- Converting the regenerative feedback energy using an integrated pulsed resistor with i^2t monitoring
- Regenerative feedback protection
- Signals (e.g. ready, fault)
- Max. continuous motoring current capacity: 25 A
- Ambient temperature: 0...55 °C
- Continuous power: 10 W (DC–PMM/24V)
  15 W (DC–PMM/48V)
- Maximum energy drawn: 40 Ws

  Example for POSMO A – 300 W (for 75 W, then P_D = 10 W):
  For power ratings above 15 W, the components, that are above 15 W are integrated up according to the following algorithm and may not exceed 40 Ws.

  $$\int_0^T P_t \cdot dt - \int_0^T P_D \cdot dt \leq E_{max} = 40\ Ws$$

  – **Transistor on:**

  $$P_t = \frac{V_s^2}{R_{PMM}} = \frac{(58.5\ V)^2}{2\ \Omega} = 1711.125\ W; \quad P_D = 15\ W$$

  Vs = switching threshold PMM 58.1...58.5 V; $R_{PMM} = 2\ \Omega$

  $P_t - P_D = 1711.125\ W - 15\ W = 1696.125\ W$

  $\Rightarrow$ increment = 1696.125 W · t

  – **Transistor off:**

  $P_t = 0; \quad P_D = 15\ W$

  $P_t - P_D = -15\ W$

  $\Rightarrow$ decrement = 15 W · t

The maximum number of positioning motors that can be connected to a DC PMM depends on the current carrying capacity, the coincidence factor of the regenerative feedback and the regenerative feedback energy.

If 1 Power Management Module is not sufficient to convert the braking energy, then an additional supply line with an additional DC–PMM (75 W/300 W) must be provided – or a Power Management Module Extension DC–PMM_E/48V (300 W) can be used.

Power Management Module Extension (DC–PMM_E/48V)

The DC–PMM_E/48 V is connected between the DC–PMM/48V and the first SIMODRIVE POSMO A.

The DC–PMM_E/48V cannot be used as an autonomous (standalone) device. It only operates in a group with the DC–PMM/48V.

Type	Order No. (MLFB)
DC–PMM_E/48V	9AL2137–2BA00–1AA0

Note:

Operating Instructions in German and English are provided with the Power Management Module (DC–PMM_E/48V).

Fig. 2-10 Power Management Module Extension (DC–PMM_E/48V)

Functions, features and technical data
(group, DC–PMM/48V and DC–PMM_E/48V):

- Additional regenerative feedback protection
- Max. continuous motoring current capacity: 25 A
- Ambient temperature: 0...55 °C
- Continuous power: 45 W
- Maximum energy drawn: 120 Ws
- A maximum of one DC–PMM_E/48V in combination with a DC–PMM/48V may be operated.

Regenerative feedback protection for 24 V supply (75 W motor)

Depending on the type of power supply, the following possibilities are available to provide regenerative feedback protection when the motors brake:

Non–regulated 24 V power supply (transformer, rectifier)

The regenerative feedback protection depends on the following factors:

- Effective total moment of inertia
- Coincidence factor
- Power supply used (output rating)

Regulated 24 V power supply (SITOP power)

- Regenerative feedback protection with diode and capacitor

  An example is shown in Fig. 2-11 where up to 3 drives can be operated under the following conditions:

  – Effective overall moment of inertia = 1 motor moment of inertia

  – Coincidence factor = 1

  – Braking from rated speed in S3 duty

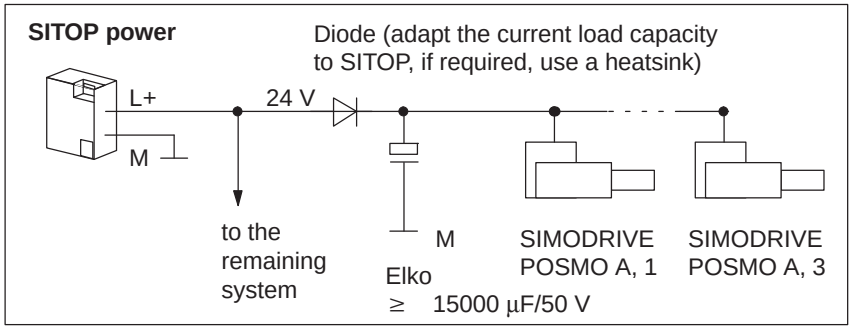


Fig. 2-11 Example: Regenerative feedback protection with diode and capacitor

- Regenerative feedback protection with Power Management Module 24 V DC (DC PMM/24V)

  1 DC–PMM/24V can accept a braking power of 10 W.

  Example:

  Braking 5 motors, that individually have a rated current of 5 A and a regenerative feedback energy of 3 Ws per braking operation, once simultaneously, then a DC–PMM/24V is sufficient for this single braking operation.

  However, in this case, it is not possible to continuously brake the motors per second or over a longer time period, as in this case, the maximum permissible continuous power of 10 W would be exceeded and the I^2t monitoring would respond. The unit goes into a ”fault” condition and can only be restarted after a ”reset”.

– Total current through the PMM: 5 x 5 A = 25 A
– Pulse load at the pulsed resistor: 5 x 3 Ws = 15 Ws
– Continuous power through the pulsed resistor: 15 Ws/1s = 15 W

In this application, a maximum of only 3 motors could be braked once per second or over a longer periods of time without the I^2t monitoring responding and causing the unit to go into a ”fault” condition (3 x 3 Ws /1s = 9 W < 10 W).

Regenerative feedback protection for 48 V supply (300 W motor)

Depending on the type of power supply, the following possibilities are available to provide regenerative feedback protection when the motors brake:

Non–regulated 48 V power supply (transformer, rectifier)

The regenerative feedback protection depends on the following factors:

- Effective total moment of inertia
- Coincidence factor
- Power supply used (output rating)

Regulated 48 V power supply (SITOP power)

- Regenerative feedback protection with diode and capacitor

  An example is shown in Fig. 2-12 where up to 3 drives can be operated under the following conditions:

  – Effective overall moment of inertia = 1 motor moment of inertia
  – Coincidence factor = 1
  – Braking from rated speed in S3 duty

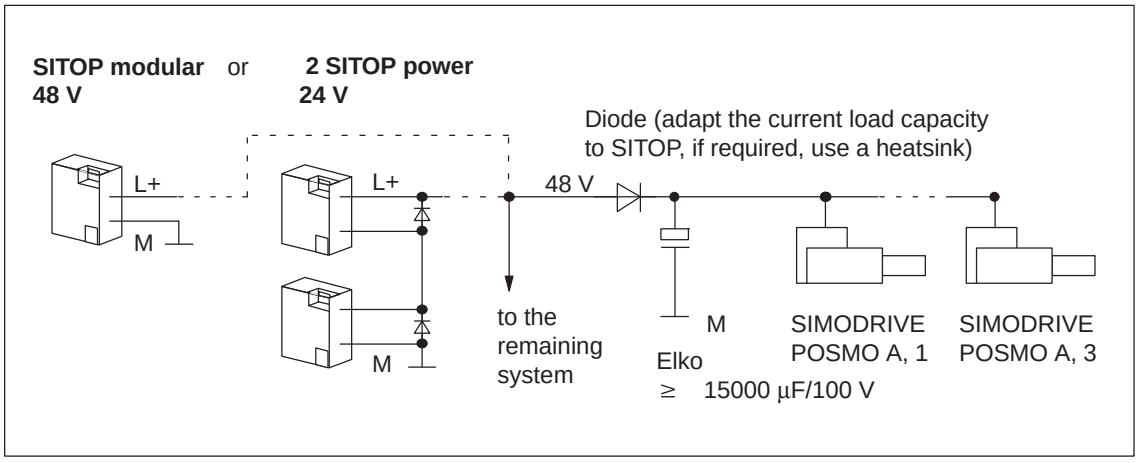


Fig. 2-12 Example: Regenerative feedback protection with diode and capacitor

- Regenerative feedback protection with Power Management Module 48 V DC (DC PMM/48V)

  1 DC–PMM/48V can accept a braking power of 15 W.

  Example:

  Braking 5 motors, that individually have a rated current of 5 A and a regenerative feedback energy of 3.5 Ws per braking operation, once simultaneously, then a DC–PMM/48V is sufficient for this single braking operation.

  However, in this case, it is not possible to continuously brake the motors per second or over a longer time period, as in this case, the maximum permissible continuous power of 15 W would be exceeded and the I^2t monitoring would respond. The unit goes into a ”fault” condition and can only be restarted after a ”reset”.

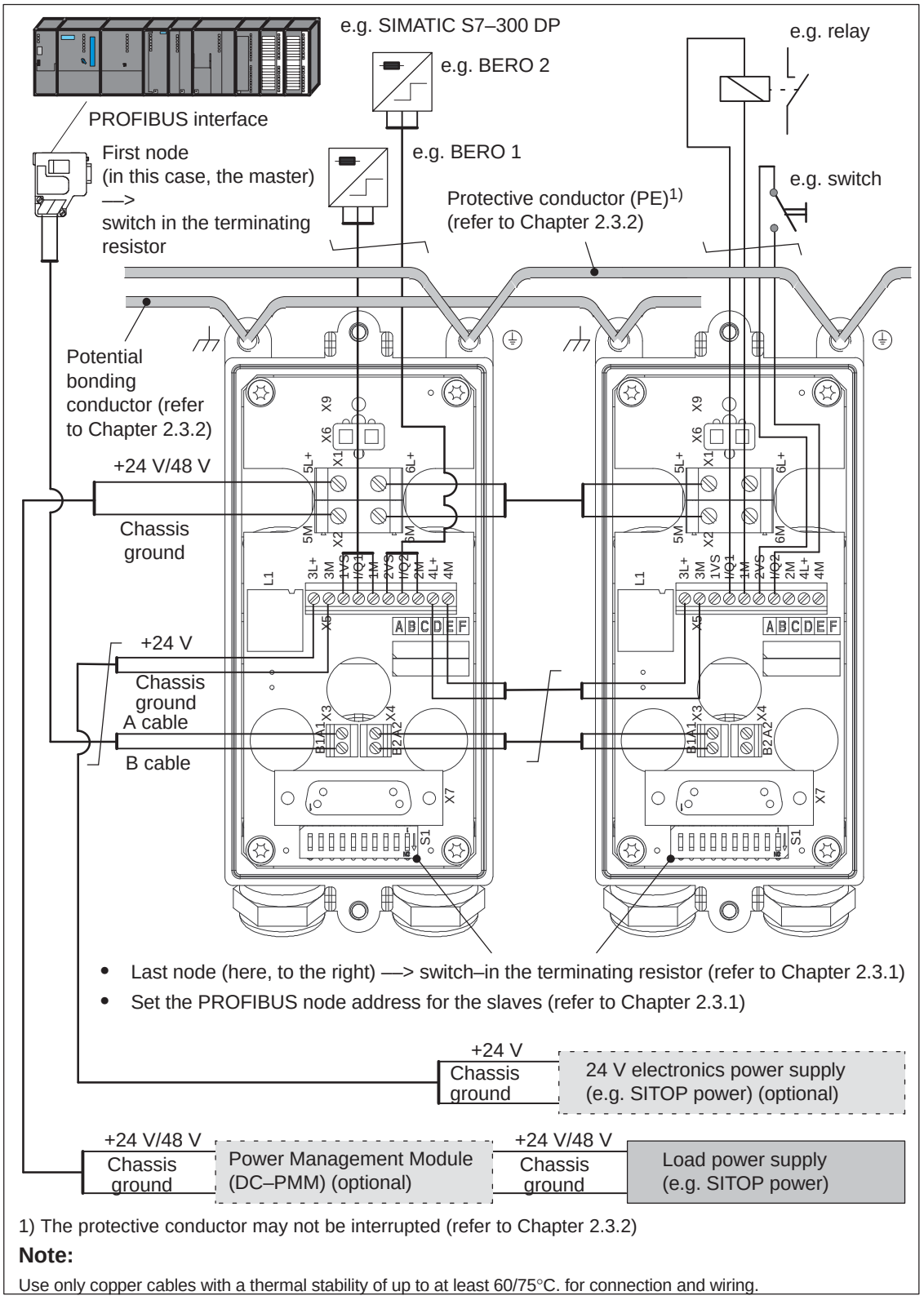
  – Total current through the PMM: 5 x 5 A = 25 A

  – Pulse load at the pulsed resistor: 5 x 3.5 Ws = 17.5 Ws

  – Continuous power through the pulsed resistor: 17.5 Ws/1s = 17.5 W

  In this application, a maximum of only 4 motors could be braked once per second or over a longer periods of time without the I^2t monitoring responding and causing the unit to go into a ”fault” condition (4 x 3.5 Ws /1s = 14 W < 15 W).

2.3 Connection and wiring overview



1) The protective conductor may not be interrupted (refer to Chapter 2.3.2)

Note:

Use only copper cables with a thermal stability of up to at least 60/75°C. for connection and wiring.

Fig. 2-13 Connection and wiring overview (example with DC PMM and electronics power supply)

2.3.1 Connection and setting possibilities in the connection cover

Connection cover from the top

The SIMODRIVE POSMO A wiring is completely realized in the connection cover.

One connection can be used as input or output. The user defines this using the appropriate wiring.

All of the cable connections are fed through PG glands.

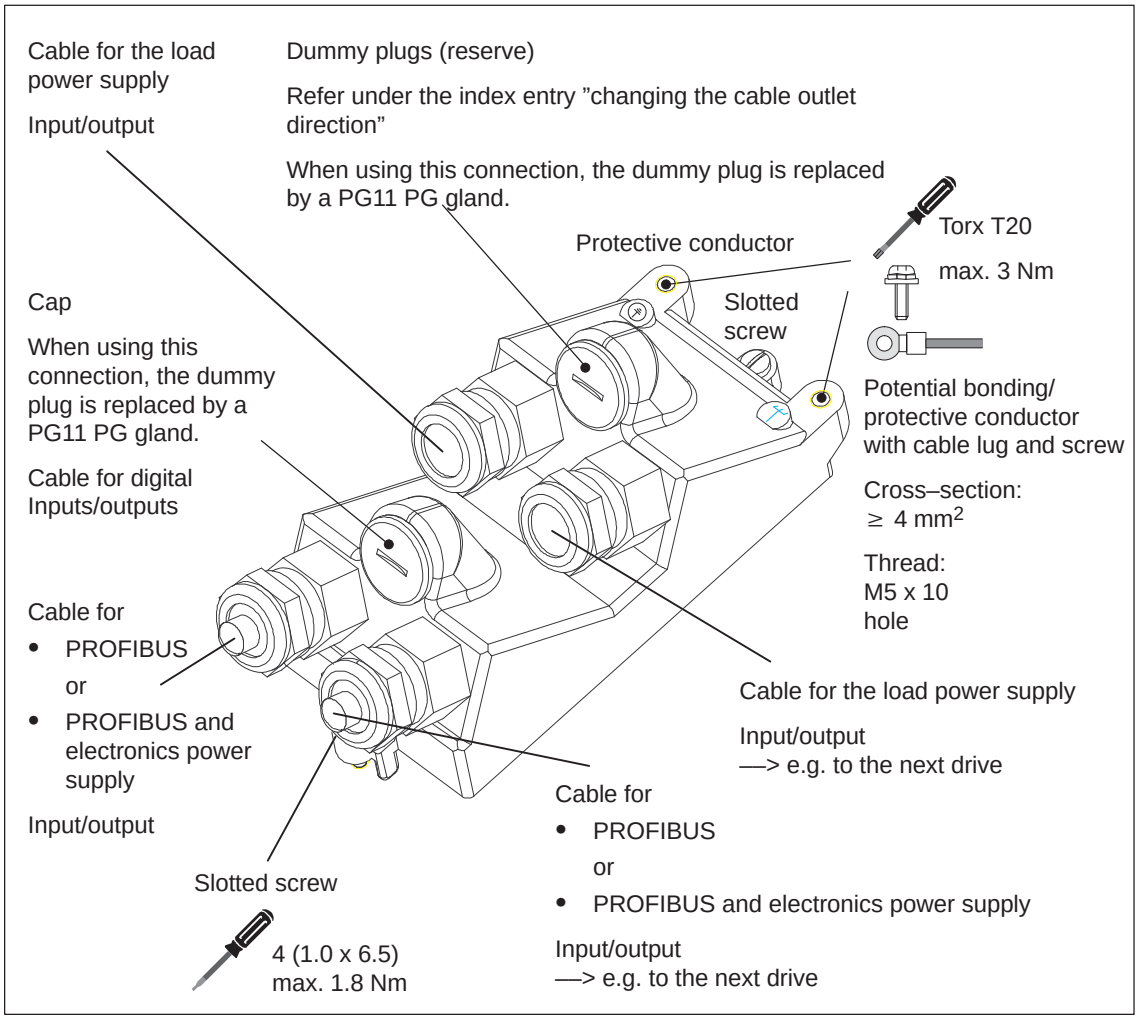


Fig. 2-14 SIMODRIVE POSMO A connection cover from the top

Caution

In order to guarantee the degree of protection, all of the connections must be provided with either a dummy plug or with a PG gland; both of these must be tightly screwed–in.

Connection cover from the bottom

S1

Setting

- PROFIBUS Node address (station address)
- PROFIBUS Terminating resistor

X3

PROFIBUS–DP cable

Input/output

X1

Load power supply

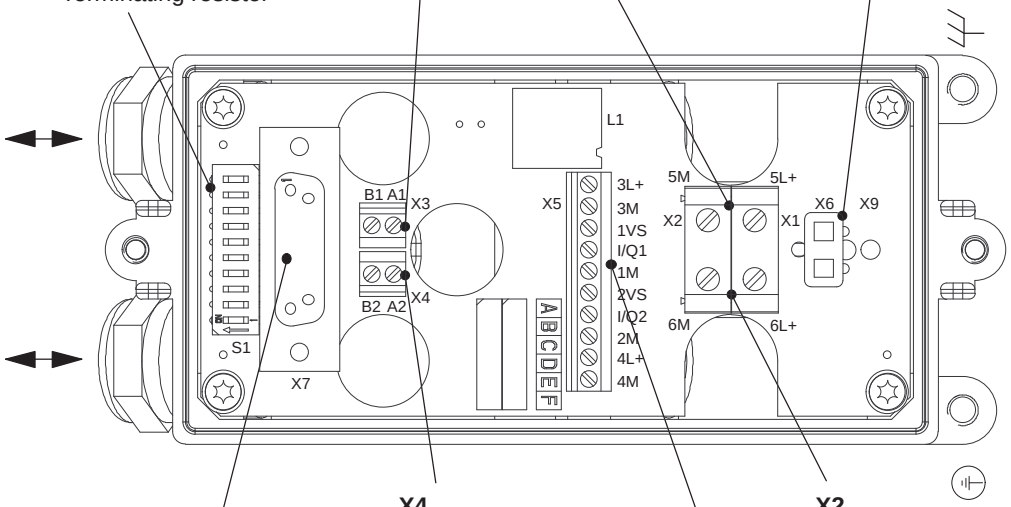
Input/output

X6 /X9

Internal load power supply

Note:

Equipping differs depending on whether it is a 75 W or 300 W motor



X7

Internal interface

X4

PROFIBUS–DP cable

Input/output

X2

Load power supply

Input/output

X5	Input/output
3L+	+24 V electronics supply input (optional)
3M	0 V ground
1VS	Supply 1
I/Q1	Digital input/output 1
1M	0 V ground
2VS	Supply 2
I/Q2	Digital input/output 2
2M	0 V ground
4L+	+24 V electronics power supply output (optional)
4M	0 V ground

Note:

Screwdriver for terminals (slotted screws)

Where?	Size!	Tightening torque!
• X1 and X2	1 (0.5 x 3.5)	0.6...0.8 Nm
• X3, X4 and X5	0 (0.4 x 2.5)	0.22...0.25 Nm

Fig. 2-15 SIMODRIVE POSMO A connection cover from the bottom

Caution

The screws are not screwed tight into the terminals when the system is delivered. These must be tightened with the specified tightening torque, in particular for unused connections as well, otherwise the screws may fall out under heavy vibration.

Connection cover Changing the cable outlet direction

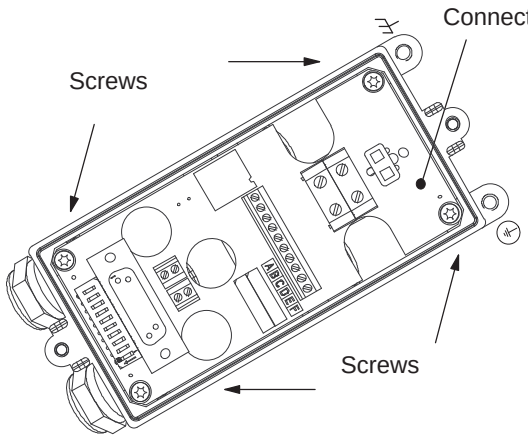
The cable outlet direction is, as standard, in the opposite direction to the motor drive shaft.

Depending on the mounting situation, the cable outlet direction of the positioning motor can be changed.

How can the cable outlet direction be changed?

—> refer to Fig. 2-16

1. In the unwired connection cover, release the four screws of the connection module.
2. Rotate the connection module and screw back into place.
3. Interchange the load current and PROFIBUS cabling in the connection cover at the top.

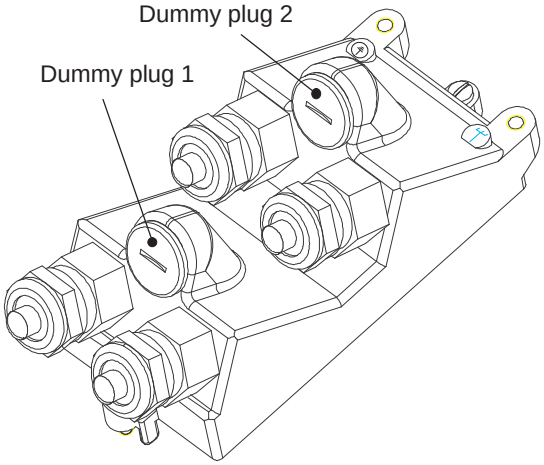


Connection cover from the bottom

Screw type: Cheese–head screw
M3 x 6 – 8.8
SN 60730

Torx T10

max. 1.8 Nm



Connection cover from the top

After turning the connection module, connect–up as follows:

- Dummy plug 1
  —> reserved
- Dummy plug 2
  When this connection is used, the dummy plug is replaced by a PG11 PG gland for the digital input/output cable.
- The interchanged cables should be appropriately connected–up.

  Refer to Chapter 2.4.3

Fig. 2-16 Connection cover: Changing the cable outlet direction

Interfaces, terminals, Switch S1

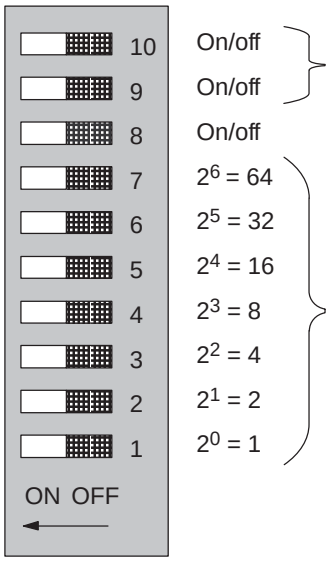
All interfaces, terminals and switches of the SIMODRIVE POSMO A are listed in the following table with technical information.

Table 2-2 Overview of the interfaces, terminals and switches

No.	Designation	Function	Type 1)	Technical specifications	Cross–section
		Load power supply		24 V for the 75 W motor	
X1	5L+	+24 V/+48 V	I/O	48 V for the 300 W motor	
	6L+	+24 V/+48 V	I/O	—> Technical data on the power supply, refer to Chapter 2.6.1 or 2.6.2	Max. 4 mm²
X2	5M	Ground 24 V/48 V	I/O	0 V	
	6M	Ground 24 V/48 V	I/O	0 V	
		PROFIBUS–DP bus connection			Max. 0.35 mm²
X3	A1	A cable	I/O	–	
	B1	B cable	I/O	–	
		PROFIBUS–DP bus connection			Max. 0.35 mm²
X4	A2	A cable	I/O	–	
	B2	B cable	I/O	–	
X5		Electr. power supply (optional)			Max. 0.75 mm²
	3L+	+24 V	I/O	24 V ± 20 %	
	3M	Ground, 24 V	I/O	Current drain: ≤ 250 mA The electronics can be separately supplied with 24 V via these terminals. Advantage: When the load power supply is shut down, the electronics are still supplied with power and remain functional (no galvanic isolation).	
	1VS	P24 output	O	• Output (terminals Q1 and Q2): – Maximum current/output: 100 mA • Supply (terminal VS): – Max. current/terminal: 100 mA • Input (terminals I1 and I2): – Current drain: ≤ 15 mA – 24 V ± 20 % The following can be connected: • BERO (3–wire PNP) • External relay • Logical I/Os (PLC)	Max. 0.75 mm²
	I/Q1	Input/output terminal 1	I/O		
	1M	M24 output	O		
	2VS	P24 output	O		
	I/Q2	Input/output terminal 2	I/O		
	2M	M24 output	O		
		Electr. power supply (optional)			Max. 0.75 mm²
	4L+	+24 V	I/O	24 V ± 20 % The electronics of an additional unit can be supplied from these terminals.	
	4M	Ground, 24 V	I/O		

Table 2-2 Overview of the interfaces, terminals and switches, continued

No.	Designation	Function	Type 1)	Technical specifications	Cross–section
X6 **X9**	–	Internal load power supply	O	Equipping differs depending on whether it is a 75 W or 300 W motor	–
X7	–	Internal interface	I/O	15–pin D–sub socket connector	–
	⏚	Potential bonding conductor (route, as far as possible, in parallel to the PROFIBUS cable)	I O	0 V 0 V	4 ... 16 mm^2
	⏚	Protective conductor	I O	0 V 0 V	4 ... 16 mm^2
S1	–	PROFIBUS node address	I	DIL switch, 10–pin	–



Standard setting

PROFIBUS terminating resistor

	Terminating	Terminating
ON ≙ on		OFF ≙ off
ON ≙ on		OFF ≙ off

OFF ≙ PROFIBUS communications

PROFIBUS node address

Example:	1	2
S7:	ON ≙ 64	OFF ≙ 0
S6:	ON ≙ 32	ON ≙ 32
S5:	ON ≙ 16	OFF ≙ 0
S4:	OFF ≙ 0	OFF ≙ 0
S3:	OFF ≙ 0	ON ≙ 4
S2:	OFF ≙ 0	OFF ≙ 0
S1:	ON ≙ 1	ON ≙ 1
Σ =	113	37

Note:

- Valid addresses which can be set: 3 to 126
- For the first and last physical PROFIBUS nodes, the terminating resistor must be switched–in.

  Switches 9 and 10 must always be in the same setting.
- The selected address is indicated using P918 (PROFIBUS node address).
- From SW 1.4, the following applies:

  When powering–up the positioning motor, PROFIBUS node address 0 or 127 is detected (all of the address switches are either OFF or ON); this means that the function ”jog operation without PROFIBUS and parameterization” is activated (refer to Chapter 5.5.11).

1) I: Input; O: Output

Bus termination for PROFIBUS

The following must be taken into consideration for the bus termination at the PROFIBUS–DP in connection with the ”DP Slave POSMO A”:

- The terminating resistor must be switched–in at the first and last bus nodes.
- Is the ”DP slave POSMO A” the first or last bus node?
  - If yes?
    —> The bus termination must be switched–in using switch S1 (refer to Table 2-2).
    —> The bus termination that is switched–in is only effective if the electronics power supply of the positioning motor is switched–on and the connection cover is inserted.
  - If no?
    —> The bus termination must be switched–out using switch S1 (refer to Table 2-2).
- If it must be possible, with bus communications still operational, to power down the SIMODRIVE POSMO A positioning motor without resulting in errors, then the following applies:
  - This ”DP slave POSMO A” may neither be used as the first nor last bus node.
  - For this ”DP slave POSMO A”, the bus termination must be switched–out using switch S1 (refer to Table 2-2).
  - Recommendation: Use an active bus terminating resistor

    The ”active RS485 terminating element” bus component has its own 24 V supply voltage and can terminate the bus independently of the DP slave.

    Order No. (MLFB): 6ES7972–0DA00–0AA0

2.3.2 Protective grounding and potential bonding

Protective grounding

Use the M5 threaded hole in the connection cover for the protective conductor (refer to Chapter 2.3.1).

Notice

When removing a POSMO A it is not permissible that the protective conductor is interrupted.

We recommend the following when connecting–up the protective conductor:

- Star–type configuration, or
- the input and output of the protective conductor on the connection cover must be crimped in a cable lug (refer to Fig. 2-13).

Grounding preparations

Connect cable shields, ground connections and electronic grounds to ground through the largest surface area.

Grounding cable shields

The cable shields must be connected in the gland to the largest surface area.

PROFIBUS cabling

Notice

The cable shield of each bus node must be connected to ground through the largest possible surface area (at SIMODRIVE POSMO A in the PG gland).

Recommendation:
Route a potential bonding conductor in parallel to PROFIBUS (cable cross–section: 4 – 16 mm^2).

Use the M5 threaded hole in the connection cover for the potential bonding conductor (refer to Chapter 2.3.1).

If connector couplings are used for PROFIBUS at higher data transfer rates (> 1.5 Mbaud), then perfect functioning can no longer be guaranteed (cable reflection).

Grounding load power supply

Ground the load power supply at the secondary side in the cabinet. When using a shielded cable, the shield must be connected at the supply point to ground potential through the largest possible surface area.

Grounding electronics power supply (optional)

Ground the 24 V electronics power supply on the secondary side in the cabinet. The power supply cables are routed without any shielding in the PROFIBUS cable.

Power supply

PELV
Protective Extra Low Voltage

The protective extra low voltage (PELV) must have protective separation, be grounded and must be safe to touch.

Applicable standards:
DIN EN 60204 Part 1, DIN EN 60529, DIN EN 50178 DIN VDE 0160

2.4 Mounting SIMODRIVE POSMO A

2.4.1 Mounting overview

Mounting and installation steps

The following steps are required when mounting a SIMODRIVE POSMO A:

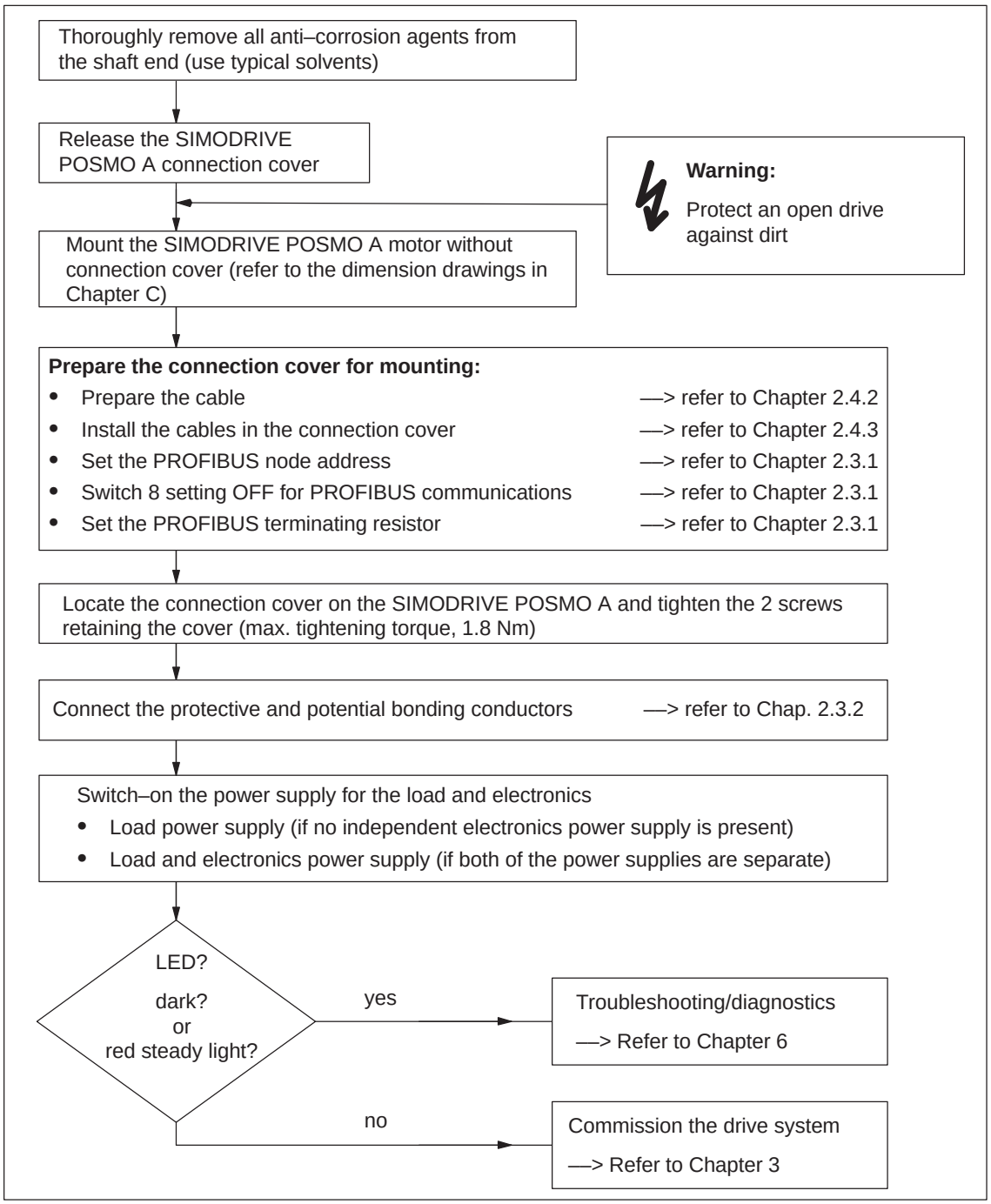


Fig. 2-17 Mounting and installation steps

2.4.2 Preparing the cable

Note

We recommend that connector sleeves are used, but these are not absolutely necessary.

The outer cable diameter should be maintained in order to guarantee the IP 54/IP64/IP65 degree of protection.

Use only copper cables with a thermal stability of up to at least 60/75 °C for connection and wiring. See Figure 2-13

Cable for the load power supply

- 2 x max. 4 mm^2, with or without shield, flexible conductor (finely–stranded)
- Gland:

  PG13.5 (with shield connection) for outdoors ∅ = 6–12 mm

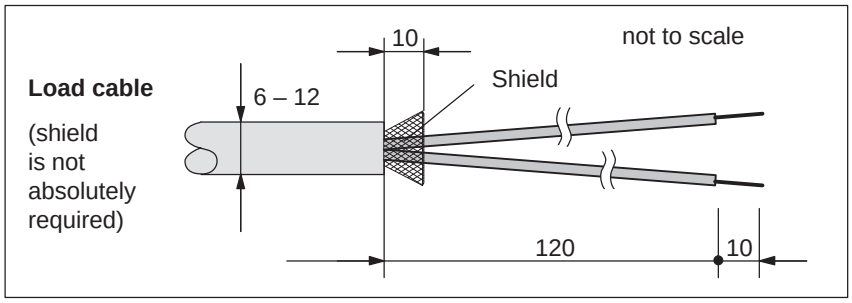


Fig. 2-18 Preparing Cable for the load power supply

Cable for PROFIBUS (without electronics power supply)

- 2 x 0.35 mm^2, with shield
- Gland:

  PG13.5 (with shield connection) for outdoors ∅ = 6–12 mm

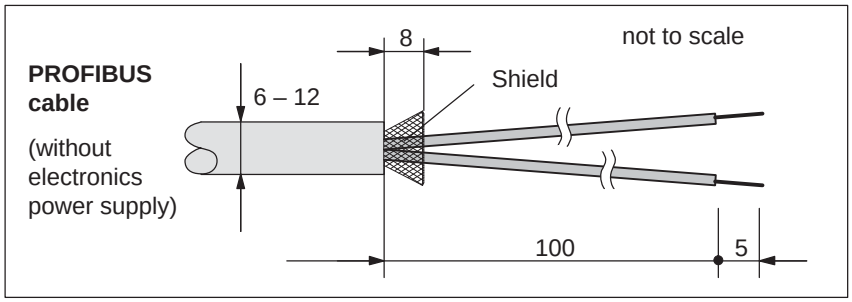


Fig. 2-19 Preparing the PROFIBUS cable

Recommendation for 2–core reeled cable:

- Not of trailing type 6XV1830–0EH10
- Trailing type 6XV1830–3BH10

Cable for PROFIBUS (with electronics power supply)

- 3 x 0.75 mm^2, with or without shield —–> for the electronics power supply
  +
  2 x 0.35 mm^2, with shield —–> for PROFIBUS

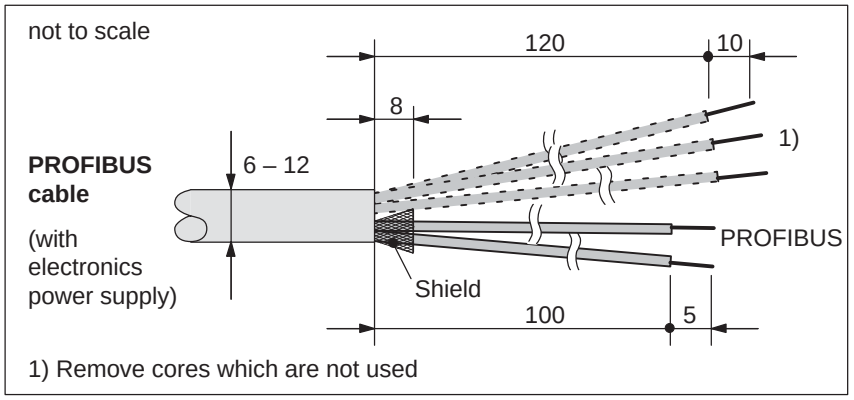


Fig. 2-20 Preparing The PROFIBUS cable with electronics power supply

Recommendation for 5–core reeled cable: 6ES7194–1LY00–0AA0

Cable for inputs/outputs

- 2 x 3 x max. 0.75 mm^2, with shield, flexible conductor (finely–stranded)
- Gland:

  The dummy plug provided should be replaced by a suitable PG11 gland (e.g.: Pflitsch Company, type PG15152m2x6 – gland assembly PG11/13.5 mounted using a multi–sealing insert for 2 cables with 6 mm diameter).

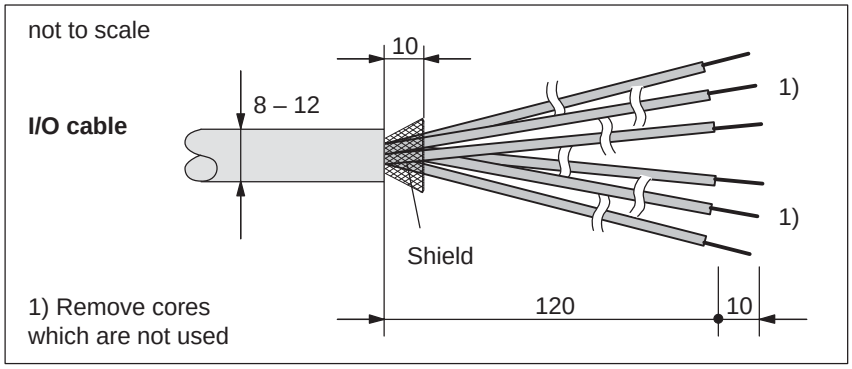


Fig. 2-21 Preparing cables for inputs/outputs

Cables for potential bonding and protective conductor

Cross–section: ≥ 4 mm^2

Thread: M5 x 10, hole

Note:

- The potential bonding conductor should be routed as far as possible, in parallel to the Profibus cable. This increases the PROFIBUS noise immunity.
- It is not permissible that the protective conductor is interrupted (refer to Chapter 2.3.2).

Fig. 2-22 Potential bonding conductor and protective conductor

Example: Cables prepared for installation

The following pre–assembled cable is shown in Fig. 2-23:

- The PROFIBUS cable with electronics power supply

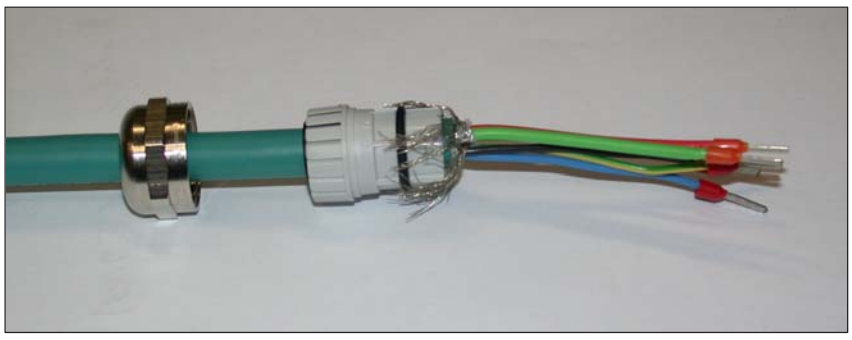


Fig. 2-23 Example: Pre–assembled cable for PROFIBUS

2.4.3 Mounting the prepared cables in the connection cover

How are the prepared cables installed?

The following sequence should be maintained when installing the prepared cables into the connection cover (refer to Fig. 2-24):

1. Release the nut, dummy plugs and terminal insert/seal from the PG gland.
2. Locate the nut and clamping insert/seal onto the cable.
3. Open–up the shield braiding (remove the insulating foil below). The shield must cover the O ring by approx. 2 mm. Cleanly cut–off excessive shield!
4. Assemble the nut with clamping insert/seal.
5. Insert these into the PG gland and tighten the nut.
6. Connect the ends of the cables to the lower side of the connection cover.

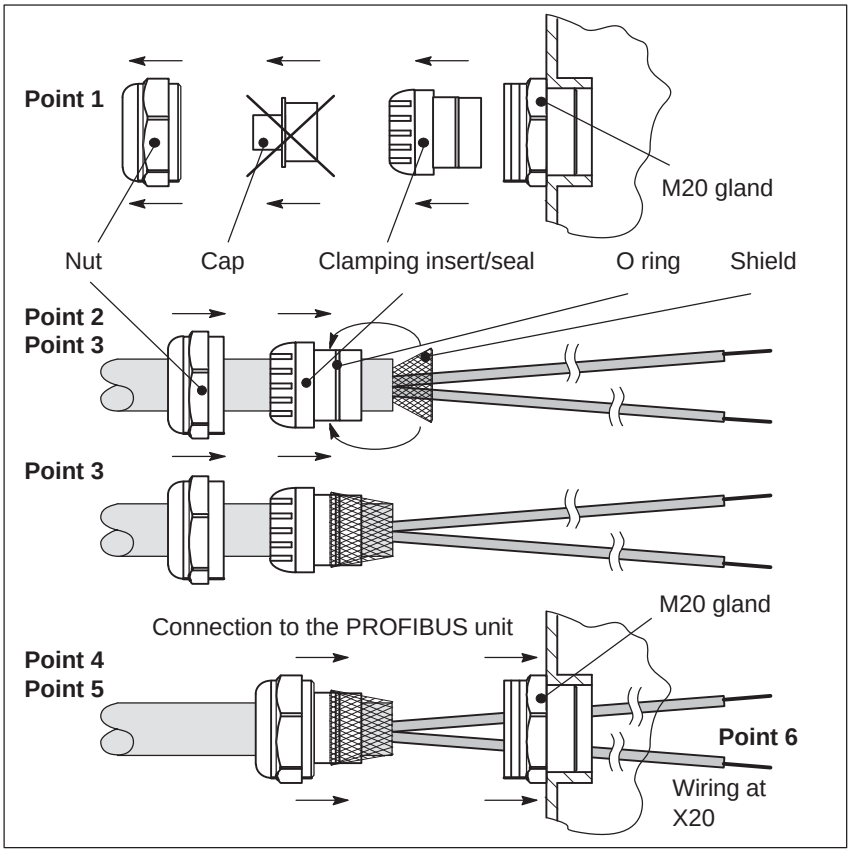


Fig. 2-24 How are the prepared cables installed?

Fig. 2-25 Example: PG gland with all of the individual parts and components

Example: Connection cover mounted

The following diagrams show a connection cover that has been connected–up:

- Connection cover from the top —> refer to Fig. 2-26
- Connection cover from the bottom —> refer to Fig. 2-27

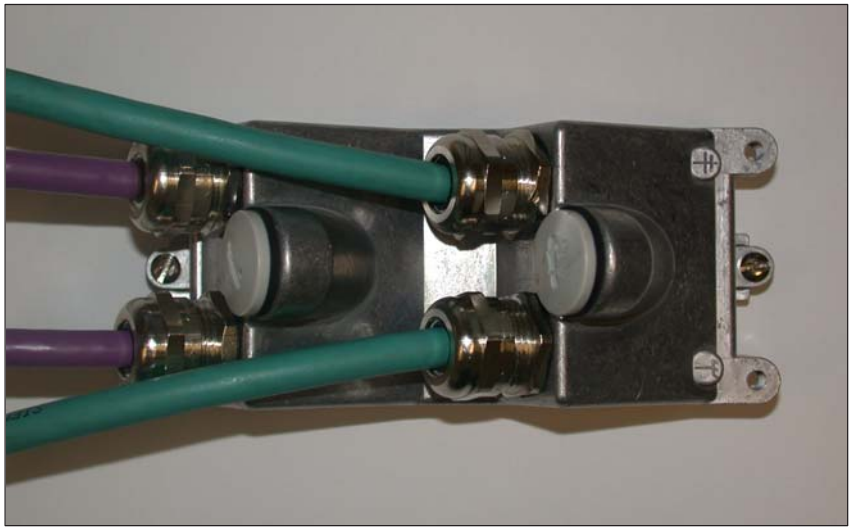


Fig. 2-26 Connection cover with the cables inserted: View from the top

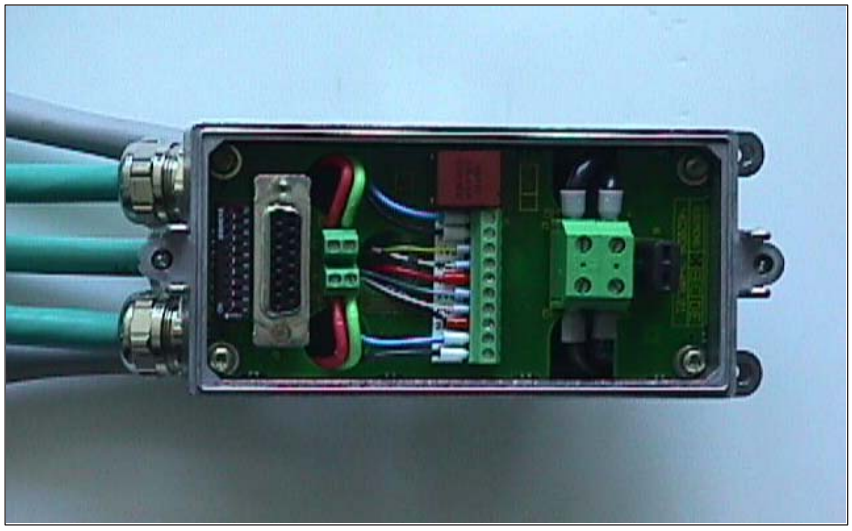


Fig. 2-27 Connection cover with the cables inserted: View from below

Additional protection against moisture

When routing the connecting cable, additional moisture protection can be achieved by appropriately angling the connecting cable (water loop).

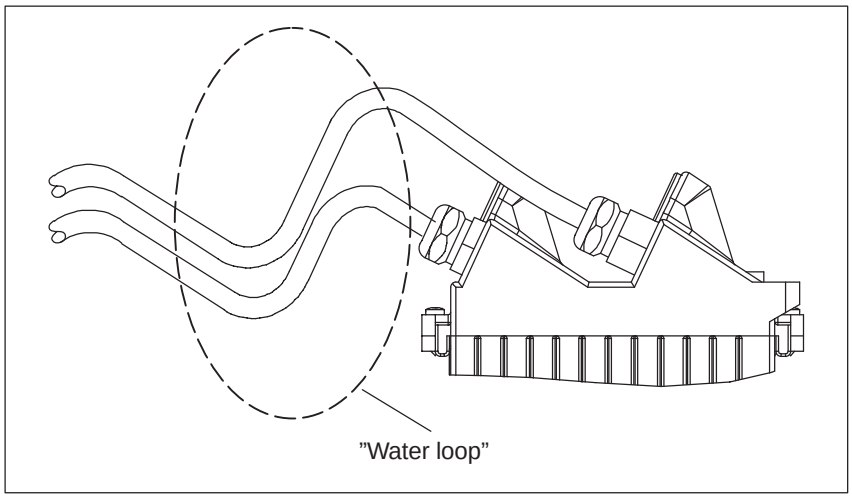


Fig. 2-28 Cable connection at SIMODRIVE POSMO A with ”water loop”

2.4.4 Extension set ”separate version” POSMO A – 300 W

How is the extension set mounted?

The separate version for SIMODRIVE POSMO A – 300 W means that the drive unit is mounted separately from the motor. This means that for applications with restricted space, the space requirement of the motor can be flexibly adapted to the mounting space available.

The SIMODRIVE POSMO A – 300 W is supplied as complete unit. This is the reason that for this particular application, the drive unit is to be separated from the motor and connected to the motor using the extension set ”separate version”.

It is only permissible to use the pre–fabricated extension set from Siemens. Refer to Chapter 1.2 for ordering data.

When disassembling the drive unit (refer to Fig. 2-29) and when mounting/installing the extension set (refer to Fig. 2-30), proceed in the following sequence:

Warning

Before disassembling the drive unit, the positioning motor must be brought into a no–voltage condition and locked–out so that it cannot be powered–up again!

1. Release and remove the four retaining screws of the drive unit (do not re–use!).

   —> Allen key SW 3

2. Remove the drive unit

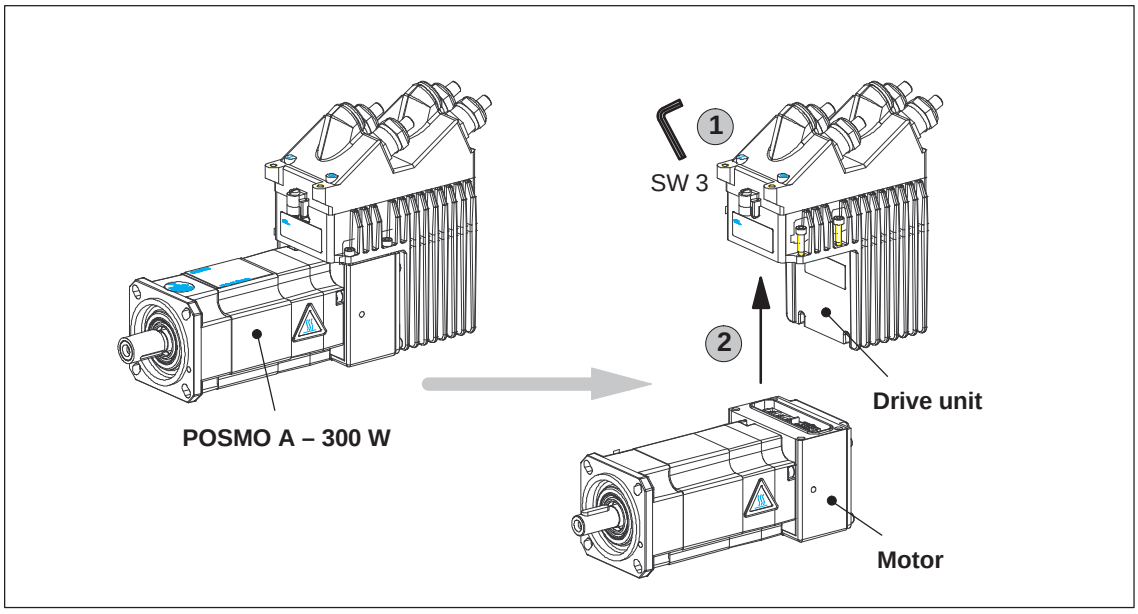


Fig. 2-29 Withdraw the drive unit from the motor

3. Insert the extension set ”separate version” POSMO A – 300 W at the motor and drive unit.
4. Using the 4 retaining screws supplied, screw the extension set to the motor and drive unit.
   – Torque wrench (Allen key, SW 3)
   – Tighten the screws diagonally
   – Torque: 1.8 Nm
5. Attach the potential bonding and protective conductor (cross–section: ≥ 4 mm^2)
   – At the drive unit: Two screw terminals (M5) on the cover —> refer to Chapter 2.3.1
   – At the motor: Two of the three screw threads (M5) for the transport lugs —> refer to Fig. 2-30

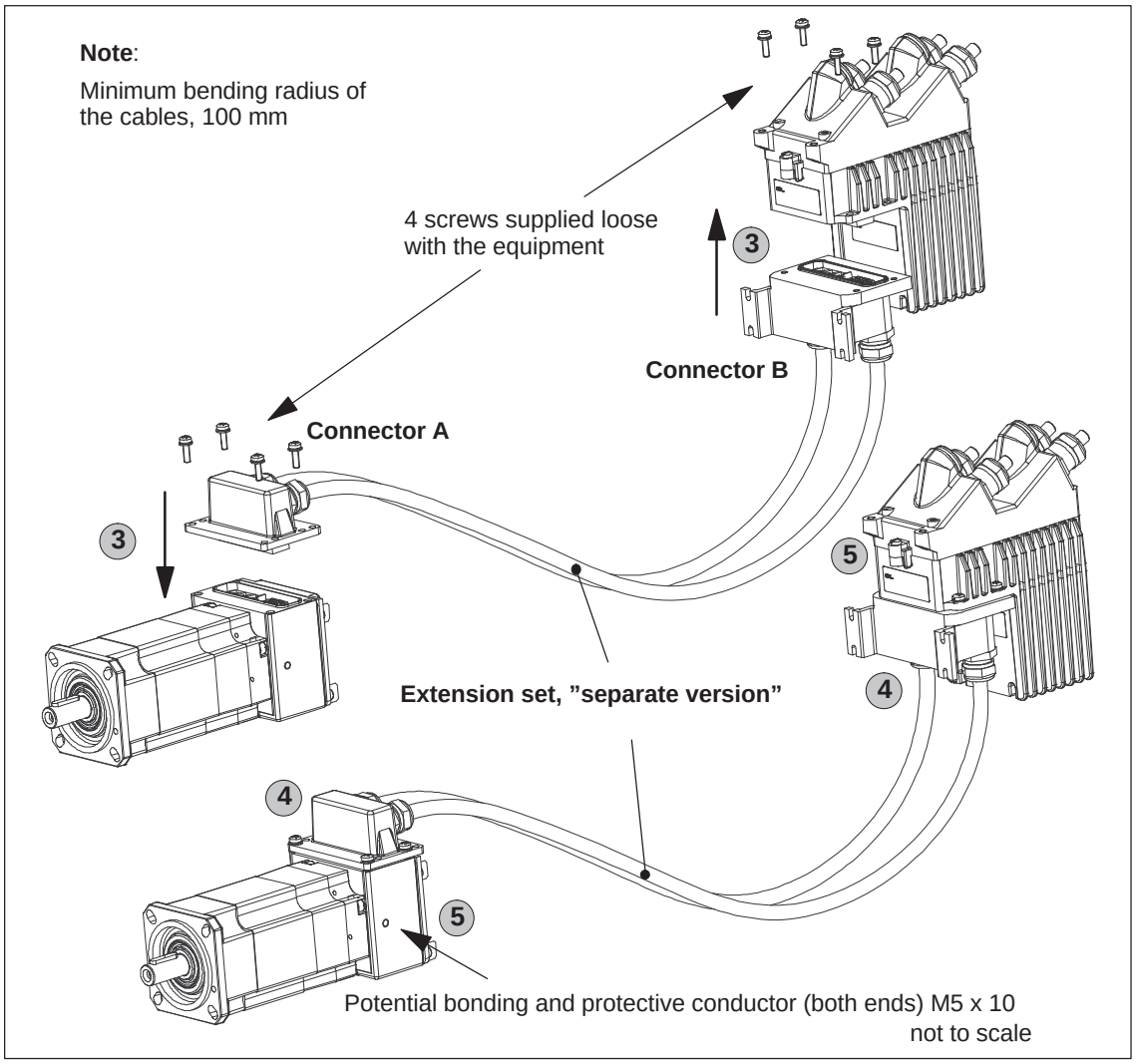


Fig. 2-30 Mounting the extension set ”separate version” POSMO A – 300 W

How is the extension set supplied?

The extension set ”separate version” POSMO A – 300 W is supplied pre–fabricated.

Optionally, a connector and cables can be separately supplied. In this case, as specified in the Table 2-3, the cable must be connected to the corresponding connectors A and B (refer to 2-30).

Table 2-3 Connect the cable to the connector pin (connectors A, B)

Cable color	Connector A	Connector B
green–red	11	1
green	12	2
white–black	13	3
yellow	14	4
brown–yellow	6	6
brown	7	7
gray	8	8
black	9	9
orange	1	11
brown–blue	2	12
blue	3	13
red	4	14
black U/L1/C/L+	U	U
black V/L2	V	V
black W/L3/D/L–	W	W

2.5 Gearbox selection

2.5.1 Gearboxes for SIMODRIVE POSMO A – 75 W

Modular gearbox, 75 W motor

For SIMODRIVE POSMO A –75 W, the following gearboxes can be selected and used according to Table 2-4:

Table 2-4 System data, modular gearbox with planetary/worm gearboxes

Gearbox type	Stage number	Step–down ratio	Efficiency	Torque				Rated speed
				Permissible[1]		Available		
				S1	briefly	S1	S3 25 % 1 min	n (S1)
		$i_{Gearbox}$	Gearbox	[Nm]	[Nm]	[Nm]	[Nm]	[rpm]
Without gearboxes	–	–	–	–	–	0.18	0.36	3300
Planetary gearbox	1	4.5	0.85	1.2	2.4	0.7	1.4	733
		8	0.85	1.2	2.4	1.2	2.4	413
	2	20.25	0.72	8	16	2.6	5.2	163
		36	0.72	8	16	4.7	9.3	92
		50	0.72	8	16	6.5	13.0	66
	3	126.5625	0.61	24	48	13.9	27.8	26
		162	0.61	24	48	17.8	35.6	20
Worm gear[2)3)]	1	5	0.70	2	4	0.6	1.3	660
		24	0.50	3.5	7	2.2	4.3	138
		75	0.25	4	8	3.4	6.8	44

1) The specified permissible gearbox torque may not be exceeded.
Gearboxes can be briefly loaded (1 – 2 s when starting) with higher torques up to a maximum of twice the continuous torque without causing permanent damage (but this does have a negative impact on the gearbox lifetime). The gearbox could be destroyed if this limit is exceeded.
The current limits of the positioning motor (P16 and P28) are preset in the factory to prevent destruction by the torque produced by the motor.
2) Notice: If the worm gear has to be rotated due to the mechanical design, then the mounting screws must be subsequently tightened to a torque of 2 Nm and secured using Loctite 274. No warranty is accepted for damage caused by incorrect changes.
3) Torsional play < 1°

Notice

The factory default setting of the parameters P16 and P28 must not be increased.

Forced rotation acceleration or delay from the outside is permitted only within the scope of permissible torques.

Due to the run–up time of the gearbox, elevated currents may occur when commissioning for the first time (grease distribution in the gearbox).

Reader's note

Additional gearbox data —> refer to Chapter 2.6.1

Dimension drawings of motors and gearboxes —> refer to Chapter C.1

Gearbox–dependent parameters —> refer to Chapter 5.6.3

2.5.2 Gearboxes for SIMODRIVE POSMO A – 300 W

Modular gearbox, 300 W motor

For SIMODRIVE POSMO A –300 W, the following gearboxes can be selected and used according to Table 2-5:

Table 2-5 System data, modular gearbox with planetary gears

Gearbox type	Stage number	Step–down ratio	Efficiency	Torque					Rated speed
				Permissible[1]		Available			
				S1	briefly	S1	S3 25 % 4 min	S3 6.25 % 4 min	n (S1)
		$i_{Gearbox}$	$\eta_{Gearbox}$	[Nm]	[Nm]	[Nm]	[Nm]	[Nm]	[rpm]
Without gearboxes	–	–	–	–	–	0.48	0.95	1.9	3500
Planetary gearbox	1	4	0.90	26	52	1.7	3.4	6.8	750[2]
		7	0.90	26	52	3.0	6.0	12.0	429[2]
	2	12	0.85	36	45	4.9	9.7	19.4	250[2]
		20	0.85	42	52.5	8.2	16.2	32.3	150[2]
		35	0.85	44	55	14.3	28.3	55.0	86[2]
		49	0.85	44	55	20.0	39.6	55.0	61[2]
	3	120	0.80	100	125	46.1	91.2	125.0	25[2]

1) The specified permissible gearbox torque may not be exceeded.
The gearboxes may be briefly subject to higher torques (with associated lower lifetime) (1 – 2 s to start) (1–stage: 200% continuous torque, 2 and 3–stage: 125% continuous torque) without the gearbox being destroyed (this has a negative impact on the lifetime).
The gearbox could be destroyed if this limit is exceeded.
The current limits of the positioning motor (P16 and P28) are preset in the factory to prevent destruction by the torque produced by the motor.

2) Referred to the gearbox rated speed of 3000 rpm.

Notice

The factory default setting of the parameters P16 and P28 **for a factory mounted gearbox** must not be increased. After a gearbox has been changed/replaced, parameters P16 and P28 must be set again according to Chapter 5.6.3.

Forced rotation acceleration or delay from the outside is permitted only within the scope of permissible torques.

Due to the run–up time of the gearbox, elevated currents may occur when commissioning for the first time (grease distribution in the gearbox).

Reader's note

Additional gearbox data	—> refer to Chapter 2.6.2
Dimension drawings of motors and gearboxes	—> refer to Chapter C.2
Gearbox–dependent parameters	—> refer to Chapter 5.6.3
Mounting or replacing gearboxes	—> refer to Chapter 7.2

2.6 Technical data

2.6.1 Technical data for SIMODRIVE POSMO A – 75 W

Table 2-6 Technical data for the POSMO A – 75 W positioning motor

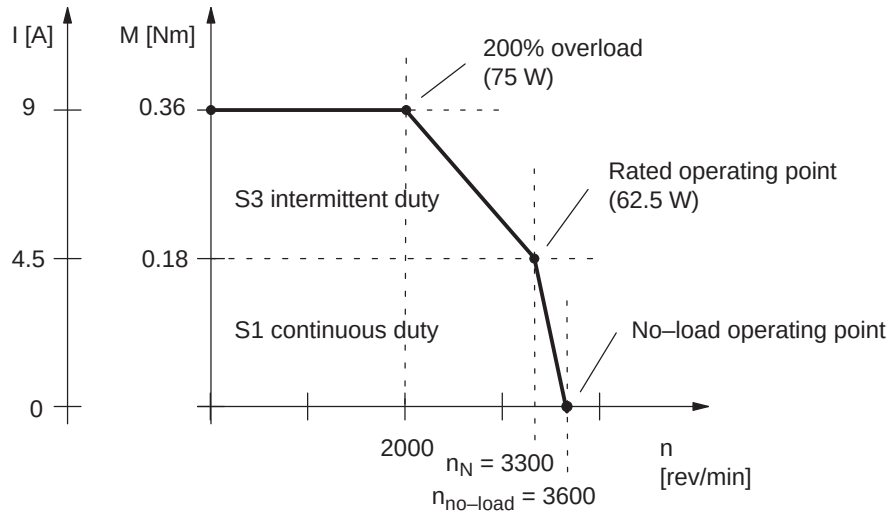
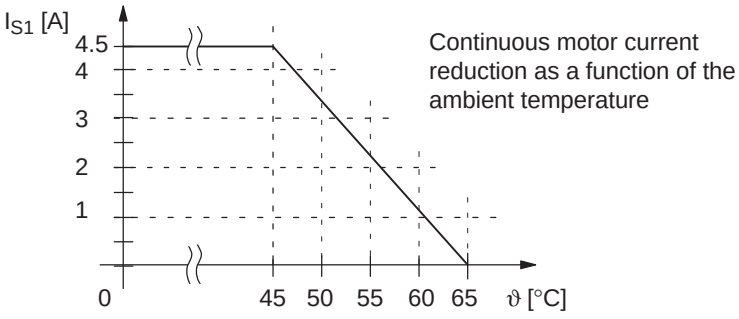
Designation		Description
Electrical data	Load power supply	Supply voltage: 24 VDC ± 20 % Power consumption: rated: ≤ 4.5 A for 200% overload (S3): ≤ 9 A **Note:** The rated output and rated speed are reduced when the 24 V power supply voltage is fallen below.
	Electr. power supply (optional)	Voltage: 24 V DC ± 20 % Current drain: ≤250 mA
	Digital inputs	Voltage: 24 V DC ± 20 % Current drain: ≤15 mA
	digital outputs	Maximum current/output: 100 mA
Torque/speed characteristic motor M/n characteristic Motor without gearbox U_{IN} = 24 VDC		
Permissible ambient temperature	0 ... 45 °C up to 65 °C with continuous motor current reduction	

Table 2-6 Technical data for the POSMO A – 75 W positioning motor, continued

Designation		Description		
Degree of protection DIN EN 60034	IP54 **Note:** IP40 at the motor shaft and planetary gearbox shaft. If necessary, an external seal must be provided. The shaft may not run in an oil bath. If necessary, grease lubrication must be provided.			
Installation altitude and permissible output	Installation altitude above sea level in m 1000 1500 2000 2500 3000 3500 4000	Output as a % of the rated output 100 97 94 90 86 82 77		
Motor data	Motor type	Permanent–magnet brushless servomotor (brushless DC: BLDC)		
	Cooling	Non–ventilated (free convection) **Note:** The clearance ⩾100 mm must be maintained to adjacent parts and components on at least three sides of the SIMODRIVE POSMO A		
	Overload monitoring	i^2t limitation		
	Measuring system (integrated)	Incremental Resolution: 816 increments/motor revolution		
	Rated motor speed	3 300 rpm 2 000 rpm	(S1) (S3, 25 %, 1 min)	**Note:** The data is only valid for supply voltages of ≥ 24 V
	Rated motor torque (without gearbox)	0.18 Nm 0.36 Nm	(S1) (S3, 25 %, 1 min)	
	Rated motor power (without gearbox)	62.5 W 75 W	(S1) (S3, 25 %, 1 min)	
	Rated motor current	4.5 A		
	Motor efficiency	65 %		
	Motor moment of inertia • referred to the motor out drive • +Gearboxes referred to the gearbox output	Ratio i: without gearbox 4.5 8 20.25 36 50 126.5625 162 5 24 75	Without holding brake: $60.00 \cdot 10^{-6}$ kgm^2 $1{,}233.2 \cdot 10^{-6}$ kgm^2 $3{,}897.6 \cdot 10^{-6}$ kgm^2 $24{,}972.8 \cdot 10^{-6}$ kgm^2 $78{,}926.4 \cdot 10^{-6}$ kgm^2 $152{,}250.0 \cdot 10^{-6}$ kgm^2 $975{,}500.2 \cdot 10^{-6}$ kgm^2 $1{,}598{,}259.6 \cdot 10^{-6}$ kgm^2 $1{,}537.5 \cdot 10^{-6}$ kgm^2 $35{,}424.0 \cdot 10^{-6}$ kgm^2 $345{,}937.5 \cdot 10^{-6}$ kgm^2	
	Shaft load capability (motor shaft)	Axial load Radial load (effective 20 mm above the plane where the motor is bolted)	max. 150 N max. 150 N	

Table 2-6 Technical data for the POSMO A – 75 W positioning motor, continued

Designation		Description
Operating possibilities (excerpt from VDE 0530)	S1 continuous duty	The equipment can operate continually at rated load without the permissible temperature being exceeded. Duty cycle = ∞
	S3 intermittent duty S3 – 25 %	The equipment can only be operated at rated load during the power–on duration specified as a percentage of the load duty cycle without the permissible temperature being exceeded. The equipment is powered down in the no–load interval. Overload factor = 2 Duty cycle = 1 min Duration = 25 % of the duty cycle
Measuring surface sound–pressure level DIN EN 21680 Part 1	max. 55 dB (A)	Motor without gearbox **Note:** Speed range: 0 – 3300 rpm
Gearbox data	Backlash	1–stage planetary gear: 1.0 degrees 2–stage planetary gear: 1.0 degrees 3–stage planetary gear: 1.5 degrees Worm gear: <1.0 degrees
	Shaft load capability (gearbox shaft)[1)]	Axial load / Radial load (at center of key) Planetary gear: max. 500 N / max. 350 N Worm gear: 300 N max. / 500 N max.
	Gearbox lifetime	A generally valid statement cannot be made about the lifetime as a result of the various possible applications and the resulting load types as well as varying ambient conditions. Factors which influence the lifetime include: • Duty types from continuous operation with one direction of rotation up to extreme start/stop operation with load levels from partial load up to full load and significant surge loading. • Forced rotation accelerations or delays from the outside. • External mechanical loads in the form of a vibration and shock. • The ambient temperature and humidity/moisture
Weights	• Motor without gearbox: 3.1 kg • Motor with 1–stage gearbox: 3.5 kg • Motor with 2–stage gearbox: 3.7 kg • Motor with 3–stage gearbox: 3.9 kg • Motor with worm gear: 3.5 kg	

1) Notice: Contrary to the specifications of the radial load of the motor shaft end this specification refers to the center of the key (shaft center)!

Table 2-6 Technical data for the POSMO A – 75 W positioning motor, continued

Designation		Description
Climatic environmental conditions	Relevant Standards	IEC 68–2–1, IEC 68–2–2
	Operating temperature range	0 ... 45 °C
	Extended operating temperature range	to +65 °C with continuous reduced motor current
	Relevant Standards	according to DIN EN 60721 Part 3–3, Class 3K5
Climatic transport and storage conditions	Transport and storage temperature range	–40 ... +70 °C
	Relevant Standards	according to DIN EN 60721, Part 3–1 and 3–2, Class 2K4 and 1K4 **Note:** Data applies for components which have been packed ready for transport.
Mechanical ambient conditions	Relevant Standards	IEC 68–2–32
Tested vibration and shock stressing in operation	• Vibration stressing in operation	
	Frequency band 2 ... 9 Hz	With constant deflection = 7 mm
	Frequency range 9 ... 200 Hz	With constant acceleration = 20 m/s^2 (2 g)
	Relevant Standards	IEC 68–2–6, DIN EN 60721 Parts 3–0 and 3–3 Class 3M6
	• Shock stressing in operation	
	Peak acceleration	max. 250 m/s^2 (25 g)
	Shock duration	6 ms
	Relevant Standards	DIN EN 60721 Part 3–0 and Part 3–3 Class 3M6
Vibration and shock stressing during transport	Relevant Standards	DIN EN 60721 Part 3–3, Class 2M2 **Note:** Data applies for components which have been packed ready for transport.
Pollutant stressing	Relevant Standards	IEC 68–2–60

2.6.2 Technical data for SIMODRIVE POSMO A – 300 W

Table 2-7 Technical data for the POSMO A – 300 W positioning motor

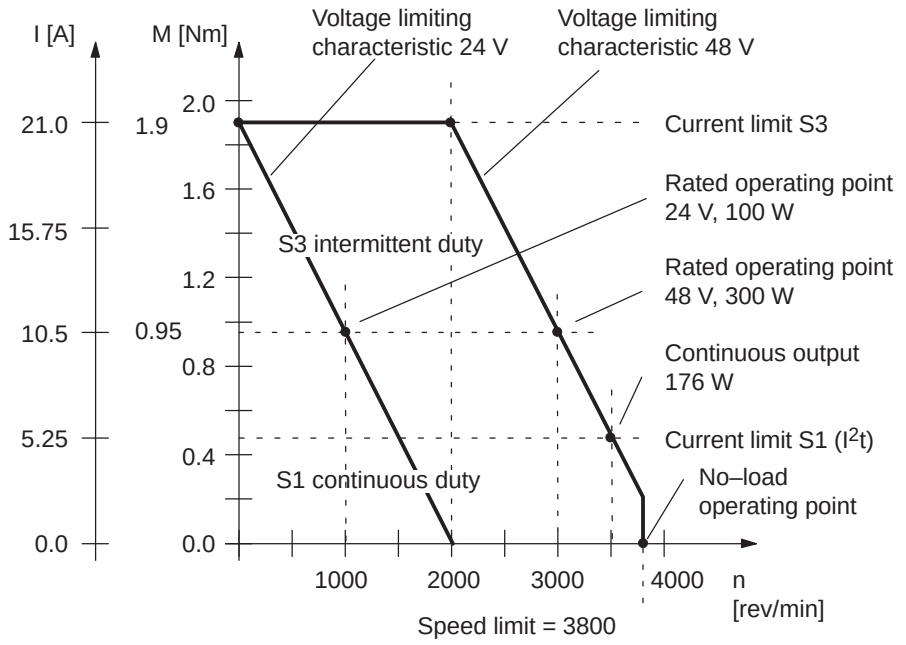
Designation		Description
Electrical data	Load power supply	Supply voltage: 48 VDC ± 20 % 24 VDC ± 20 % (optional) Power consumption: ≤ 5.25 A (with S1) **Note:** • A supply voltage less than 48 V means: —> lower speed • For motors with integrated holding brake, the power supply voltage must be > 24 V DC.
	Electr. power supply (optional)	Voltage: 24 V DC ± 20 % Current drain: ≤ 500 mA
	Digital inputs	Voltage: 24 V DC ± 20 % Current drain: ≤ 15 mA
	Digital outputs	Maximum current/output: 100 mA
Torque/speed characteristic Motor M/n characteristic Motor without gearbox		

Table 2-7 Technical data for the POSMO A – 300 W positioning motor, continued

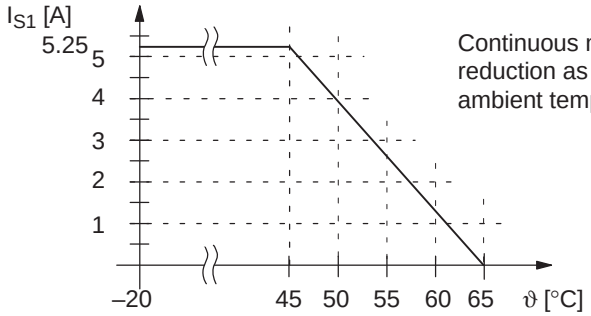
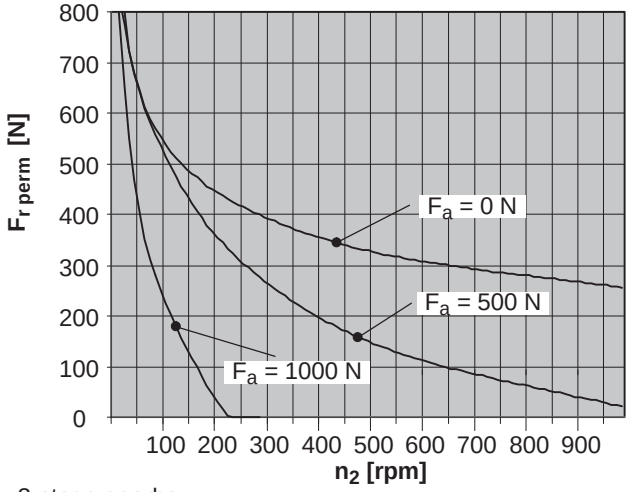
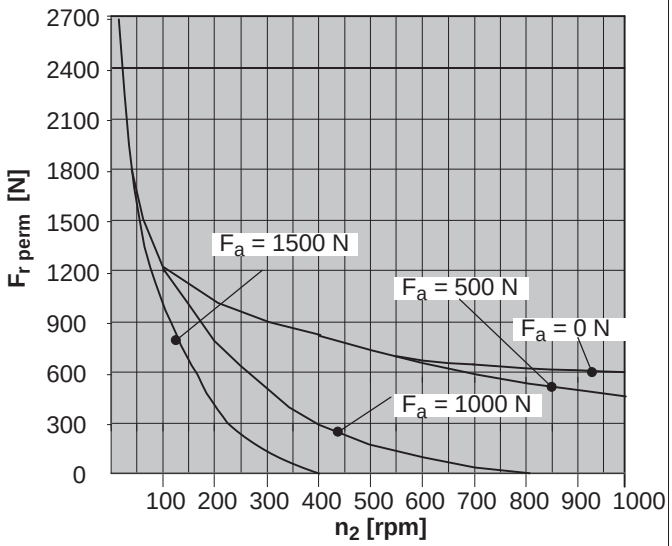
Designation		Description
Operating possibilities (excerpt from VDE 0530)	S1 continuous duty	The equipment can operate continually at rated load without the permissible temperature being exceeded. Duty cycle = ∞
	S3 intermittent duty	The equipment can only be operated at rated load during the power–on duration specified as a percentage of the load duty cycle without the permissible temperature being exceeded. The equipment is powered down in the no–load interval.
	S3 – 25 %	Power–on duration = 25 % (≙ 60 s) —> at 3000 rpm and 0.95 Nm Duty cycle = 4 min
	S3 – 6.25 %	Power–on duration = 6.25 % (≙ 15 s) —> at 2000 rpm and 1.9 Nm Duty cycle = 4 min
Measuring surface sound–pressure level DIN EN 21680 Part 1	max. 55 dB (A) max. 70 dB (A)	Motor without gearbox Motor with 2–stage gearbox **Note:** Speed range: 0 – 3000 rpm
Permissible ambient temperature	–20 ... 45 °C up to 65 °C with continuous motor current reduction	 Continuous motor current reduction as a function of the ambient temperature
Degree of protection DIN EN 60034	IP54 or IP65 can be ordered	
Installation altitude and approved power	Installation altitude above sea level in m 1000 1500 2000 2500 3000 3500 4000	Output as a % of the rated output 100 97 94 90 86 82 77

Table 2-7 Technical data for the POSMO A – 300 W positioning motor, continued

Designation		Description		
Motor data	Motor type	3–phase brushless servomotor **Note:** The motor corresponds to the 1FK6 motor series.		
	Cooling	Non–ventilated (free convection) **Note:** The clearance ⩾100 mm must be maintained to adjacent parts and components on at least three sides of the SIMODRIVE POSMO A		
	Overload monitoring	i^2t limitation		
	Measuring system (integrated)	Incremental Resolution: 4096 increments/motor revolution		
	Rated motor speed	3500 rpm 3000 rpm	(S1) (S3, 25 %, 4 min)	**Note:** The data is only valid for supply voltages of ≥ 48 V
	Rated motor torque (without gearbox)	0.48 Nm 0.95 Nm	(S1) (S3, 25 %, 4 min)	
	Rated motor power (without gearbox)	176 W 300 W	(S1) (S3, 25 %, 4 min)	
	Rated motor current	5.25 A 10.5 A	(S1) (S3, 25 %, 4 min)	
	Motor efficiency	75 % 68 %	motor motor and drive unit	
	Motor moment of inertia • referred to the motor out drive • +Gearboxes referred to the gearbox output	Ratio i: without gearbox 4 7 12 20 35 49 120	without holding brake: $58.00 \cdot 10^{-6}$ kgm² $1{,}424.0 \cdot 10^{-6}$ kgm² $4{,}267.9 \cdot 10^{-6}$ kgm² $13{,}017.6 \cdot 10^{-6}$ kgm² $35{,}480.0 \cdot 10^{-6}$ kgm² $107{,}065.0 \cdot 10^{-6}$ kgm² $209{,}847.4 \cdot 10^{-6}$ kgm² $1{,}856{,}160.0 \cdot 10^{-6}$ kgm²	with holding brake: $65.00 \cdot 10^{-6}$ kgm² $1{,}536.0 \cdot 10^{-6}$ kgm² $4{,}610.9 \cdot 10^{-6}$ kgm² $14{,}025.6 \cdot 10^{-6}$ kgm² $38{,}280.0 \cdot 10^{-6}$ kgm² $115{,}640.0 \cdot 10^{-6}$ kgm² $226{,}654.4 \cdot 10^{-6}$ kgm² $1{,}956{,}960.0 \cdot 10^{-6}$ kgm²
	Shaft load capability (motor shaft)	• Axial load – Motor without holding brake – Motor with holding brake • Radial load (effective 30 mm above the plane where the motor is bolted)	max. 210 N forces not permissible max. 240 N	
Holding brake	Brake type	EBD 0.13BS		
	Holding torque M_4	1.1 Nm		
	Direct current	0.4 A		
	Opening time	30 ms		
	Closing time	10 ms		
	Number of emergency braking operations	2000 with a regenerative feedback energy of 13 Ws		
Gearbox data	Backlash	1–stage planetary gear: <15’ (angular minutes) 2–stage planetary gear: <20’ (angular minutes) 3–stage planetary gear: <25’ (angular minutes)		

Table 2-7 Technical data for the POSMO A – 300 W positioning motor, continued

Designation		Description
Gearbox data Planetary gearbox	Efficiency	1–stage gearbox: 90 % 2–stage gearbox: 85 % 3–stage gearbox: 80 %
	Temperature	Max. permissible temperature: 90 °C
	Speed at the gearbox input	Rated input speed: 3000 rpm Maximum input speed (drive–in): 3500 rpm Note: A POSMO A with gearbox can be briefly operated up to the maximum possible speed (depending on the supply voltage)
	Shaft load capability Radial and axial shaft load capability for the gearbox shaft[1)]	1-stage/2-stage gearbox  3-stage gearbox  F_a [N] axial force $F_{r\,perm}$ [N] permissible radial force (at center of key) n_2 [rpm] drive–out speed

1) Notice: Contrary to the specifications of the radial load of the motor shaft end this specification refers to the center of the key (shaft center)!

Table 2-7 Technical data for the POSMO A – 300 W positioning motor, continued

Designation		Description
Gearbox data Planetary gearbox	Gearbox lifetime	A generally valid statement cannot be made about the lifetime as a result of the various possible applications and the resulting load types as well as varying ambient conditions. Factors which influence the lifetime include: • Duty types from continuous operation with one direction of rotation up to extreme start/stop operation with load levels from partial load up to full load and significant surge loading. • Forced rotation accelerations or delays from the outside. • External mechanical loads in the form of a vibration and shock. • The ambient temperature and humidity/moisture
Weights	• Motor without gearbox: 3.9 kg • Motor with 1–stage gearbox: 5.1 kg • Motor with 2–stage gearbox: 5.4 kg • Motor with 3–stage gearbox: 8.2 kg	
Climatic environmental conditions	Relevant Standards	IEC 68–2–1, IEC 68–2–2
Climatic operating conditions	Operating temperature range	–20 ... 45 °C
	Extended operating temperature range	to +65 °C with continuous reduced motor current
	Relevant Standards	according to DIN EN 60721 Part 3–3, Class 3K5
Climatic transport and storage conditions	Transport and storage temperature range	–40 ... +70 °C
	Relevant Standards	according to DIN EN 60721, Part 3–1 and 3–2, Class 2K4 and 1K4 **Note:** Data applies for components which have been packed ready for transport.
Mechanical ambient conditions	Relevant Standards	IEC 68–2–32

Table 2-7 Technical data for the POSMO A – 300 W positioning motor, continued

Designation		Description
Tested vibration and shock stressing in operation	• Vibration stressing in operation	
	Frequency band 2 ... 9 Hz	With constant deflection = 7 mm
	Frequency range 9 ... 200 Hz	With constant acceleration = 20 m/s^2 (2 g)
	Relevant Standards	IEC 68–2–6, DIN EN 60721 Parts 3–0 and 3–3 Class 3M6
	• Shock stressing in operation	
	Peak acceleration	max. 250 m/s^2 (25 g)
	Shock duration	6 ms
	Relevant Standards	DIN EN 60721 Part 3–0 and Part 3–3 Class 3M6
	Note: In order to ensure a long lifetime, the motor should be supported if it is subject to external vibration stressing (e.g. continuous operation at the resonant frequency) Tapped holes are provided to support the motor.	
Vibration and shock stressing during transport	Relevant Standards	DIN EN 60721 Part 3–3, Class 2M2 **Note:** Data applies for components which have been packed ready for transport.
Pollutant stressing	Relevant Standards	IEC 68–2–60

Commissioning

3

3.1 General commissioning information

Prerequisites for Commissioning

The following prerequisites must be fulfilled before commissioning the drive:

1. Has the drive been completely installed, cabled and is it ready to be powered–up?

   —> Refer to Chapter 2

2. Has the PROFIBUS–DP node address been set at the connection cover of SIMODRIVE POSMO A?

   —> Refer to Chapter 2.3.1

3. Has the terminating resistor been set at the first and last bus nodes?

   —> Refer to Chapter 2.3.1 and Chapter 2.3

4. Is there a master device file (GSD) and has it been installed?

   —> Refer to Chapter 4.4.2

Communications between master and slave

SIMODRIVE POSMO A can only be controlled and parameterized via PROFIBUS. This is the reason that it is absolutely necessary that communications are established between the DP master and the ”DP slave POSMO A” that is to be commissioned.

What are the communication possibilities?

- C2 master Parameterizing and start–up tool ”SimoCom A”

  —> Refer to Chapter 3.2.3

- C1 master SIMATIC S5 or SIMATIC S7

  —> Refer to Chapter 4.4

- Third–party master

  —> Refer to the documentation associated with the third–party master

Standalone operation can be set via P100 and P101:11. This means that operation is possible without PROFIBUS communications (refer to Chapter 5.5.12).

Overview of the communications

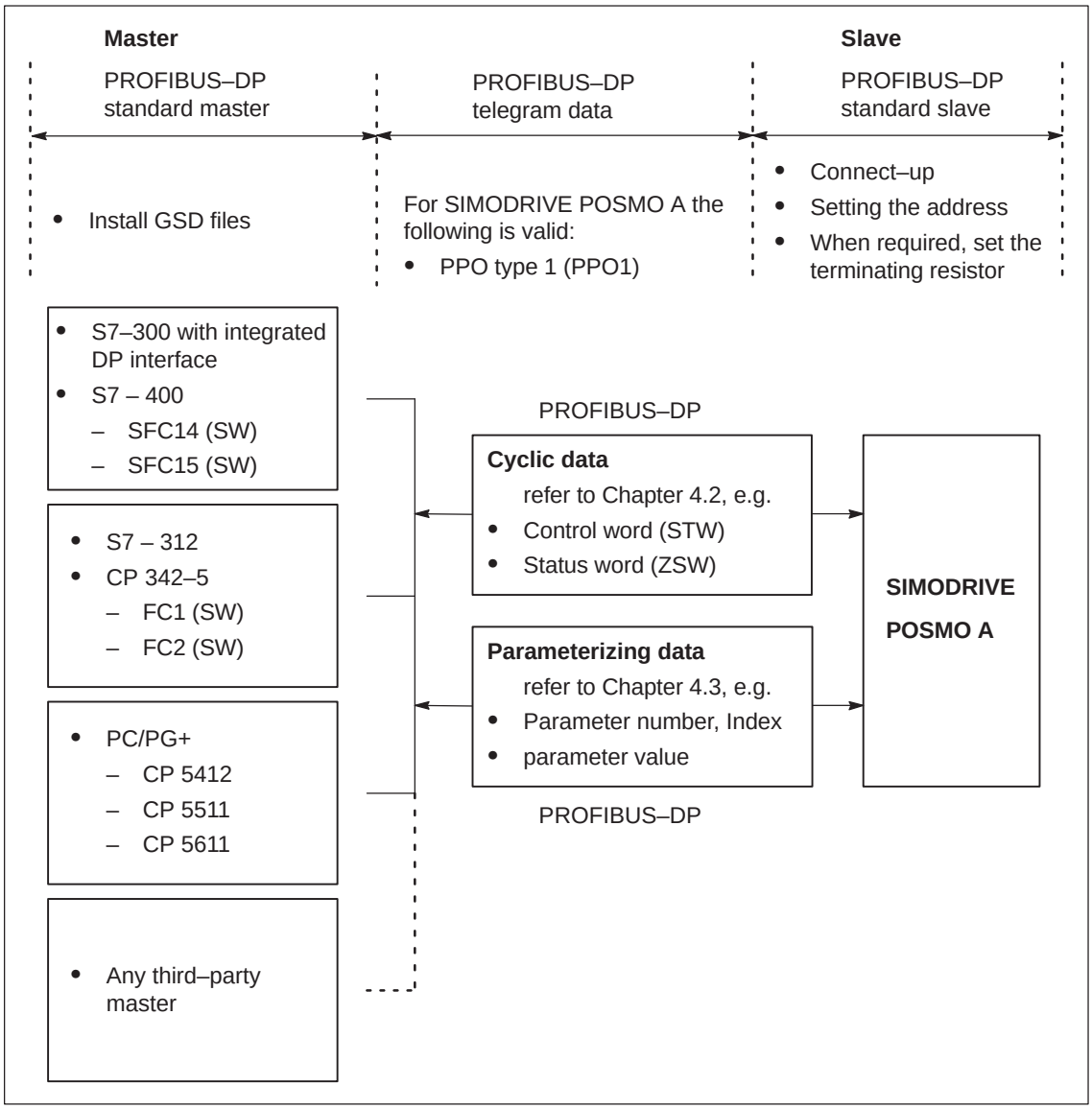


Fig. 3-1 Overview of the communications for SIMODRIVE POSMO A

LED after power–on

After SIMODRIVE POSMO A has been powered up, the LED has the following status, if no fault/error has been detected:

- LED flashes green

  —> bus connection is not established (refer to Chapter 6.1)

3.2 Commissioning the DP master

3.2.1 Commissioning and communications for the master

How is a communications established between the master and the slave?

The procedure on how to establish communications between the master and slave is shown using an example with the following prerequisites:

Assumptions and prerequisites:

- The master is a SIMATIC S7–315–2 DP.
- The prerequisites for commissioning are fulfilled (refer to Chapter 3.1).
- The ”DP slave POSMO A” should be integrated into an existing SIMATIC S7 project.
- The GSD file for the ”DP slave POSMO A” is available and installed (refer to Chapter 4.4.2).

How communications are established:

1. Open the existing SIMATIC project.
2. In the hardware Catalog under PROFIBUS–DP, add the station ”SIMODRIVE POSMO A”.
3. Set the PROFIBUS address under properties.

   The same address must be set at the positioning motor (DP slave) using switch S1 (refer to Chapter 2.3.1).
4. Set the I/O address

Part	I address	O address
PKW	256–263	256–263 (each 8 bytes, addresses are only an example)
PZD	264–267	264–267 (each 4 bytes, addresses are only an example)

5. Close the project and transfer to the master.
6. Power–up the drive and check the LED.

   Does the LED have a steady green light?
   yes —> Normal operation, communications is error–free
   no —> Evaluate the status of the LED (refer to Chapter 6.1)

   The drive itself identifies the selected baud rate.

Note

The DP master can now communicate with the SIMODRIVE POSMO A DP slave which has been powered–up.

Data to/from the drive in the PZD and PKW areas

The following data transfers in the PZD and PKW areas result from the peripheral addresses configured in the example:

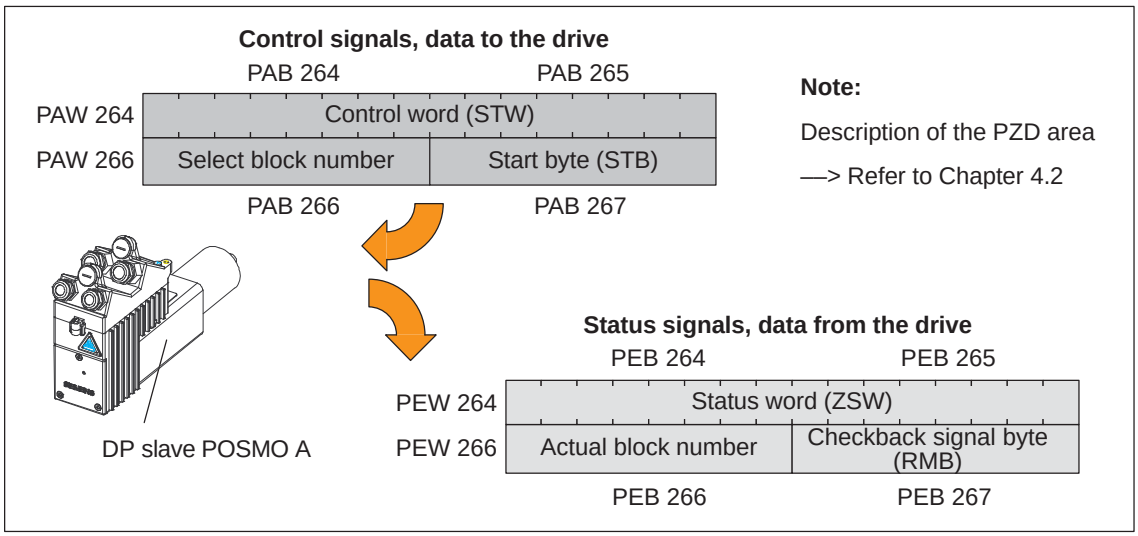


Fig. 3-2 Data transfer in the PZD area in the ”positioning” mode (P700=2) (addresses are only as example)

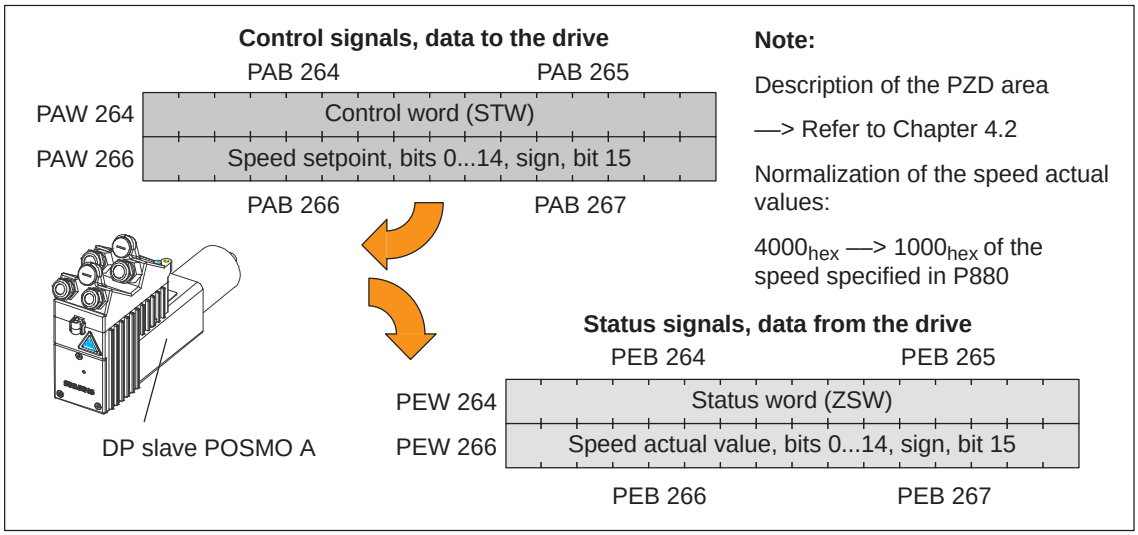


Fig. 3-3 Data transfer in the PZD area in the ”speed setpoint” mode (P700=1) (addresses are only as example)

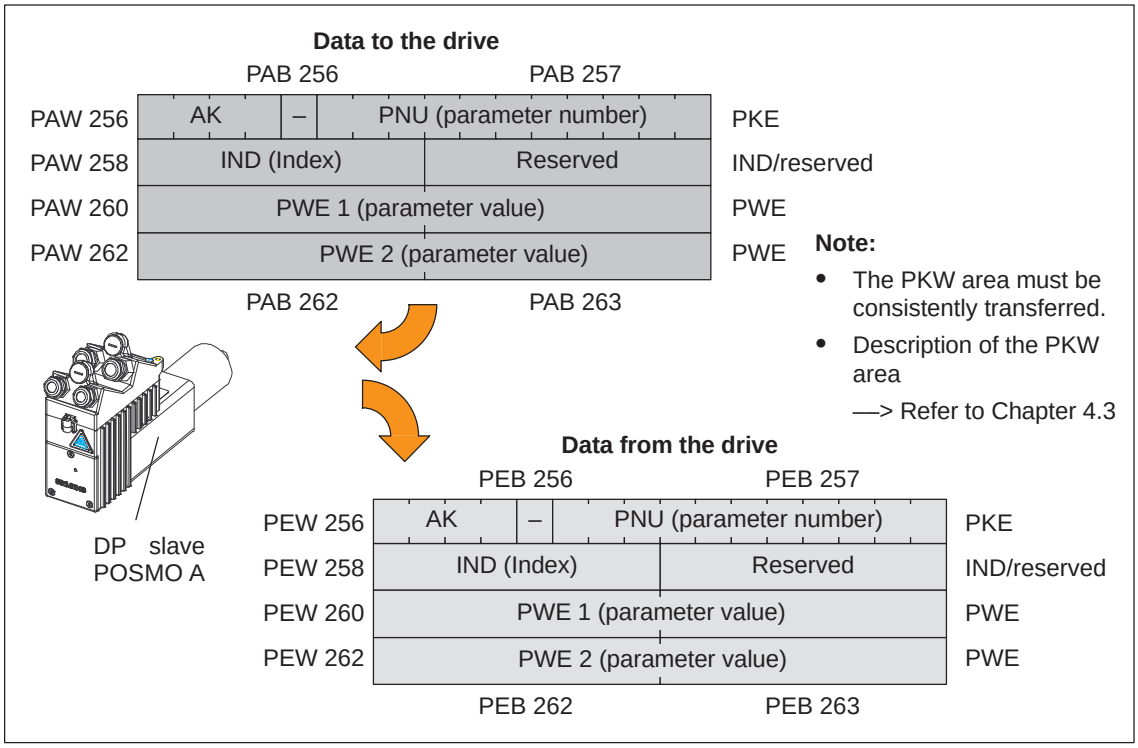


Fig. 3-4 Data transfer in the PKW area (addresses are only example addresses)

Commissioning tasks after communications have been established

After establishing communications, the commissioning of the DP master should be completed.

The following tasks have to be fulfilled:

1. Carry out a function check

   You can set the required enable bits here for the function test.

   —> Refer to Chapter 4.2

   Move the drive as follows:

   – Jogging 1 (to the left, 20 % of 3000 rpm motor revolutions)

     or

   – Jogging 2 (to the right, 20 % of 3000 rpm)

2. Generate the user program for the PZD area

   Generating a user program in the DP master to supply the control and status words.

   —> Refer to Chapter 4.2

3. Generate the user program for the PKW area

   Generate the user software the communicate the PKW area.

   —> Refer to Chapter 4.3

3.2.2 SIMATIC S7 function blocks

Product Brief

Using these function blocks, it is simpler to control and parameterize a SIMODRIVE POSMO A positioning motor from a SIMATIC S7 program simplified from this.

This means that a drive, for example, can be parameterized without being knowledgeable about PROFIBUS parameter formats and the task IDs.

Which blocks are available?

The following function blocks are available:

- FB 10 CONTROL_POSMO_A (from 02.00)
- FB 11 PARAMETERIZE_POSMO_A (from 02.00)
- FB 12 PARAMETERIZE_ALL_POSMO_A (from 05.00)

Where are these function blocks?

You can obtain all of the function blocks up to Version 1.5 at no charge from your local Siemens office (sales partner). However, these function blocks do not support the ”speed setpoint” mode and will not be further innovated.

Function blocks with expanded functional scope (including the ”speed setpoint” operating mode) are available in the software package ”Drive ES SIMATIC” from Version 5.3 onwards.

Software Class C

Siemens AG accepts no liability and no warranty that these block examples operate error–free.

The software license conditions according to Class C apply.

—> Refer to the description of the function blocks which has also been installed

Installation

Prerequisites: SIMATIC S7 Manager version 4.02 and higher

Run the unzipped file ”setup.exe” and following the instructions.

The function blocks are then available in the SIMATIC Manager under the ”Posmo A Library Vx” library.

The associated description of the function blocks is available as pdf document under:

Start —> Simatic —> S7 Manuals —> Posmo A Library

Reader’s note

In order that you always have an up–to–date description which matches the blocks, please refer to the information on the blocks provided in the PDF document which was also installed.

3.2.3 Parameterizing and start–up tool ”SimoCom A” (from SW 1.5)

Prerequisite

A PG/PC is required to install the tool; it must fulfill the following minimum requirements:

- Operating system:

  Windows XP®
  Windows Vista®
  Windows 7®
- 32 MB RAM memory
- 30 MB free memory on the hard disk

Where can I get ”SimoCom A”?

The ”SimoCom A” parameterizing and start–up tool is available through the Internet as follows:

- German

  http://support.automation.siemens.com/WW/view/de/10804026/133100
- English

  http://support.automation.siemens.com/WW/view/en/10804026/133100

Which version is the optimum ”SimoCom A” version?

The ”SimoCom A” parameterizing and start–up tool can be used for all SIMODRIVE POSMO A drives from SW 1.5 onwards.

The functional scope of the ”SimoCom A” tool is continually adapted to the expanded functionality of these drives.

In order to parameterize and handle all of the functions of a drive using ”SimoCom A”, the optimum matching ”SimoCom A” must be used. This depends on the drive software release.

Reader’s note

Which version of ”SimoCom A” optimally matches which drive and which drive software release?

Refer to ”SimoCom A” as follows:

Help —> info about ”SimoCom A” ... —> versions

Installing "SimoCom A"

This is how you install the "SimoCom A" tool on your PG/PC:

Reader's note

The "readme.txt" file is provided on the software CD.
Please observe the information, tips and tricks provided in this file.

1. Insert the software CD into the appropriate drive of your PG/PC.
2. Run the "setup.exe" file in directory "disk1" for the required version of "SimoCom A".
   –> START –> RUN –> OPEN SETUP.EXE –> OK
3. Follow the instructions which the installation program displays step–by–step.

   Result:

   – The "SimoCom A" tool has now been installed in the target directory which you selected.

   – The tool can e.g. be started as follows:
   –> START –> PROGRAM –> SIMOCOMA
   –> SimoComA –> mouse click

Un–installing "SimoCom A"

This is how you can un–install the "SimoCom A" parameterizing and start–up tool from your PG/PC:

- Using the program/operation of "SimoCom A"

  The "SimoCom A" tool can be e.g. un–installed as follows:

  –> START –> PROGRAMS –> SIMOCOMA
  –> Uninstall SimoComA –> mouse click

- Using the Control Panel just like any other Windows program

  – Select the "control panel"
  –> START –> SETTINGS –> CONTROL PANEL

  – Double–click on the "Software" symbol

  – Select the "SimoCom A" program from the selection field

  – Press the "add/remove..." button and then follow the instructions

Online operation, "SimoCom A" with drive

You can go into online operation as follows:

- Online operation via the CP 5511/CP 5611 directly with the fieldbus

  PC/PG <—> CP 5511/CP 5611 <—> PROFIBUS <—> drives

- Online operation via the MPI interface of SIMATIC S7

  PC/PG <—> MPI <—> PROFIBUS <—> drives

Prerequisites for online operation

The following prerequisites must be fulfilled in order to establish online operation between ”SimoCom A” and a drive via the PROFIBUS–DP fieldbus:

1. Communication modules, if ”connect via PROFIBUS”
   – CP 5511 (PROFIBUS connection via PCMCIA card)

     Configuration:
     PCMCIA card, type 2 + adapter with 9–pin SUB–D socket connector to connect to PROFIBUS.

     Order No. (MLFB): 6GK1551–1AA00

     or

   – CP 5611 (PROFIBUS connection through a short PCI card)

     Configuration:
     Short PCI card with 9–pin SUB–D socket to connect to PROFIBUS.

     Order No. (MLFB): 6GK1561–1AA00

   – CP 5613 (PROFIBUS connection via a short PCI card)

     Configuration:
     Short PCI card with 9–pin SUB–D socket to connect to PROFIBUS–DP.
     Diagnostic LEDs
     PROFIBUS controller ASPC2 StepE

     Order No. (MLFB): 6GK1561–3AA00

   For newer PGs, this communications interface is already included.
2. SIMATIC CPU, if ”connect via MPI interface”

   A routing–capable SIMATIC–CPU is required for a coupling via MPI interface.
3. S7–DOS from V5.0

   The software is also installed when installing ”SimoCom A”.
4. Connecting cables
   – between CP 5511 or CP 5611 and the PROFIBUS fieldbus

     or

   – between the MPI interface from the PG and SIMATIC CPU

Note

Going online/offline in cyclic operation via PROFIBUS:

While PROFIBUS is in cyclic operation, ”SimoCom A” with CP xxxx can be connected or disconnected from the fieldbus using the following plug–in cable without generating an error.

Order No. (MLFB): 6ES7901–4BD00–0XA0 (plug–in cable)

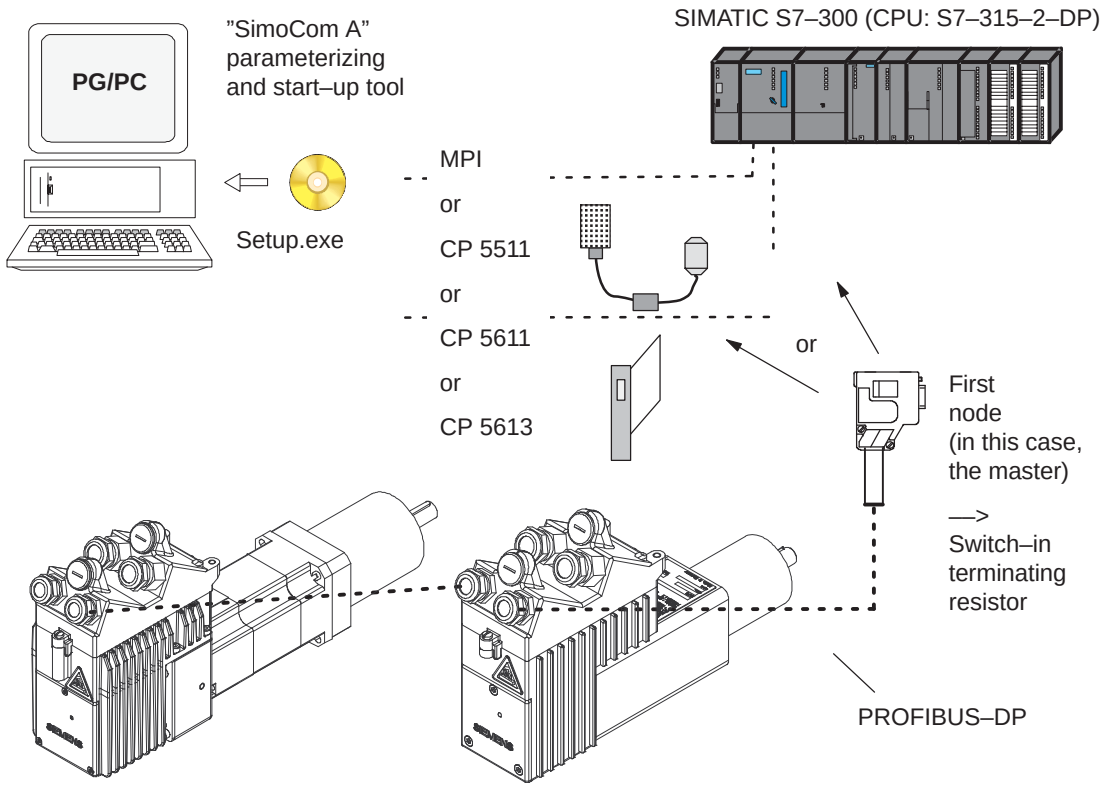
Settings for "SimoCom A"

For "SimoCom A", communications should be set as follows via PROFIBUS–DP:

- Options – Settings – Communications —> "Interface" dialog"
- With "For "Go online" connect via" set the following:
  —> "direct connection", if the coupling is directly established
  or
  —> "routed via S7", if coupled via the MPI interface

Online operation can be directly established to the drive directly via the fieldbus using the "Go online" function.

Example: Online operation via PROFIBUS



- At the last node (in this case at the left) —> switch in the terminating resistor (refer to Chapter 2.3.1)
- Set the PROFIBUS node address for the slaves (refer to Chapter 2.3.1)

Fig. 3-5 Example for online operation via PROFIBUS: "SimoCom A" <—> 2 drives

Entry in "SimoCom A"

Prerequisites:

The parameterizing and start–up tool "SimoCom A" is installed on the PG/PC and can be started.

The following basic screen is displayed after the first start:

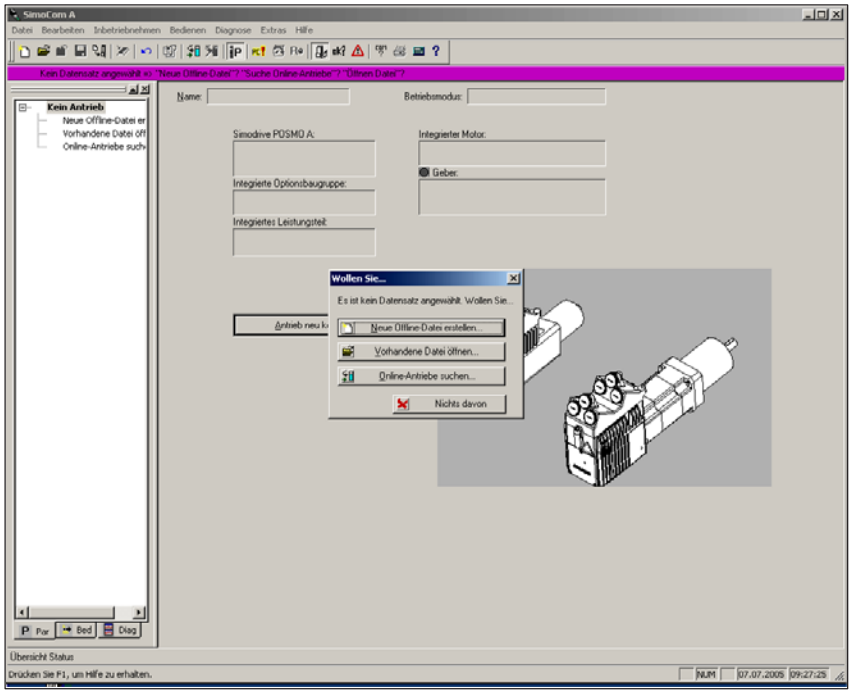


Fig. 3-6 Basic display of "SimoCom A"

Note

This is what you really need to know when using "SimoCom A":

The program attempts to "think with you":

- If you select a command, which is presently not available for a specific reason (e.g. you are offline and wish to "move an axis "), then the program does what you would probably wish it to do:
  It goes "online", and offers you a list of drives and after the required drive has been selected, it opens the traversing window. However, if you do not wish to do this, then you can exit and continue as required.
- Only the information is provided in the dialog boxes which must be available as a result of the selected configuration.

Please observe the information on "SimoCom A" in Table 3-1.

Information on ”SimoCom A”

The information provided in the following text provides you with some basic information and instructions on how to handle the parameterizing and start–up tool ”SimoCom A”.

Table 3-1 Information on ”SimoCom A”

Function	Description
Tasks that can be executed using ”SimoCom A”	• Check the wiring (go into the Online Help: connection diagrams) • Establish a connection to the drive to be parameterized • Change the parameters – The essential parameters are changed, dialog–prompted – You can change all of the parameters using the expert list • Traverse the axis • Diagnose the drive status – Obtain an overview of all of the connected drives and their status – Detect the connected hardware – Display the terminal status – Alarms and information on how they can be removed • Carry–out diagnostics – Parameterize test sockets (DAU1, DAU2). Selected signals in the drive can be routed to the test sockets for measurement with an oscilloscope. • Save the results – Save the parameters in the drive FEPROM – Save the parameters in a file/open a file – Print the parameters • Compare parameter sets This allows the difference between 2 parameters sets to be identified. • Initialize the drive The drive can be initialized using this function. It is then necessary to configure a drive. • Load the factory setting The status of a drive when originally shipped can be established using this function. • Generate a user parameter list. The user can include a parameter in this list. This list has the same functionality as the expert list.
Language	Menu ”Option/Settings/Language”
Browser	The browser (the lefthand window) can be set to the following areas via the lower buttons: • Parameter (Par) • Operator control (OpCo) • Diagnostics (Diag) Close/open the browser: Menu ”Options/settings/browser”

Table 3-1 Information on ”SimoCom A”, continued

Function	Description
Working offline	... in other words, you are working on the computer only and have no connection to a drive. Only the opened files are included in the browser under ”Operate”.
Working online	... in other words, you are connected to one or more drives and ”SimoCom A” also recognizes these drives. This is the case if ”SimoCom A” has already searched for the interface once. You go online, if • Your default is set in the menu ”Options/Settings/Communications” (this is realized when starting ”SimoCom A”) • Select it with the operation ”Find online drives” During online operation, the opened files and all drives available via the interface are found in the browser under ”Operation”. **Note:** The parameters displayed via ”SimoCom A” are not cyclically read.
Working in the drive or in the file	You can work directly in the drive or only at the PC in the file, but only with one data set at any one time. For example, you can be connected with a POSMO A – 300 W (4A) and a POSMO A – 75 W (6A), so that you have access to the parameter sets in both of the drives – and at the same time have several files open. All of these parameter sets are displayed in the browser under ”Operate” and also in the menu ”File”. If you select ”Drive 4A”, then you will see the current status and parameters of drive 4A – but no others. When changing over, for example to the ”My.par” file, then you only see the parameters associated with this file. Parameters files which have been opened can be re–closed using the”File/ Close file” menu.
Assign the PC the master control	... means that the ”DP Slave POSMO A” should be controlled from the PC. How is the control authority transferred to the PC? • The C1 master must signal OFF 1, OFF 2 or OFF 3 • Transfer the control authority to the PC using the menu ”Operator control/ control authority for PC”
Returning the control authority	... means that the ”DP Slave POSMO A” should be controlled from the C1 master. How is the control authority returned? • Bring the drive to a standstill • Withdraw the PC controller enable
Procedure when commissioning	Recommendation: Set the browser to ”Parameter” and work through the following dialog boxes one after the other ”Configuration – re–configure drive” —> ”Mechanical system” —> ”Traversing blocks”.
1. Configuration	... enter the drive type, gearbox stage and braking option (only for 300 W motor) used. If this data is changed, this causes the parameters, which are dependent on it, to be re–calculated, i.e. changes previously made to the parameters involved are overwritten.
2. Mechanical system	... here you can determine the mechanical components used (e.g. rotary axis?, external gearbox?).

Table 3-1 Information on ”SimoCom A”, continued

Function	Description
3. Limits	... here, you can define the basic limit values and properties of all of the position–controlled or speed–controlled traversing blocks. This defines the characteristics of the time–velocity profile and, for speed control sets, the characteristics of the time–speed profile. The maximum current and the maximum overcurrent of the drive can be defined.
4. Digital I/O	... both digital inputs/outputs can be parameterized here. The function of an input/output can be very quickly defined by selecting a text. It is then still possible to display the actual status of the input/output in SimoCom A or, to invert an input/output.
5. Monitoring	... here, you can define several parameter values which are required for correct and safe sequence of a traversing motion. These included, e.g.: • Software limit switch • Maximum following error • Precise stop and standstill window Faults and warnings, which are possible in operation, can also be re–defined here.
6. Controller	... here, you can define the parameters of the control loop.
7. Traversing blocks (only pos mode)	... here, you can generate the traversing programs by parameterizing the individual traversing blocks.
8. Referencing (only pos mode)	... here, you can generate the traversing program in an automated way which allows a reference approach travel to a BERO with or without direction reversal.
9. Speed setpoint, interface (only n–set mode, version 4.0 and higher)	... here, you can define the parameters for the speed setpoint interface.
Traverse the drive	After the drive has been configured, you can already move the axis from the PC. Call: Menu ”Operate/Jog/ ...” or menu ”Operate/MDI/ ...”

Table 3-1 Information on ”SimoCom A”, continued

Function	Description
Expert list	You can influence the complete parameter set of a drive using the expert list, i.e. you can individually change each parameter. In this case, the operator is not additionally supported by dialog boxes. Parameterization using the expert list should only be used in exceptional cases. Operating information: • Call: Menu ”Start–up/Additional parameters/Expert list” • The standard value and the value limits for the actual parameters are displayed via the tooltip. • Modified values only become effective after pressing the Enter key or if another parameter was selected. Values which are not active have a yellow background. • Expert list selected —> Menu ”List” or the righthand mouse key The following functions can be executed in this window: – Display filter: Here, you have the possibility of selecting as to which data should appear in the expert list: e.g. all data or only the controller data. – Search: Using F3 (or menu ”List/Search), you can search for specific terminals. For instance, you can search for ”temp” if you wish to know the value for the electronics temperature. – Bit–coded values: With the cursor, go to the line and press F4 (or menu ”List/bit value”). You then obtain a plain text display of the individual bits and can select these at a click of the mouse.
Data transfer	Also here, the program attempts to ”think with you”: If you are presently working on a drive and select File/Download into drive” then the program assumes that you wish to download a file, still to be selected, into this particular drive. If a file is presently open, then the program assumes that using the same command, you wish to download this open data set into a drive still to be selected. If these assumptions are not applicable, then you can always undo by canceling.
Integrated help	The ”SimoCom A” tool is equipped with an integrated help function which supports you when using the ”SimoCom A” and the ”SIMODRIVE POSMO A” drive. You can call the help function for ”SimoCom A”: • Using the menu ”Help/help subjects ...” or • By pressing the ”Help” button or • By pressing key ”F1”

3.3 Commissioning an axis

The appropriate parameters must be appropriately set to adapt the axis.

Parameters for general settings (refer to Chapter 5.6.2)

The most important parameters for general settings are:

- P1 Axis type
- P2 Travel per gearbox revolution
- P3 Gearbox ratio
- P4 Dimension unit
- P8 Maximum speed
- P10 Maximum velocity
- P22 Maximum acceleration

Parameters for monitoring (refer to Chapter 5.6.2)

The most important parameters for monitoring functions are:

- P6 Software limit switch, start
- P7 Software limit switch, end
- P12 Maximum following error
- P14 Standstill range

Note

There are neither software switches nor traversing range limits in the n–set mode (from SW 2.0).

The drive must always be able to rotate endlessly and therefore to be parameterized as rotary axis. It must be de–referenced.

Example: Linear axis, parameterization

How are the assumed values represented in Fig. 3-7 in the appropriate parameters?

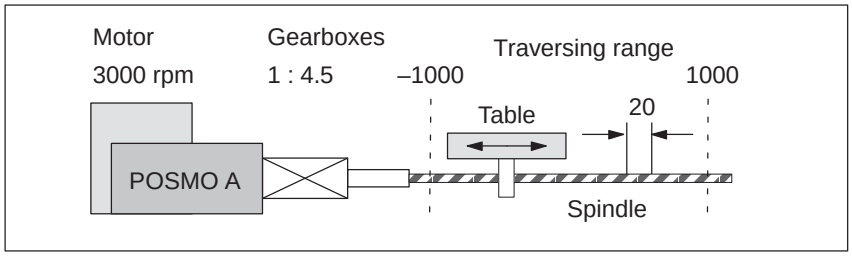


Fig. 3-7 Example: Parameterizing the linear axis

- P1 = 0 :Axis type, linear axis
- P2 = 20 :Travel per gearbox revolution
- P3 = 4.5 :Gearbox ratio
- P4 = 0 :Dimension units mm
- P6 = –1000 :SW limit switch, start
- P7 = 1000 :SW limit switch, end
- P8 = 3000 :Maximum speed
- P10 = 13333,33 :Maximum velocity
  :v_{max} = 3000/min • 1/4.5 • 20 mm = 13333.33 mm/min

When parameterizing a linear axis, the maximum possible traversing range is automatically defined as +/– 200000 mm/degrees/inch.

This means that,

- the software limit switches are de–activated (P0005=P0006) or
- the software limit switches are active but the drive has not been referenced,

so that it can be traversed up to a maximum of +/–200000 mm/degrees/inch.

Example: Rotary axis, parameterization

How are the assumed values represented in Fig. 3-8 in the appropriate parameters?

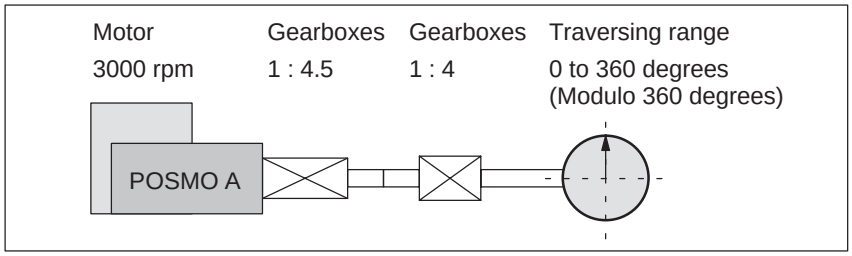


Fig. 3-8 Example: Parameterizing a rotary axis

- P1 = 360 :Axis type, rotary axis, modulo 360 degrees
- P2 = 360 :Travel per gearbox revolution
- P3 = 18 (4.5 • 4) :Gearbox ratio
- P4 = 1 :Dimension units, degrees
- P6 = P7 = 0 :For a rotary axes, deactivate the software limit switch
- P8 = 3000 :Maximum speed
- P10 = 60000 :Maximum velocity

  :v_{max} = 3000/min · 360 degrees/18 = 60,000 degr./min

For a rotary axis, the internal position actual value calculation limits the maximum modulo value with which a drive can be parameterized.

The following inter–relationship exists:

F in the following is a conversion factor which depends on the dimension system:

Dimension system inch: F = 25.4

Dimension system mm/degrees: F = 1

- POSMO A 75 W:
  - P1 < 2147483647 • P2 / (*F* • 816 • |P3|)
  - P2 > P1 • *F* • 816 • |P3| / 2147483647
  - |P3| < 2147483647 • P2 / (*F* • 816 • P1)
- POSMO A 300 W:
  - P1 < 2147483647 • P2 / (*F* • 4096 • |P3|)
  - P2 > P1 • *F* • 4096 • |P3| / 2147483647
  - |P3| < 2147483647 • P2 / (*F* • 4096 • P1)

From SW 1.6, the following applies:

When changing P1, P2 or P3, a check is automatically made in the drive as to whether these three parameter values fulfill the appropriate formula. If the modified value lies outside the valid range, then the drive rejects it and the old value is kept.

In addition to the preceding formulas the following condition applies for parameter P2:

$P2 \leq P1$

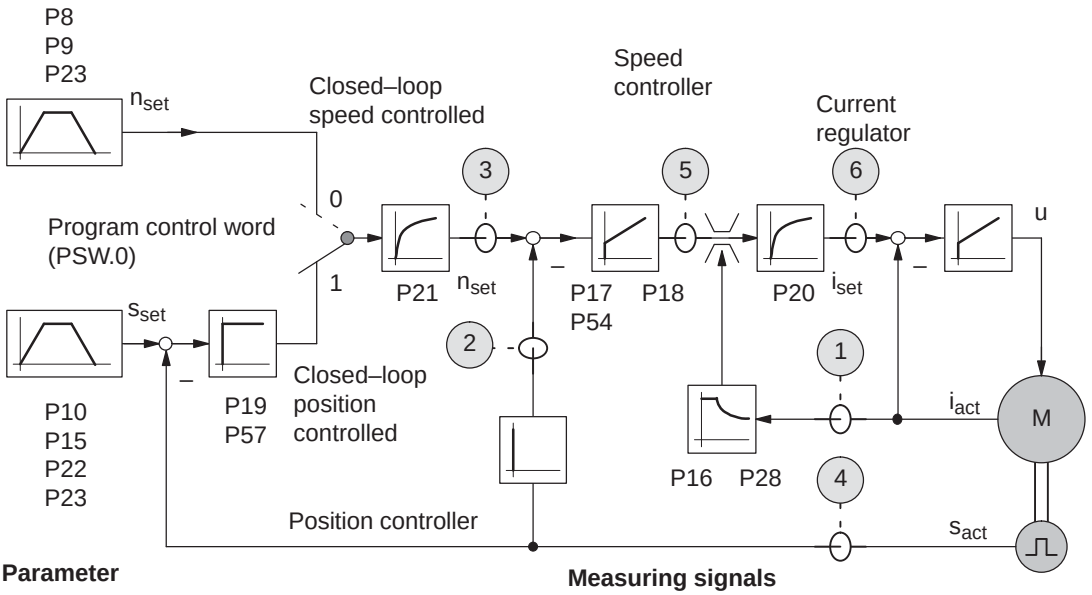
This means that a revolution at the gearbox output must be smaller than or equal to the rotary axis circumference.

Note

If P2 > P1 is selected, the axis zero of the rotary axis cannot be reproduced for several revolutions.

3.3.1 Control structure positioning (pos mode)

Description The structure of the current/speed and position controller in the ”positioning” mode (pos mode) is shown in the following figure.



Parameter

P8 Maximum speed
P9 Ramp–up time
P10 Maximum velocity
P13 Monitoring time (zero speed monitoring, activation of holding and standstill controller)
P15 Backlash compensation
P16 Maximum overcurrent
P17 P gain, n controller
P18 Integral action time, n controller
P19 Kv factor (position loop gain)
P20 Current setpoint smoothing
P21 Speed setpoint smoothing
P22 Maximum acceleration
P23 Jerk time constant
P28 Maximum current
P54[1)] P gain, n controller, standstill (if P56.2 = 1, this was standard before SW 1.3)
P57[1)] P gain, holding controller, standstill (if P56.2 = 0, this was standard from SW 1.3)

Note:
Additional information on the parameters is provided in the parameter list.
—> Refer to Chapter 5.6.2

Measuring signals

1 Current actual value
2 Speed actual value
3 Speed setpoint
4 Position actual value
5 Current setpoint from the speed controller
6 Current setpoint smoothed

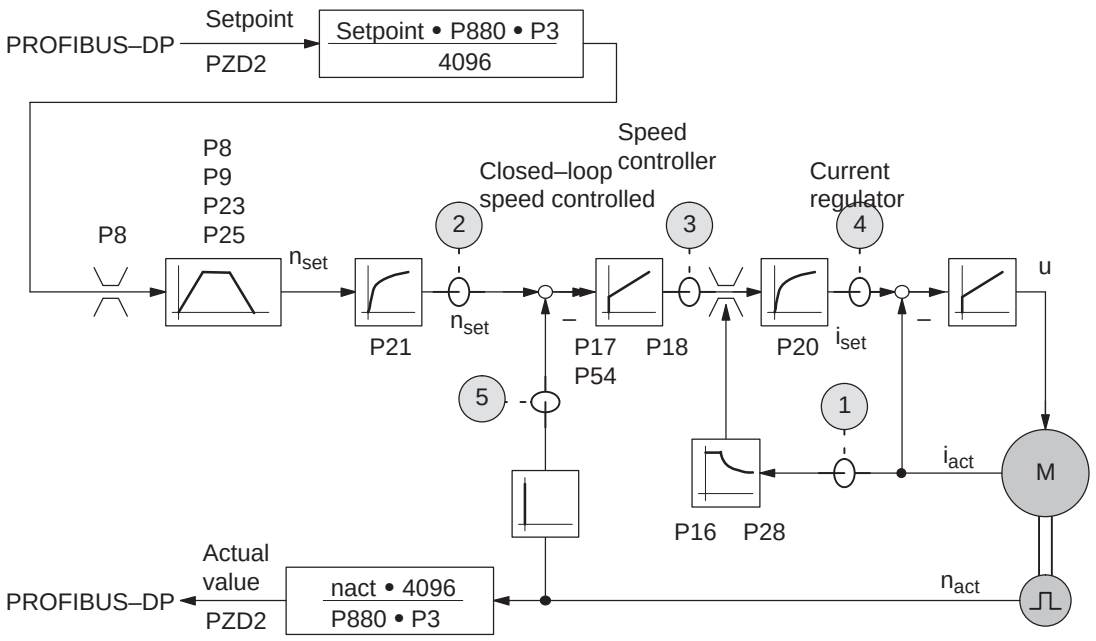
Note:
These signals can be output via the analog measuring outputs.
—> Refer to Chapter 6.3

1) From SW 1.3 the factory presetting is “Holding controller active” (P56.2 = 0). The holding controller is switched-in when the standstill monitoring function has been activated. We recommend that this factory presetting remains unchanged. The holding controller has a standstill-optimized control structure.

Fig. 3-9 Closed–loop structure for the ”positioning” mode for SIMODRIVE POSMO A

3.3.2 Control structure, speed setpoint (n–set mode)

Description The structure of the current/speed controller in the ”speed setpoint” operator mode (n–set mode) is shown in the following diagram.



Parameter

P8	Maximum speed
P9	Ramp–up time
P16	Maximum overcurrent
P17	P gain, n controller
P18	Integral action time, n controller
P20	Current setpoint smoothing
P21	Speed setpoint smoothing
P23	Jerk time constant
P25	Override, acceleration
P28	Maximum current
P54	P gain, n controller, standstill

Measuring signals

1	Current actual value
2	Speed setpoint
3	Current setpoint from the speed controller
4	Current setpoint smoothed
5	Speed actual value

Note:
These signals can be output via the analog measuring outputs.
—> Refer to Chapter 6.3

Note:
Additional information on the parameters is provided in the parameter list.
—> Refer to Chapter 5.6.2

Fig. 3-10 Closed–loop control structure, ”speed setpoint” mode for SIMODRIVE POSMO A

3.3.3 Flow diagram to commission a SIMODRIVE POSMO A

- in “Positioning” mode

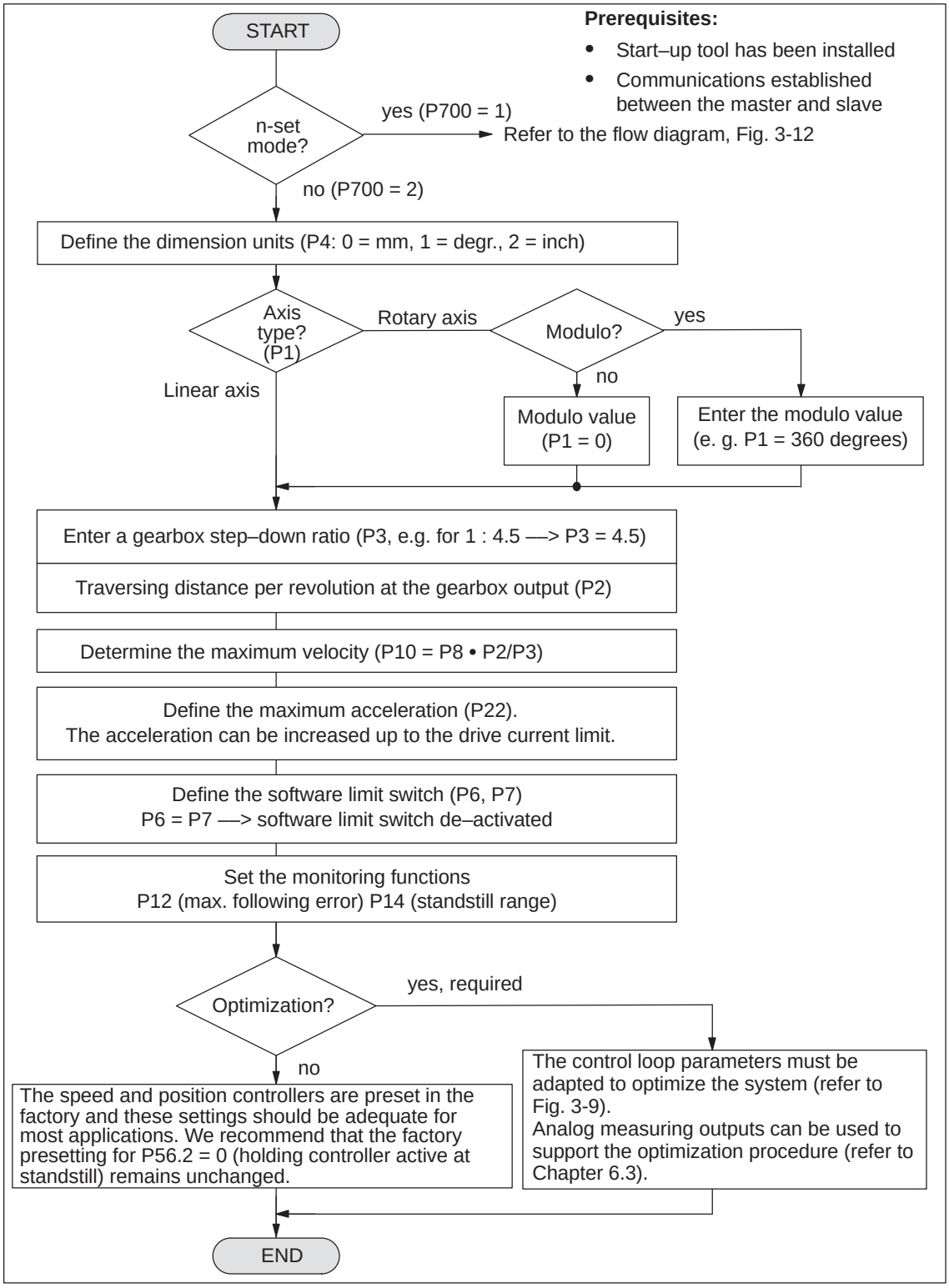


Fig. 3-11 Flow diagram when commissioning the system for the first time in the positioning mode (P700=2)

- in “Speed setpoint” mode

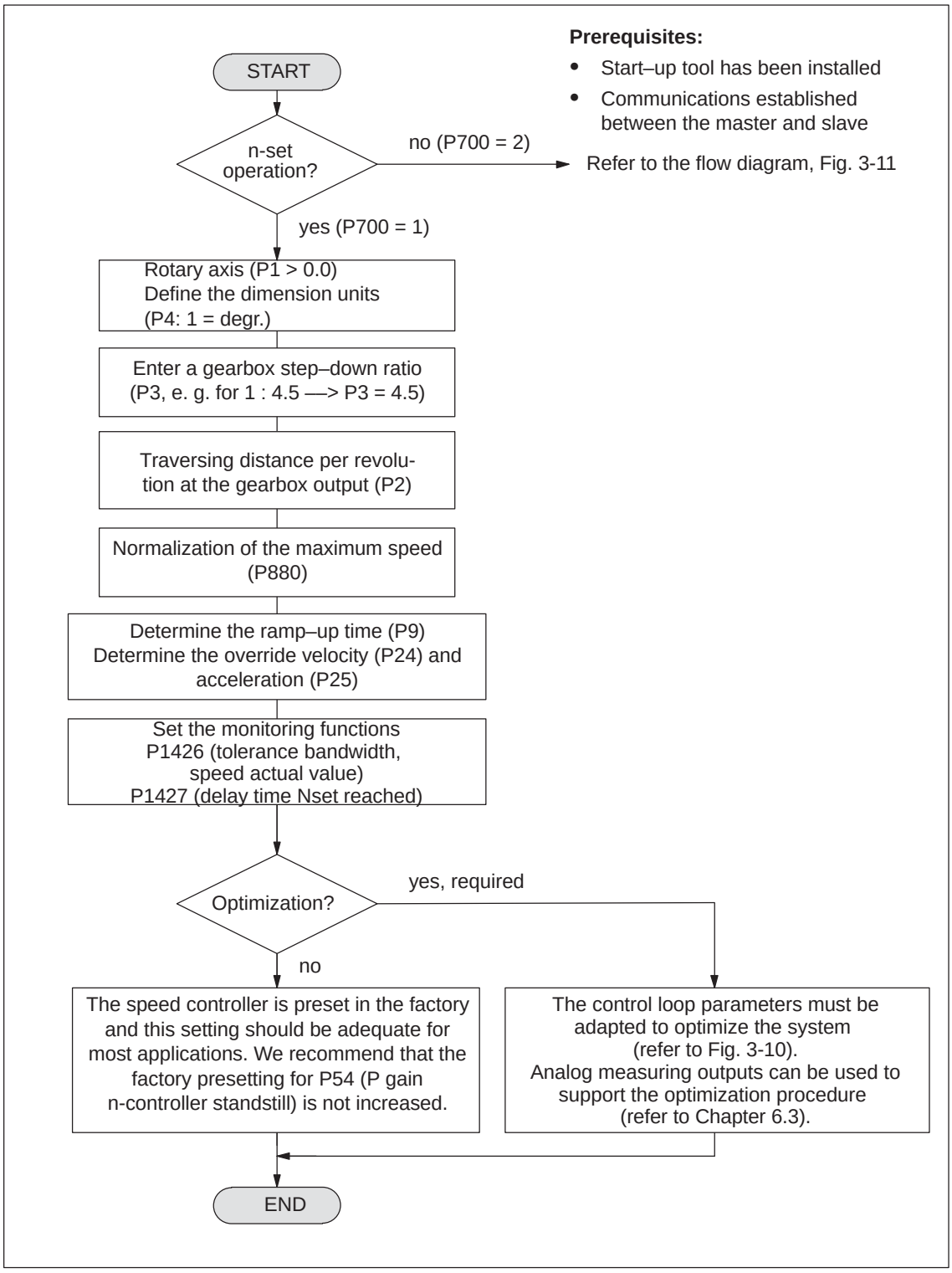


Fig. 3-12 Flow diagram when commissioning the system for the first time in the speed setpoint mode (P700 = 1)

3.3.4 Optimization runs

Optimizing the speed and position controllers

The speed and position controller is preset in the factory and should be adequate for most applications.

However, if changes are required, analog measuring outputs can be used to support the optimization procedure (refer to Chapter 6.3).

Caution

Only appropriately trained personnel with control knowhow may optimize the speed and current controllers.

Parameters for optimization (refer to Chapter 5.6.2)

The following parameters must be configured in this order to optimize the speed and position controller:

- P13 Monitoring time (e. g. for standstill monitoring, changeover to P54, P57)
- P17 P gain, n controller
- P18 Integral action time, n controller
- P20 Current setpoint smoothing
- P19 Kv factor (position loop gain)
- P22 Maximum acceleration
- P21 Speed setpoint smoothing
- P54 P gain, n controller, standstill (if P56.2 = 1, standard before SW 1.3)
- P57 P gain, holding controller, standstill (if P56.2 = 0, standard from SW 1.3)
- P15 Backlash compensation
- P23 Jerk time constant

3.3.5 Activate traversing range adaptation (from SW 3.1)

Description

For large traversing ranges, the traversing range adaptation must be activated in order to maintain the accuracy.

If traversing only in one direction, a greater traversing range applies. For example, this is possible if, when traversing in the positive direction, the reference point is set again and then the axis continues to move in the positive direction and this scenario is repeated. This condition applies both for rotary axes and linear axes. The average value of all traversing distances is decisive for traversing in one direction.

Activating

It should be activated as follows:

- P702 = 1: Activating traversing range adaptation
  - P971: 0 → 1 Save parameter change
  - P97: 0 → 1 (power–on reset) complete activation
- P702 = 2: Traversing range adaptation is activate

Supplementary conditions

- The traversing range for linear axes is limited to an adaptation band **ADB** (refer to the calculation of ADB).
- The adaptation band **ADB** on a rotary axis is identical with the maximum permissible value of P1 (this depends on P2 and P3 and is described in the parameter description of P1).
- Certain parameters are limited to the adaptation band applicable for the axis type. A rotary axis is involved if P1 > 0, a linear axis if P1 = 0.
- Calculating the adaptation band **ADB** of a linear axis:
  - SIMODRIVE POSMO A – 75 W

    ADB [mm] = (2^{30}) • 1.5 • P2[mm] / (816 • |P3|)
  - SIMODRIVE POSMO A – 300 W

    ADB [mm] = (2^{30}) • 1.5 • P2[mm] / (4096 • |P3|)

  The adaptation band, independent of the calculation value, has a maximum value of 200000 mm.

  (2^{30} corresponds to 1073741824)

  The following parameters must lie in the adaptation band:

Table 3-2 Parameter in the adaptation band

Parameter	Value
P1 axis type	0 ≤ P1 ≤ ADB
P5 reference point coordinate	|P5| ≤ ADB
P85:28 signaling position	|P85| ≤ ADB
P6 software limit switch	|P6| ≤ ADB
P7 software limit switch	|P7| ≤ ADB
P40 position actual value	|P40| ≤ ADB

- A parameter value outside the adaptation band is rejected when entering.
- Any referencing/actual value setting to a value outside the adaptation band is not possible and is rejected with fault 711 ”Flying measuring/actual value setting” and the supplementary information 913 ”invalid reference data”.
- The adaptation band is re–calculated when changing the following parameters:
  - P3 (gearbox step down),
  - P2 (distance per gearbox revolution) or
  - P4 (dimension unit)

  The internal traversing range limits on linear axes are then lined to the new adaptation band. Software limit switches possibly located outside the adaptation band are set to the limits of the adaptation band.

When activating the traversing range adaptation, if position actual value P40 already lies outside the **ADB,** then after finally activating the option (power–on reset) the drive is non–referenced once and signals Fault 713 ”reference position lost”.

■

Communications via PROFIBUS–DP

4

4.1 General information about PROFIBUS–DP

General information

PROFIBUS–DP is an international, open fieldbus standard and is defined in the following Standards:

- European fieldbus EN 50170 Part 2
- DIN 19245 Part 1 and 3
- IEC 61158

PROFIBUS–DP is optimized for fast, data transfer at the field level for time–critical applications.

The fieldbus is used for cyclic and non–cyclic data transfer between a master and the slaves assigned to this master.

Master and slave

For PROFIBUS–DP a differentiation is made between master and slave.

- Master (active bus device)

  Devices, which represent a master on the bus, define data transfer along the bus, and are therefore known as active bus nodes.

  For the masters, a differentiation is made between 2 classes:

  – DP Master Class 1 (DPMC1):
  This designates central master devices which exchange information with the slaves in a defined telegram cycle.
  Examples: SIMATIC S5, SIMATIC S7, etc.

  – DP Master Class 2 (DPMC2):
  These are devices to configure, commission, control and visualize with the bus operational.
  Examples: Programming units, operator control and visualization devices

- Slave (passive bus node)

  These devices may only receive, acknowledge and transfer messages to a master when so requested.

Reader’s note

The SIMODRIVE POSMO A positioning motor is a slave on the fieldbus. This slave is designated ”DP slave POSMO A” in the following.

Data transfer technology, baud rate

At power–up, the ”DP slave POSMO A” automatically detects the baud rate set on the fieldbus.

When commissioning the fieldbus, the baud rate is defined the **same for all devices** starting from the master.

Data transfer via PROFIBUS

Data is transferred between the master and slaves according to the master/slave principle. The drives are always the slaves.

This permits extremely fast cyclic data transfer.

Essential properties of bus communications

For SIMODRIVE POSMO A for communications via PROFIBUS, the following properties are involved:

Table 4-1 Essential properties of bus communications

Features	Which of these does the ”DP slave POSMO A” have?
Supports 9.6 kbaud	yes
Supports 19.2 kbaud	yes
Supports 45.45 kbaud	yes
Supports 93.75 kbaud	yes
Supports 187.5 kbaud	yes
Supports 500 kbaud	yes
Supports 1.5 Mbaud	yes
Supports 3 Mbaud	yes
Supports 6 Mbaud	yes
Supports 12 Mbaud	yes
Supports the FREEZE control command	yes
Supports the SYNC control command	yes
Supports automatic baud rate search	yes
Station number can be changed via software	no

Addressing

The PROFIBUS node address and the terminating resistor are permanently set in the connection cover of SIMODRIVE POSMO A.

—> Refer to Chapter 2.3.1

Protocols for the ”DP slave POSMO A”

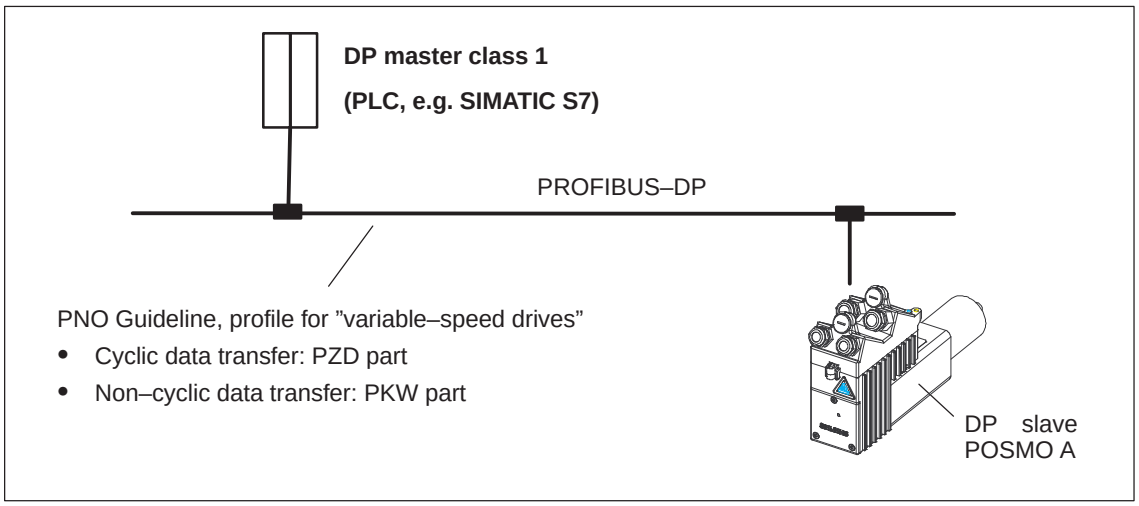


Fig. 4-1 Protocol for the ”DP slave POSMO A”

Net data structure according to PPOs

The structure of the net data for cyclic operation is designated in the ”PROFIBUS profile variable–speed drives” as parameter process data object (PPO).

Reference: /P3/ PROFIBUS
Profile for variable–speed drives

The net data structure for cyclic data transfer is sub–divided into two areas, which are transferred in each telegram.

- Process data area (PZD, process data)

  This area contains the control words, setpoints and status information and actual values.

  The following data is transferred with the process data:

  – Control words and setpoints (task: master —> drive)

    or

  – Status words and actual values (responses: drive —> master)

  Description: —> refer to Chapter 4.2

- Parameter area (PKW, parameter identification value)

  This telegram section is used to read and/or write parameters and to read out faults.

  Description: —> refer to Chapter 4.3

Telegram structure for cyclic data transfer

The telegrams for cyclic data transfer have the following basic structure:

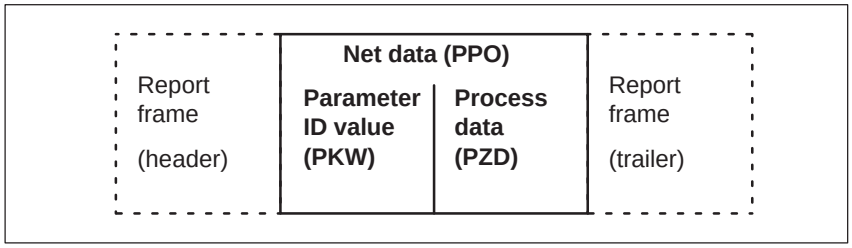


Fig. 4-2 Telegram structure for cyclic data transfer

PPO types

There are 5 defined PPO types (PPO1 to PPO5).

For SIMODRIVE POSMO A, only PPO type 1 (PPO1) can be used.

PPO1 is structured as follows:

- 4 words for the parameter area (PKW area)
- 2 words for the process data area (PZD area)

Table 4-2 Structure of Parameter Process Data Object 1 (PPO 1)

	Net data						
	PKW • Refer to Chapter 4.3				**PZD** • Refer to Chapter 4.2		
	PKE	IND	PWE		PZD 1	PZD 2	...
	1st word	2nd word	3rd word	4th word	1st word	2nd word	...
PPO1							...

Abbreviations:

PPO	Parameter Process data Object
PKW	Parameter ID value
PKE	Parameter ID
IND	Sub–index, sub–parameter number, array index
PWE	Parameter value
PZD	Process data

4.2 Process data (PZD area)

Configuration The process data area for PPO type 1 consists of 2 words (PZD 1 and PZD 2).

Table 4-3 Structure of the process data (PZD)

	Net data						
	PKW • Refer to Chapter 4.3				PZD		
	PKE	IND	PWE		PZD 1	PZD 2	...
	1st word	2nd word	3rd word	4th word	1st word	2nd word	...
PPO1							...

"Positioning" mode (P700=2)

Bit	15 ... 0	15 ... 8	7 ... 0
Master –> slave **Control signals (refer to Chapter 4.2.1)**	Control word (STW)	Selection block number (AnwSatz)	Start byte (STB)
Master <– slave **Status signals (refer to Chapter 4.2.2)**	Status word (ZSW)	Actual block number (AktSatz)	Checkback signal byte (RMB)

"Speed setpoint" mode (P700=1)

Bit	15 ... 0	15 ... 0
Master –> slave **Control signals (refer to Chapter 4.2.1)**	Control word (STW)	Speed setpoint, bits 0...14, sign, bit 15
Master <– slave **Status signals (refer to Chapter 4.2.2)**	Status word (ZSW)	Speed actual value, bits 0...14, sign, bit 15

Abbreviations:

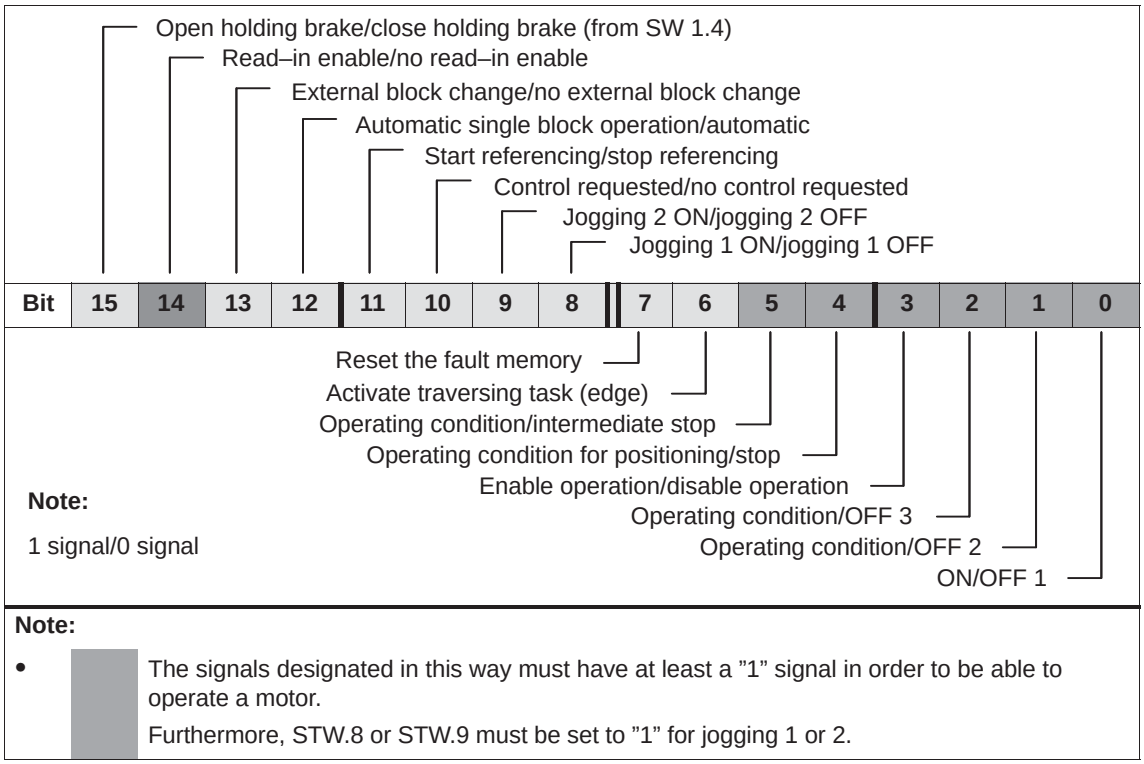
PKW	Parameter ID value	STW	Control word
PZD	Process data	AnwSatz	Select block number
PPO	Parameter Process data Object	STB	Start byte
		ZSW	Status word
		AktSatz	Actual block number
		RMB	Checkback signal byte

4.2.1 Description of the control signals (data to drive)

Control word (STW) (pos mode)

The master issues its commands to the slave using the control word (STW).

Table 4-4 Structure of control word STW for the pos mode



Note:

- The signals designated in this way must have at least a ”1” signal in order to be able to operate a motor.
  Furthermore, STW.8 or STW.9 must be set to ”1” for jogging 1 or 2.

Table 4-5 Description of the individual signals in the control word (STW) for the pos mode

Bit	Signal name	Signal status, signal description	
0	ON/OFF 1	1	ON Ready
		0	OFF 1 Shutdown, decelerating along the down ramp, power disconnected, tracking operation.
1	Operating condition/OFF 2	1	Operating Condition Ready
		0	OFF 2 The power is disconnected and the motor coasts down, power–on inhibit

Table 4-5 Description of the individual signals in the control word (STW) for the pos mode

Bit	Signal name	Signal status, signal description	
2	Operating condition/OFF 3	1	Operating Condition Ready
		0	OFF 3 Deceleration along the current limit, power disconnected from the motor, tracking operation, power–on inhibit
3	Enable operation/ inhibit operation	1	Enable operation Ready
		0	Inhibit operation Power disconnected from the motor, motor coasts down, ”operation inhibited” status
4	Operating condition for program/stop	1	Operating condition for program The signal must be continuously present in order to execute a traversing task.
		0	Stop Deceleration along the current limit. The motor remains stationary with the holding torque. The actual traversing task is rejected.
5	Operating condition for program/intermediate stop	1	Operating condition for program The signal must be continuously present in order to execute a traversing task.
		0	Intermediate stop The drive brakes from an active traversing task along the ramp to n = 0 and then remains stationary with the holding torque. The traversing task is not rejected. For a change to bit 5 = 1, the traversing task is continued.
6	Activate traversing task (edge)	1/0	Each edge enables a traversing task or a new setpoint (toggle bit). An edge change may only be realized if bit 12 of the status word is used to acknowledge that the previous traversing task was accepted. A program start is valid as a traversing task.
		0/1	
7	Reset the fault memory	1	Acknowledge faults (0/1 edge) Refer to Chapter 6.2
		0	–
8	Jogging 1 ON/jogging 1 OFF	1	Jogging 1 ON If operation is enabled and positioning is not active —> the drive traverses closed–loop speed controlled with jogging setpoint 1. —> Refer to Chapter 5.4.1
		0	Jogging 1 OFF

Table 4-5 Description of the individual signals in the control word (STW) for the pos mode

Bit	Signal name	Signal status, signal description	
9	Jogging 2 ON/jogging 2 OFF	1	Jogging 2 ON If operation is enabled and positioning is not active —> the drive traverses closed–loop speed controlled with jogging setpoint 2. —> Refer to Chapter 5.4.1
		0	Jogging 2 OFF
10	Control from PLC requested	1	Not used or permanent 1 signal From SW 3.0: If P701 = 1 —> process data (PZD) are accepted
		0	– From SW 3.0: If P701 = 1 —> drive state is kept constant (last valid process data with STW.10 = 1)
11	Start referencing/ stop referencing	1	Referencing is executed Prerequisite: Operation enabled
		0	Normal operation
12	Automatic single block operation/automatic	1	Automatic single block operation Disables programmed path controlled operation. Each block has to be re–started.
		0	Automatic Programmed path controlled operation is effective.
13	External block change/ No external block change	1	External block change The active block is interrupted and the subsequent block is selected. This is realized, dependent on the program, with approximate positioning or precise stop. When the block change is recognized, the position actual value of the axis is written into P55 (signal position).
		0	No external block change
14	Read–in enable/ no read–in enable	1	Read–in enable The following program block is enabled for execution.
		0	No read–in enable
15	Open holding brake/ brake sequence control effective (from SW 1.4)	1	Open holding brake The integrated holding brake can be controlled using this signal. The signal corresponds to P56.4 (open holding brake). **Note:** If the holding brake is controlled using an input terminal with function number 26 (open holding brake), then this signal has no effect. —> Refer to Chapter 5.5.13
		0	Brake sequence control effective

Selection block number (AnwSatz)

The master selects the traversing block to be started by entering the required block number into this control byte.

The selection becomes effective, if:

- If neither a traversing block nor program is active.
- The program or the traversing block has been completely executed.
- The program or the traversing block was canceled by an external signal or a fault.

Start byte (STB)

The start byte is compared with a bit mask ”SMStart” (P86:x) programmed in a traversing block.

This means that the program sequence can be influenced via the start byte.

- P86:x (high byte) = 0: If there is no function

  The block is not influenced by the start byte.

- P86:x (high byte) > 0: Function available

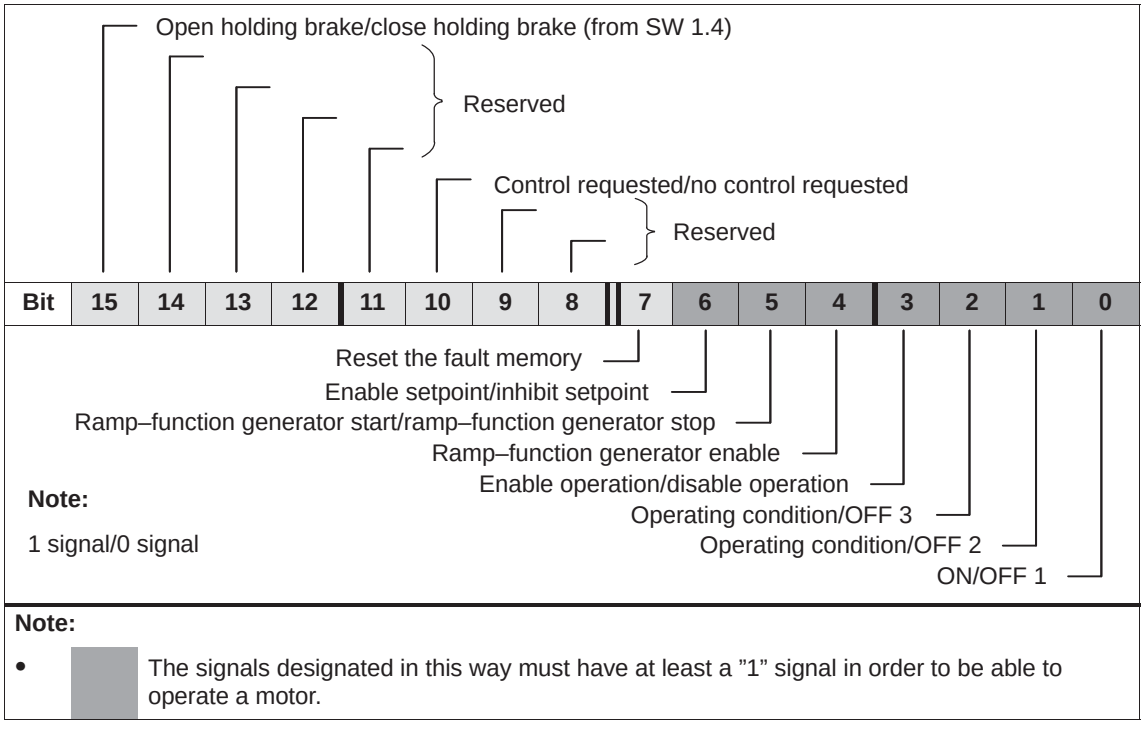
  The block can only be started if the bits, set in P86:x (high byte), are also set in the start byte.

  The program control can be additionally influenced via P80:x bit 6 and bit 7.

Control word (STW) (n–set mode)

The master issues its commands to the slave using control word STW.

Table 4-6 Structure of the control word (STW) for the n–set mode



Note:

- The signals designated in this way must have at least a ”1” signal in order to be able to operate a motor.

Table 4-7 Description of the individual signals in the control word (STW) for the n–set mode

Bit	Signal name	Signal status, signal description	
0	ON/OFF 1	1	ON Ready
		0	OFF 1 Shutdown, decelerating along the down ramp, power disconnected, tracking operation.
1	Operating condition/OFF 2	1	Operating Condition Ready
		0	OFF 2 The power is disconnected and the motor coasts down, power–on inhibit
2	Operating condition/OFF 3	1	Operating Condition Ready
		0	OFF 3 Deceleration along the current limit, power disconnected from the motor, tracking operation, power–on inhibit
3	Enable operation/ inhibit operation	1	Enable operation Ready
		0	Inhibit operation Power disconnected from the motor, motor coasts down, ”operation inhibited” status
4	Ramp–function generator enable	1	Enables the ramp–function generator The motor accelerates to the speed setpoint along the parameterized ramp
		0	• Standstill The motor does not accelerate up to its speed setpoint • During motion, motor brakes with the maximum deceleration
5	Ramp–function generator start/ramp–function generator stop	1	Motor accelerates corresponding to the parameterized ramp
		0	The speed is kept at the actual value
6	Enable setpoint/ inhibit setpoint	0/1	Setpoint enable (acceleration along the ramp)
		1/0	Setpoint inhibit • No ramp–up at standstill • During motion, motor brakes along the ramp
7	Reset the fault memory	1	Acknowledge faults (0/1 edge) Refer to Chapter 6.2
		0	–
8, 9	Reserved		

Table 4-7 Description of the individual signals in the control word (STW) for the n–set mode, continued

Bit	Signal name	Signal status, signal description	
10	Control from PLC requested	1	Not used or permanent 1 signal From SW 3.0: If P701 = 1 —> process data (PZD) are accepted
		0	– From SW 3.0: If P701 = 1 —> drive state is kept constant (last valid process data with STW.10 = 1)
11 to 14	Reserved		
15	Open holding brake/ brake sequence control effective (from SW 1.4)	1	Open holding brake The integrated holding brake can be controlled using this signal. The signal corresponds to P56.4 (open holding brake). **Note:** If the holding brake is controlled using an input terminal with function number 26 (open holding brake), then this signal has no effect. —> Refer to Chapter 5.5.13
		0	Brake sequence control effective

4.2.2 Description of the status signals (data from the drive)

Status word (ZSW) (pos mode) The slave signals its current status to the master using the status word (ZSW).

Table 4-8 Structure of the status word (ZSW) in the pos mode

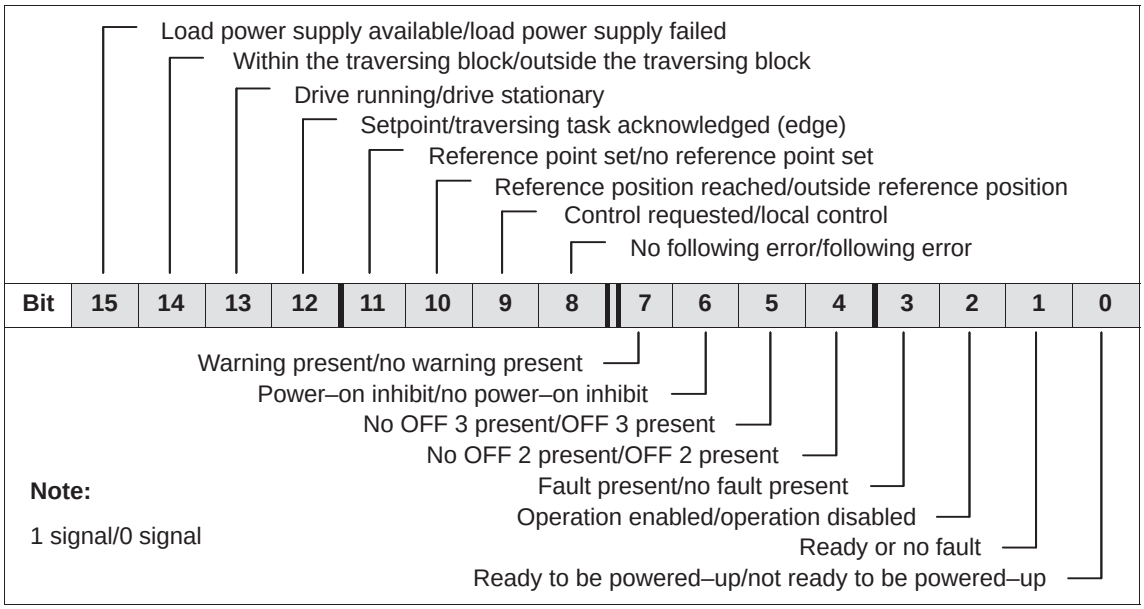


Table 4-9 Description of the individual signals in the status word (ZSW) in the pos mode

Bit	Signal name	Signal status, signal description	
0	Ready to power–up/ not ready to power–up	1	Power supply powered–up
		0	Not ready to power up
1	Ready or no fault	1	Ready
		0	Not ready
2	Operation enabled/ operation inhibited	1	Operation enabled
		0	Operation inhibited
3	Fault present/ No fault present (refer to Chapter 6.2)	1	Drive is faulty and not operational. The drive goes to switch–on disable after the fault has been successfully removed and acknowledged. Which faults are present? —> refer to P947 (faults) and —> P954 (supplementary information, faults/warnings)
		0	No fault present
4	No OFF 2 present/ OFF 2 present	1	No OFF 2 present
		0	OFF 2 command present

Table 4-9 Description of the individual signals in the status word (ZSW) in the pos mode, continued

Bit	Signal name	Signal status, signal description	
5	No OFF 3 present/ OFF 3 present	1	No OFF 3 present
		0	OFF 3 command present
6	Power–on inhibit/ No power–on inhibit	1	Power–on inhibit The system can only be powered–up using ”OFF 1” followed by ”ON”.
		0	No power–on inhibit
7	Warning present/ Warning not present (refer to Chapter 6.2)	1	Warning present The drive still remains operational. Acknowledgment is not required. Which warning is present? —> refer to P953 (warnings) and —> P954 (supplementary information, faults/warnings)
		0	Warning not present
8	No following error/following error	1	No following error The dynamic target (reference) actual position comparison is made within the defined following error window. The following error window is defined using P12 (maximum following error) (refer to Chapter 5.6.2).
		0	Following error
9	Control requested/ local control (from SW 1.4)	1	Master, Class 1
		0	No master Class 1 (but master, Class 2) **Note:** Before SW 1.4 the following applies: The signal is not supported (a permanent ”1” signal).
10	Reference position reached/ Outside the ref. position	1	Reference position reached Before SW 1.6 the following applies: • The position reference value is located at the end of a traversing task within the positioning window. • The traversing task was interrupted by a fault, stop or OFF commands. From SW 1.6, the following applies: The behavior is dependent on P56, bit 3: • P56.3=1 – The position reference value is located at the end of a traversing task within the positioning window. • P56.3=0 – The position reference value is located at the end of a traversing task within the positioning window. – The traversing task was interrupted by a fault, stop or OFF commands.
		0	Outside the ref. position
11	Reference point set/ no reference point set	1	Referencing was executed and is valid
		0	Valid reference not available

Table 4-9 Description of the individual signals in the status word (ZSW) in the pos mode, continued

Bit	Signal name	Signal status, signal description	
12	Setpoint/traversing task acknowledged (edge)	1/0	An edge is used to acknowledge that a new traversing task or setpoint was transferred.
		0/1	Same signal level as STW.6 (activate traversing task (signal edge)).
13	Drive running/drive stationary	1	Traversing task is executed (n > 0) The drive is stationary after it reaches its target position.
		0	Signals the completion of a traversing task or standstill for intermediate stop and stop.
14	Within the traversing block/ outside the traversing block	1	Within the traversing block A traversing block is active.
		0	Outside the traversing block No traversing block is active.
15	Load power supply available/ load power supply failed	1	Load power supply available
		0	Load power supply failed This corresponds to the ”undervoltage” fault **Note:** When an undervoltage condition is detected, the appropriate fault is signaled and ZSW.15 is set to ”0”. • Before SW 1.3 the following applies: ZSW.15 is set to ”1”, if, when acknowledging the fault, an undervoltage condition is no longer detected. • From SW 1.3, the following applies: ZSW.15 is set to ”1” if an undervoltage condition is no longer detected. The fault itself remains until it is acknowledged. ZSW.15 indicates the status of the load power supply, independent of the fault and acknowledgment.

Actual block number (AktSatz)

The block number of the actual traversing block is entered into this status byte.

If no block is active, then the block number of the selected traversing block is signaled back, i.e. the block which should be the next block to be started.

Checkback signal byte (RMB)

The programmed block components ”MMStart”, ”MMStop” and ”MMPos” corresponding to the program sequence are output in this status byte.

This means that the master has information about programmed block for additional processing and evaluation.

Checkback signal (feedback) of the terminal status (from SW 1.4), refer to Chapter 5.5.10

- RMB.6 —> state of terminal 1
- RMB.7 —> state of terminal 2

Status word (ZSW) (n–set mode) The slave signals its current status to the master using the status word (ZSW).

Table 4-10 Structure of the status word (ZSW) for the n–set mode

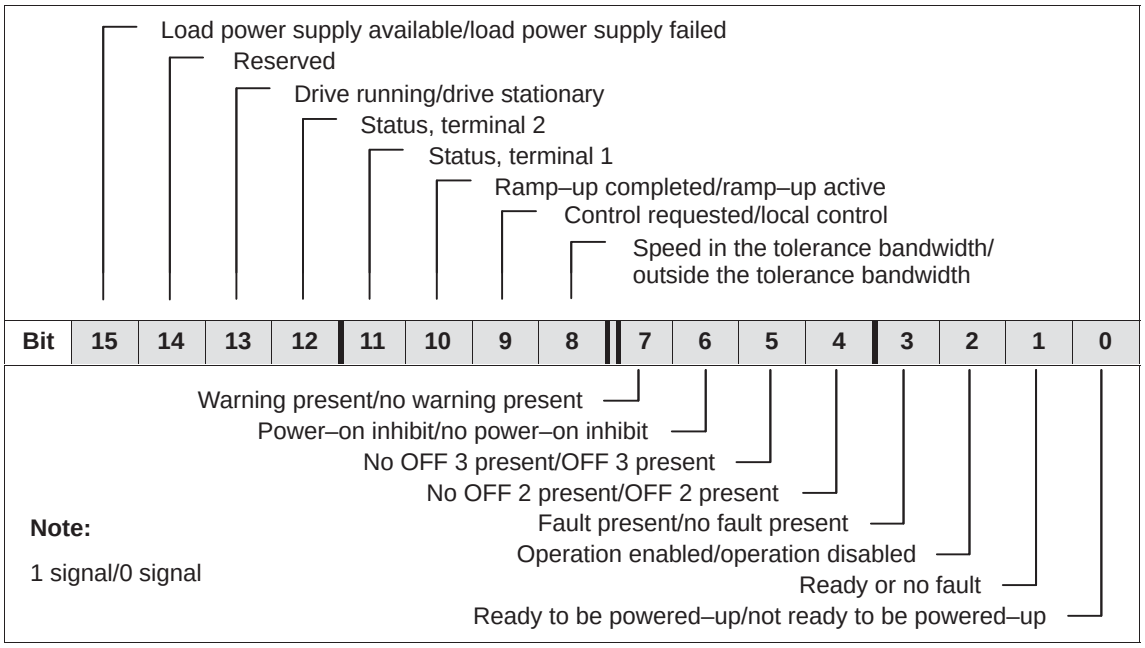


Table 4-11 Description of the signals in the status word (ZSW) for the n–set mode

Bit	Signal name	Signal status, signal description	
0	Ready to power–up/ not ready to power–up	1	Power supply powered–up
		0	Not ready to power up
1	Ready or no fault	1	Ready
		0	Not ready
2	Operation enabled/ operation inhibited	1	Operation enabled
		0	Operation inhibited
3	Fault present/ No fault present (refer to Chapter 6.2)	1	Drive is faulty and not operational. The drive goes to switch–on disable after the fault has been successfully removed and acknowledged. Which faults are present? —> refer to P947 (faults) and —> P954 (supplementary information, faults/warnings)
		0	No fault present
4	No OFF 2 present/ OFF 2 present	1	No OFF 2 present
		0	OFF 2 command present
5	No OFF 3 present/ OFF 3 present	1	No OFF 3 present
		0	OFF 3 command present

Table 4-11 Description of the signals in the status word (ZSW) for the n–set mode, continued

Bit	Signal name	Signal status, signal description	
6	Power–on inhibit/ No power–on inhibit	1	Power–on inhibit The system can only be powered–up using ”OFF 1” followed by ”ON”.
		0	No power–on inhibit
7	Warning present/ Warning not present (refer to Chapter 6.2)	1	Warning present The drive still remains operational. Acknowledgment is not required. Which warning is present? —> refer to P953 (warnings) and —> P954 (supplementary information, faults/warnings)
		0	Warning not present
8	Speed in the tolerance bandwidth/outside the tolerance bandwidth	1	Speed is within the parameterized tolerance window
		0	Speed is outside the parameterized tolerance window
9	Control requested/ local control (from SW 1.4)	1	Master, Class 1
		0	No master Class 1 (but master, Class 2) **Note:** Before SW 1.4 the following applies: The signal is not supported (a permanent ”1” signal).
10	Ramp–up completed/ ramp–up active	1	Ramp–up completed
		0	Ramp–up not completed
11	Status, terminal 1		Checkback signal from the parameterized terminal signals
12	Status, terminal 2		Checkback signal from the parameterized terminal signals
13	Drive running/drive stationary	1	Traversing task is executed ($n \geq 0$) The drive is stationary after it reaches its target position.
		0	Signals the completion of a traversing task or standstill for intermediate stop and stop.
14	Reserved		

Table 4-11 Description of the signals in the status word (ZSW) for the n–set mode, continued

Bit	Signal name	Signal status, signal description	
15	Load power supply available/ load power supply failed	1	Load power supply available
		0	Load power supply failed This corresponds to the ”undervoltage” fault **Note:** When an undervoltage condition is detected, the appropriate fault is signaled and ZSW.15 is set to ”0”. • Before SW 1.3 the following applies: ZSW.15 is set to ”1”, if, when acknowledging the fault, an undervoltage condition is no longer detected. • From SW 1.3, the following applies: ZSW.15 is set to ”1” if an undervoltage condition is no longer detected. The fault itself remains until it is acknowledged. ZSW.15 indicates the status of the load power supply, independent of the fault and acknowledgment.

4.2.3 Example: Operating the drive via the control signals with jogging 1

Example: Operating the drive with with jogging 1

The drive should be operated with jogging 1.

Assumptions for the slave:

- The drive has been completely commissioned, is connected to PROFIBUS–DP and is ready.
- PROFIBUS node address = 12

Assumptions for the master:

- The DP master is a SIMATIC S7 (CPU: S7–315–2–DP)
- Hardware configuration
  - PROFIBUS node address = 12
  - Part I address O address
    PKW 256 – 263 256 – 263 (not drawn in the example)
    PZD 264 – 267 264 – 267

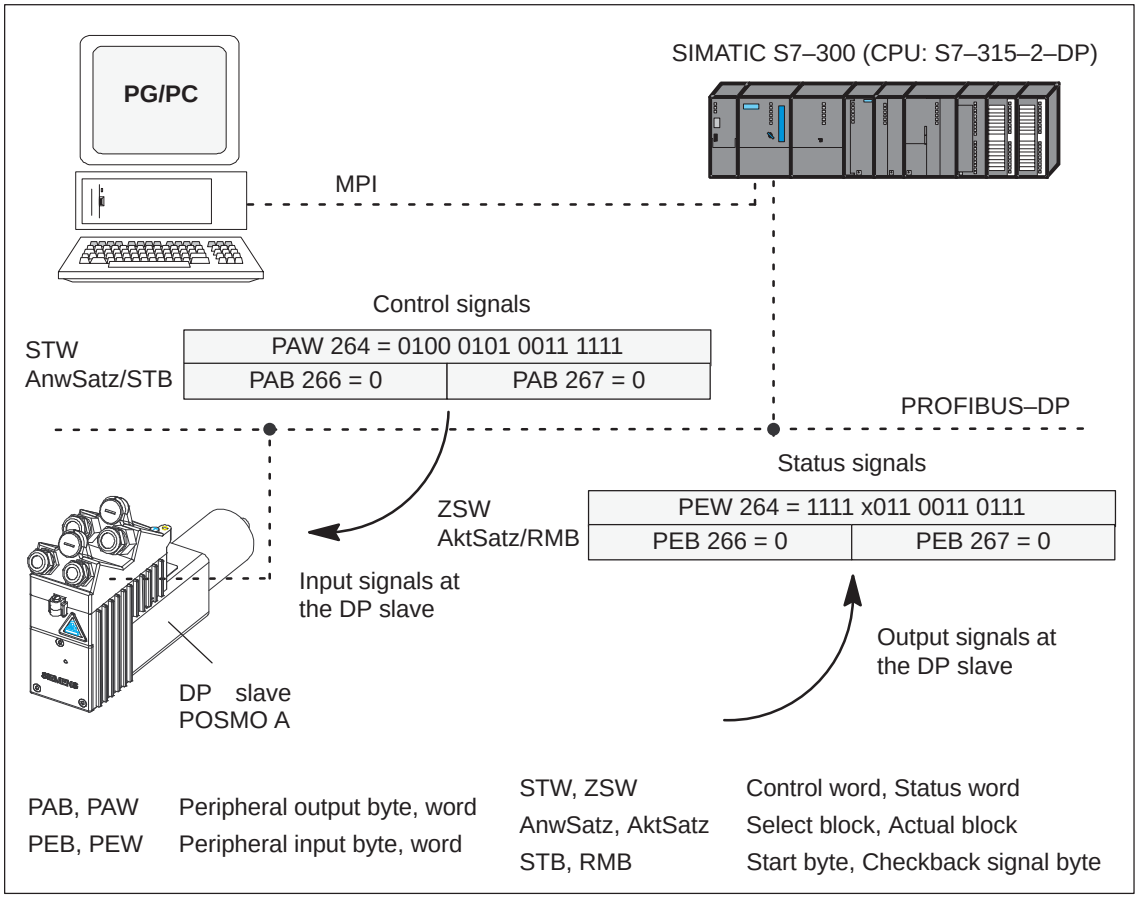


Fig. 4-3 Example: Operating the drive with jogging 1

4.2.4 Example: The drive should traverse with n–set using the control signals

Example: Operating the drive with n–set

The drive should be operated with n = 500 rpm (gearbox output) in n–set mode.

Assumptions for the slave:

- The drive has been completely commissioned, is connected to PROFIBUS–DP and is ready.
- PROFIBUS node address = 12

Assumptions for the master:

- The DP master is a SIMATIC S7 (CPU: S7–315–2–DP)
- Hardware configuration
  - PROFIBUS node address = 12
  - Part I address O address
    PKW 256 – 263 256 – 263 (not drawn in the example)
    PZD 264 – 267 264 – 267

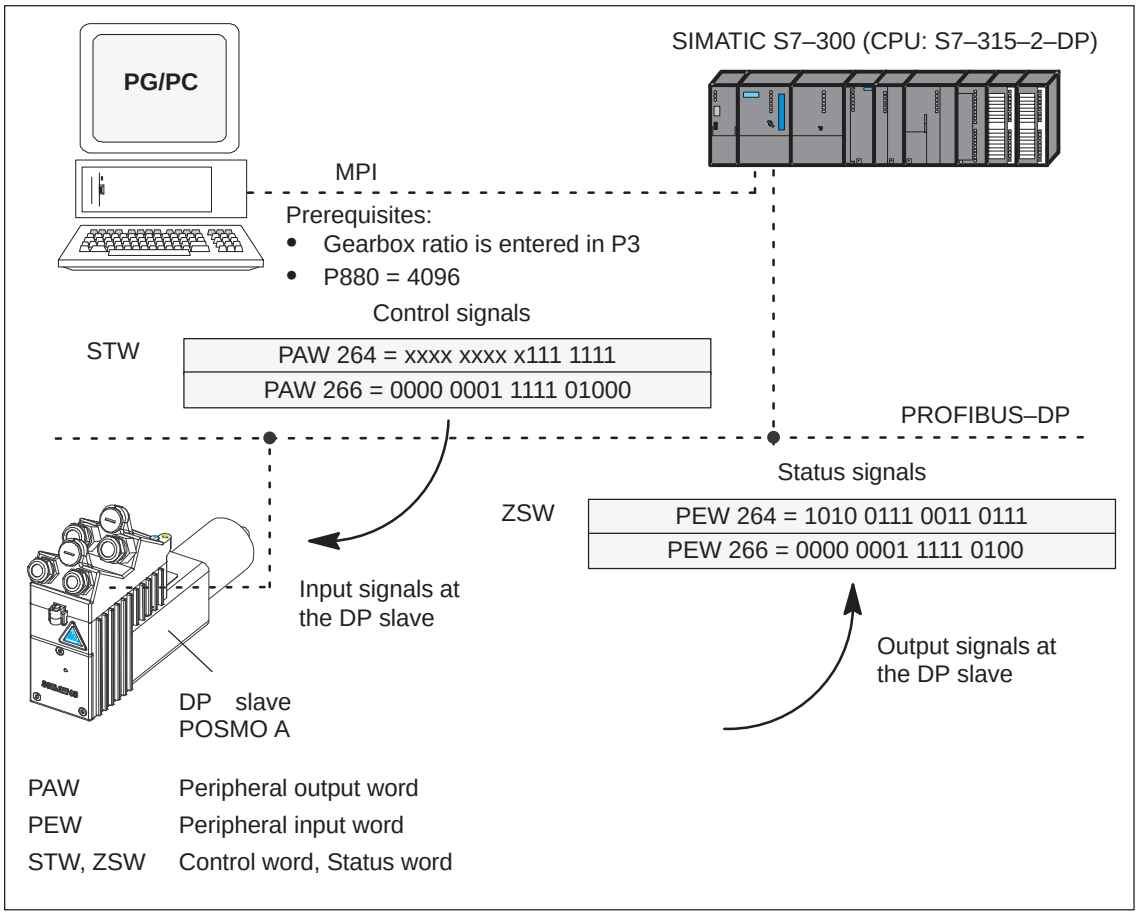


Fig. 4-4 Example: Drive should traverse with n–set

4.2.5 Sequence diagram ”Variable–speed drives”

pos mode

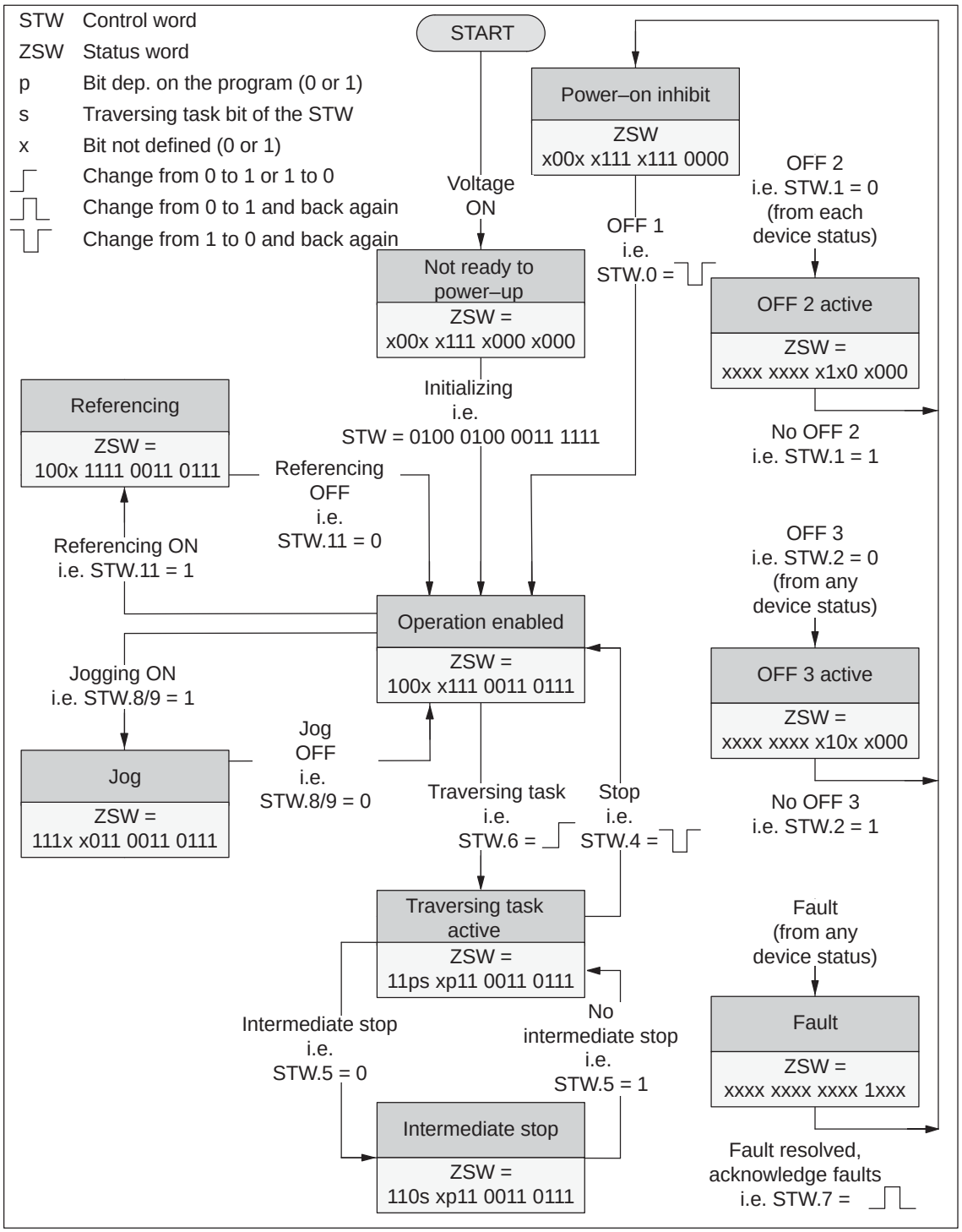


Fig. 4-5 Flow diagram, ”Variable–speed drives” for the pos mode

n–set operation

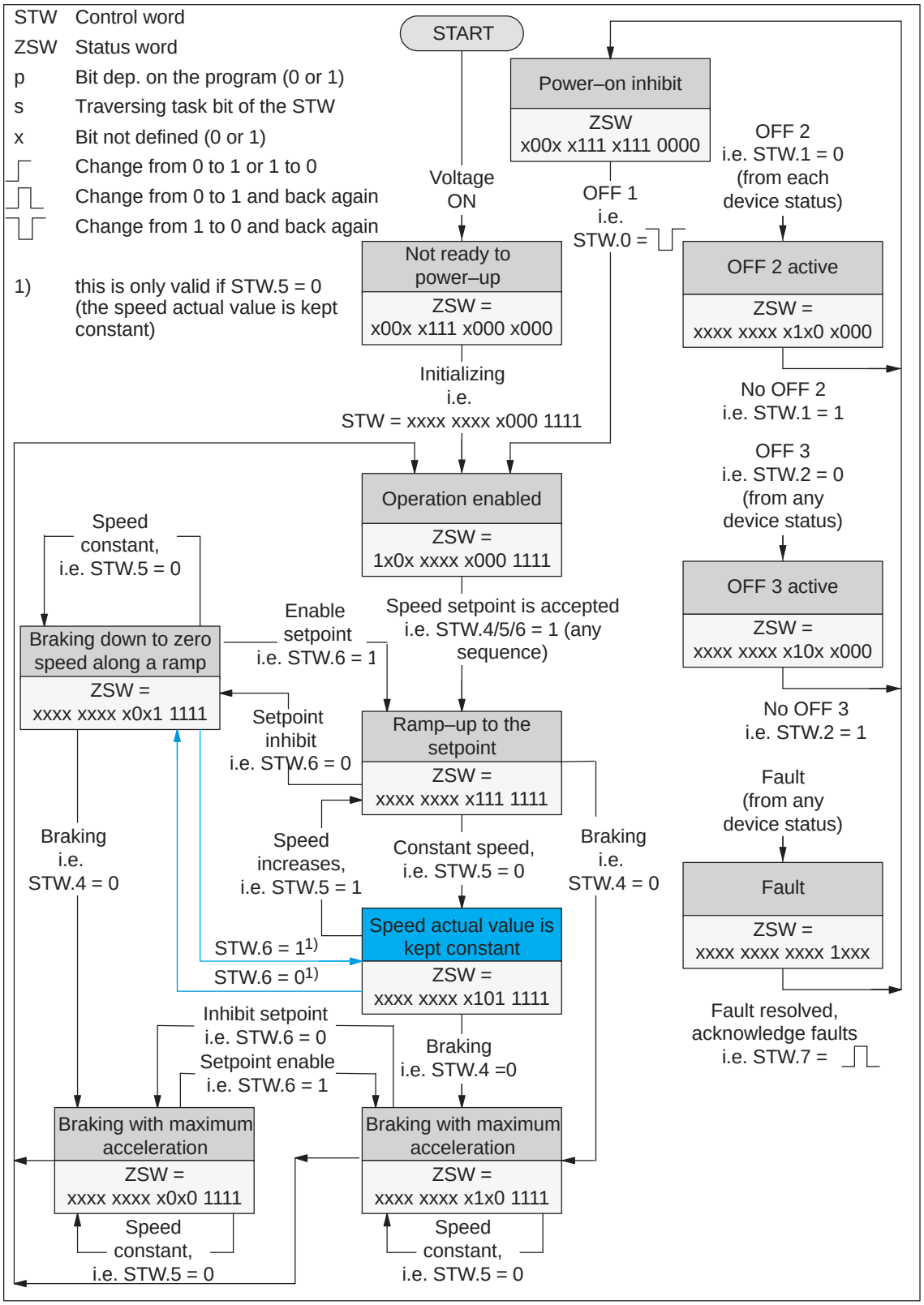


Fig. 4-6 Flow diagram ”Variable–speed drives” for the n–set mode

Note

The following conditions should be observed:

- Control word STW.4 has priority over STW.6
- Control words STW.4 and STW.6 have priority over STW.5

This means:

- If the drive brakes along the ramp, then when STW.4 is withdrawn, the drive brakes with the maximum deceleration.
- If STW.5 = 0, STW.4 and STW.6 brake according to how they are defined.
- If STW.5 is reset while braking, this does not mean that the speed is kept constant.

4.3 Parameter area (PKW area)

4.3.1 Structure and description of the parameter area

Tasks

For PPO Type 1 for the net data, a parameter with 4 words is also transferred.

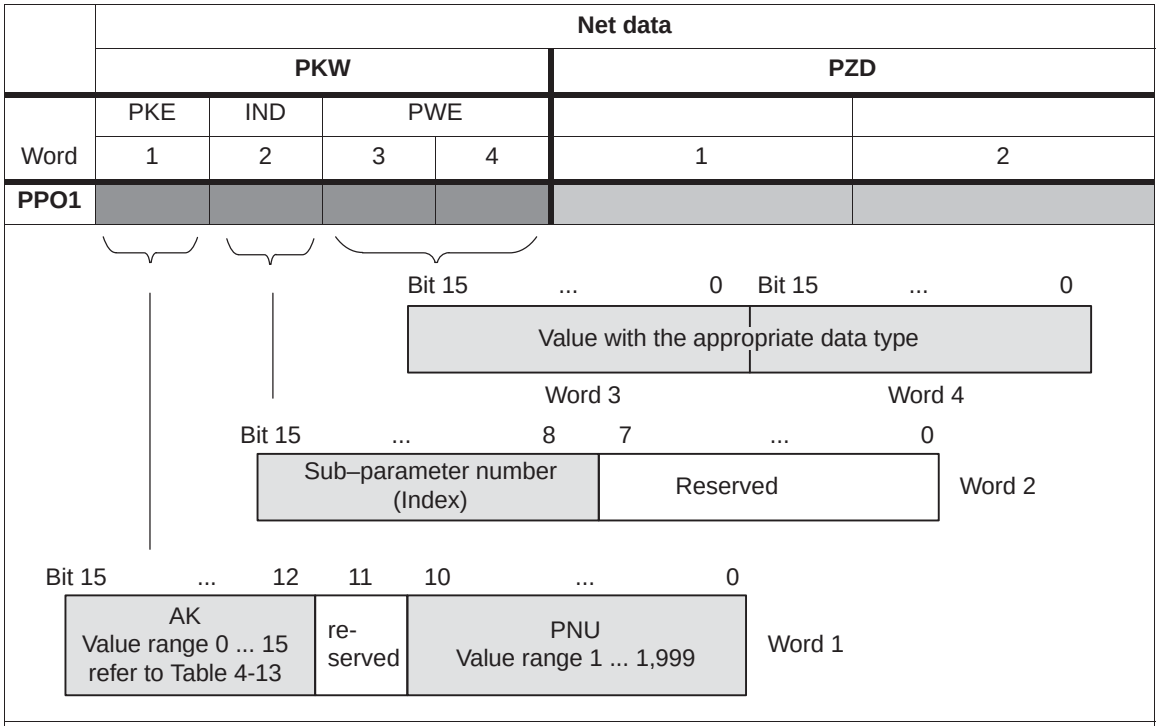
The following tasks are possible using the parameter range:

- Request parameter value (reading parameters)
- Change parameter value (writing into parameters)
- Request number of array elements

Structure of PKW area

The PKW area comprises the parameter ID (PKE), the sub–index (IND) and the parameter value (PWE).

Table 4-12 Structure of the parameter area (PKW)



Abbreviations:

PPO	Parameter Process data Object	PWE	Parameter value
PKW	Parameter ID value	PZD	Process data
PKE	Parameter ID	AK	Task and response ID
IND	Sub–index, sub–parameter number, array index	PNU	Parameter number

Task telegram, IDs

The IDs for the task telegram (master —> slave) should be taken from the following table 4-13:

Table 4-13 Task IDs (master —> slave)

Request identifier	Function	Response IDs (positive)
0	No task	0
1	Request parameter value	1, 2
2	Change parameter value (word)	1
3	Change parameter value (double word)	2
4, 5	–	–
6	Request parameter value (array)	4, 5
7	Change parameter value (array word)	4
8	Change parameter value (array double word)	5
9	Request number of array elements	6

Note:

- The negative response ID is 7,
  i.e. it is a task that cannot be executed
  —> error ID, refer to Table 4-15

Response telegram, IDs

The IDs for the response telegram (master —> slave) should be taken from the following table 4-14:

Table 4-14 Response IDs (slave —> master)

Response ID	Function
0	No response
1	Transfer parameter value (word)
2	Transfer parameter value (double word)
3	–
4	Transfer parameter value (array word)
5	Transfer parameter value (array double word)
6	Transfer number of array elements
7	Task cannot be executed (with error number)
8, 9 and 10	–

Fault evaluation

If tasks cannot be executed, the slave responds as follows:

- Outputs a response ID = 7
- Outputs an error number in word 4 of the parameter area

Table 4-15 Error IDs for the ”DP slave POSMO A”

Error identifier	Error cause
0	Illegal parameter number (the parameter does not exist)
1	Parameter value cannot be changed (Parameter can only be read or is write protected)
2	Upper or lower value limit exceeded
3	Incorrect sub–index
4	No array (parameter does not have any sub–parameter)
5	Incorrect data type
9	Description data not available
17	Request cannot be executed due to operating status
18	Other error

Data types

The data type, to which the parameter is assigned, must be written into the parameter values using the PKW mechanism.

The following apply for the format names (acc. to the recommended PROFIBUS guideline):

Table 4-16 Parameter formats

Format	Length (byte)	Description
C4	4	Fixed–point value, 32 bit with 4 decimal places (value = number/10 000) Example: P11 = 75 000 —> 7.5 mm
I4	4	32–bit integer number (32–bit integer)
I2	2	16–bit integer number (16–bit integer)
T4	4	32–bit time constant (as for unsigned 32–bit integer) Time as a multiple of the sampling time of 10 ms
T2	2	16–bit time constant (as for unsigned 16–bit integer) Time is entered as a multiple of the sampling time Speed control = 1 ms, position control = 10 ms
OC2	2	Linear normalized value ±200 %: 100 % ≙ $4\,000_{hex}$ ($16\,384_{dec}$)
E2	2	Linear fixed–point value, 16 bit with 7 binary decimal places 0 ≙ $0_{hex,}$ 128 ≙ $4\,000_{hex}$
V2	2	Bit sequence 16 Boolean quantities combined in 2 octets

Note

All data are saved in the little Endian format (the same as for the PROFIBUS Standard).

Transferring traversing blocks

For SIMODRIVE POSMO A the traversing blocks are saved in parameters which means that they can only be read and changed via the PKW mechanism.

Reader's note

The parameters for the traversing blocks are described in Chapter 5.3.2.

When mapping the traversing blocks to the parameters, the parameter number defines the block components (position, velocity, etc.) and the sub–parameter number of the traversing block number.

Example: P81.17 —> position, parameter 81 with traversing block 17

Addressing in the PKW mechanism:

- The parameter ID (PKE) addresses the block components.
- The sub–index (IND) addresses the traversing block number

This means that a complete set can only be read or changed one after the other via the individual components.

Additionally:

1. Machine data is mapped to the parameters
2. Additional parameters (e.g. P947, P953, etc.) are possible from the PROFIBUS Guidelines.

Rules for the task/response processing

The following rules apply for the task/response processing:

1. A task or a response can always only be referred to one parameter.
2. The master must repeat a task until it has received the appropriate response from the slave (clock cycle: 10 ms).
3. The slave provides the response until the master has formulated a new task.
4. The master recognize the response to a task which it issued:
   – by evaluating the response ID
   – by evaluating the parameter number (PNU)
   – if required, by evaluating the parameter index (IND)
5. For response telegrams that contain parameter values, the slave, for this cyclic repeat process, always responds with the updated value.

   This involves all responses to the tasks ”request parameter value” and ”request parameter value (array)”.

Note

The time between sending a change task and when the change actually becomes effective is not always the same. No maximum times can be guaranteed!

The response times of the PKW channel depend on the utilization level of the field bus.

4.3.2 Example: Reading parameters via PROFIBUS

Example: Reading parameters via PROFIBUS

It at least one fault is present, the drive fault buffer (P947) should be read out and buffered on the master side.

Assumptions for the slave:

- The drive has been completely commissioned, is connected to PROFIBUS–DP and is ready.
- PROFIBUS node address = 12

Assumptions for the master:

- The DP master is a SIMATIC S7 (CPU: S7–315–2–DP)
- Hardware configuration
  - Node address = 12
  - Part I address O address
    PKW 256 – 263 256 – 263
    PZD 264 – 267 264 – 267 (not drawn in the example)

What has to be programmed on the master side?

If the input signal from the peripheral area (I/O area) I265.3 (ZSW1.3, fault present/no fault present) has a ”1” signal, then the following must be executed on the master side (refer to Fig.4-7):

1. Programming SFC14 and SFC15

   The standard functions SFC14 ”Read slave data” and SFC15 ”write slave data” are required in order to consistently transfer more than 4 bytes.

2. Request parameter value
   - Write into the PKW output signals (AB 256 – 263)
     with
     AK = 1, PNU = 947, IND = 0, PWE = no significance

3. Read parameter value and save
   - Evaluate the PKW input signals (EB 256 – 263)
   - If AK = 1, PNU = 947, IND = 0 and PWE = xx
     —> then O. K.
     —> read P947 = xx and buffer
   - If AK = 7,
     —> then not O. K.
     —> evaluate the fault number in EW 262
     (refer to Table 4-15)

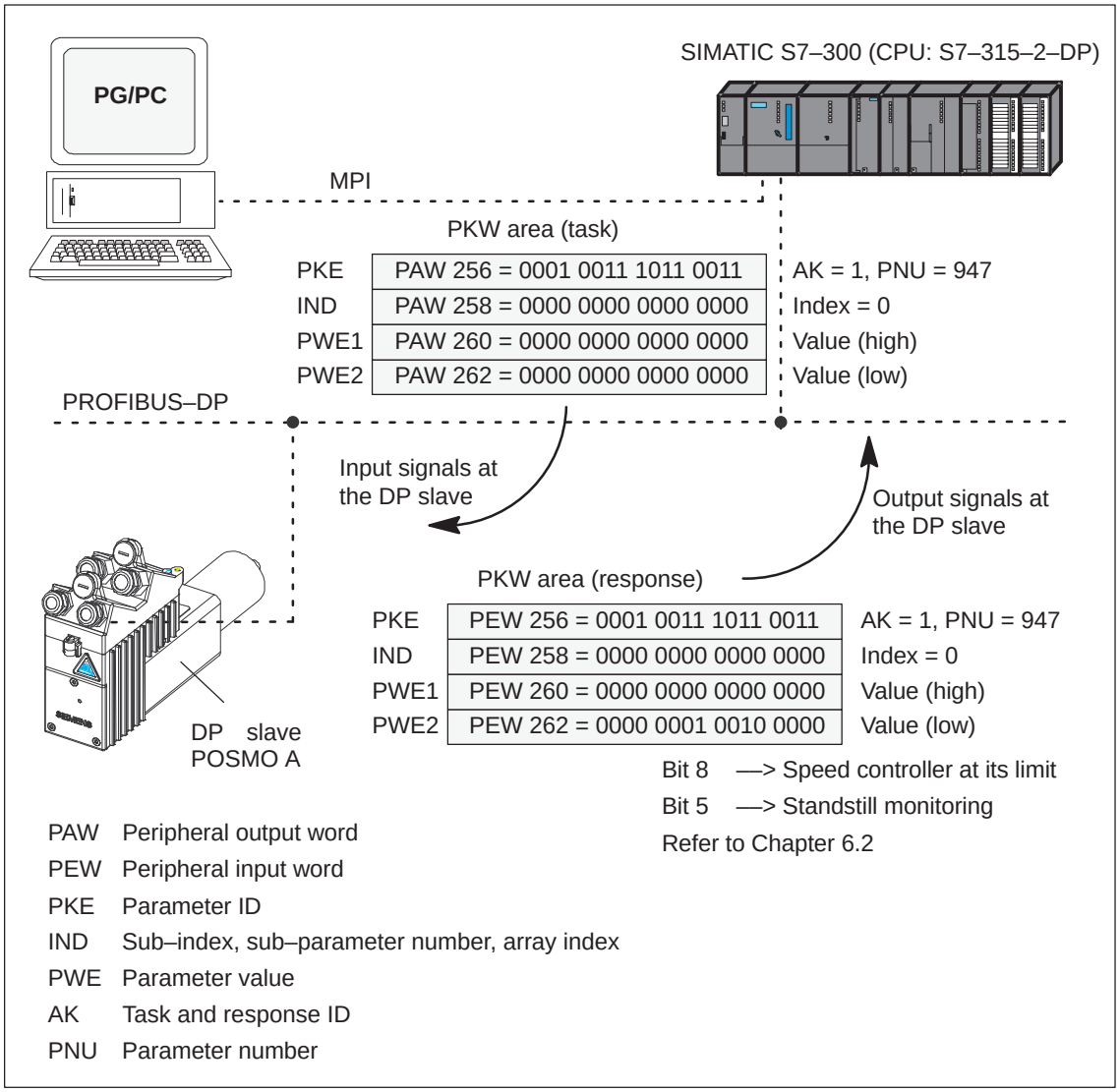


Fig. 4-7 Example: Reading parameters via PROFIBUS

Note

The SIMATIC S7 ”FB 11” block can be used to ”Read parameters via PROFIBUS”.

—> Refer to Chapter 3.2.2

4.3.3 Example: Writing parameters via PROFIBUS

Example: Writing parameters via PROFIBUS

Dependent on a condition, a value of 786.5 mm should be written into the position in traversing block 4 (P81:4) via PROFIBUS.

Assumptions for the slave:

- The drive has been completely commissioned, is connected to PROFIBUS–DP and is ready.
- PROFIBUS node address = 12

Assumptions for the master:

- The DP master is a SIMATIC S7 (CPU: S7–315–2–DP)
- Hardware configuration
  - Node address = 12
  - Part I address O address
    PKW 256 – 263 256 – 263
    PZD 264 – 267 264 – 267 (not drawn in the example)

What has to be programmed on the master side?

If the condition to write the position is present in traversing block 4, then the following must be executed on the master side (refer to Fig. 4-8):

1. Write the parameter value (define task)
   - Write into the PKW output signals (AB 256 – 263) with AK = 8, PNU = 81, IND = 4, PWE = 7 865 000_{dec} = 78 02 $A8_{hex}$
2. Check the task
   - Evaluate the PKW input signals (EB 256 – 263)
   - If AK = 5, PNU = 81, IND = 4 and PWE = 7 865 000_{dec}
     —> then O. K.
   - If AK = 7,
     —> then not O. K.
     —> evaluate the fault number in EW 262 (refer to Table 4-15)

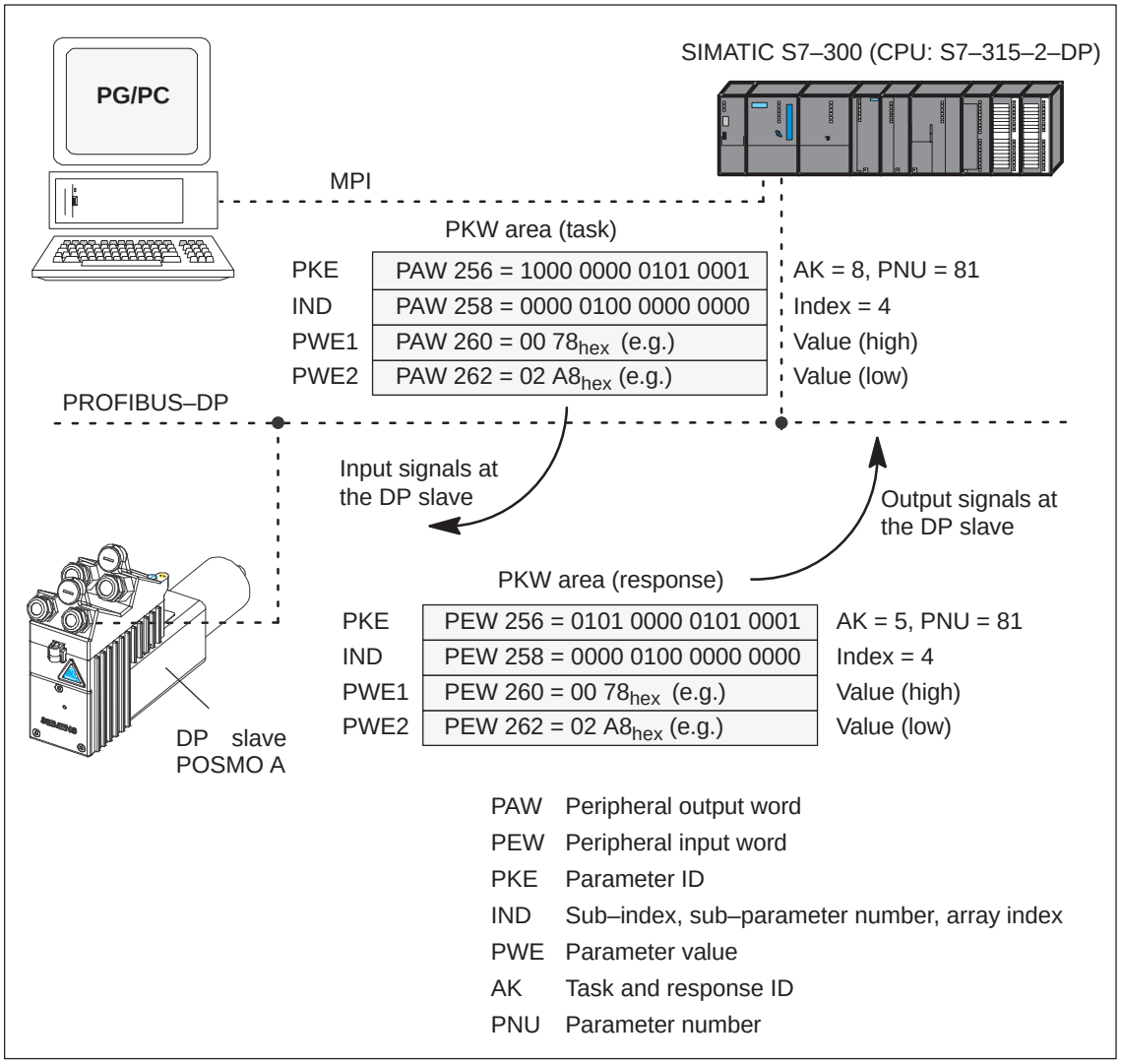


Fig. 4-8 Example: Writing parameters via PROFIBUS

Note

The SIMATIC S7 ”FB 11” block can be used to ”write parameters via PROFIBUS”.

—> Refer to Chapter 3.2.2

4.4 Settings at the PROFIBUS–DP master

4.4.1 General information on the DP master

Performance features of PROFIBUS devices

PROFIBUS devices have different performance features.

The characteristic features of the slaves are summarized in a master device file (GSD) so that all of the master systems can correctly address the DP slave.

The features for the various master systems are summarized in a standardized master device file (GSD).

What is a master device file (GSD file)?

A master device (GSD file) describes the features of a DP slave in a precisely defined, uniform format in accordance with EN 50 170, Volume 2, PROFIBUS.

GSD files are saved in the directory ”\GSD”.

The associated bitmaps are saved in the directory ”\Bitmaps”.

GSD file for ”DP slave POSMO A”

The master device file (GSD) for the ”DP slave POSMO A” is available as ASCII file as follows:

File name: SIEM8054.GSD

Where is the GSD file for the ”DP slave POSMO A”?

From your local Siemens office (sales partner)
or
via the Internet http://www.profibus.com/products/gsd–files/

Data transfer consistent/ inconsistent

The PKW must be consistently transferred.

Consistent data include input/output data areas, which from the contents, contain closed information which cannot be accommodated using a byte, word or double–word structure.

For consistent data transfer, you require the SFC 14 and SFC 15 blocks in SIMATIC S7.

Setting up consistent data transfer (e.g. for SIMATIC S7)

Proceed as follows to generate the required user program for consistent data transfer:

- Open ”OB1” (object folder).
- In the Program Editor, enter the ”CALL SFC 14” command and press the RETURN key. The SCF 14 is displayed with its input and output parameters.

  Initialize the input and output parameters. Now, call SFC 15 and initialize the parameters, accordingly.
  When the two SFCs are called–up, the associated block shells for these standard functions are automatically copied into the block object folder from the STEP 7 standard library.
- In order to be able to simply check the data transfer in the application example, allocate the data, as shown in the example, to an appropriate data block.
- Now save OB 1 with save and close the window of the program editor for the OB 1.

  Now create DB 40. Using the task bar, change from Windows to the SIMATIC Manager and select the blocks object folder. The block objects, system data, OB 1, DB 40, SFC 14 and SCF 15 are in this object folder.
- Transfer these with ”download all blocks” into the CPU 315–2DP.
- After the transfer has been completed, the CPU 315–2DP must be switched back to RUN.

  If the motor is connected, the LED display elements for the DP interface are dark. The CPU must be in the RUN condition.

4.4.2 Installing the new master device files (GSD)

Installing a new GSD file?

When configuring a PROFIBUS–DP system where DP devices are to be incorporated, which the configuring tool does not ”know” then the new GSD files must be appropriately installed.

How is a new GSD file installed with SIMATIC S7?

New GSD files are installed in ”HW Config” as follows:

TOOLS —> Installing new GSD file

Station GSD importing

All of the GSD files of DP devices of a plant/system are saved in the project (e.g. for SIMATIC S7).

This means that it is always possible to edit this project using an additional configuring/engineering tool, to which the project was transferred – even if the GSD files for the DP devices to be used have still not been installed on this device.

GSD files that are only saved in existing projects, but not in the general GSD directory, are transferred into the generally valid GSD directory using GSD import. This means that they can be used for additional new projects.

4.4.3 Operating the slave with a third–party master

GSD file required

The master device data (GSD file) supplied with the equipment contains all of the information/data that a DP master system requires in order to incorporate SIMODRIVE POSMO A as DP standard slave in its PROFIBUS configuration.

If the third–party master system allows a GSD file to be directly incorporated, then the file for the DP slave can be directly copied into the appropriate sub–directory.

■

Description of the Functions

5

5.1 Operating mode (from SW 2.0)

SIMODRIVE POSMO A can be either parameterized in the ”positioning” or ”speed setpoint” mode. Mixed operation is not supported.

Speed setpoint (P700 = 1) (from SW 2.0)

In the ”speed setpoint” mode (n–set mode) a speed setpoint can be entered via PROFIBUS–DP; the speed is then controlled to this speed setpoint at the gearbox output.

Note

In this particular operating mode, only modulo axes (P1 > 0) are permissible. Software limit switches cannot be activated.

The following functions are possible in the ”speed setpoint” mode:

- Rotary axis
- Jerk limitation
- Changeover, metric/inch
- Control sense reversal
- Digital I/O
- Holding brake
- Speed setpoint, interface
- Hardware limit switches

Reader’s note

Information on the various functions, refer to Chapter 5.

Positioning (P700 = 2)

In the ”positioning” mode (pos mode), 27 archived traversing blocks can be traversed in the drive.

The traversing blocks offer various possibilities for the block change enable (P80, P81) and the positioning type (P80.1: Relative or absolute).

The following functions are possible in the ”positioning” mode:

- Referencing
- Flying measurement/actual value setting (from SW 1.4)
- Travel to fixed stop
- Linear/rotary axis
- Backlash compensation and correction direction (from SW 1.4)
- Jerk limitation
- Changeover, metric/inch
- Reversing the control sense (from SW 1.3)
- Zero speed monitoring
- Digital I/O
- Jogging without PROFIBUS and parameterization (from SW 1.4)
- Standalone mode (without bus communication) (from SW 1.2)
- Holding brake (from SW 1.4)
- Software limit switch
- Hardware limit switch (from SW 2.0)

Note

The factory setting is the ”positioning” mode!

Reader’s note

Information on the various functions, refer to Chapter 5.

5.2 ”Speed setpoint” mode (P700 = 1) (from SW 2.0)

5.2.1 General information on the ”speed setpoint” mode

Description

For operation with a DP master, a speed setpoint can be cyclically input into the POSMO A 75 W/300 W drives via PROFIBUS–DP. The speed actual value is also cyclically fed back via PROFIBUS–DP.

The ”speed setpoint” mode is activated via P700 = 1 and de–activated via P700 = 2; however, only power–on is effective.

The active operating mode is displayed in P930.

Note

The following control bit must be set to change most of the parameters in the ”speed setpoint” mode:

- STW.0 = 0 (ON/OFF 1) or
- STW.4 = 0 (ramp–function generator enable)

Corresponds to the state ”no traversing block active” in the ”positioning mode”.

If the factory pre–setting is downloaded, then the ”speed setpoint” mode is immediately de–activated and the system goes into the ”positioning” mode.

Note

Before changing the operating mode, the factory pre–setting should be downloaded using P970. This allows a defined initial status to be achieved.

Reader’s note

Closed–loop control structure for the speed setpoint interface, refer to Chapter 3.3.2.

Transmission elements

The speed setpoint and the speed actual feedback value are transferred using PZD data.

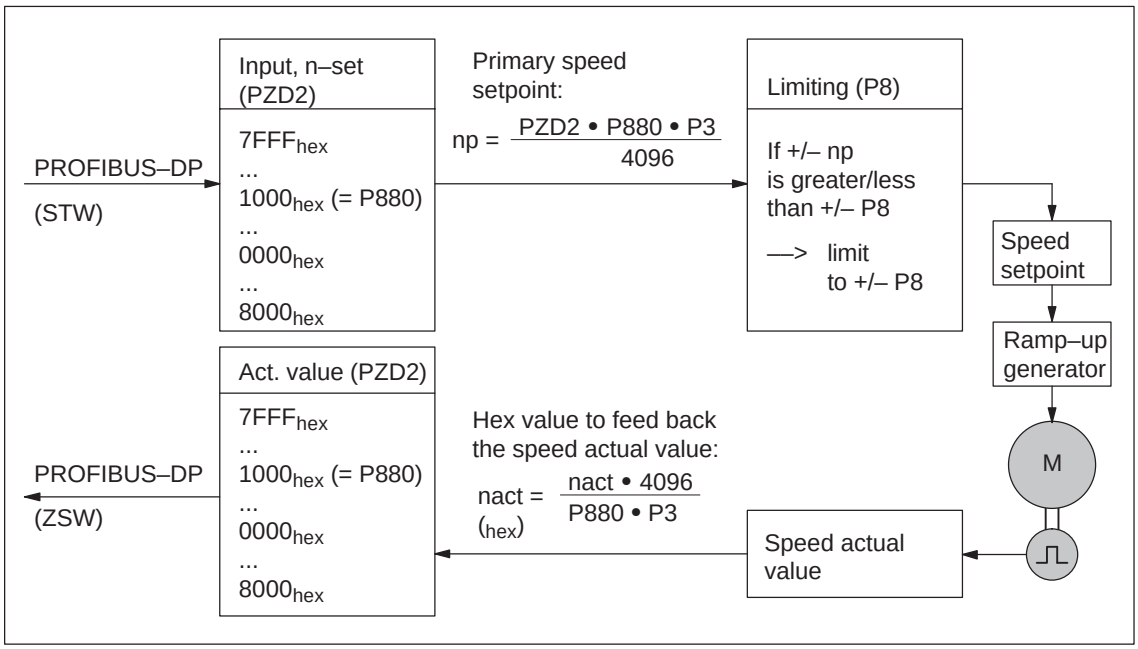


Fig. 5-1 Transfer, speed setpoint/actual value

Reader's note

PZD data, refer to Chapter 4.2.

5.2.2 Ramp–function generator

General

The ramp–function generator is used to limit the acceleration when the speed setpoint changes as a step function.

POSMO A transfers the speed setpoint from the DP master to the ramp–function generator as soon as it is in a specific state of the PROFIBUS state machine (refer to Chapter 4.2.2).

How do the software limit switches function?

At run–up, the software limit switches are automatically de–activated (P6 = P7) and a rotary axis parameterized. In this case, P1 is set to the maximum value which corresponds to the parameterized values P2 and P3.

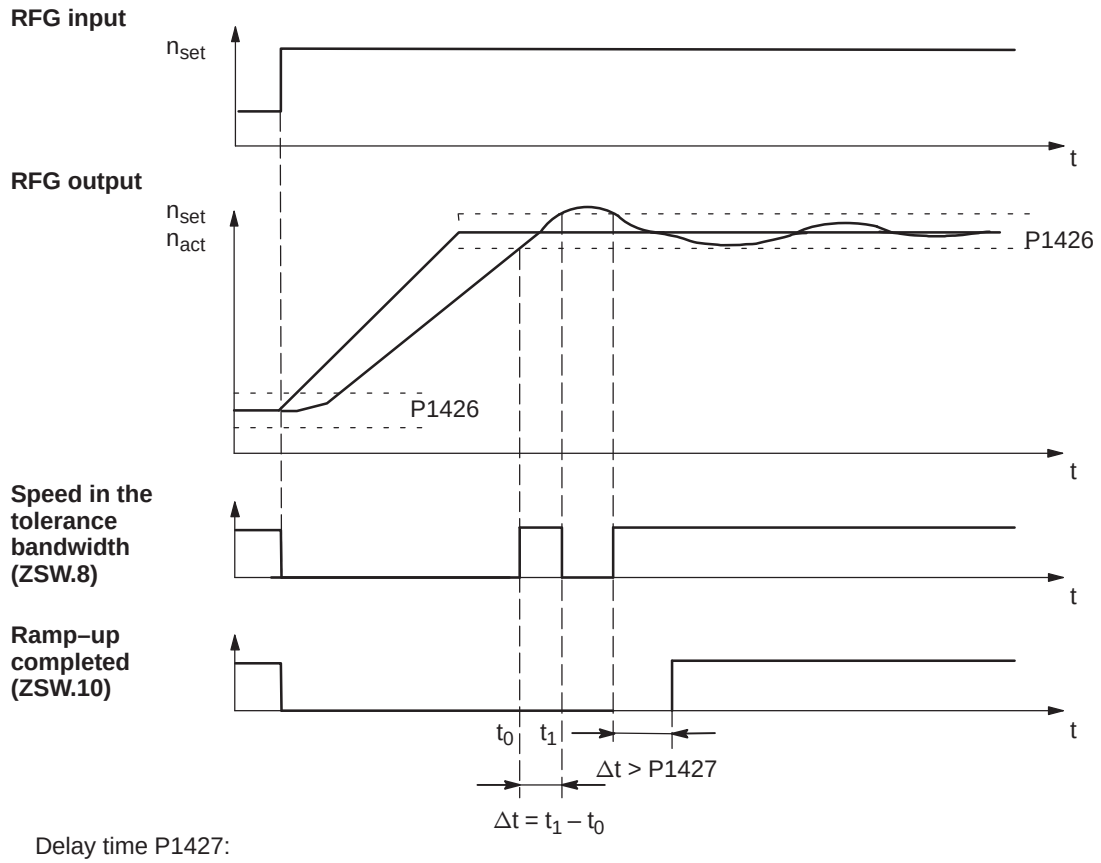
P1 may not be set to zero in "speed setpoint" mode so that no more traversing range limits can be activated. Referencing is not possible.

The software limit switches must remain de–activated so that the drive can always rotate endlessly. This is the reason that in the speed set-point mode the drive must be parameterized as rotary axis and be de–referenced.

Input/output signals for the ramp–function generator

For the ramp–function generator, the following signals are used:

- Input signals:
  - Ramp–function generator enable (STW.4 = 1)
  - Ramp–function generator start/ramp–function generator stop (STW.5 = 1)
  - Enable setpoint/inhibit setpoint (STW.6 = 1)
- Output signals:
  - Speed in the tolerance bandwidth/speed outside the tolerance bandwidth (ZSW.8)
  - Ramp–up completed/ramp–up not completed (ZSW.10)



Delay time P1427:

IfΔt > P1427, then ”ramp–up completed” (ZSW.10 = 1)

Fig. 5-2 Signal characteristics for the ramp–function generator

5.2.3 Direction of rotation reversal

P880 is used to normalize the speed which is obtained at the gearbox output of the motor when a setpoint of 1000_{hex} (4096_{dec}) is entered using control word STW.

If a negative value is entered into P880, then, in addition, the motor direction of rotation is inverted.

There is the following assignment between inversion, direction of rotation, and setpoint:

- Without inversion, the motor rotates clockwise for a positive setpoint
- With inversion, the motor rotates anti–clockwise for a positive setpoint

Definition of the direction of rotation:

- When viewing the output shaft, the shaft rotates counter–clockwise
  → The motor direction of rotation is counter–clockwise
- When viewing the output shaft, the shaft rotates clockwise
  → The motor direction of rotation is clockwise

5.2.4 Displays the position actual value

The position actual value can be set with P40 when commissioning the system and so that the axis position can be tracked. P40 corresponds with the settings of P1 to P4.

Note

The system does not go into the "drive referenced" state when writing into P40.

The write from P40, the drive must be in closed–loop control, but with the condition STW.4 = 0 (internal setpoint = 0).

5.2.5 Adaptation of the speed controller

At standstill, the speed controller gain (P17) is changed–over to P54 (P gain, speed controller standstill).

We recommend that the factory default setting of P54 = 2 remains unchanged.

5.2.6 Parameters for n–set operation

The following parameters are used for the general parameterization in the ”speed setpoint” mode:

- P8 Maximum speed
- P9 Ramp–up time
- P25 Override, acceleration
- P58 Holding brake, brake opening time
- P59 Speed, close holding brake
- P60 Holding brake, brake delay time
- P61 Holding brake, controller inhibit time
- P700 Selector switch mode
- P880 Normalizing N–SET
- P930 Actual operating mode
- P1426 Tolerance bandwidth, speed actual value
- P1427 Delay time Nset reached

5.2.7 Terminal signals

It is not possible to feed back the terminal signals as was the case previously (pos mode). This is because the feedback signal byte (RMB) is used to display the speed actual value.

The relevant bits of the control and status word in the n–set mode are interlocked with the terminals using the appropriate parameterization (P31/P32).

The status word is used to feed back the terminal signal
Status word (n–set).

—> ZSW.11: Feedback signal, terminal 1

—> ZSW.12: Feedback signal, terminal 2

5.3 Programming the traversing blocks (only in the pos mode, P700 = 2)

5.3.1 Overview of the traversing blocks and programs

Traversing blocks and programs

There are a total of 27 traversing blocks for SIMODRIVE POSMO A.

The components are emulated in parameters and the traversing blocks in sub–parameters. The sub–parameter number corresponds to the traversing block number. The traversing blocks are programmed by writing the appropriate parameters into SIMODRIVE POSMO A.

Traversing blocks and programs:

Table 5-1 Traversing blocks and programs (factory default setting)

Jogging – **1**	**Jogging +** **2**	**Single blocks** **3 – 12**	**Program 1** **13 – 17**	**Program 2** **18 – 22**	**Program 3** **23 – 27**	**Component**
P80:1	P80:2	P80:3 – :12	P80:13 – :17	P80:18 – :22	P80:23 – :27	PSW (Program control word)
P81:1	P81:2	P81:3 – :12	P81:13 – :17	P81:18 – :22	P81:23 – :27	Target position
P82:1	P82:2	P82:3 – :12	P82:13 – :17	P82:18 – :22	P82:23 – :27	Velocity or speed
P83:1	P83:2	P83:3 – :12	P83:13 – :17	P83:18 – :22	P83:23 – :27	Acceleration
P84:1	P84:2	P84:3 – :12	P84:13 – :17	P84:18 – :22	P84:23 – :27	Timer value
P85:1	P85:2	P85:3 – :12	P85:13 – :17	P85:18 – :22	P85:23 – :27	Signaling position
P86:1	P86:2	P86:3 – :12	P86:13 – :17	P86:18 – :22	P86:23 – :27	SMStart, MMStart
P87:1	P87:2	P87:3 – :12	P87:13 – :17	P87:18 – :22	P87:23 – :27	MMStop, MMPos
Note: Traversing blocks 1 and 2 are permanently reserved for jogging.		**Note:** Traversing blocks 3 to 27 are set in the factory. The allocation of block numbers to individual traversing blocks and programs can be changed using P99:21 (Program Manager).				

Difference: Single block Program

The single traversing blocks and programs have the same structure referred to the parameter structure.

- The following is valid for single traversing blocks:
  - These blocks must be individually selected and started.
  - The program–specific instructions which occur in the traversing blocks (e.g. path mode) are ignored in the traversing blocks (refer to Table 5-6).
- The following is valid for programs:
  - A program is started by selecting and starting a block within the program. The additional blocks are then automatically executed as programmed.

How are single blocks and programs defined?

Blocks 3 to 27 can be combined to form programs via P99:21 (Program Manager).

The following rules apply when defining programs:

1. The value, saved under an index of P99:21, is the block number of the first block in the appropriate program area.
2. The block number of the last block in the program area is obtained from the start of the block of the next area minus 1.
3. Valid block starts lie in the range between 3 and 27.
4. The last block of the last valid program area is 27.
5. All block numbers from the first block of the first program area are single blocks.
6. All entries from P99:21 are evaluated in the sequence of the index until an invalid block start or a value less than the previous value is found.

The factory default setting for P99:21 is as follows:

Table 5-2 P99:21 (Program Manager) (factory default)

P99:21	Index								
	1	2	3	4	5	6	...	19	20
Value	13	18	23	0	0	0	...	0	0

≙ Program 3 Block 23 – 27
≙ Program 2 Block 18 – 22
≙ Program 1 Block 13 – 17

Note: refer to Table 5-1

Pre–assignment of traversing blocks 3 ... 27

Traversing blocks 3 to 27 are preset as follows:

Table 5-3 Pre–assignment of traversing blocks 3 ... 27 (factory presetting)

Presetting of standard traversing blocks					
3[1]			27[1]		
Parameter	Value	...	Parameter	Value	Component
P80:3	3	...	P80:27	3	PSW (program control word)
P81:3	0	...	P81:27	0	Target position
P82:3	100	...	P82:27	100	Velocity or speed
P83:3	100	...	P83:27	100	Acceleration
P84:3	0	...	P84:27	0	Timer value
P85:3	0	...	P85:27	0	Signaling position
P86:3	0000_{Hex}	...	P86:27	0000_{Hex}	SMStart, MMStart
P87:3	0000_{Hex}	...	P87:27	0000_{Hex}	MMStop, MMPos

1) Traversing blocks 3 to 27: Traverse with the maximum speed and maximum acceleration 0 mm relative Traversing blocks such as these are zero blocks.
By setting a target position and program control word (PSW), such as block can be extremely simply converted into a standard positioning block.

Pre–assignment of traversing blocks 1 and 2 for jogging

Traversing blocks 1 and 2 are reserved for jogging and are pre–assigned as follows:

Table 5-4 Pre–assignment of traversing blocks 1 and 2 for jogging (factory presetting)

Pre–assignment of traversing blocks for jogging				
1[1]		2[2]		
Parameter	Value	Parameter	Value	Component
P80:1	0	P80:2	0	PSW (program control word)
P81:1	0	P81:2	0	Target position
P82:1	–100	P82:2	100	Velocity or speed
P83:1	100	P83:2	100	Acceleration
P84:1	0	P84:2	0	Timer value
P85:1	0	P85:2	0	Signaling position
P86:1	0000_{Hex}	P86:2	0000_{Hex}	SMStart, MMStart
P87:1	0000_{Hex}	P87:2	0000_{Hex}	MMStop, MMPos

1) Traversing block 1: Traverse with maximum speed and maximum acceleration in a negative direction
2) Traversing block 2: Traverse with maximum speed and maximum acceleration in a positive direction

5.3.2 Structure and description of the traversing blocks

Structure of traversing blocks

The traversing blocks are emulated in parameters as follows:

Table 5-5 Parameters for traversing blocks

Block memory...			Description						Memory	
Block 1	**Block 2**	**...**	**Component**	**Min.**	**Standard**	**Max.**	**Unit**	**Format** 1) 2)	**...**	**Block 27**
80:1	80:2	...	PSW (Program control word)	0000_{Hex}	–	$FFFF_{hex}$	–	V2	...	80:27
81:1	81:2	...	Target position	$-2 \cdot 10^5$	–	$2 \cdot 10^5$	mm Degrees inch	C4	...	81:27
82:1	82:2	...	Velocity or speed	–100 5)	–	100	% 3)	OC2	...	82:27
83:1	83:2	...	Acceleration	0	–	100	% 4)	OC2	...	83:27
84:1	84:2	...	Timer value	0	–	$2 \cdot 10^6$	10 ms	T4	...	84:27
85:1	85:2	...	Signaling position	$-2 \cdot 10^5$	–	$2 \cdot 10^5$	mm Degrees inch	C4	...	85:27
86:1	86:2	...	SMStart, MMStart	0000_{Hex}	–	$FFFF_{hex}$	–	V2	...	86:27
87:1	87:2	...	MMStop, MMPos	0000_{Hex}	–	$FFFF_{hex}$	–	V2	...	87:27

1) The task ID to change a value can be derived from the data width (2 or 4) specified in the format.
Examples: I2 —> AK = 2 for array parameters AK = 7, C4 —> AK = 3 for array parameters AK = 8
2) Formats: —> refer to Chapter 4.3, Table 4-16
3) Traversing blocks 1 and 2: Speed = P82:x • P26 • P24 • P8
Traversing blocks 3 to 27: Closed–loop speed contr. operation: Speed = P82:x • P24 • P8
Closed–loop position contr. operation: Velocity = P82:x • P24 • P10
4) Traversing blocks 1 and 2: Acceleration = P83:x • P27 • P25 • P9
Traversing blocks 3 to 27: Closed–loop speed contr. operation: Acceleration = P83:x • P25 • P9
Closed–loop position contr. operation: Accel. = P83:x • P25 • P22
5) Negative value: —> Reversal of the motor direction

PSW (program control word, P80:28)

The program control word defines the general properties and characteristics of a traversing block.

Table 5-6 Structure of the program control word (PSW, P80:28)

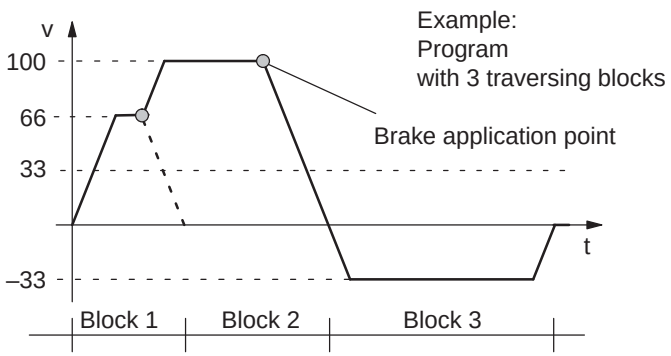
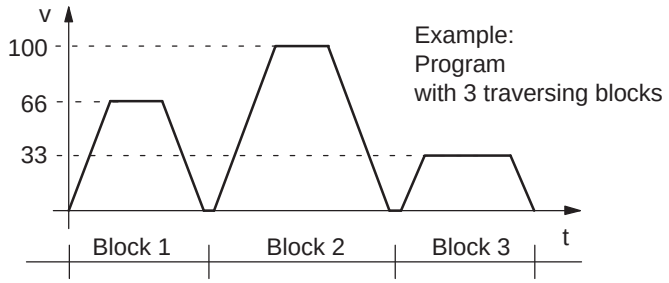
Bit	Description	Signal status, description		Effective for single blocks
0	Motion type	1	Enter position and velocity (position control)	yes
		0	Enter speed (speed control index)	
1	Positioning type (only for positioning)	1	Relative	yes
		0	Absolute	
2	Timer type	1	Traverse as soon as the timer no longer runs	no
		0	Traverse as long as the timer is running	
3	Logic operation between timer with start byte	1	Traverse if timer or start byte condition is fulfilled	no
		0	Traverse if timer and start byte condition is fulfilled	
4	Return program jump (M18)	1	Jump to the start of the program after the end of block	yes
		0	No response	
5	Traversing type	1	Path controlled operation • Approximate positioning to the following program block • The following block is immediately processed when the time to apply the brake is reached **Pos., velocity, motion type, positioning type, traversing type** 10 66 POSITIONING ABSOLUTEPath controlled operation 30 100 POSITIONING ABSOLUTEPath controlled operation 20 33 POSITIONING ABSOLUTEPrecise stop 	no

Table 5-6 Structure of the program control word (PSW, P80:28), continued

Bit	Description		Signal status, description	Effective for single blocks
5	Traversing type	0	Precise stop • The position programmed in the block is precisely approached • The axis is braked down to standstill • The block is changed when the target area is reached (precise stopping window) • A precise stop is always executed at the end of program **Pos., velocity, motion type, positioning type, traversing type** 20 66 POSITIONING ABSOLUTE Precise stop 40 100 POSITIONING RELATIVE Precise stop 10 33 POSITIONING RELATIVE Precise stop 	no
6	Negate start byte condition	1	The block is executed, if at least one of the bits, configured in the start mask, is not set.	no
		0	Normal evaluation	
7	SMStart type (from SW 1.2)	1	The following is valid dependent on the condition defined in SMStart: • fulfilled then the block is executed • not fulfilled then the block is skipped	no
		0	Wait until the start condition is fulfilled according to SMStart. The block is executed if the condition is fulfilled and ”Execute block” is present.	
8	Program stop (from SW 1.2)	1	Program end when the end of the block is reached	no
		0	No response	

5

Table 5-6 Structure of the program control word (PSW, P80:28), continued

Bit	Description	Signal status, description		Effective for single blocks
9	Set reference position (from SW 1.2)	1	Before SW 1.4 the following applies: The actual position is set the same as the signaled position at the end of the block. In conjunction with this, the end of block means the following: • For a precise stop: After entering into the precise stop window • For approximate positioning: After entering into the precise stop window of the next block • After withdrawing the start conditions and external block change: Immediately after entering into the precise stop window From SW 1.4, the following applies: At the end of the block, the position of the last zero mark is set the same as the signal position and the drive is referenced.	no
		0	– **Note:** Bit 9 = 0 if • Bit 10 = 1 (flying actual value setting) or • Bit 11 = 1 (flying measurement) or • Bit 14 = 1 (Reference to the occurring zero mark) (from SW 2.1)	
10	Flying actual value setting (from SW 1.4)	1	Active	yes
		0	Inactive **Note:** Bit 10 = 0 if • Bit 9 = 1 (set reference position) or • Bit 11 = 1 (flying measurement) or • Bit 14 = 1 (Reference to the occurring zero mark) (from SW 2.1)	
11	Flying measurement (from SW 1.4)	1	Active	yes
		0	Inactive **Note:** Bit 11 = 0 if • Bit 9 = 1 (set reference position) or • Bit 10 = 1 (flying actual value setting) or • Bit 14 = 1 (Reference to the occurring zero mark) (from SW 2.1)	
12	Traverse along the shortest path (from SW 1.4)	1	Active	yes
		0	Inactive	
			Note: For axes with modulo correction and absolute position data, when the bits are set, the shortest traversing distance is calculated and traversed. Programming the traversing direction using the velocity sign is ineffective when the function is active (refer to Chapter 5.5.3).	

Table 5-6 Structure of the program control word (PSW, P80:28), continued

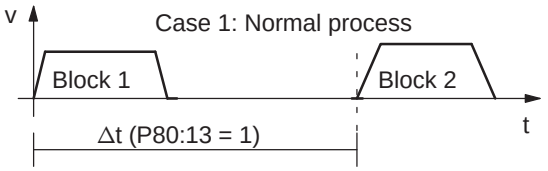
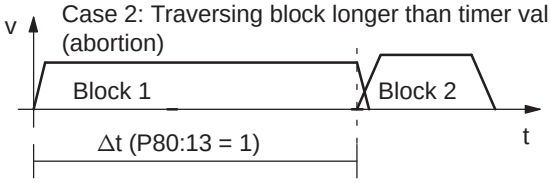
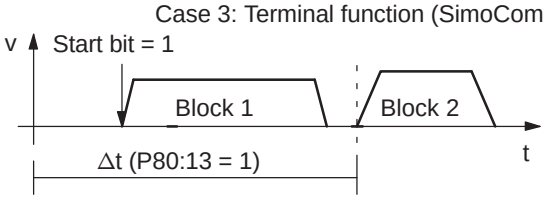
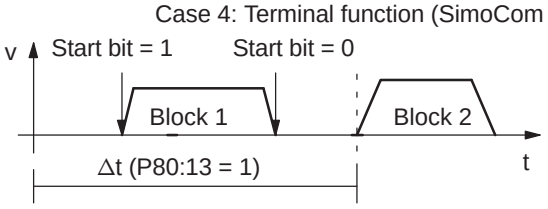
Bit	Description	Signal status, description		Effective for single blocks
13	Defined delay before next traversing block (from SW 2.1)	1	Active If a traversing block with the number x+1 should be started after a specified time following traversing block x, this specified time must be configured in traversing block x. The following conditions must be observed for implementation: • Traversing block x – Timer mode: ”Traverse as long as the timer is running” (P80:x.2 = 0) – Timer value: desired delay in ms (P84:x) – PSW (program control word): ”Defined delay before next traversing block” (P80:x.13 = 1) • Traversing block x+1: – PSW (program control word): ”Wait for start condition” (P80:(x+1).7 = 0) This special delay is handled internally in the drive. It can **not** be checked via parameter P45 (timer status). In this case, traversing block x+1 starts regardless of the length of the traversing path in traversing block x. If traversing block x is interrupted early due to the loss of a start condition (SMStart), traversing block X+1 also will not start until the time has expired (case 4).     Δt is the timer value of block 1	no

Table 5-6 Structure of the program control word (PSW, P80:28), continued

Bit	Description	Signal status, description		Effective for single blocks
13	Defined delay before next traversing block (from SW 2.1)	1	**Note:** **Upon an external block change:** • If the target position in traversing block x has not yet been reached, an external block change acts like the loss of a start condition in traversing block x. • However, if traversing block x+1 has already been selected as the current traversing block (P48), an external block change acts on traversing block x+1.	
		0	Inactive	
14	Reference to occurring zero mark (from SW 2.1)	1	Active The traversing block is aborted upon the occurrence of a zero mark. The reference point is set to the value given in the signal position. If this function is used together with a digital input (BERO) that is configured with an additional cam monitoring (P31/P32), referencing only takes place if a cam signal edge has occurred in accordance with P56.7. If the corresponding signal has not occurred at the digital input, the drive is de–referenced upon reaching the zero mark. In this case, error 711/912 is signaled.	yes
		0	Inactive **Note:** Bit 14 = 0 if • Bit 9 = 1 (set reference position) or • Bit 10 = 1 (flying actual value setting) or • Bit 11 = 1 (flying measurement)	
15	Reserved	–	–	–

Timer value (P84:28)

Contains the time required for the timer. A value of 0 de–activates the function.

Signaling position (P85:28)

When this position is passed, the bits, specified in the MMPos, are set and signaled to the master via the feedback signal byte (RMB).

From SW 1.4, the following applies:

When the ”set reference position” function is activated (PSW.9 = 1) or ”flying actual value setting” (PSW.10 = 1), this parameter is the setting value. The ”signal position” function is then inactive.

SMStart (P86:28, high byte)

Contains a mask, that determines which bits of the start byte (STB) in the PZD are to be evaluated as additional start bits to start program blocks.

A program block starts as soon as, in addition to the normal start enable signals, all of the configured bits are set.

If one of the bits is withdrawn, traversing motion stops and the block is exited.

A value of 0 de–activates the function.

MMStart (P86:28, low byte)
MMStop (P87:28, high byte)
MMPos (P87:28, low byte)

Contain bit masks, which are OR’d with the status signals (feedback signal byte, RMB) when a pre–defined event occurs.

These events include:

- MMStart: Start of the traversing block

  Bits that are activated at the start of a traversing block.

  MMStart is reset at the end of block.

- MMStop: End of the traversing block (as for ZSW.14)

  Bits that are activated at the end of a traversing block.

  MMStop is reset at the start of a new traversing block.

- MMPos: Passing the signaled position

  Bits that are activated when passing the signaled position.

  MMPos is reset when a new traversing block is started.

  Note:

  MMPos is ineffective when the ”set reference position” (PSW.9 = 1) or ”flying actual value setting” (PSW.10 = 1) function is activated.

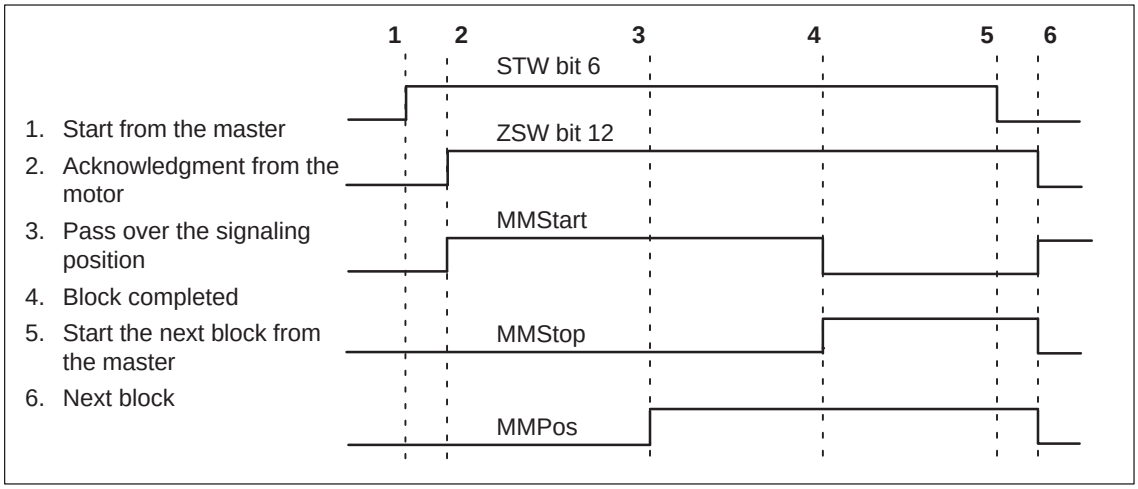


Fig. 5-3 Signal timing for feedback signals from program blocks

Difference: closed–loop speed controlled – closed–loop position controlled

The parameters, which are saved in the traversing blocks, are only evaluated if it makes sense in the mode specified by the program control word (PSW). This means, for example, in the speed controlled range, the target position is ignored.

5.3.3 Selecting and controlling traversing blocks and programs

Signals for traversing blocks and programs

The following PROFIBUS signals are available to select and control the traversing blocks and programs saved in SIMODRIVE POSMO A:

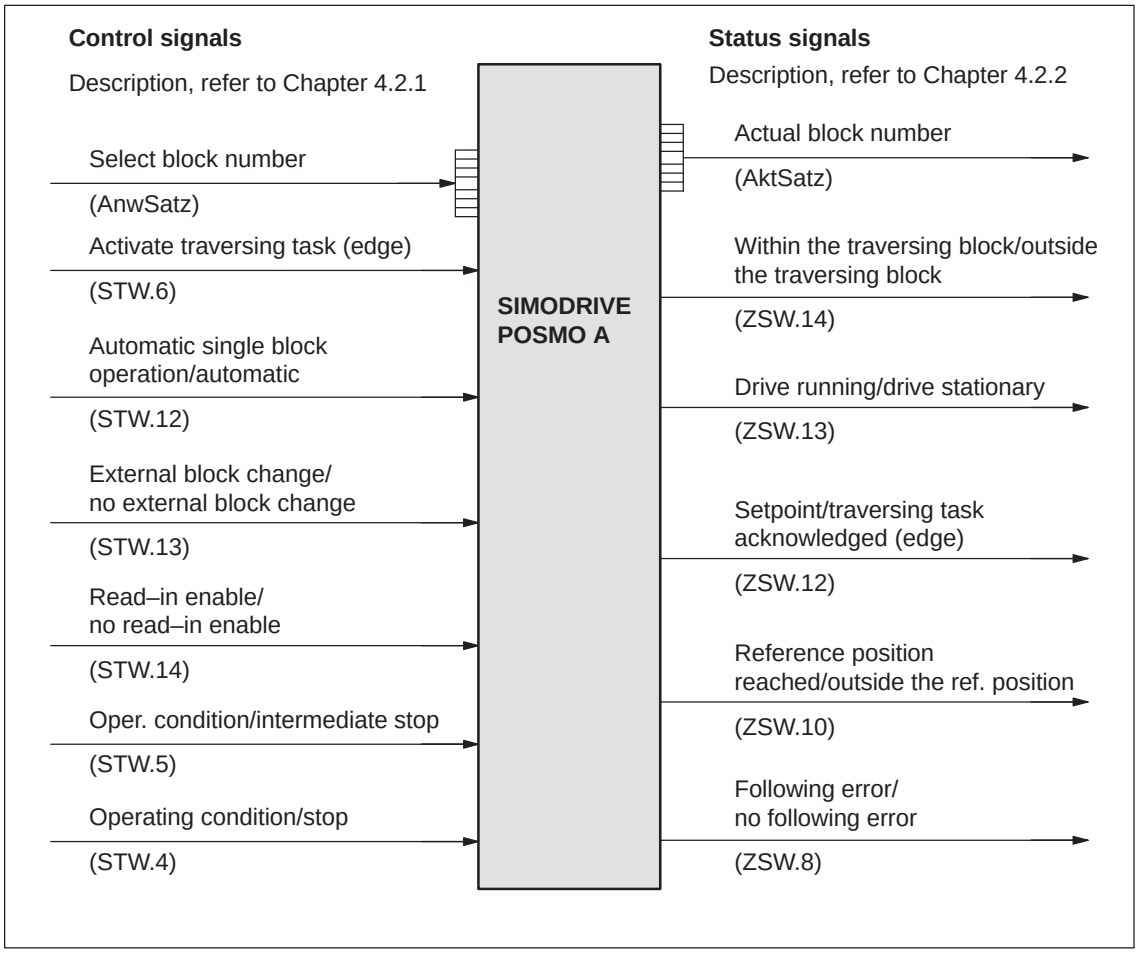


Fig. 5-4 Signals for traversing blocks and programs

5

5.3.4 Behavior of speed–controlled traversing blocks

Description

Speed–controlled traversing blocks use the speed controller to regulate the actual speed to the setpoint speed.

Because the actual position value/position reference value has no influence on this control, the position setpoint is set equal to an actual position value resulting from the speed change.

What has to be observed?

If a speed–controlled traversing block is terminated by a stop command (e.g. due to expired timer) or by an external block change and no error is present, then:

- if the SIMODRIVE POSMO A switches to closed–loop position control,
- the actual position present after the standstill is kept according to the controller setting.

If during a speed–controlled traversing block

- the override speed (P24) is set to zero

  or

- the control word STW.5 is set to zero (intermediate stop),

then the SIMODRIVE POSMO A remains in speed control and regulates the speed to zero, regardless of the current actual position of the axis.

From this follows:

—> If, for example, the mechanical system pushes the drive away from the actual position opposing the maximum possible motor current, then at the new position SIMODRIVE POSMO A controls the actual speed to zero.
The positional shift does not affect the closed–loop control.

—> When controlling to zero speed, a minimum drift velocity can exist due to the control, that is not evaluated by the drive as the axis does not have a speed when averaged over time.
If SIMODRIVE POSMO A should maintain its position at zero speed, the speed–controlled traversing block must be ended and closed–loop position control selected.

Note

The execution of an intermediate stop, for instance to stop the axis temporarily at a position, is not recommended in speed–controlled traversing blocks due to the behavior described above!

5.4 Operating modes (only the pos mode)

As standard, SIMODRIVE POSMO A is in the automatic mode. The operating mode can be changed using the bits in the control word.

5.4.1 Jogging operation

Description

Traversing blocks 1 and 2 are reserved for jogging.

Note

Pre–assignment of traversing blocks 1 and 2 for jogging
—> refer to Chapter 5.3.1

The jog mode has the following functions:

- After setting the appropriate control signal, the jog traversing block is selected, and immediately executed.
  - Control signal STW.8 Jogging 1 ON/OFF
  - Control signal STW.9 Jogging 2 ON/OFF
- After this signal has been withdrawn, the block is stopped. The distance to go is rejected. After this, the block selection is re–activated via the control signal ”SNR”.
- If both jogging signals are simultaneously set or if the axis is not at standstill due to an active traversing block, then jogging is rejected with an warning.
- When jogging, speed and acceleration override are effective:
  - Speed = P82:x • P26 • P24 • P8 (refer to Chapter 5.6.2)
  - Acceleration = P83:x • P27 • P25 • P9(refer to Chapter 5.6.2)
- Stop and intermediate stop do not influence the jogging blocks.

Defining the direction of rotation of the motor

The following is valid when viewing the output shaft of the positioning motor:

- If the shaft rotates counter–clockwise (to the left)
  —> the motor direction of rotation is negative (left)
  —> this can for example be realized using jogging 1
- If the shaft rotates in the clockwise direction (to the right)
  —> the motor direction of rotation is positive (right)
  —> this can for example be realized using jogging 2

From SW 1.3, the required motor direction of rotation can be set using P3 (gearbox step–down factor (refer to Chapter 5.5.8)).

5.4.2 Manual Data Input (MDI)

Description

For SIMODRIVE POSMO A, the MDI mode is replaced when selecting a single traversing block.

New coordinates are programmed by overwriting one of the traversing blocks which is then transferred at the next start.

5.4.3 Automatic

Description

In the ”automatic mode”, traversing blocks and programs can be selected, started and their behavior significantly influenced via the interface.

When programs are run, it is possible to change over into the ”automatic single–block mode” using the control signal STW.12. This is used to test the drive system.

5.4.4 Tracking mode

Description

If an axis is in the tracking mode, then the control is disabled and its position reference value tracks the actual position actual value.

For SIMODRIVE POSMO A, the tracking mode cannot be explicitly selected.

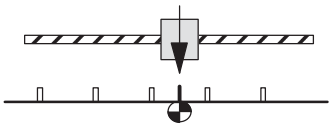
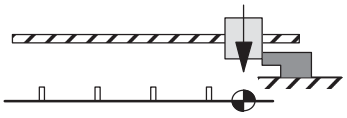
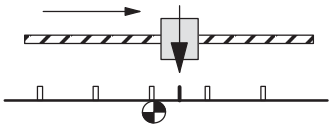
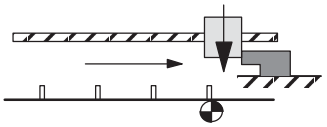
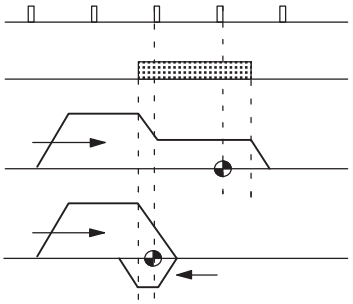
In fact, it becomes implicitly active if e.g. closed–loop control is no longer active after withdrawing STW.0.

5.5 SIMODRIVE POSMO A functions

5.5.1 Referencing

Description For SIMODRIVE POSMO A, an incremental position measuring system is used. In order that the positioning motor identifies the axis zero, the measuring system must be synchronized with the axis.

Table 5-7 What are the referencing possibilities?

Type	Referencing possibilities	Sketch
Axis **without** reference cams	Approach the visual mark Set the actual value by writing into P40 —> This position is assigned to the required actual value.	
	Approach the endstop Set the actual value by writing into P40 —> This position is assigned to the required actual value.	
	Approach the visual mark Set STW.11 —> The position of the last zero mark which was passed is overwritten by the value from P5[1] (reference point coordinate).	
	Approach the endstop Set STW.11 —> The position of the last zero mark which was passed is overwritten by the value from P5[1] (reference point coordinate).	
Axis **with** reference cams[2]	Reference travel to BERO without direction reversal —> The axis remains stationary after exiting the reference cam. The position of the last zero mark which was passed is overwritten with the reference position[1].	
	Reference approach to the BERO with direction reversal —> The axis remains stationary after exiting the reference cam. The position of the last zero mark which was passed is overwritten with the reference position[1].	
	Reference to occurring zero mark (from SW 2.1)	Refer to Chapter 5.5.1
Flying	"Flying actual value setting" function (from SW 1.4)	Refer to Chapter 5.5.2

1) The actual position to be written is corrected by the distance which was traveled since the last zero mark.
2) This function must be emulated using the existing traversing blocks (refer to the following examples).

Limitations when referencing

The following limitations apply when referencing:

- The positioning motor supplies the following zero marks:
  - 75 W motor —–> 4 zero marks per motor revolution
  - 300 W motor —–> 1 zero mark per motor revolution
- The position of the zero mark, which was last recognized, is overwritten with the value in P5 (reference point coordinate) by setting STW.11 (start referencing/stop referencing).
  The actual position to be written is corrected by the distance which was traveled since the last zero mark.

  Prerequisite:
  The axis must be at a standstill and be in closed–loop control.

  If the axis is moving, then the value is not accepted and an warning is output.
- If the motor was not moved after being powered up, i.e. a zero mark has still not been passed, and therefore there is no valid position for a zero mark, then referencing is rejected and a warning output.
  The ”referenced” status is lost.
- Generally, the following is valid:

  ZSW.11 (reference point set/no reference point set) is used to display whether an axis is referenced.
- Resetting the status ”reference point set” (from SW 1.4)

  For a stationary axis that has been referenced, the ”no reference point set” state is re–established by writing a 0 into P98.
- The following applies for a non–referenced axis:
  - No blocks with absolute position data are executed.
  - The axis zero of the axis is the position after the drive has been powered up.

Warning

For non–referenced axes, the software limit switches are not monitored.

Suitable measures must be implemented in the system (e.g. hardware limit switches) in order to avoid injury to personnel and damage to the machine.

Setting actual value by writing into P40

The SIMODRIVE POSMO A positioning motor can be referenced at a specific axis position by writing the required actual value into P40 (position actual value).

For a stationary axis, this position is accepted as position actual value, and after this, SIMODRIVE POSMO A is considered to have been referenced.

- Move, e.g. using ”jogging” to the required axis position.
- Reference the positioning motor by writing the actual value, valid for this axis position, into P40 (position actual value).

Note

For ”set actual value”, the same conditions must exist as when referencing, i.e. the drive must be closed–loop controlled and be stationary.

Setting the referencing position to the zero mark using the traversing block (from SW 1.4)

The reference position can be set to a zero mark using the traversing block as shown in the following program example.

Example:

- Program control word (PSW) = 515_{dec} ($10\ 0000\ 0011_{bin}$) P80:x

  Bit 9 = 1 —> set reference position
  Bit 1 = 1 —> relative
  Bit 0 = 1 —> enter position and velocity (closed–loop pos. contr.)
- Target position = 100.0 mm P81:x
- Speed = 100 % P82:x
- Acceleration = 100 % P83:x
- Time = 0 ms P84:x
- MeldPos = 50.0 P85:x

For this traversing block, the axis traverses through 100 mm relative. At the end of the block, the setting value for the reference position is read from ”MeldPos”, in order to correct the distance moved since the last zero mark. The axis is then referenced.

This function corresponds to referencing an axis with reference cams (refer to Table 5-7).

Setting the actual value using the traversing block (before SW 1.4)

The actual value can be set via a traversing block as shown in the above program example.

At the end of the block, the position, saved in ”MeldPos” becomes the new actual position of the drive.

Reference approach with "traverse to fixed endstop"

The "travel to fixed stop" function can be used as follows for referencing:

- Set the current to a permissible value for the fixed endstop.
  - P28 (max. current) = "required current"
  - P16 (max. overcurrent) = "required overcurrent"
- Suppress the "speed controller at the endstop " fault.
  - P30.0 = "1" "speed controller at the endstop" fault —> is redefined to become a warning
- Traverse to the fixed endstop by jogging

  When the endstop is reached, it is displayed as follows:
  - ZSW.7 = "1" —> means "warning present"

    and
  - P953.7 = "1" —> means "speed controller at the endstop"
- Cancel jogging
- Set a valid position actual value for the fixed endstop position
  - Write a valid position actual value into P40

    P40 = "requested actual value" Position actual value

  or
  - Assign a valid position actual value from P5

    The position of the last zero mark is set to the value in P5 (reference point coordinate) by "start referencing" and "stop referencing" (STW.11).

    The actual position to be written is corrected by the distance which was traveled since the last zero mark.

    Set the "stop referencing" depending on "reference point set" (ZSW.11).

Reader's note

"Travel to fixed stop" function refer to Chapter 5.5.3

Reference approach to a BERO proximity switch without direction reversal

The reference point approach is executed via program. The axis traverses without direction of reversal dependent on the reference cam signal.

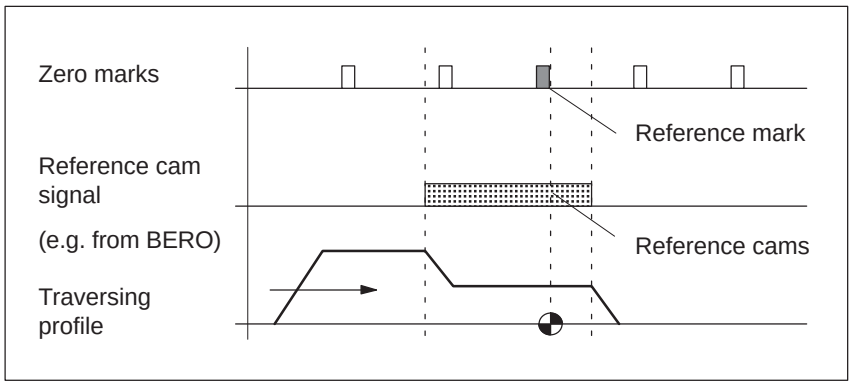


Fig. 5-5 Reference travel to BERO without direction reversal

Prerequisites:

- Connect the reference cam signal to terminal 1 (X5, I/Q1, refer to Chapter 2.3)
- Define terminal 1 as input and directly transfer the input terminal signal into the start byte (e.g. start byte bit 7 —> P31 = 25, refer to Chapter 5.5.10)

Program the following traversing program (example):

- Program block (e.g. block 13)
  - SMStart bit 7 as start condition
  - Program control word (PSW) = 224_{dec} (00 1110 0000_{bin}) ($E0_{hex}$) (closed–loop speed controlled, with approximate positioning, with negated start byte, skip if the start byte is not fulfilled)
  - Speed e.g. 20 % (= approach velocity)
  - Acceleration 100 %
- Program block (e.g. block 14)
  - SMStart bit 7 as start condition
  - Program control word (PSW) = 384_{dec} (01 1000 0000_{bin}) (180_{hex}) (closed–loop speed controlled without negated start byte)
  - Speed e.g. 5 % (= shutdown velocity)
  - Acceleration 100 %
  - Program end when the end of the block is reached
- Start program

  As soon as ZSW.14 = ”0” (outside traversing block) is signaled, the reference point can be set with STW.11 (start referencing/stop refer-

encing).

- Set reference coordinate

  The position of the last zero mark before the end of the second program block is therefore set to the value in P5 (reference point coordinate).

Set simplified reference position (from SW 1.4)

The drive is automatically referenced when the above traversing program is run if the following is specified in the second block:

- P85:14 (signal position for block 14)
  = set ”required reference point” coordinate
- Set PSW.9 (set reference position) to 1

In this case, the last part of the example above is eliminated.

Note

- If the direction of rotation is reversed in both traversing blocks (negative velocity), the reference point approach is executed in the opposite direction.
- In order to select the last zero mark at the reference cam as reference point coordinate, the shutdown velocity should be selected low enough, so that when braking after leaving the cam, no other zero marks are passed.
- Reference cam length

  A cam length should be selected so that the axis brakes from the approach velocity to the shutdown velocity while still at the cam.

Reference approach to a BERO proximity switch with direction reversal

The reference point approach is executed via program. The axis traverses with direction reversal depending on the reference cam signal.

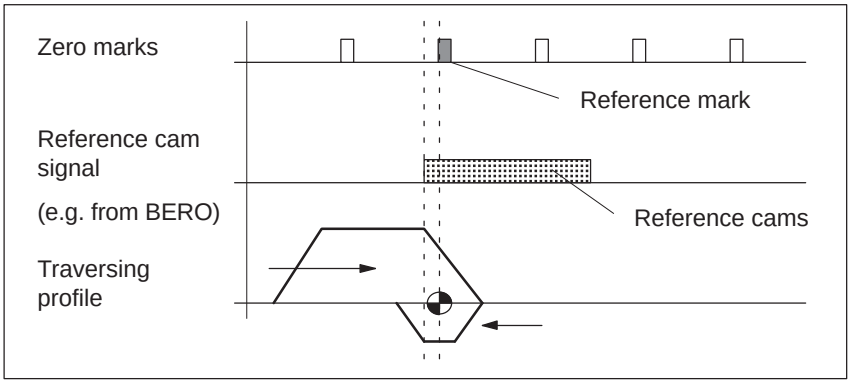


Fig. 5-6 Reference approach to the BERO with direction reversal

Prerequisites:

- Connect the reference cam signal to terminal 1 (X5, I/Q1, refer to Chapter 2.3)
- Define terminal 1 as input and directly transfer the input terminal signal into the start byte (e.g. start byte bit 7 —> P31 = 25, refer to Chapter 5.5.10)

Program the following traversing program (example):

- Program block (e.g. block 13)
  - SMStart bit 7 as start condition
  - Program control word (PSW) = 224_{dec} (00 1110 0000_{bin}) ($E0_{hex}$) (closed–loop speed controlled, with approximate positioning, with negated start byte, skip if the start byte is not fulfilled)
  - Speed e.g. 20 % (= approach velocity)
  - Acceleration 100 %
- Program block (e.g. block 14)
  - SMStart bit 7 as start condition
  - Program control word (PSW) = 384_{dec} (01 1000 0000_{bin}) (180_{hex}) (closed–loop speed controlled without negated start byte)
  - Speed e.g. –5 % (= shutdown velocity with direction reversal)
  - Acceleration 100 %
  - Program end when the end of the block is reached
- Start program

  As soon as ZSW.14 = ”0” (outside traversing block) is signaled, the reference point can be set with STW.11 (start referencing/stop refer-

encing).

- Set reference coordinate

  The position of the last zero mark before the end of the second program block is therefore set to the value in P5 (reference point coordinate).

Set simplified reference position (from SW 1.4)

The drive is automatically referenced when the above traversing program is run if the following is specified in the second block:

- P85:14 (signal position for block 14)
  = set ”required reference point” coordinate
- Set PSW.9 (set reference position) to ”1”

In this particular case, the last section in the example above is eliminated.

Note

- If the direction of rotation is reversed in both traversing blocks, the reference point approach is executed in the opposite direction.
- In order to select the last zero mark at the reference cam as reference point coordinate, the shutdown velocity should be selected low enough, so that when braking after leaving the cam, no other zero marks are passed.
- Reference cam length

  The cam length should be selected, so that the axis brakes from the approach velocity to standstill while still at the cam.
- Position of the reference cam

  If the reference cam is not favorably mounted, when the traversing program starts from the cam, a different reference point can be obtained than when starting in front of the reference cam.

  Remedy: The referencing program should be modified so that the axis initially moves away from the cam.

Reference to occurring zero mark (from SW 2.1)

Use of the function in a traversing program

Note

The drive must be de–referenced before starting the function (set P98 = 0)

The following two cases show examples of a referencing program. The blocks in the reference program have the following functions:

Block 1: ”Traverse up to cam”

Block 2: ”Leave cam”

Block 3: ”Reference to occurring zero mark”

Block 4: ”Traverse to absolute position”

- **Case 1:** Start in front of the cam (e.g. referencing with direction reversal)

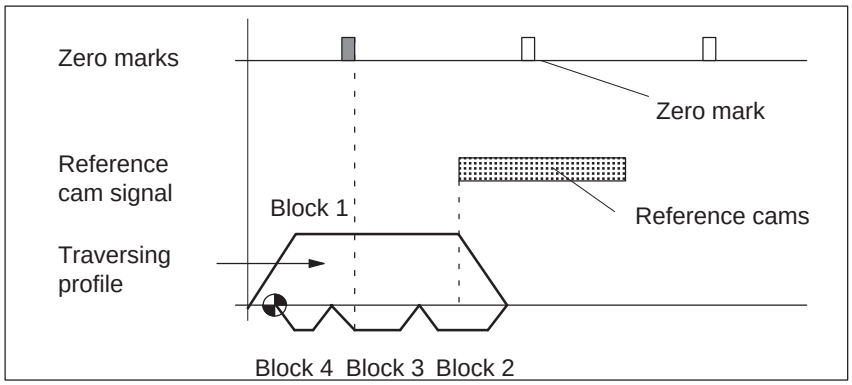


Fig. 5-7 Reference to occurring zero mark, start in front of the cam

Referencing is performed at the zero mark occurring after leaving the cam.

- **Case 2:** Start at the cam
  (e.g. referencing with direction reversal)

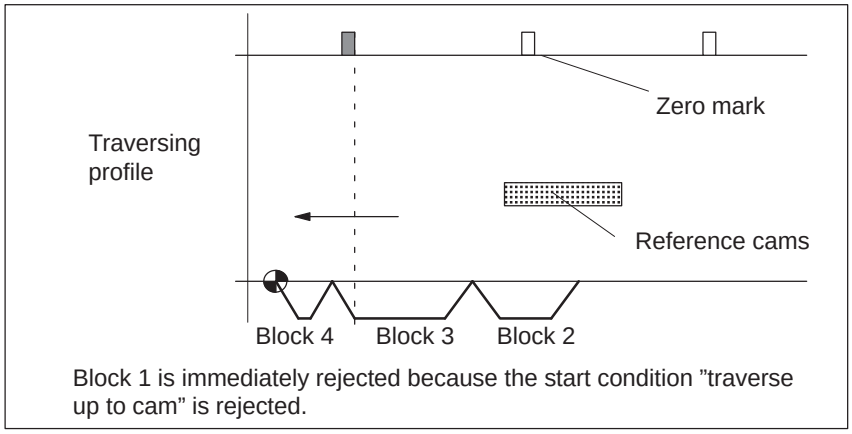


Fig. 5-8 Reference to occurring zero mark, start at the cam

Referencing is performed at the zero mark occurring after leaving the cam.

The function ”reference to occurring zero mark” can be assigned to an individual traversing block (with the No.: X) of the drive.

The activation takes place with P80:X.14 = 1.

The corresponding traversing block (relative position/absolute position/ speed–controlled) is executed until occurrence of a zero mark. The drive is referenced at the zero mark to the position given in the signal position (P85:X).

If the function is executed in connection with a positioning block (relative position/absolute position), the specified path must pass over a zero mark.

A speed–controlled block stops at the zero mark.

Note

The function ”Reference to occurring zero mark” cannot be used simultaneously with one of the following functions in a traversing block:

- ”Flying measurement” (P80:X.11 = 1)
- ”Flying actual value setting” (P80:X.10 = 1)
- ”Set reference position” (P80:X.9 = 1)

Using the function with the help of the parameterizing and start–up tool SimoCom A (from version 4.02.xx)

The reference dialog allows the configuration of a referencing program **with 4 traversing blocks**, in accordance with the diagrams shown in the dialog.

As in the previous referencing function (before SW 2.1), all required data must be entered in the dialog.

This data must then be confirmed with ”Generate traversing program”.

Functions of the referencing program:

- Block X: ”Traverse up to cam”
- Block X+1: ”Leave cam”
- Block X+2: ”Reference to occurring zero mark”
- Block X+3: ”Traverse to absolute position”

The selected input terminal is automatically monitored for a cam signal edge through the use of the dialog in SimoCom A.

P56.7 can be used to configure whether the cam signal edge to be monitored should be a negative (P56.7 = 0; standard value for leaving the cam) or a positive (P56.7 = 1 leaving an inverted cam).

The traversing program generated by the dialog is only created according to the standard setting (setting P56.7 = 0).

If no corresponding cam signal edge occurs, the program is aborted (in traversing block X+2) with error message 711 and supplementary information 912. In this case (use of the referencing program with cam monitoring), the drive is de–referenced.

Referenced axis when powering up again

Before SW 1.2, the following is valid:

If a referenced axis is switched–out, then it is still referenced after it has been switched–in again if it was not moved when it was switched–out (refer to ZSW.13 = 0).

From SW 1.2, the following applies:

Another behavior when the axis is switched–in again can be set using P56 (operating options).

—> refer to Chapter 5.6.2 under P56

Behavior when powering–down

For axes with extremely low friction, it should be noted that a motor can move into a preferred position when it is powered–down. In the least favorable case, this uncontrolled compensation movement is 11 degrees on the motor shaft.

If the electronics power supply is simultaneously switched–out, then this drive motion is not detected.

Possible counter measures include:

- If there are separate electronics and load power supplies then the electronics power supply must be switched–off with a delay after the load power supply has been switched off.
- The pulses should be cancelled before switching–off the load and electronics power supply (e.g. using STW.1 = 0).

5.5.2 Flying measurement/actual value setting (from SW 1.4)

Note

For the ”flying measurement/actual value setting” function, digital input 1 is updated in a 125 µs grid.

While the motor is braking, a 0/1 edge is ineffective and the ”flying measurement/actual value setting” function is not executed.

Flying measurement (from SW 1.4)

The positioning motor can be used for test purposes using the ”flying measurement” function.

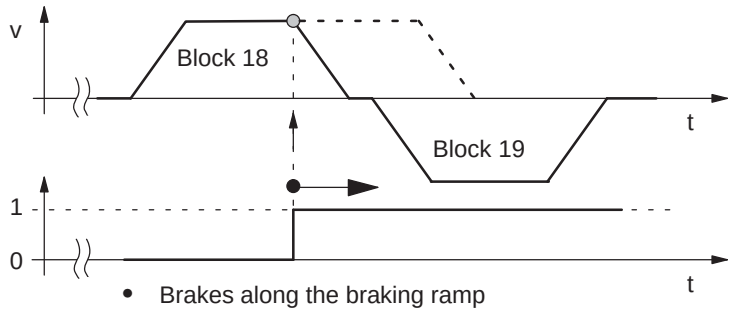


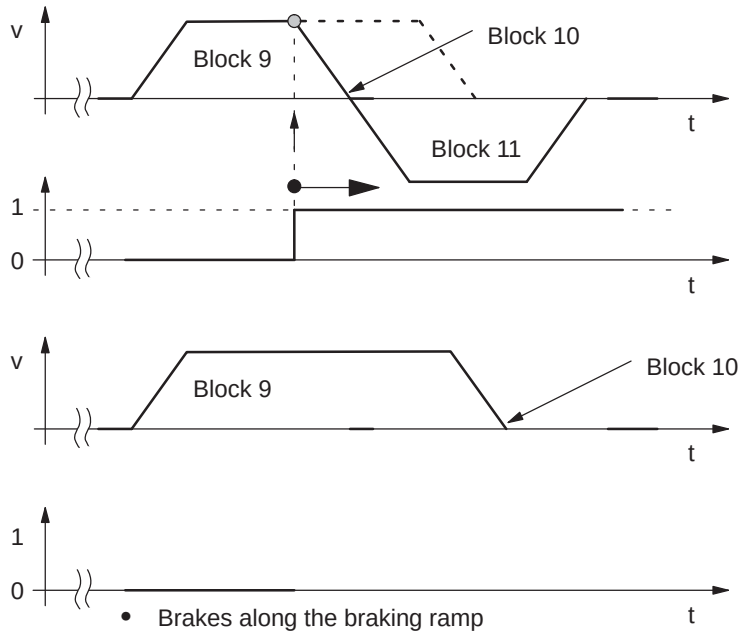
Fig. 5-9 Example: Flying measurement

What should be done?

The following has to be done in order to use the ”flying measurement” function?

1. Connect the signal transmitter to digital input 1 (X5 terminal I/Q1)
   —> the signal transmitter must be high active
   —> refer to Chapter 2.3 and 2.4
2. Assign digital input 1 to the ”flying measurement/actual value setting” function
   —> in the SimoCom A under the tab ”Par” and entry ”Digital inputs/outputs”
   —> by setting SIMATIC S7 P31 to 27
3. Program the traversing block, activating the ”flying measurement” function
   —> set PSW.11 to ”1”
4. Read the measured value after a 0/1 signal edge has been detected
   —> P62 (measuring position) = measured position value

Example **Position–controlled traversing motion to the cam/BERO with stop if a cam was not detected.**



What happens for a 0/1 signal edge?

- Brakes along the braking ramp
- Block change with delete distance to go
- The position value is written into P62 (measuring position)
- Continue the program (here: block 10)

What happens if an edge is not detected?

- The drive changes after the traversing distance, specified in block 9, to block 10.
- The drive stops because this does not contain a start condition. This means, that in comparison to a speed–controlled solution, it can be ensured that the drive does not endlessly move if the cam/BERO is either not wired at all or is defective.

Fig. 5-10 Example: Position–controlled traversing motion to cam/BERO with stop

Using a special configuration of the traversing blocks, the ”flying measurement” function can be executed so that the drive stops if the BERO/cam is not reached within a specified maximum distance. In this particular case, the program is still active and must be interrupted using a stop command.

In this case, the first program block selected is – e.g. block No. 9.

What should be done?

The following has to be done in order to use the ”flying measurement” function?

1. Connect the signal transmitter to digital input 1 (X5 terminal I/Q1)

   —> the signal transmitter must be high active

   —> refer to Chapter 2.3 and 2.4

2. Assign digital input 1 to the function ”transfer value directly in the start byte (bit 7)”

   —> in the SimoCom A under the tab ”Par” and entry ”Digital inputs/ outputs”

   —> by setting SIMATIC S7 P31 to 25

3. Program the traversing block (e.g. Block No. 9) as follows

   —> in SimoCom A under the ”Par” tab and entry ”Traversing blocks”

   —> select the ”relative” traversing type (via SIMATIC S7 P80:9 bit 0 = 1)

   —> enter the target position (max. distance to the cam) The sign of the distance specifies whether the signal is in the positive or negative traversing direction with respect to the current actual value. (if the drive moved through this distance, then the drive stops and changes to the following traversing block.)

   —> select ”continue flying” block change enable (via SIMATIC S7 P80:9 bit 5 = 1)

   —> In the section block PSW, select ”flying measurement: active” (via SIMATIC S7 P80:9 bit 11 = 1)

4. Then program the following traversing block as follows (e.g. block No. 10)

   —> select the ”relative” traversing type (via SIMATIC S7 P80:10 bit 0 = 1)

   —> position = 0, set the velocity to the value of block 9 ($v \neq 0$) (via SIMATIC S7 P81:10 = 0; P82:10 = P82:9)

   —> select ”continue flying” block change enable (via SIMATIC S7 P80:10 bit 5 = 1)

   —> in the selection box PSW check that ”SM start type” is in the default setting ”SM start type: wait” (bit=0) (via SIMATIC S7 P80:10 bit 7 = 0)

   —> in the selection box PSW, select ”flying measurement: active” (via SIMATIC S7 P80:10 bit 11 = 1) This means that a measurement is made if the cam is passed during the braking phase.

   —> SM/MM – Set start bit 15 = 1 (via SIMATIC S7 P86:10 bit 15 = 1) This means that the traversing block is only executed if the BERO/cam was actually reached.

The program can be started under the ”Control” tab, entry ”Automatic”.

The program with the number of the start block must be selected to do this.

Possible program sequence:

1. The following happens if the BERO/cam in block 9 signals a 0/1 edge at the digital input before the braking phase:
   - The motor brakes along the braking ramp
   - A block change with delete distance to go is initiated
   - The measured position value is written into P0062 (measuring position)
   - The program continues with block 10. As a result of the cam feedback signal via start byte bit 7, this immediately receives the start condition, specified in the SM/MM start and changes to block 11.
2. The following happens if the BERO/cam in block 9 did not provide a signal at the digital input before the braking phase:
   - The motor brakes along the braking ramp and then changes, after this has been initiated, to traversing block 10
   - If, the cam still outputs a signal in the braking phase, then the measuring function in block 10 is executed and a change is made to traversing block 11.
   - If a cam does not output a signal in the braking phase, then traversing block 10 does not have a valid start condition and therefore goes into the state ”wait for start condition”.

In this case, the program has not been completed. When the cam signal or BERO outputs a signal via the digital input, the program with block 11 is continued without a position having been measured.

Flying actual value setting (from SW 1.4)

Setting of the actual value can be triggered via a 0/1 signal edge at input terminal 1 during processing of a block.

The dimension system is then re–synchronized. The following blocks are then executed in the new reference system.

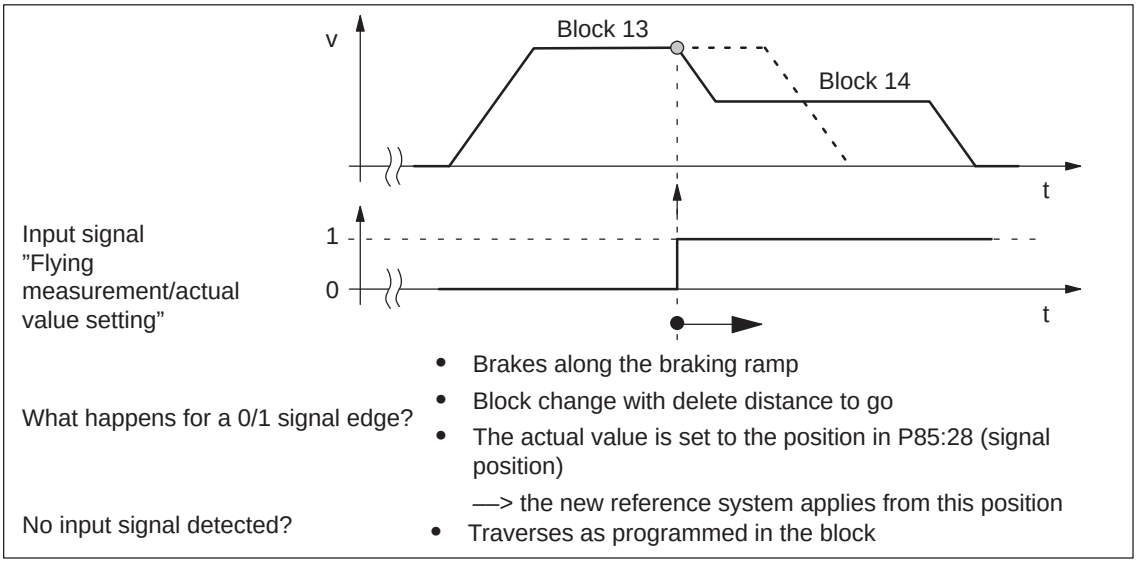


Fig. 5-11 Example: Flying actual value setting

What should be done?

The following has to be done in order to use the "flying actual value setting" function?

1. Connect the signal transmitter to digital input 1 (X5 terminal I/Q1)

   —> the signal transmitter must be high active

   —> refer to Chapter 2.3 and 2.4

2. Assign digital input 1 to the "flying measurement/actual value setting" function

   —> in the SimoCom A under the tab "Par" and entry "Digital inputs/ outputs"

   —> by setting SIMATIC S7 P31 to 27

3. Program the traversing block, activating the "flying actual value setting" function

   —> set PSW.10 to "1"

4. Enter the value for "actual value setting"

   —> P85:28 (signaled position) = required actual value

Example

Flying actual value setting followed by absolute positioning (from SW 1.4)

The following example shows how the actual value can be set flying when approaching a BERO/cam and then an absolute or relative positioning operation can be started.

However, for safety reasons, positioning should be interrupted if neither BERO nor cam were detected within a specified maximum distance.

In this case, the first program block selected is – e.g. block No. 9.

1. Connect the signal transmitter to digital input 1 (X5 terminal I/Q1)
   —> the signal transmitter must be high active
   —> refer to Chapter 2.3 and 2.4
2. Assign digital input 1 to the ”flying measurement/actual value setting” function
   —> in the SimoCom A under the tab ”Par” and entry ”Digital inputs/ outputs”
   —> by setting SIMATIC S7 P31 to 27
3. Program the traversing block (e.g. Block No. 9) as follows
   —> in SimoCom A under the ”Par” tab and entry ”Traversing blocks”
   —> select the ”relative” position (PSW.0 = 1)
   —> select the ”flying” block change enable (via SIMATIC S7 P0080:9 bit 5 = 1)
   —> enter the target position (max. distance to the cam) The sign of the distance specifies whether the signal is in the positive or negative traversing direction with respect to the current actual value.
   —> in the selection box PSW, select ”flying actual value setting: active” (PSW.10 = 1)
   —> enter the required actual value in the signaling position.

If a relative positioning to the new reference point is then to be carried–out in block No. 10, then the block change enable condition in block No. 9 must be programmed for ”continue flying”. The block is now changed with delete distance to go.

The traversing block to find the signals has now been programmed

If the signal is detected within the maximum distance via the digital input, then the actual position is set to the required actual value and the drive goes into the state ”reference point set” (ZSW1.11 = 1).

If the subsequent traversing blocks are configured as absolute blocks, these are only executed if the ”flying actual value setting” was successful in traversing block number 9.

However, in this case, it is necessary that the drive is in the state ”reference point is not set” (ZSW1.11 = 0) before the start of traversing block No. 9.

If the drive was already referenced when block No. 9 was started, and a signal was not found, then it is possible that the absolute blocks were executed in the incorrect reference system. This means that before the start of the program, the POSMO A must always be ”de–referenced” (P98 = 0).

5.5.3 Travel to fixed stop

Description

A linear or rotary axis can be moved in the closed–loop speed controlled mode to a fixed endstop using the ”travel to fixed stop” function. Upon reaching a fixed endstop, the defined torque/force is then built up.

This feature can be used, e.g. as follows:

- To clamp workpieces (e.g. to press the spindle sleeve against the workpiece)
- To approach the mechanical reference point (refer to Chapter 5.5.1)

What should be done?

The following has to be done to traverse to a fixed endstop:

- Set the current to a permissible value for a fixed endstop
  - P28 (max. current) = ”required current”
  - P16 (max. overcurrent) = ”required overcurrent”
- Suppress the ”speed controller at the endstop” fault
  - P30.0 = ”1” ”speed controller at the endstop” fault —> is redefined to become a warning
- Move to the fixed endstop closed–loop speed–controlled (PSW.0 = ”0” or jogging)

  When the endstop is reached, it is displayed as follows:
  - ZSW.7 = ”1” —> means ”warning present”

    and
  - P953.7 = ”1” —> means ”speed controller at the endstop”
- Stop traversing

What has to be observed?

The following has to be observed:

Note

- The ”travel to fixed stop” function can only be practically used when traversing in the closed–loop speed controlled mode (PSW.0 = ”0” or jogging).

  For closed–loop position controlled techniques (PSW.0 = ”1”), the ”fixed endstop reached” state can only be exited using OFF commands.
- Limit P28 and P16 to values at which torques significantly below the torque limit occur at the gearbox output.

  P28 maximum current

  P16 maximum overcurrent
- Limit the traversing velocity to a value which is significantly below the maximum velocity at the rated speed.

The following must also be observed:

The function ”travel to fixed stop” causes an externally forced rotation delay and therefore an externally forced torque that must be below the permissible torques indicated in Chapter 2.5.1 for POSMO A – 75 W and 2.5.2 for POSMO A – 300 W. The electrical torque limiter is ineffective here!

The torque must therefore be limited with mechanical measures for forced braking. The endstop therefore cannot be designed to be permanently fixed; rather, it must be flexible enough that the forced braking process is extended over a specific minimum time Δt. The minimum time results from:

- The translated moment of inertia of the motor = $J_{Mot} \bullet i^2$
- The speed at the gearbox output (N_{Shaft},) at which the endstop is approached. The speed must be entered in rad/s for computational inspection.
- The maximum permissible gearbox torque

For the POSMO A – 75 W with i = 162 : 1 and a speed of 18 rpm (corresponds to a motor speed of 2916 rpm) yields, for example

$$\Delta t = \frac{N_{Shaft} \bullet (J_{Mot} \bullet i^2)}{M_{max\_perm}} = \frac{\left(18\ rpm \bullet \frac{2 \bullet \pi}{60\ smin^{-1}}\right) \bullet (0.00006\ kg \bullet m^2 \bullet 162^2)}{48\ N \bullet m} = 65\ ms$$

The mechanical system of the fixed stop according to the diagrams in Table 5-7 must therefore be designed to be flexible enough that the motion is not braked abruptly, but is extended over at least 65 ms. The centrifugal masses that are braked to a standstill by the mechanical endstop comprise not only the moment of inertia of the motor (as in the above example), but all moments of inertia and linearly moved masses participating in the motion. For the event that the mechanical forced braking takes place unevenly, a corresponding safety factor must be accounted for in the brake time calculation.

As an alternative to a carefully soft design of the endstop, the mechanical limitation of the torque during forced braking can also be implemented with a coupling on the gearbox output. The coupling then exhibits the required flexibility k_{rot} in the direction of rotation, whereby only the translated motor moment of inertia need then be considered as centrifugal mass.

$$k_{rot} = \frac{M_{max\_perm}^2}{(J_{Mot} \bullet i^2)} \bullet \frac{1}{N_{Shaft}^2} = \frac{(48\ N \bullet m)^2}{(0.00006\ kg \bullet m^2 \bullet 162^2)} \bullet \frac{1}{\left(18\ rpm \bullet \frac{2 \bullet \pi}{60\ smin^{-1}}\right)} = 410\ N \bullet m\ rad^{-1}$$

Upon transfer of the maximum permissible torque for this gearbox, the coupling twists by approx. 1/10 rad, in other words about 6 degrees. The user must check whether this much twisting can be accepted.

5.5.4 Rotary axis

Parameterizing a rotary axis

A rotary axis is parameterized using the following parameters:

- P1 axis type e.g. = 360
- P2 travel per gearbox revolution e.g. = 360
- P3 gearbox step–down factor e.g. = 18
- P4 dimension units e.g. = 1

Example (refer to Chapter 3.3):

A rotary axis with modulo 360 and dimension units of degrees is parameterized with these typical values.

Programming

The traversing characteristics of a rotary axis are dependent on which positioning type has been programmed – either ABSOLUTE or RELATIVE.

- Absolute motion
  - Target position

    The target position is programmed in the traversing block using P81:28 and is executed, modulo–corrected.

    Example:

    P81:4 = 520 —> for modulo 360, the axis is positioned to 160
  - Velocity and traversing direction

    The velocity and traversing direction is programmed in the traversing block using P82:28.

Velocity:	Absolute value of P82:28
Traversing direction:	Sign of P82:28 +: —> positive direction –: —> negative direction
Traverse through the shortest distance:	PSW.12 = ”1” (from SW 1.4)

- Relative motion
  - Target position and traversing direction

    The target position is programmed in the traversing block using P81:28 and is not executed, modulo–corrected.

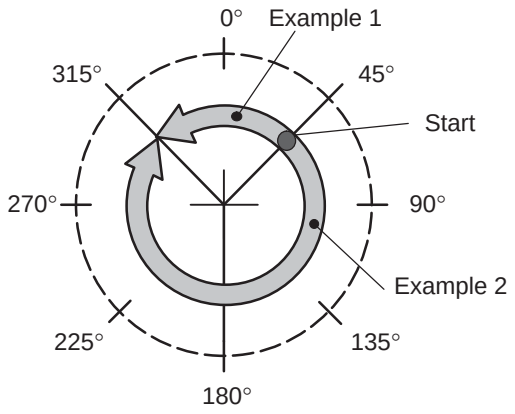
    P81:28 > 0 —> positive traversing direction
    P81:28 < 0 —> negative traversing direction

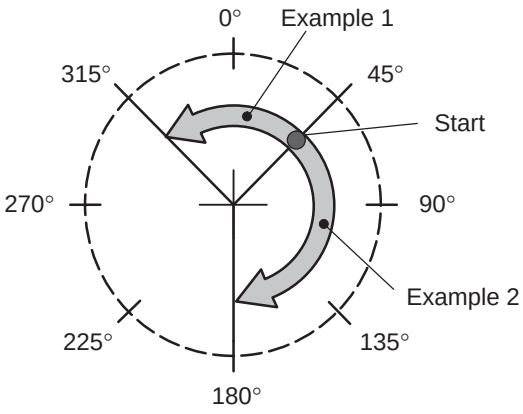
    Examples:

    P81:4 = 520 —> the axis moves in the positive direction through 520
    P81:4 = –10 —> the axis moves in the negative direction through 10
  - Velocity

    Velocity: is entered via P82:28

5





Positioning type = ABSOLUTE

Example 1 (PSW.12 = ”0”):

P81:4 = 315

P82:4 = –100

—> Traverse with 100 % to 315˚ negative

Example 2 (PSW.12 = ”0”):

P81:4 = 315

P82:4 = 100

—> Traverse with 100 % to 315˚ positive

Positioning type = RELATIVE

Example 1:

P81:4 = –90

P82:4 = 100

—> Traverse with 100 % through 90˚ negative

Example 2:

P81:4 = 135

P82:4 = 100

—> Traverse with 100 % through 135 ˚ positive

Fig. 5-12 Example: Programming rotary axes

Signaling position (P85:28)

Signaling position (P55)

The following should be observed for the signaling position:

- Before SW 1.3 the following applies:
  - The drive has precisely one zero position (refer to Chapter 5.5.1). The signal position is viewed, referred to this position.
  - A modulo evaluation is not made.
- From SW 1.3, the following applies:
  - The signal position is saved, evaluated as modulo value

Software limit switch

The software limit switches act the same as for a linear axis.

- P6 Software limit switch, start (refer to Chapter 5.6.2)
- P7 Software limit switch, end

The software limit switches are de–activated with P6 = P7.

5.5.5 Backlash compensation and correction direction (from SW 1.4)

Description

When an indirect measuring system is used (position measuring encoder at the motor), at each direction reversal, the mechanical play is first traveled through before the axis moves.

For this measuring system, mechanical play falsifies the traversing distance. This is because at direction reversal, the axis moves too little by the absolute value of the play.

After entering the backlash compensation and the correction direction, at each direction reversal, the axis actual value is corrected depending on the actual traversing direction.

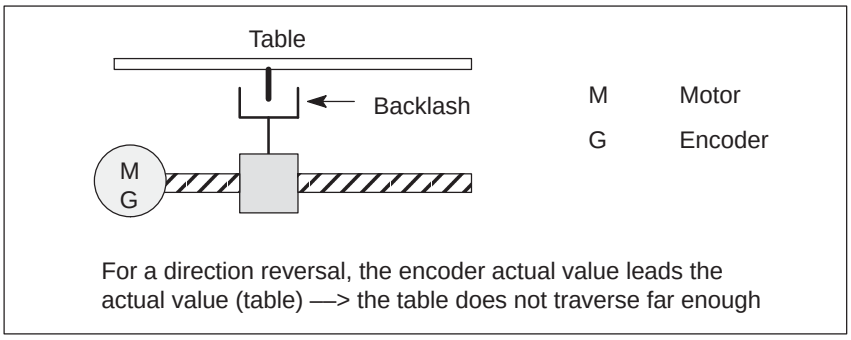


Fig. 5-13 Backlash

Example: Determining the backlash

The following procedure is recommended to determine the backlash of an axis:

- Traverse the axis e.g. in the positive direction – take up the play
- Mount a dial gauge on the axis mechanical system
- Note down the actual position 1 (read P40)
- Traverse the axis in the negative direction until axis movement can be detected at the dial gauge
- Note down the actual position 2 (read P40)

The backlash is obtained from the difference between actual position 1 and actual position 2.

Correction direction (from SW 1.4)

The correction direction of the backlash compensation is defined as follows using the sign of P15:

P15 = positive –> positive correction direction

The following applies when first traversing after power–on:

- Traversing in the positive direction – backlash is corrected
- Traversing in the negative direction– backlash is not corrected

P15 = negative –> negative correction direction

The following applies when first traversing after power–on:

- Traversing in the positive direction – backlash is not corrected
- Traversing in the negative direction– backlash is corrected

---

Note

The following applies when entering a value in P15 (backlash compensation):

Depending on the sign of P15, the actual value can be immediately shifted by the value entered for the backlash. The backlash value becomes effective immediately and is taken into account in the display.

Parameter (refer to Chapter 5.6.2)

P15	Backlash compensation

5.5.6 Jerk limitation

Description

Acceleration and deceleration are step–like if jerk limiting is not used.

Using jerk limiting, a ramp–type increase can be parameterized for both quantities, so that approach and braking are ”smooth” (jerk–limited).

Applications

Jerk limiting can be used, e.g. for positioning tasks using liquids or generally to reduce the mechanical stressing on an axis.

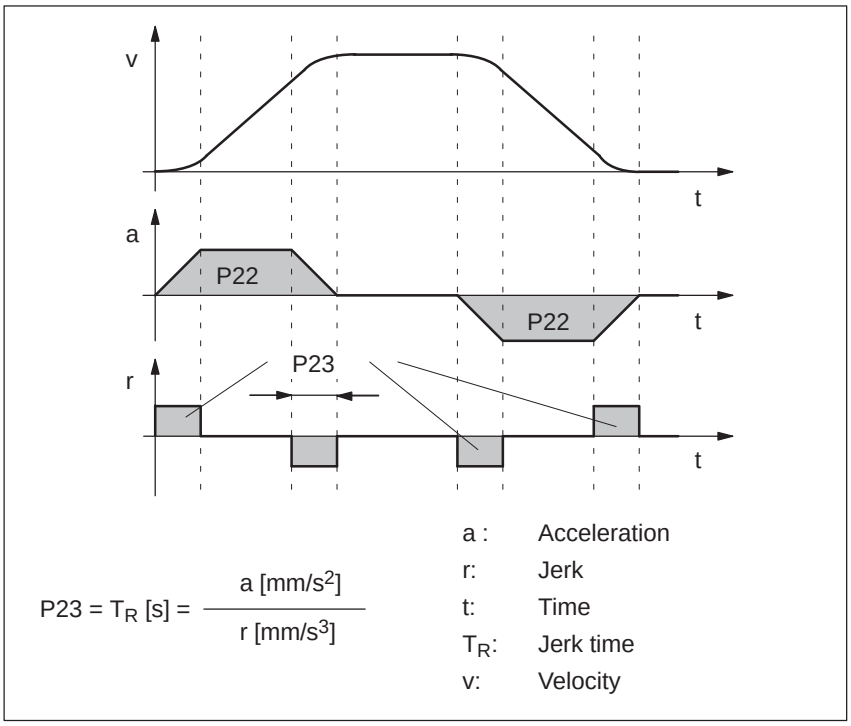


Fig. 5-14 Jerk limitation

Parameter (refer to Chapter 5.6.2)

P23	Jerk time constant
P22	Maximum acceleration

5.5.7 Changeover, metric/inch

Description

When changing over between mm and inch and vice versa, all existing values, dependent on length measurements, are automatically changed.

All of the following inputs and outputs are handled in the new dimension units.

Parameter (refer to Chapter 5.6.2)

P4 Dimension unit

5.5.8 Reversing the control sense (from SW 1.3)

Description

Before SW 1.3 the following applies:

The direction of rotation of the motor shaft depends on whether it traverses in the positive or negative direction and cannot be changed.

From SW 1.3, the following applies:

The direction of rotation of the motor shaft can be set as required, dependent on whether traversing in the positive or negative direction using P3.

Table 5-8 Traversing and direction of rotation of the motor shaft

Traversing direction	**Rotation of the motor shaft when viewing the motor shaft drive out end**	
	P3 = positive	**P3 = negative (from SW 1.3)**
Traversing in the positive direction	Clockwise	Counter–clockwise
Traversing in the negative direction	Counter–clockwise	Clockwise

Parameter (refer to Chapter 5.6.2)

P3 Gearbox ratio

5.5.9 Zero speed monitoring

Description

Using the standstill monitoring function, it can be detected when the axis leaves the target position (under load, for hanging axes, etc.).

Mode of operation

The monitoring time (P13) is started after the motion block has been completed (position reference value = target setpoint).

After the monitoring time (P13) has expired, it is cyclically monitored as to whether the actual axis position remains within the standstill range (P14) around the target position.

Objective:
Continually check whether the position of the axis is also maintained.

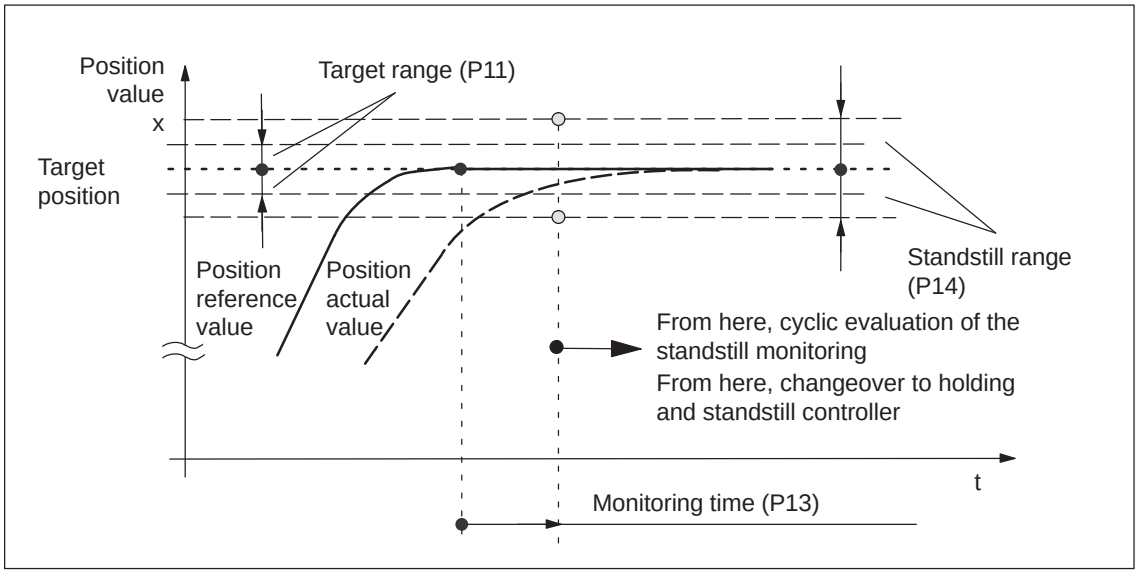


Fig. 5-15 Zero speed monitoring

Fault

When the standstill monitoring responds, an appropriate fault is signaled.

Switching–off

When the next block is started, the standstill monitoring is disabled.

Parameter (refer to Chapter 5.6.2)

P11	Target range
P13	Monitoring time
P14	Standstill range

5.5.10 Digital I/O

Description

For SIMODRIVE POSMO A, there are 2 freely–parameterizable input/output terminals. The function of a terminal is defined by appropriately parameterizing it.

- Designation of the input/output terminals (refer to Chapter 2.3.1)
  - X5 terminal I/Q1 Terminal 1
  - X5 terminal I/Q2 Terminal 2
- Parameterization of the input/output terminals (refer to Chapter 5.6.2)
  - P31 Function, terminal 1
  - P32 Function, terminal 2

Note

The digital inputs/outputs are updated every 10 ms.

Reader's note

List of function numbers for digital inputs/outputs?

—> refer to Chapter 5.6.2 under P31 (function, terminal 1)

The list is valid for terminals 1 and 2.

Rules

The following rules apply for allocating functions:

- The hardware inputs/outputs are high active.
- Rules for input terminals
  - A hardware terminal has a higher priority than a PROFIBUS signal

    If a terminal is parameterized as input, then this terminal completely assumes the function, i.e. a control signal, with the same significance, received via PROFIBUS, is ignored.

    Exceptions:

    If a terminal is parameterized with a value 100, 101 or 102 (OFF 1, OFF 2, OFF 3 logically AND'ed with the terminal), then the following applies:
    The signals are only present if they are set from the terminal and from the PROFIBUS–DP master (this is a safety function).
  - If both input terminals are assigned the same function number, then terminal 2 has priority.

Warning

The appropriate signals from PROFIBUS–DP are ignored!

- Rules for output terminals
  - Output signals are output via a terminal without influencing PROFIBUS communications.
  - Inversion:

    The outputs can be inverted by adding 128 to the values specified in the function list.

    Example:

    The "reference point set" signal should be output inverted via terminal 1.

    —> parameter value = 74 + 128 = 202 (refer to Chapter 5.6.2)
    —> set P31 to 202

    —> a signal is set at the terminal if SIMODRIVE POSMO A is not referenced.
- Signaling the terminal state (from SW 1.4)

  The actual state of the terminal can be displayed in the feedback signal byte (RMB) by adding 256 to the value specified in the function list.

  RMB.6 —> state of terminal 1

  RMB.7 —> state of terminal 2

  Feedback signal byte (RMB) refer to Chapter 4.2 and 4.2.2

5.5.11 Jogging without PROFIBUS and parameterization (from SW 1.4)

Description

The positioning motor can be immediately traversed in the jog mode using this function PROFIBUS communication and traversing immediately over the input terminals in jog mode without additional parameterizing.

If PROFIBUS node address 0 or 127 is detected when the positioning motor is powered–up (all address switches are either OFF or ON), then the following is executed:

- The factory default setting for the parameters is downloaded.
- Parameters which were possibly changed beforehand are ignored.
- Jogging is selected with the following data:
  - P100 = 17471_{dec} —> simulation of the control word
  - P31 = 4 function, terminal 1 <—> jogging –
  - P32 = 5 function, terminal 2 <—> jogging +

  These changes are not saved.

What should be done?

The following has to be done to be able to use the positioning motor in the jogging mode without parameterization and PROFIBUS:

1. Connect the load power supply and both digital inputs

   —> refer to Chapter 2.3 and 2.4
2. Set the PROFIBUS node address to 0 or 127

   —> refer to Chapter 2.3.1 and Table 2-2

Caution

For reliable operation, it is absolutely necessary that the motor is correctly mounted and connected up (refer to Chapter 2).

3. Switch on the load power supply
4. Operate the positioning motor in the jogging mode

   24 V/0 V at X5, I/Q1 —> jogging 1 ON/OFF (jogging –)

   24 V/0 V at X5, I/Q2 —> jogging 2 ON/OFF (jogging +)

Note

- Jogging operation refer to Chapter 5.4.1
- Stand–alone mode is possible as usual after configuration of a PROFIBUS node address ≠ 0 or ≠ 127 (refer to Chapter 5.5.12).

5.5.12 Standalone mode (without bus communication) (from SW 1.2)

Description

Safety signals, such as e.g. OFF1 are continually required. This means, that when bus communications are interrupted, the motor is immediately shut down with fault. This can be prevented using P100 (simulation of the control word).

Caution

In standalone mode, the drive is automatically reset in event of an error, in other words:

- The faults which occur are automatically acknowledged
- Before SW 1.3 the following applies: The block sequence is re–started
- From SW 1.3, the following applies: The block sequence is continued from the next defined block

Setting standalone mode

If the value of P100 is not equal to zero (e.g. $443F_{hex}$), when powering up without a master or when the communication fails, after 3 seconds the control word is replaced by this value.

The terminal signals remain active with the highest priority.

A maximum of ten traversing blocks in the range 3 to 27 can be preset with SIMODRIVE POSMO A in P101:11 for the standalone mode. These specified blocks are then processed consecutively in standalone mode.

Rules when executing the blocks:

- Execution sequence: from P101:1 to P101:10
- If it is recognized that P101:x = 0, then the last block which is entered is continuously repeated.
- If the block lies within a program range, then the program is executed, as programmed from this block.

The factory default setting for P101:11 is as follows (refer to Table 5-9):

Table 5-9 P101:11 (block sequence in stand–alone mode) (factory default)

P101:11	Index									
	1	2	3	4	5	6	7	8	9	10
Value	0	0	0	0	0	0	0	0	0	0

Jogging operation during stand–alone mode

Assumption:

Jogging 1 and 2 are permanently connected via digital inputs and parameterized using P31 and P32 (refer to Chapter 5.5.10).

This means that when the bus communications fail, in order that the positioning motor can still be jogged via these inputs, the following applies:

- Before SW 1.3, the following applies:

  In order to be able to jog, only one block without traversing motion may be entered in P101:1.

  e.g.: P101:1 = 5, P101:2 – :10 = 0, block 5 with standard values

- From SW 1.3, the following applies:

  In order to be able to jog, P101:1 – :10 = 0 or $\neq$ 0.

  If a block sequence is specified in P101:10, then a jogging signal which is present is always effective before repeating the last specified block.

  e.g.: P101:1 = 5, P101:2 = 7 and P101:3 – :10 = 0
  —> jogging is effective before repeating block 7

Parameter (refer to Chapter 5.6.2)

P100	Control word simulation
P101:11	Block sequence in standalone mode

5.5.13 Holding brake (from SW 1.4)

Description

Using the brake sequence control, the axes can be held at standstill to avoid undesirable motion.

The sequence control can be used both for motors with integrated holding brake as well as to control an external holding brake.

- Holding brake for 75 W motors

  75 W motors do not have an integrated holding brake.

  An external holding brake can always be used. In this case, it is controlled using an appropriately parameterized digital output.

- Holding brake for 300 W motors

  300 W motors are optionally available with integrated holding brake.

  An external holding brake can always be used. In this case, it is controlled using an appropriately parameterized digital output.

Warning

- It is not permissible to use the integrated holding brake as working brake, as generally it is only designed for a limited number of emergency braking operations.
- Axial forces may not be applied to the shaft – both when installing and operating the system!

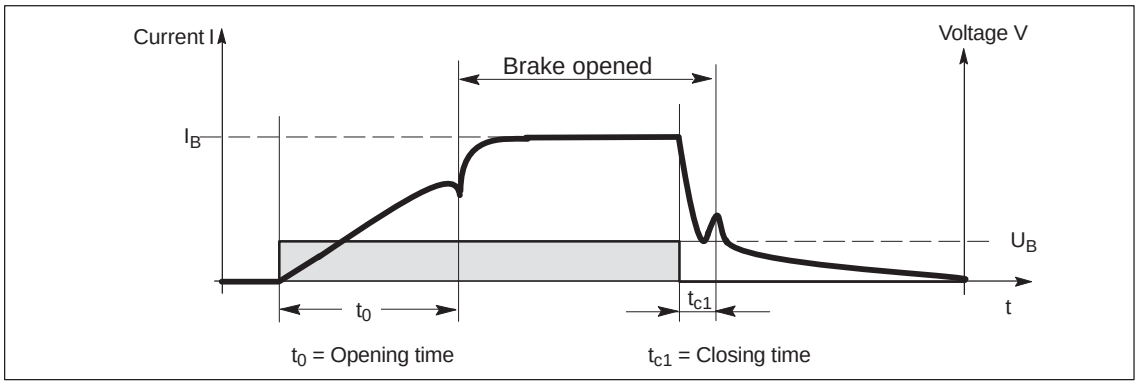


Fig. 5-16 Terminology (time) for holding operation

Reader's note

Technical data, refer to Chapter 2.6.2, Table 2-7.

Connecting the holding brake

The brake sequence control operates with the ”open holding brake” output signal. The signal can be output as follows:

- Motor with integrated holding brake (only 300 W motors)

  No additional wiring is required for the brake sequence control.

- Motor with external holding brake

  The external holding brake is controlled using a digital output with function number 95 (open holding brake).

  The following must be observed:

  – Output terminal X5, I/Q1, I/Q2

  – Activated via P56.4 and P56.6

  – Parameterizing the output terminal —> refer to Chapter 5.5.10

  – Connecting up the output terminal —> refer to Chapter 2.3

  – The relay for the holding brake is connected at the parameterized output terminal.

Parameter (refer to Chapter 5.6.2)

The following parameters are available for the ”Holding brake” function:

- P31 Function, terminal 1
- P32 Function, terminal 2
- P56.4 Open holding brake
- P56.5 Monitoring, holding brake undervoltage
- P56.6 Open the holding brake, also for an external holding brake
- P58 Holding brake, brake opening time
- P59 Speed, close holding brake
- P60 Holding brake, brake delay time
- P61 Holding brake, controller inhibit time

Signals (refer to Chapter 5.5.10)

The following signals are relevant for the ”holding brake” function:

- Input signal

  – Input terminal (X5, I/Q1, I/Q2)

  Function number 26 Open holding brake

  – PROFIBUS

  Control signal STW.15 Open holding brake

- Output signal

  – Output terminal (X5, I/Q1, I/Q2)

  Function number 95 Control external holding brake

Open brake

When the brake control is activated, when the status changes from ”ready” to ”operation enabled”, the brake is opened. At the same time, the pulses are enabled and the axis goes into closed–loop controlled operation without a traversing task. In the “Positioning” mode (P700 = 2), the “holding controller” (P57) is switched-in with the factory default setting of P56.2 = 0 (from SW 1.3). In the “speed setpoint” mode (P700 = 1), it is switched-over to “P gain n-controller standstill” (P54).

In order to give the brake the necessary time to mechanically open, the drive starts after the brake opening time (P58).

The drive goes into the ”operation enabled” status after the time in P58 has expired.

Objective when setting the brake opening time

The brake opening time should be selected, so that after the ”controller enable” is issued, the speed controller becomes active when the motor holding brake opens. For all other settings, the control acts against the brake.

The following applies:
Brake opening time (P58) ≥ Time required to open the holding brake

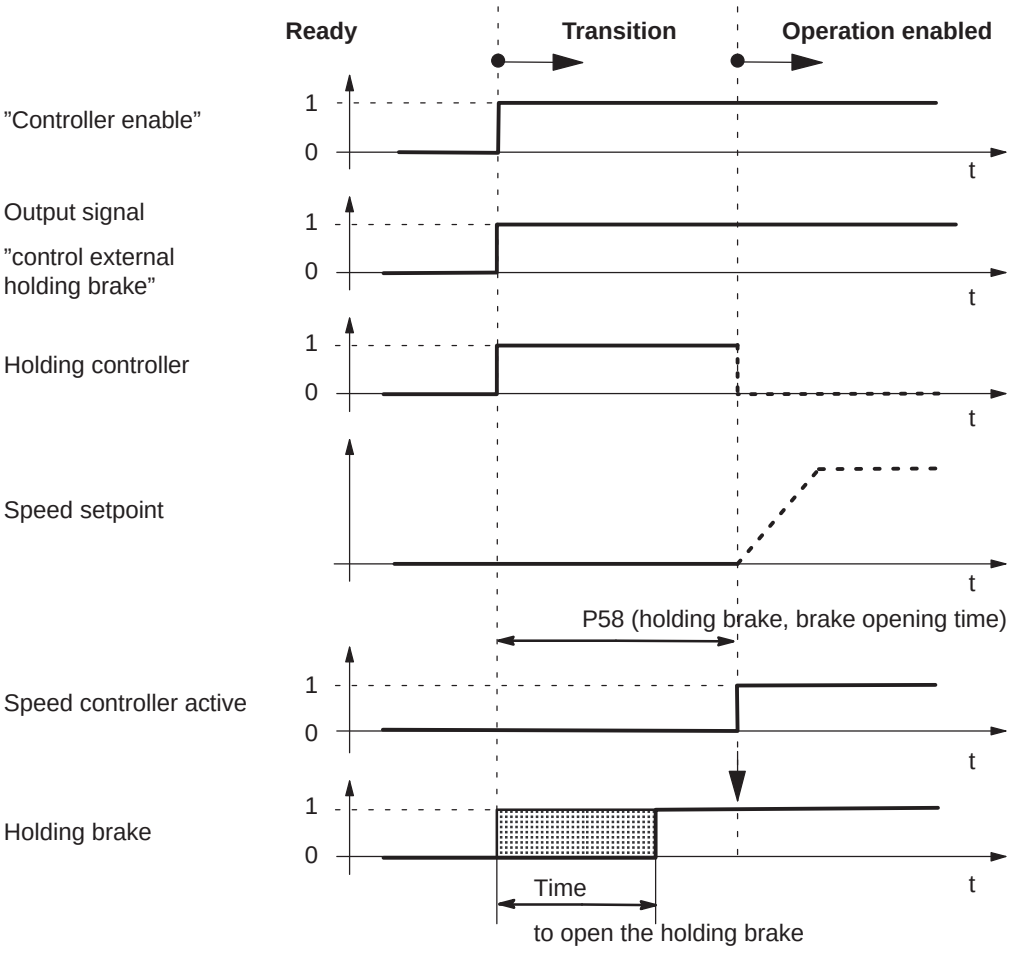


Fig. 5-17 Opening the brake: Behavior when the status changes from ”ready” to ”operation enabled”

Closing the brake when withdrawing the ”controller enable”

The ”controller enable” is withdrawn for the following events:

- STW.0 (ON/OFF 1) = 1/0 signal
- STW.2 (operating condition/OFF 3) = 1/0 signal
- A fault occurs where it is possible to brake in an orderly fashion (e.g. software limit switch actuated)

What happens if the ”controller enable” is withdrawn?

- The axis is actively braked and the brake delay time started
  - The axis is actively braked according to the data entered (ramp or maximum deceleration)
  - The brake delay time (P60) is started
- The brake control signal is withdrawn

  The brake control signal is withdrawn, if
  - n_{act} = $n_{holding\ brake}$ (P59), or
  - The brake delay time (P60) has expired
- Start the controller inhibit time (P61) and then cancel the pulses

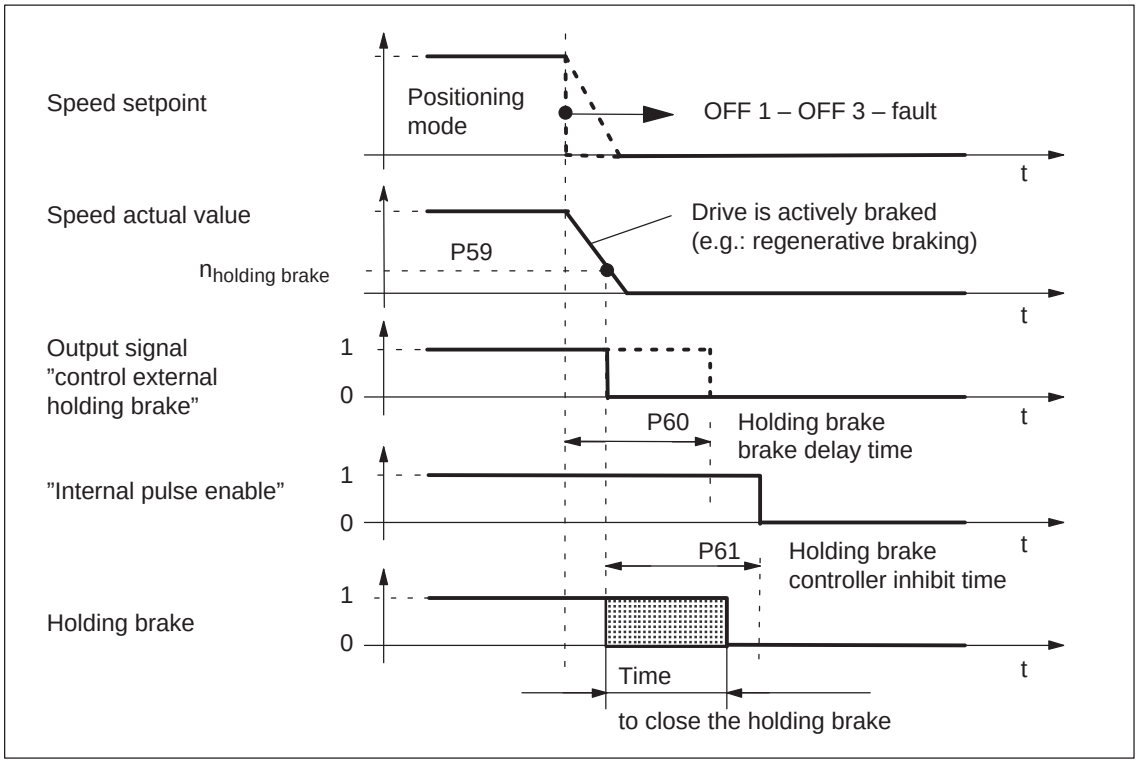


Fig. 5-18 Closing the brake: Behavior when withdrawing ”controller enable”

Objective when setting

The controller inhibit time should be harmonized so that the closed–loop control is only withdrawn after the brake has been closed. This prevents an axis from possibly sagging.

Closing the brake when the ”pulse enable” is withdrawn

The ”pulse enable” is withdrawn when the following events occur:

- STW.1 (operating condition/OFF 2) = 1/0 signal
- STW.3 (operation enabled/operation inhibited) = 1/0 signal
- A fault occurs, where it is no longer possible to brake in a controlled fashion (e.g. encoder fault)

What happens if the ”pulse enable” is withdrawn?

When the pulse enable is withdrawn, the drive coasts down, and the ”open holding brake” output signal is canceled.

The motor ”coasts” down until the brake becomes effective mechanically and brings the motor to a standstill.

After the time taken for the brake to close, the drive is braked by the motor holding brake.

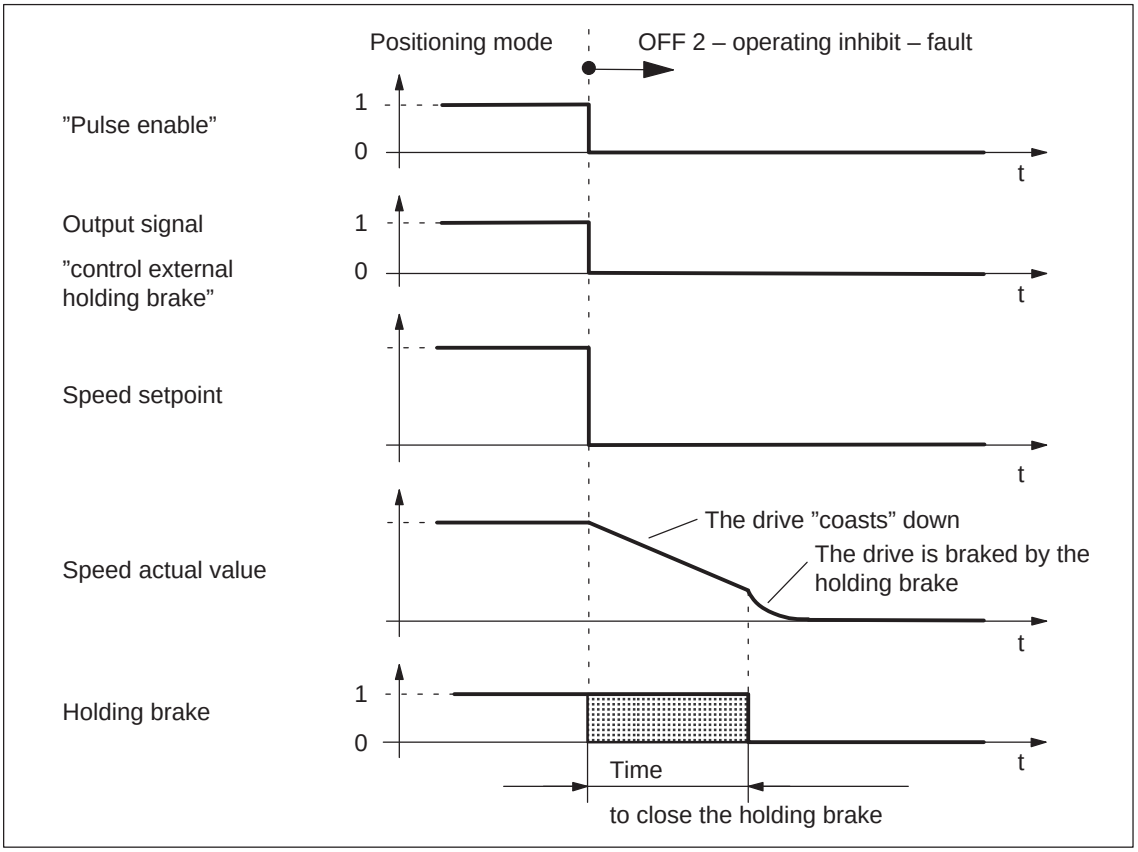


Fig. 5-19 Closing the brake: Behavior when withdrawing ”pulse enable”

Warning

When this type of braking is used, it subjects the holding brake to mechanical wear and therefore should only be seldomly used.

Example: Motor with external holding brake

Task and assumptions:

A motor with external holding brakes should be used for hanging axes. The holding brake is to be controlled via output terminal 1.

What other settings are required?

1. Connect the relay to control the motor holding brake to output terminal 1.
2. Assign the ”control external holding brake” function to output terminal 1.

   P31 = 95
3. Activate the brake sequence control in the drive.

   P56.4 = 0, STW.15 = 0
4. Set the parameters to open the holding brake.
   - P58 (holding brake, brake opening time)

     The brake opening time must be set so that it is equal to or greater than the time required to actually open the holding brake.
5. Set the parameters to close the holding brake when ”controller enable” is withdrawn.
   - P59 (speed, close holding brake)
   - P60 (holding brake, brake delay time)

     The brake delay time (P60) must be harmonized with the speed, at which the holding brake is closed (P59).
   - P61 (holding brake, controller inhibit time)

     The controller inhibit time must be harmonized with the time that it takes to close the brake so that the drive cannot sag.

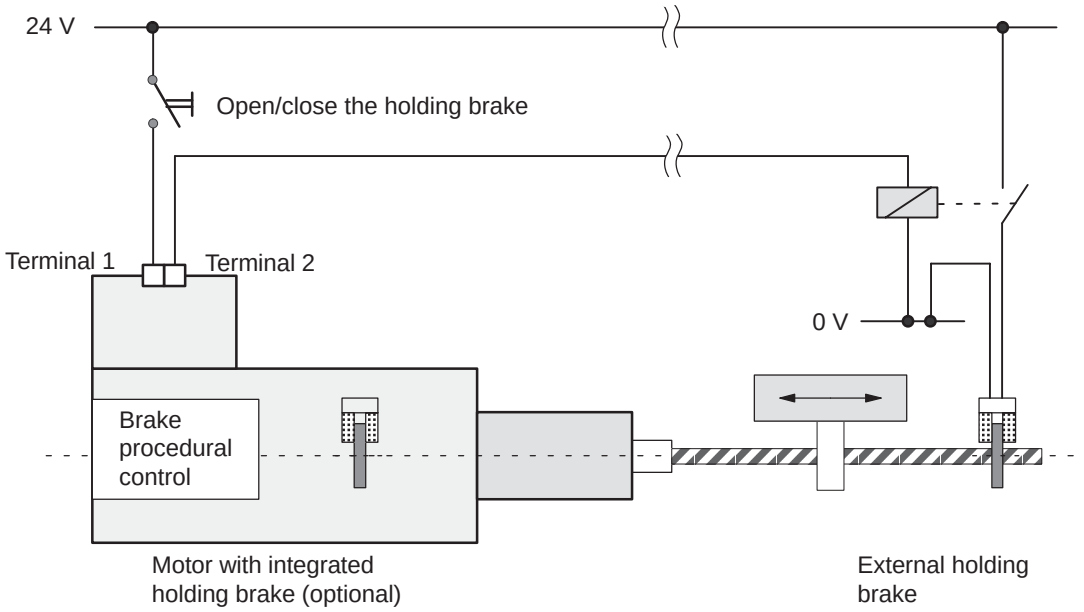
     Example to determine the controller inhibit time

     Mark the position of the axis and initiate a fault which results in the controller enable being withdrawn (e.g. change the setting of the software limit switch in P6 or P7).

     Does the axis sag (drop slightly)?

     —> yes, then increase the controller inhibit time (P61)

     —> no, then the settings are OK



Parameter

P31	Function, terminal 1
P32	Function, terminal 2
P56.4	Open holding brake
P56.5	Monitoring, holding brake undervoltage
P56.6	Open the holding brake, also for an external holding brake
P58	Holding brake, brake opening time
P59	Speed, close holding brake
P60	Holding brake, brake delay time
P61	Holding brake, controller inhibit time

Inputs/outputs

P31 = 26	Terminal 1 as input with ”open holding brake” function
P32 = 95	Terminal 2 as output with the ”control external holding brake” function

Fig. 5-20 Example: Integrated holding brake – external holding brake

5.5.14 Limit switch monitoring functions

Description

For POSMO A, the following limit switch monitoring functions can be used:

- Hardware limit switch (from SW 2.0)
- Software limit switch

The limit switch monitoring functions can be used to limit the operating range or to protect the machine and are also available in the n–set mode.

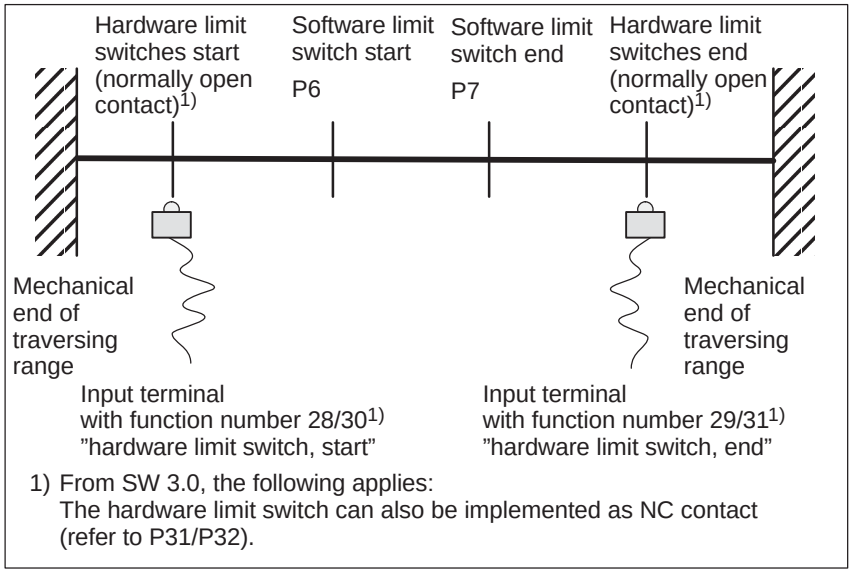


Fig. 5-21 Limit switch monitoring functions

Hardware limit switches (HW limit switch)

There is a hardware limit switch for every axis and every approach direction. The hardware limit switches must be connected to an input terminal (P31/P32) with the following function numbers.

- Function "hardware limit switch start" —> function number 28
- Function "hardware limit switch, end" —> function number 29

—> Refer to Chapter 5.6.2

Traverse to a hardware limit switch?

When traversing to a hardware limit switch, the associated input signal is set and the following response is automatically initiated:

- The axis is braked down to the maximum velocity set using P28 (maximum velocity).
- The following fault is signaled:
  - Fault 706/707 software limit switch, start/end
  - Supplementary info 911 hardware limit switch, passed/reached

How do you move away from a hardware limit switch?

If an axis is at a hardware limit switch, then it can be moved away as follows:

1. Acknowledge the fault
2. Return the axis to the valid traversing range

   In the jog mode or via velocity, move away in a direction opposite to the approach direction

   or

1. Withdraw the controller enable (control signal ON/OFF1)
2. Set the input terminal (function number 28/29) to 0

Note

If the hardware limit switch was passed, then it is only possible to continue to traverse in the original direction, if after acknowledging the fault, the axis is traversed in the opposite direction and again passes over the hardware limit switch.

Software limit switch (SW limit switch) P6, P7

The software limit switch start (P6) and software limit switch end (P7) can be correspondingly set to limit the operating range or to protect the machine.

Notice

The software limit switches only become active if the following conditions exist:

- P6 < P7
- pos mode: The axis is referenced (”reference point set” output signal)

Only then is it certain that the axis will be immediately stopped if it attempts to move out of the permissible range.

Note

The SW limit switch monitoring is dependent on the axis type as follows:

For a linear axis or rotary axis with modulo correction, the following is valid:

—> the software limit switches can be activated via P6<P7 and set via P6 and P7.

Traverse to a software limit switch?

When traversing to a software limit switch, the following response is automatically initiated:

- When the axis reaches the software limit switch, then the axis is braked down to the velocity set in P10 (maximum velocity). The axis therefore comes to a standstill after the limit switch.
- One of the following faults/warnings is signaled:
  - Fault 706 software limit switch, start
  - Fault 707 software limit switch, end
  - Warning 803 software limit switch, start
  - Warning 804 software limit switch, end

How do you move away from a software limit switch?

If an axis is located at a software limit switch, then it can be moved away as follows:

1. Acknowledge the fault
2. Return the axis to the valid traversing range

   In the jog mode or via velocity, move away in a direction opposite to the approach direction

   or

   withdraw the controller enable (OFF1) and ”manually” move the drive.

5.5.15 Telegram substitution (from SW 3.0)

Description

For specific applications it is necessary that under no circumstances (PROFIBUS–DP fails) that the axis of the drive comes undesirably to a standstill or the drive state can be configured to ”freeze” to run–down the master.

Warning

For P701=1, the function is immediately effective. The drive only evaluates PZD data if STW.10 = 1.

It must be carefully ensured that the drive can always be stopped using an EMERGENCY SWITCHING–OFF button/function In addition we recommend that one of the two input terminals should be parameterized with the ”OFF1” function (refer to P31/P32).

The function is available for both operating modes – ”positioning” and ”speed setpoint” (P700).

Behavior after activation (P701 = 1)

- PZD data that is available (STW, block selection and start byte) is only evaluated if the STW.10 ”control from PLC requested” is equal to ”1”.
- If STW.10 changes from ”1” to ”0”, then the currently active drive state (PZD data being used) is frozen. The drive uses the last received STW, block selection and start byte (or speed setpoint) where STW.10 was 1.
- PZD data that is received is only taken into account if STW.10 = 1. In this case, PZD data must be sent from the same master type as before the connection was lost. It is not possible to interrupt a connection with a Class 1 master (S7–CPU) and resume communications with a Class 2 master (PG/SimoCom A) (refer to P928).
- If the drive is powered–up (power–on) and P701 = 1 was previously saved in the FEPROM (refer to P971), then the drive only responds when PZD data is available, if STW.10 = 1.
- If the bus connection to the drive fails, then the currently active drive state is frozen. The drive uses the last received STW, block selection and start byte where STW.10 was 1.

  After the bus connection has been restored, PZD data that is received is only taken into account again if STW.10 = 1. Also in this case, PZD data must be sent from the same master type as before the connection was interrupted.

- The drive LED indicates when PZD data is being actively substituted ((P701 = 1 and STW.10 = 0).

  In this case, the LED flashes, alternating between yellow/green.

  If STW.10 = 1, then the behavior of the LED is compatible to the behavior with P701 = 0.
- The function cannot be used in the standalone mode (refer to P100).
- Independent of the operating mode and independent of P701, parameters P967 and P972 always display the PZD data presently being internally used in the drive.

  This can used, when establishing a connection to the drive, after bus failure or replacing the master, to immediately send the last valid control word (for which STW.10 = 1), the last valid block selection and start byte (or speed setpoint) to the drive. This means that the connection can be immediately restored without changing the status of the drive.

Response for P701 = 0 (factory default)

The drive behavior is compatible to previous software releases.

PZD data is always evaluated independently of STW.10.

5.6 Parameters for SIMODRIVE POSMO A

5.6.1 General information on parameters

General information

The majority of the parameters required when commissioning the system for the first time are, for SIMODRIVE POSMO A, already preset in the factory (factory default setting).

All of the motor, power module and encoder data are known because of the fixed hardware. This means that the commissioning (start–up) data is limited to defining the gearbox (refer to Chapter 5.6.3) and the system geometry as well as some positioning data and software limit switches.

Saving parameters

There is a non–volatile memory to save parameters.

After parameters have been changed, they must be saved by transferring them into the non–volatile memory.

The parameters are loaded from the non–volatile memory after power up.

Transfer into the non–volatile memory?

- Set P971 from 0 to 1
- Data save is automatically acknowledged with P971 = 0

Changing parameters

For safety reasons, some parameters can only be changed if a traversing block is not active, i.e. the motor is not moving (equalization movements initiated by the closed–loop position control are an exception).

Exceptions:

- It is always possible to change parameters of traversing blocks which are not selected.
- It is always possible to change parameters which do not have an appropriate ID.

Illegal change tasks are rejected in the PKW part with PROFIBUS fault number 17 (task not able to be executed due to the operating state) (refer to Chapter 5.1).

Setting the factory default

The factory setting of parameters for SIMODRIVE POSMO A can be re–established if required.

Establish the factory default setting?

- Set P970 from 1 to 0
- Download is automatically acknowledged with P970 = 1

  The parameters are now in the volatile memory (RAM).

  After the parameters have been transferred into the non–volatile memory, the factory default setting is loaded when powering up.
- Set P971 from 0 to 1
- Data save is automatically acknowledged with P971 = 0

Service functions for the parameters (refer to Chapter 5.6.2)

For SIMODRIVE POSMO A, the following service functions are available with reference to parameters:

- P980:78 Supported parameters

  List of all supported parameters
- P990:78 Changes with respect to the factory default setting

  list of all of the parameters which have been changed with respect to modified parameters

Parameters for identification (refer to Chapter 5.6.2)

The following parameters are available for positioning motor identification:

- P52 Hardware version
- P53 Firmware version
- P964:8 (from SW 1.4) Drive identification

5.6.2 List of parameters

Reader's note

The parameters, listed in the following, are valid for all software releases of SIMODRIVE POSMO A.

The complete list is updated corresponding to the Edition of the documentation (refer to the Edition status in the header line) and corresponds to the software release of SIMODRIVE POSMO A documented here.

The parameters that are dependent on the software release are appropriately identified.

Explanation of the parameter list The parameters are listed as follows:

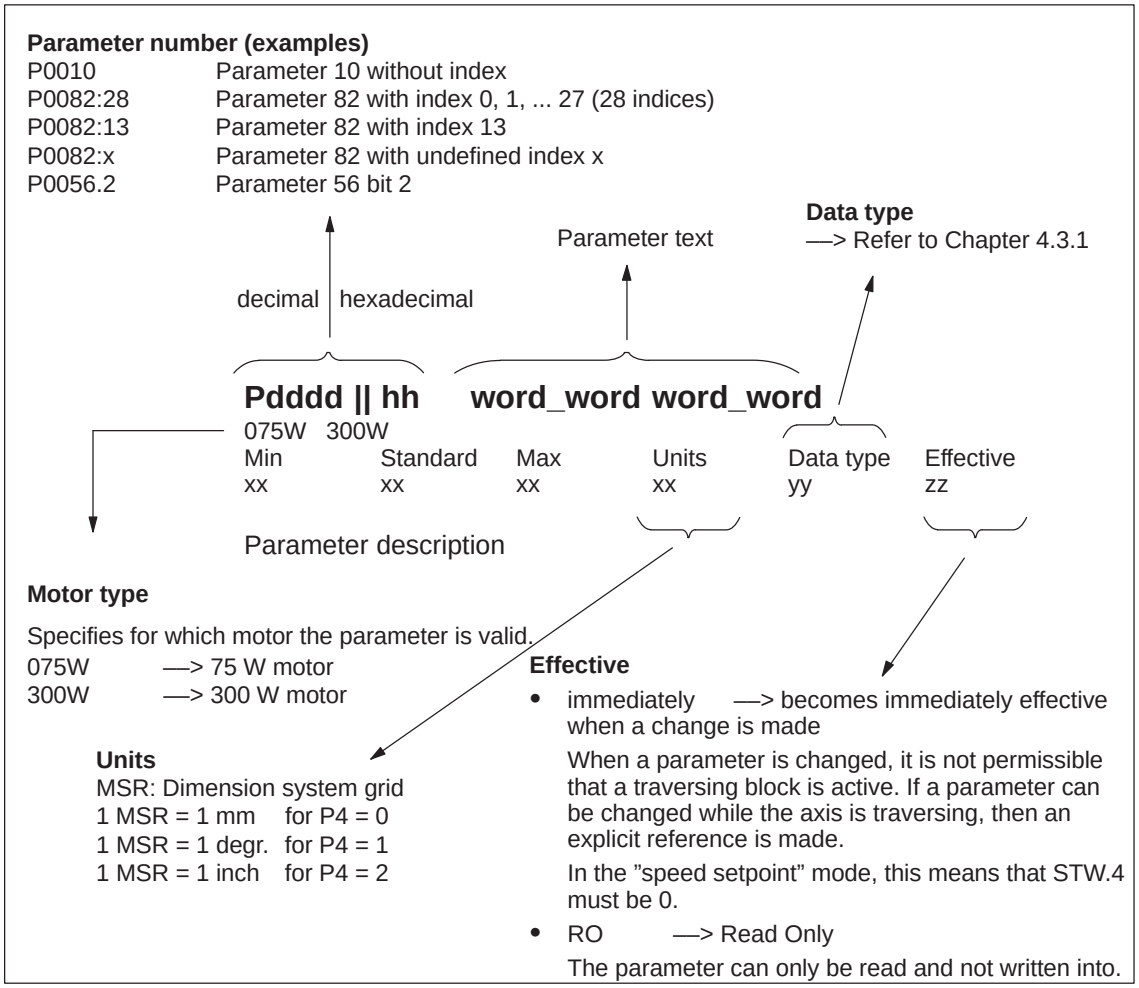


Fig. 5-22 Parameter list

Parameter list The following parameters are available for SIMODRIVE POSMO A:

Version: 05.03.02

P0001 / 01 Axis type

300W

Min	Standard	Max	Unit	Data type	Effective
0	0	200000	MSR	C4	immed.

0.0 —> Linear axis
> 0.0 —> rotary axis
The value corresponds to the modulo correction of the axis (e.g.: P1 = 360 —> 0.0 – 359.9).
Note:
If the drive is programmed as a rotary axis (P1 > 0), the start and end of software limit switches must lie within the modulo range. Furthermore, P6>=0 and P7<=P1 must apply.

The following applies from SW 1.6:
The parameter is limited in relation to the gear reduction factor and the travel per gear revolution.
The following formula applies:
F = Conversion factor (mm —> F = 1 ; inch —> F = 25.4)
P1 < 2147483647 * P2 / (F * 4096 * |P3|)

The following applies from SW 2.0:
Only the procedure with modulo axes is possible in the ”Speed setpoint” operating mode (P930).

In addition to the preceding formulas the following condition applies for parameter P2:
The travel per gear revolution P2 must be less than or equal to the rotary axis circumference P1 ($P2 \leq P1$).

075W

Min	Standard	Max	Unit	Data type	Effective
0	0	200000	MSR	C4	immed.

0.0 —> Linear axis
> 0.0 —> rotary axis
The value corresponds to the modulo correction of the axis (e.g.: P1 = 360 —> 0.0 – 359.9).
Note:
If the drive is programmed as a rotary axis (P1 > 0), the start and end of software limit switches must lie within the modulo range. Furthermore, P6>=0 and P7<=P1 must apply.

The following applies from SW 1.6:
The parameter is limited in relation to the gear reduction factor and the travel per gear revolution.
The following formula applies:
F = Conversion factor (mm —> F = 1 ; inch —> F = 25.4)
P1 < 2147483647 * P2 / (F * 816 * |P3|)

The following applies from SW 2.0:
Only the procedure with modulo axes is possible in the ”Speed setpoint” operating mode (P930).

In addition to the preceding formulas the following condition applies for parameter P2:
The travel per gear revolution P2 must be less than or equal to the rotary axis circumference P1 ($P2 \leq P1$).

P0002 / 02 Distance per gearbox revolution

300W

Min	Standard	Max	Unit	Data type	Effective
0.0001	10	200000	MSR	C4	immed.

The parameter specifies the travel which is moved through in the reference system after a gearbox revolution.
Note:

The following applies from SW 1.6:

With a modulo axis (P1 > 0), the path per gear revolution is limited by the axis type and the gear reduction ratio.
The following formula applies:
F = Conversion factor (mm —> F = 1 ; inch —> F = 25.4)
P2 > P1 * F * 4096 * |P3| / 2147483647

In addition to the preceding formulas the following condition applies for parameter P2:
The travel per gear revolution P2 must be less than or equal to the rotary axis circumference P1 (P2 $\leq$ P1).

075W

Min	Standard	Max	Unit	Data type	Effective
0.0001	10	200000	MSR	C4	immed.

The parameter specifies the travel which is moved through in the reference system after a gearbox revolution.
Note:

The following applies from SW 1.6:

With a modulo axis (P1 > 0), the path per gear revolution is limited by the axis type and the gear reduction ratio.
The following formula applies:
F = Conversion factor (mm —> F = 1 ; inch —> F = 25.4)
P2 > P1 * F * 816 * |P3| / 2147483647

In addition to the preceding formulas the following condition applies for parameter P2:
The travel per gear revolution P2 must be less than or equal to the rotary axis circumference P1 (P2 $\leq$ P1).

P0003 / 03 Gearbox step-down ratio

300W

Min	Standard	Max	Unit	Data type	Effective
–200000	1	200000	–	C4	immed.

The step-down ratio should be entered in accordance with the gear used.
Note:
P3 = 0 is not permissible.
Sign change —> direction of rotation change
This parameter has a gearbox-dependent factory default.
The following applies before SW 1.3: Min. value = 0.0001

The following applies from SW 1.6:

With a modulo axis (P1 > 0), the gear reduction ratio is limited by the path per gear revolution and the axis type.
The following formula applies:
F = Conversion factor (mm —> F = 1 ; inch —> F = 25.4)
|P3| < 2147483647 * P2 / (F * 4096 * P1)

075W

Min	Standard	Max	Unit	Data type	Effective
–200000	1	200000	–	C4	immed.

The step-down ratio should be entered in accordance with the gear used.
Note:
P3 = 0 is not permissible.
Sign change —> direction of rotation change
This parameter has a gearbox-dependent factory default.
The following applies before SW 1.3: Min. value = 0.0001

The following applies from SW 1.6:

With a modulo axis (P1 > 0), the gear reduction ratio is limited by the path per gear revolution and the axis type.
The following formula applies:
F = Conversion factor (mm —> F = 1 ; inch —> F = 25.4)
|P3| < 2147483647 * P2 / (F * 816 * P1)

P0004 / 04 Dimension units

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	2	–	I2	immed.

Dimension units for parameter values (0 = mm, 1 = degree, 2 = inch).

P0005 / 05 Reference point coordinate

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–200000	0	200000	MSR	C4	immed.

The parameter specifies the position at the reference point.
Note:
The parameter value can be changed while traversing.

P0006 / 06 Software limit switch, start

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–200000	–200000	200000	MSR	C4	immed.

The parameter specifies the software limit switch, left negative.
de-activated: P6 = P7
activated: P6 < P7
Note:
Also refer to P7.
If the drive is programmed as a rotary axis (P1 > 0), the start and end of software limit switches must lie within the modulo range. Furthermore, P6>=0 and P7<=P1 must apply.

The following applies from SW 2.0:
Software limit switches are not possible in the ”Speed setpoint” operating mode (P930).

P0007 / 07 Software limit switch, end

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–200000	200000	200000	MSR	C4	immed.

The parameter specifies the software limit switch, right positive.
de-activated: P6 = P7
activated: P6 < P7
Note:
Also refer to P6.
If the drive is programmed as a rotary axis (P1 > 0), the start and end of software limit switches must lie within the modulo range. Furthermore, P6>=0 and P7<=P1 must apply.

The following applies from SW 2.0:
Software limit switches are not possible in the ”Speed setpoint” operating mode (P930).

P0008 / 08 Maximum speed

300W

Min	Standard	Max	Unit	Data type	Effective
0	3000	3800	rpm	C4	immed.

Max. motor speed referred to the motor axis

075W

Min	Standard	Max	Unit	Data type	Effective
0	3000	3600	rpm	C4	immed.

Max. motor speed referred to the motor axis.

P0009 / 09 Acceleration time

300W 075W

Min	Standard	Max	Unit	Data type	Effective
10	100	15000	ms	T2	immed.

During this time, in the speed-controlled operation, the setpoint is set as follows:
Ramp-up: From zero up to the maximum permissible actual speed
Ramp-down: From the maximum permissible actual value down to zero

The following applies from SW 2.0:
The ramp-up time can be changed with immediate effect in the ”Speed setpoint” operating mode.
This is also possible when the drive is moving.

P0010 / 0A Maximum motor velocity

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	30000	2000000	MSR/min	I4	immed.

Max. permissible velocity, dependent on the system.
The max. speed in P8 was not exceeded in operation.
Note:
This parameter has a gearbox-dependent factory default.

P0011 / 0B Target range

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	2	200000	MSR	C4	immed.

The parameter specifies the precise stopping range (precise stopping window).
Note:
P0011 may not be set too low, as otherwise a traversing task cannot be completed. The setting is dependent on the encoder resolution and the gear ratio.
For SW 3.1 or higher, the following applies:
If the traversing range adaptation is active (compare P0704), the destination area will be deactivated with the setting P0011 = 0.
In the case of a deactivated destination area, a traversing block will be terminated independent of the positioning accuracy if the target position has been overrun

P0012 / 0C Max. following error

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	200000	200000	MSR	C4	immed.

The parameter specifies the maximum permissible following error.
Note:
The following error status is displayed using status signal ZSW.8 (no following error/following error).

P0013 / 0D Monitoring time

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	100	2000000	ms	T4	immed.

After the motion block has been completed (position ref. value = target ref. value), this time is started.
After the time has expired, the standstill monitoring and P gain are activated for standstill (P54, P57).

P0014 / 0E Standstill range

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	200000	200000	MSR	C4	immed.

Tolerance range for the closed-loop position control at standstill.
Note:
The parameter value can be changed while traversing.

P0015 / 0F Backlash compensation

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–200000	0	200000	MSR	C4	immed.

The mechanical backlash for direction reversal can be compensated using this parameter.
P15 = negative —> Correction direction negative
P15 = positive —> Correction direction positive
Note:
The following applies before SW 1.4: Min. value = 0.0

P0016 / 10 Max. overcurrent

300W

Min	Standard	Max	Unit	Data type	Effective
0	10.5	42	A	C4	immed.

Max. overcurrent for the breakaway torque.
Note:
This parameter has a gearbox-dependent factory default.
The parameter is valid for: n < 100 RPM and max. 500 ms
Maximum values depend on the gear unit —> see User Manual under the heading ”Gear unit dependant parameters (factory settings)”
The following applies as from SW 1.5:
The parameter value can be changed while traversing.

075W

Min	Standard	Max	Unit	Data type	Effective
0	9	18	A	C4	immed.

Max. overcurrent for the breakaway torque.
Note:
This parameter has a gearbox-dependent factory default.
The parameter is valid for: n < 100 RPM and max. 500 ms
Maximum values depend on the gear unit —> see User Manual under the heading ”Gear unit dependant parameters (factory settings)”
The following applies as from SW 1.5:
The parameter value can be changed while traversing.

P0017 / 11 P gain, speed controller

300W

Min	Standard	Max	Unit	Data type	Effective
0	3	100	–	I4	immed.

The parameter specifies the P gain for traversing operation.
Note:
The parameter value can be changed while traversing.
Also refer to P54

075W

Min	Standard	Max	Unit	Data type	Effective
0	20	100	–	I4	immed.

The parameter specifies the P gain for traversing operation.
Note:
The parameter value can be changed while traversing.
The following applies before SW 1.2: Max. value = 40
Also refer to P54

P0018 / 12 Integral action time, speed controller

300W

Min	Standard	Max	Unit	Data type	Effective
2	10	1000	ms	T2	immed.

The parameter specifies the I component for the speed controller.
Note:
The parameter value can be changed while traversing.

075W

Min	Standard	Max	Unit	Data type	Effective
2	22	1000	ms	T2	immed.

The parameter specifies the I component for the speed controller.
Note:
The parameter value can be changed while traversing.

P0019 / 13 Kv factor (position loop gain)

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0.1	1	9.9	1000/min	C4	immed.

The parameter defines at which traversing velocity of the axis, which following error is obtained.

Kv factor	significance
Low:	Slow response to a setpoint-actual value difference, following error is high
High:	Fast response to a setpoint-actual value difference, following error is low

P0020 / 14 Current setpoint smoothing

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0.3	0.3	10	ms	C4	immed.

Lowpass (PT1 characteristics)
Note:
The parameter value can be changed while traversing.

P0021 / 15 Speed setpoint smoothing

300W 075W

Min	Standard	Max	Unit	Data type	Effective
2	2	100	ms	C4	immed.

Lowpass (PT1 characteristics)
Note:
The parameter value can be changed while traversing.

P0022 / 16 Maximum acceleration

300W

Min	Standard	Max	Unit	Data type	Effective
0	4000	200000	MSR/s^2	C4	immed.

Max. acceleration for closed-loop position controlled operation.
Note:
This parameter has a gearbox-dependent factory default.

075W

Min	Standard	Max	Unit	Data type	Effective
0	1000	200000	MSR/s^2	C4	immed.

Max. acceleration for closed-loop position controlled operation.
Note:
This parameter has a gearbox-dependent factory default.

P0023 / 17 Jerk time constant

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	400	ms	T4	immed.

The acceleration/deceleration is changed over this time.
Note:
Input resolution = 10 ms

P0024 / 18 Override velocity

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	16384	16384	%	N2	immed.

Closed-loop speed control: referred to P8 (maximum speed)
Closed-loop position controlled: referred to P10 (maximum velocity)
Note:
The parameter value can be changed while traversing.

P0025 / 19 Override acceleration

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	16384	16384	%	N2	immed.

Closed-loop speed control: referred to P9 (acceleration time)
P25 = 50% means: Doubling of ramp‑up time
P25 = 10% means: Multiplication by 10 of ramp‑up time
Closed-loop position controlled: referred to P22 (maximum acceleration)

The following applies from SW 2.0:
The acceleration override can be changed with immediate effect in the ”Speed setpoint” operating mode.
This is also possible when the drive is moving.

P0026 / 1A Override speed, jogging

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	3276	16384	%	N2	immed.

Referred to P8 (maximum speed).
Is calculated in addition to P24 (override velocity).
Note:
The parameter value can be changed while traversing.

P0027 / 1B Override acceleration, jogging

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	8192	16384	%	N2	immed.

Refer to P9 (acceleration time).
Is calculated in addition to P25 (override acceleration).

P0028 / 1C Max. current

300W

Min	Standard	Max	Unit	Data type	Effective
0	10.5	21	A	C4	immed.

Upper limit, motor current.
Note:
The parameter value can be changed while traversing.
This parameter has a gearbox-dependent factory default.
Maximum values depend on the gear unit —> see User Manual under the heading ”Gear unit dependant parameters (factory settings)”

075W

Min	Standard	Max	Unit	Data type	Effective
0	9	9	A	C4	immed.

Upper limit, motor current.
Note:
The parameter value can be changed while traversing.
This parameter has a gearbox-dependent factory default.
Maximum values depend on the gear unit —> see User Manual under the heading ”Gear unit dependant parameters (factory settings)”

P0029 / 1D Electronics temperature tolerance time

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	120000	2000000	ms	T4	immed.

For an electronics overtemperature condition, after this time, the warning is changed to a fault, i.e. the appropriate response is activated.
Note:
The electronics temperature is displayed using P47.
Input resolution = 10 ms
The parameter value can be changed while traversing.

P0030 / 1E Fault suppression

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	F	Hex	I2	immed.

If the bit is set, instead of the appropriate fault, only a warning is output.
Bit 0: Speed controller at its endstop
Bit 1: Start, software limit switch or end, software limit switch
Software limit switches always stop an axis.
Bit 2: Standstill monitoring
Bit 3: Undervoltage of the load current supply (from SW 1.6)

Note:
The parameter value can be changed while traversing.

P0031 / 1F Function terminal 1

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	793	–	I2	immed.

The function of the terminal is defined using this parameter:

The following applies from SW 2.0:
The meaning of terminal parameterization depends on the operating mode (P930).
Parameters with different meanings are marked.

Parameters which are not marked have the same function in both operating modes.

0		No function
1	I (STW.4)	Positioning operating mode: Operating condition positioning. Stop and reject the actual traversing task on cancelation. Stop Speed setpoint operating mode: Ramp-function generator enable. Stop with maximum acceleration on cancelation.
2	I (STW.5)	Positioning operating mode: Operating condition positioning. Stop without rejecting the actual traversing task on cancelation. Stop Speed setpoint operating mode: Ramp-function generator START/Ramp-function generator STOP. The actual speed remains constant on cancelation.
3	I (STW.6)	Positioning operating mode: Activate traversing task Speed setpoint operating mode: Setpoint enable. Deceleration at the ramp on cancelation.
4	I (STW.8)	Positioning operating mode: Jogging – Speed setpoint operating mode: No function
5	I (STW.9)	Positioning operating mode: Jogging + Speed setpoint operating mode: No function
6	I (STW.11)	Positioning operating mode: Referencing Speed setpoint operating mode: No function
7	I (STW.12)	Positioning operating mode: Automatic single block. Speed setpoint operating mode: No function
8	I (STW.13)	Positioning operating mode: External block change. Speed setpoint operating mode: No function
9	I (STW.14)	Positioning operating mode: Read-in enable. Speed setpoint operating mode: No function
10	I (RMB.0)	Positioning operating mode: Accept value directly in checkback byte (bit 0). Speed setpoint operating mode: No function
11	I (RMB.1)	Positioning operating mode: Accept value directly in checkback byte (bit 1). Speed setpoint operating mode: No function
12	I (RMB.2)	Positioning operating mode: Accept value directly in checkback byte (bit 2). Speed setpoint operating mode: No function
13	I (RMB.3)	Positioning operating mode: Accept value directly in checkback byte (bit 3). Speed setpoint operating mode: No function
14	I (RMB.4)	Positioning operating mode: Accept value directly in checkback byte (bit 4). Speed setpoint operating mode: No function
15	I (RMB.5)	Positioning operating mode: Accept value directly in checkback byte (bit 5). Speed setpoint operating mode: No function
16	I (RMB.6)	Positioning operating mode: Accept value directly in checkback byte (bit 6). Speed setpoint operating mode: No function
17	I (RMB.7)	Positioning operating mode: Accept value directly in checkback byte (bit 7). Speed setpoint operating mode: No function
18	I (STB.0)	Positioning operating mode: Accept value directly in start byte (bit 0). Speed setpoint operating mode: No function
19	I (STB.1)	Positioning operating mode: Accept value directly in start byte (bit 1). Speed setpoint operating mode: No function
20	I (STB.2)	Positioning operating mode: Accept value directly in start byte (bit 2). Speed setpoint operating mode: No function
21	I (STB.3)	Positioning operating mode: Accept value directly in start byte (bit 3). Speed setpoint operating mode: No function
22	I (STB.4)	Positioning operating mode: Accept value directly in start byte (bit 4). Speed setpoint operating mode: No function
23	I (STB.5)	Positioning operating mode: Accept value directly in start byte (bit 5). Speed setpoint operating mode: No function
24	I (STB.6)	Positioning operating mode: Accept value directly in start byte (bit 6). Speed setpoint operating mode: No function

25	I (STB.7)	Positioning operating mode: Accept value directly in start byte (bit 7). Speed setpoint operating mode: No function
26	I (STB.15)	Open holding brake (software version 1.4 and higher)
27	I	Positioning operating mode: On-the-fly measurement/actual value setting (software version 1.4 and higher) This function is only possible via terminal 1. Other input parameters can also be used. The input is updated in a 125 microsecond grid for the function ”On-the-fly measurement/actual value setting”. Speed setpoint operating mode: No function
28	E	Hardware limit switch start (closing contact) (as of SW 2.0)
29	E	Hardware limit switch end (closing contact) (as of SW 2.0)
30	E	Hardware limit switch start (opening contact) (as of SW 3.0)
31	E	Hardware limit switch end (opening contact) (as of SW 3.0)
64	O (ZSW.0)	Ready for power-up
65	O (ZSW.1)	Ready
66	O (ZSW.2)	Operation enabled
67	O (ZSW.3)	Fault
68	O (ZSW.4)	OFF 2
69	O (ZSW.5)	OFF 3
70	O (ZSW.6)	Power-on inhibit
71	O (ZSW.7)	Warning
72	O (ZSW.8)	Positioning operating mode: Following error. Speed setpoint operating mode: Speed within tolerance band
73	O (ZSW.10)	Positioning operating mode: Setpoint position reached. Speed setpoint operating mode: Ramp-up complete
74	O (ZSW.11)	Positioning operating mode: Reference point set. Speed setpoint operating mode: Checkback from Terminal1
75	O (ZSW.12)	Positioning operating mode: Acknowledge traversing task. Speed setpoint operating mode: Checkback from Terminal2
76	O (ZSW.13)	Drive moves
77	O (ZSW.14)	Positioning operating mode: Within traversing block. Speed setpoint operating mode: No function
78	O (ZSW.15)	Load power supply available
79	O (STB.0)	Positioning operating mode: Accept value directly from start byte (bit 0). Speed setpoint operating mode: No function
80	O (STB.1)	Positioning operating mode: Accept value directly from start byte (bit 1). Speed setpoint operating mode: No function
81	O (STB.2)	Positioning operating mode: Accept value directly from start byte (bit 2). Speed setpoint operating mode: No function
82	O (STB.3)	Positioning operating mode: Accept value directly from start byte (bit 3). Speed setpoint operating mode: No function
83	O (STB.4)	Positioning operating mode: Accept value directly from start byte (bit 4). Speed setpoint operating mode: No function
84	O (STB.5)	Positioning operating mode: Accept value directly from start byte (bit 5). Speed setpoint operating mode: No function
85	O (STB.6)	Positioning operating mode: Accept value directly from start byte (bit 6). Speed setpoint operating mode: No function
86	O (STB.7)	Positioning operating mode: Accept value directly from start byte (bit 7). Speed setpoint operating mode: No function
87	O (RMB.0)	Positioning operating mode: Accept value directly from checkback byte (bit 0) (SW 1.2 and higher). Speed setpoint operating mode: No function
88	O (RMB.1)	Positioning operating mode: Accept value directly from checkback byte (bit 1) (SW 1.2 and higher). Speed setpoint operating mode: No function

89 O (RMB.2) Positioning operating mode: Accept value directly from checkback byte (bit 2) (software version 1.2 and higher).
Speed setpoint operating mode: No function
90 O (RMB.3) Positioning operating mode: Accept value directly from checkback byte (bit 3) (software version 1.2 and higher).
Speed setpoint operating mode: No function
91 O (RMB.4) Positioning operating mode: Accept value directly from checkback byte (bit 4) (software version 1.2 and higher).
Speed setpoint operating mode: No function
92 O (RMB.5) Positioning operating mode: Accept value directly from checkback byte (bit 5) (software version 1.2 and higher).
Speed setpoint operating mode: No function
93 O (RMB.6) Positioning operating mode: Accept value directly from checkback byte (bit 6) (software version 1.2 and higher).
Speed setpoint operating mode: No function
94 O (RMB.7) Positioning operating mode: Accept value directly from checkback byte (bit 7) (software version 1.2 and higher).
Speed setpoint operating mode: No function
95 O Control external holding brake (software version 1.4 and higher)
100 I (STW.0) OFF 1 logically ANDed with the terminal
101 I (STW.1) OFF 2 logically ANDed with the terminal
102 I (STW.2) OFF 3 logically ANDed with the terminal
Note:
If a terminal is parameterized as input or output, the following applies:
—> Addition with 256 means:
Positioning operating mode:
Status display via RMB.6/7. (terminal 1/2) (SW 1.4 and higher).
Speed setpoint operating mode:
Status check back via ZSW.11 (terminal 1) ZSW.12 (terminal 2).
If a terminal is parameterized as output, the following applies:
—> Addition with 128 means:
Inversion for signal output.
Applies from SW 2.1:
This function can be used only with the function ”Reference to occurring zero mark”.
—> Addition with 512 means: the terminal input is monitored for an edge. The addition of 512 is only possible for terminal parameterizations from the interval [18..25] (accept the value in the start byte). The type of the edge to be monitored can be parameterized in P56.7.
The parameter value can be changed during the procedure.

P0032 / 20 Function terminal 2

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	793	–	I2	immed.

Refer to P31 (function, terminal 1).

P0033 / 21 Address, test socket 1

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	FC32	FFFFFFFF	Hex	I4	immed.

The parameter addresses the measured value for output via the analog test output.
FC00 Speed setpoint (motor shaft)
FC66 Actual speed value (motor shaft)
FC6A Position actual value
FC32 Current actual value
FC38 I set (speed controller)
FC3A I set (smoothed)
Note:
The parameter value can be changed while traversing.

P0034 / 22 Shift factor, test socket 1

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	7	F	Hex	I2	immed.

Shift factor for analog test socket 1.
Note:
Shift factor change of +1 corresponds to doubling the value
Shift factor change by –1 corresponds to halving the value
The parameter value can be changed while traversing.

P0035 / 23 Offset, test socket 1

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	80	FF	Hex	I2	immed.

Offset for analog test socket 1.
Note:
With offset = 80 hex, for ”0” 2.5 V is output.
The parameter value can be changed while traversing.

P0036 / 24 Address, test socket 2

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	FC66	FFFFFFFF	Hex	I4	immed.

Note:
Refer to P33 (address, test socket 1).

P0037 / 25 Shift factor, test socket 2

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	F	Hex	I2	immed.

Note:
Refer to P34 (shift factor, test socket 1).

P0038 / 26 Offset, test socket 2

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	80	FF	Hex	I2	immed.

Note:
Refer to P35 (offset, test socket 1).

P0039 / 27 Position setpoint

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	C4	RO

This parameter specifies the position setpoint in the selected unit of measurement.

P0040 / 28 Position actual value

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–200000	0	200000	MSR	C4	immed.

This position is directly accepted as new actual value by writing the required position into P40
The drive must be closed-loop controlled and stationary.
The axis is then considered to have been referenced.

The following applies from SW 2.0:
It is possible to write the actual position value in the ”Speed setpoint” operating mode.
The axis is always dereferenced in this operating mode.

P0041 / 29 Speed setpoint

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	rpm	C4	RO

”Positioning” operating mode:
Indicates the speed setpoint relative to the motor shaft.

P0042 / 2A Actual speed

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	rpm	C4	RO

”Positioning” operating mode:
Indicates the speed setpoint relative to the motor shaft.

P0043 / 2B Current setpoint

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A	C4	RO

P0044 / 2C Current actual value

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	A	C4	RO

P0045 / 2D Timer status

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	ms	T4	RO

P0046 / 2E Following error

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	C4	RO

P0047 / 2F Electronics temperature

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	°C	C4	RO

This parameter serves to monitor the electronics temperature in the >0°C range to avoid possible overheating of the module.
Temperatures in the negative temperature range are not monitored and not correctly displayed.

P0048 / 30 Actual traversing block, block number

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	I2	RO

The parameter specifies the block number of the traversing block presently being processed.

P0049 / 31 Following block, block number

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	I2	RO

The parameter specifies the block number of the next block.
The following block is the next traversing block to be executed.

P0050 / 32 Velocity setpoint

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR/min	I4	RO

P0051 / 33 Actual velocity

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR/min	I4	RO

P0052 / 34 Hardware version

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	I4	RO

The parameter indicates the hardware version of the motor.
= 1 —> Hardware version A
= 4 —> Hardware version D, etc.

P0053 / 35 Firmware version

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	I4	RO

The parameter indicates the firmware version of the drive.
Example:
= 10202 —> Firmware version 01.02.02

P0054 / 36 P gain, speed controller standstill

300W

Min	Standard	Max	Unit	Data type	Effective
1	2	100	–	I4	immed.

This parameter specifies the P gain for axis at standstill.
Note:
Refer to P56.2
The parameter value can be changed while traversing.

075W

Min	Standard	Max	Unit	Data type	Effective
1	5	100	–	I4	immed.

This parameter specifies the P gain for axis at standstill.
Note:
The following applies before SW 1.2: Max. value = 40
The following applies before SW 1.4: Min. value = 0
Refer to P56.2
The parameter value can be changed while traversing.

P0055 / 37 Signal position

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	MSR	C4	RO

Last position for external block change or when canceling the program block by withdrawing the start byte condition.
Note:
The following is valid for the position for rotary axis:
The following applies before SW 1.3: —> no modulo evaluation
The following applies from SW 1.3: —> modulo evaluation

P0056 / 38 Operating options

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	V2	immed.

Bit 1.0 Drive referenced and behavior after restart (from SW 1.2)

= 00: The motor is referenced when powering-up again if it had already been referenced when powered-down and was stationary. The behavior is as it was before SW 1.2.

= 01: The motor is referenced when powering-up again if it was already referenced when powered-down and was not stationary (ZSW.13).

= 1x: The motor is not referenced when powering-up again.
(x: the bit can either 0 or 1)

The following applies from SW 2.0:
The drive is always dereferenced in the ”Speed setpoint” operating mode (P930). Bit 0 and bit 1 have no function in this operating mode.

Bit 2 P gain at standstill (from SW 1.3)

= 0: P gain of holding controller active (P57)
= 1: Speed controller P gain active (P54)

The following applies from SW 2.0:
The speed controller is always active in the ”Speed setpoint” operating mode (P930). Bit 2 has no meaning here.
P54 is effective at zero speed.

Bit 3 Response of Bit 10 in the status word ”Setpoint position reached” (as of SW 1.6)
= 0: ”Set position reached” is signaled when:
– traversing block fully completed
– Abort of the traversing block by: Fault, Stop or OFF commands
= 1: ”Setpoint position reached” is signalled only after full completion of the traversing block.

Bit 4 Open holding brake (from SW 1.4)
= 0: Brake sequence control active
= 1: Open holding brake

Bit 5 Monitoring, holding brake undervoltage (from SW 1.4)
= 0: Deactivatd (P947.12)
= 1: Activated (P947.12)

Bit 6 Open holding brake is also effective for external holding brakes (from SW 1.4)
= 0: Brake sequence control active
= 1: Open holding brake is also effective for an external holding brake

Bit 7 Option bit for the function: ”Reference to occurring zero mark” (from SW 2.1)
The following applies if one of the two input terminals has been parameterized with the function ”Cam monitoring”:
= 0: A check is made as to whether a negative cam edge (leaving the cam) occurred before the zero mark.
= 1: A check is made as to whether a positive cam edge (leaving an inverted cam) occurred before the zero mark.

Bit 14 This bit controls the response to the fault message ”undervoltage load power supply”. The following applies as of SW 3.0: this fault only occurs if the drive is to be switched from follow-up mode to control mode. If no enable signals are set in the control word and only the power supply to the electronics is switched on, the alarm ”Undervoltage load power supply” is signalled.
This alarm automatically disappears when the load power supply is switched in.
= 0: Response to fault 701 as described previously
= 1: Response to fault 701 as in previous software versions

P0057 / 39 P gain, holding controller standstill

300W

Min	Standard	Max	Unit	Data type	Effective
5	20	250	–	I4	immed.

P gain for axis standstill.
Note:
Refer to P56.2

075W

Min	Standard	Max	Unit	Data type	Effective
50	100	250	–	I4	immed.

P gain for axis standstill.
Note:
Refer to P56.2
Available from SW 1.3.

P0058 / 3A Holding brake, brake opening time

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	100	1000	ms	T4	immed.

For ”pulse enable” the setpoint is output delayed by this time.
Note:
Available from SW 1.4.

P0059 / 3B Speed, close holding brake

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	10	3000	rpm	C4	immed.

When withdrawing ”controller enable” and this speed is fallen below, the holding brake is closed.
The holding brake is always closed after the time in P60 has expired.
Note:
Available from SW 1.4.

P0060 / 3C Holding brake, brake delay time

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	400	15000	ms	T4	immed.

When withdrawing ”controller enable” this time is started and after it expires, the holding brake is closed.
The holding brake can also be closed if the speed in P59 is fallen below.
Note:
Available from SW 1.4.

P0061 / 3D Holding brake, control blocking time

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	100	1000	ms	T4	immed.

When withdrawing the brake control signals, this time is started and after it has expired, the pulses are deleted.
Note:
Available from SW 1.4.

P0062 / 3E Measuring position

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–200000	0	200000	MSR	C4	immed.

The position value for the ”flying measurement” function is written into this parameter.
Note:
This parameter is overwritten at each measuring operation.
Available from SW 1.4.

P0080:28 / 50 Program control word PSW

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	3	FFFF	Hex	V2	immed.

The program control word defines the general behavior of a traversing block.
Bit 0 Motion type
= 1: Enter position and velocity
= 0: Enter speed

Bit 1 Positioning type (only when positioning)
= 1: Relative
= 0: Absolute
Bit 2 Timer type
= 1: Traverse as long as the timer no longer runs
= 0: Traverse as long as the timer runs
Bit 3 Logic operation between timer with start byte
= 1: Traverse if the timer or start bytes are fulfilled
= 0: Traverse if the timer and start byte are fulfilled
Bit 4 Return jump to program
= 1: Jump to the start of the program after the end of the block
= 0: No response
Bit 5 Traversing type
= 1: Continuous path mode
= 0: Precise stop
Bit 6 Negate start byte condition
= 1: Block is executed if at least one of the bits set in the start mask is not configured
= 0: Normal evaluation
Bit 7 SMStart type (from SW 1.2)
= 1: The following is valid dependent on the condition defined in SMStart:
Fulfilled —> Execute block, Not fulfilled —> Skip block
= 0: Wait until the start condition is fulfilled acc. to SMStart
Bit 8 Program stop (from SW 1.2)
= 1: End of program at end of block
= 0: No response
Bit 9 Set reference position, actual position
= 1: Active
Before SW 1.4 the following applies: At the end of the block the actual position is set the same as the signaled position.
The following applies from SW 1.4: At the end of the block, the position of the last zero mark is set the same as the signaled position and the drive is referenced.
= 0: Inactive
Bit 10 Flying actual value setting (from SW 1.4)
= 1: Active
= 0: Inactive
Bit 11 Flying measurement (from SW 1.4)
= 1: Active
= 0: Inactive
Bit 12 Traverse through the shorted path (from SW 1.4)
= 1: Active (only for modulo correction with absolute position data)
= 0: Inactive
Note:
Refer to P81:28 (target position).
Bit 13 Defined delay time until the next traversing block (from SW 2.1)
= 1 Active: The next traversing block begins after exactly the time parameterized in the timer value irrespective of the distance to be traversed in the current traversing block and irrespective of the discontinuance of any start conditions.
(As a result of ”external block change” during the traversing motion, the following block also waits until the delay time has expired.)
This function is valid only in conjunction with the timer type ”traverse as long as the timer runs” (compare bit 2).
This function is valid only for the following traversing block (after skipping the following traversing block, the started delay time is no longer evaluated).

The following block only waits until the time has expired if this has been parameterized with P80:x.7=0 (wait for start condition).
The delay time runs down internally in the drive. It c a n n o t be controlled via P45.

= 0 Inactive

Bit 14 Reference to occurring zero mark (from SW 2.1)

= 1 Active: The traversing block is canceled if a zero mark occurs. The reference point is set to the value stated in the signaling position.
If this function is used in conjunction with an input terminal (BERO) which has been parameterized with an additional cam monitoring (compare P31/P32), then referencing takes place only if a cam edge according to P56.7 has occurred. If the corresponding signal has not occurred at the input terminal, then the drive is dereferenced when it reaches the zero mark.
In this case, fault 711 and the supplementary information 912 are signaled.

= 0 Inactive

P0081:28 / 51 Target position

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–200000	0	200000	MSR	C4	immed.

The parameter specifies the target position in the traversing block.
Note:
Index (using as an example P81):
P81:0 —> no significance
P81:1 —> traversing block 1
P81:2 —> traversing block 2
...
P81:27 —> traversing block 27

Block numbers (factory default):
1 Traversing block jogging –
2 Traversing block jogging +
3 ... 12 Single block
13 ... 17 Program 1
18 ... 22 Program 2
23 ... 27 Program 3
All blocks before program 1 are single blocks.

P0082:28 / 52 Velocity or speed

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–16384	16384	16384	%	N2	immed.

The parameter specifies the velocity or speed in the traversing block.
Note:
Refer to P81:28 (target position).

P0083:28 / 53 Acceleration

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	16384	16384	%	N2	immed.

The parameter specifies the acceleration in the traversing block.
Note:
Refer to P81:28 (target position).

P0084:28 / 54 Timer value

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	20000000	ms	T4	immed.

Contains the time required for the timer.
Note:
Value 0 de-activates the function.
Input resolution = 10 ms
Refer to P81:28 (target position).

P0085:28 / 55 Message position

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–200000	0	200000	MSR	C4	immed.

When passing this position, the bits, specified in MMPos (P87:28) are set, and signaled to the master via the return byte (RMB).
Note:
The following is valid for the position for rotary axis:
The following applies before SW 1.3: —> no modulo evaluation
The following applies from SW 1.3: —> modulo evaluation
The following applies from SW 1.4:
If the ”set reference position” function is activated (PSW.9= 1) or ”flying actual value setting” (PSW.10= 1), this parameter is the setting value.
The signaling position function is then inactive.
Refer to P81:28 (target position).

P0086:28 / 56 SMStart MMStart

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	V2	immed.

Message mask start (MMStart):
Contains the bit mask which is activated when starting a traversing block and which is OR’d with the status signals (RMB).
Start mask start (SMStart):
Contains a mask, which defines which bits of the start byte (STB) are evaluated in the PZD as additional start bits.
The block starts as soon as all of the configured bits are set in addition to the normal start enable signals.
If one of the bits is withdrawn, traversing motion stops and the block is ended.
Note:
Value 0 de-activates the function.
Refer to P81:28 (target position).

P0087:28 / 57 MMPos MMStop

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	V2	immed.

Message mask stop (MMStop):
Bits, which are activated at the end of a traversing block and on the status signals (RMB).
MMStop is reset when starting a new traversing block.
Message mask, position (MMPos):
Bits, which are activated when passing the signaling position and are OR'd with the status signals (RMB).
MMPos is reset when starting a new traversing block.
Note:
Value 0 de-activates the function.
Refer to P81:28 (target position).

P0097 / 61 Carry-out POWER-ON RESET

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	I2	immed.

A POWER-ON RESET for the drive can be carried-out using this parameter.
0 Output status
1 Carry-out POWER ON-RESET
Note:
After P0097 = 1, POWER ON-RESET is immediately carried-out. Communications is interrupted. The master does not receive an acknowledgment.
Available with software version 1.5 and higher.

P0098 / 62 Reset reference point set

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	I2	immed.

0 No reference point set
1 Reference point set

Note:
For a stationary, referenced axis, when writing zero into P98 = 0, the "No reference point set" status is re-established.
Refer to ZSW.11
Available from SW 1.4.

P0099:21 / 63 Program management

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	27	–	I2	immed.

The parameter specifies the start of a program.
P99:0 —> no significance
P99:1 —> start, program 1 (standard value = 13)
P99:2 —> start, program 2 (standard value = 18)
P99:3 —> start, program 3 (standard value = 23), etc.
Note:
The parameter value can be changed while traversing.

P0100 / 64 Control word simulation

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	–	V2	immed.

If the cyclic communication with Master Class 1 is interrupted for more than 3 seconds, this control word is used. All terminal signals remain active with priority.
= 0 —> no simulation
= 17471 dec (= 443F hex) —> value recommended for simulation
Note:
The parameter value can be changed while traversing.
P101 must be > 0.
When operating the system with Master Class 2 alone (SimoCom A), the simulation mode is activated immediately when making entries in P100.
Available from SW 1.2.

P0101:11 / 65 Block sequence in standalone operation

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	27	–	I2	immed.

For standalone operation, a maximum of 10 traversing blocks can be entered in the range 3 to 27 in P101:11.
These specified blocks are executed one after the other in the standalone mode.
P101:0 —> no significance
P101:1 —> 1st block
P101:2 —> 2nd block, etc.
Note:
The parameter value can be changed while traversing.
Available from SW 1.2.

P0700 / 2BC Operating mode selector switch

300W 075W

Min	Standard	Max	Unit	Data type	Effective
1	2	2	–	I2	PO

This parameter is used for selecting the operating mode.
Operating mode changes only take effect when the parameter set is saved in the FEPROM (P971 0 —> 1) followed by a Power-On Reset (P097 0 —> 1).
If SimoCom A is in use, the operating mode should be selected via the configuration dialog.
The following operating modes are supported:
1 —> Speed setpoint
2 —> Positioning
The parameter corresponds to parameter 930.
Note:
Before changing the operating mode load factory default setting via P970.
This allows achieving a pre-defined initial status.
Available with software version 2.0 and higher.

P0701 / 2BD Activate substitution

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	I2	immed.

The parameter is used to activate the telegram substitution function.

NOTICE:
The parameter acts i m m e d i a t e l y. After activation, the drive responds only to PZD control signals, provided STW.10 = 1. Read b e f o r e using the parameter the further description in the online help for SimoComA. (Menu: Help –> Short Introduction SimoComA –> Contents –> Telegram substitution.)

P701=1 Telegram substitution activated
P701=0 Telegram substitution deactivated
Available from SW3.0 and higher.

P0702 / 2BE Activate travel range adaptation

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	1	–	I2	PO

In the case of large travel ranges, the travel range adaptation must be activated in order to avoid inaccuracies.
To activate the travel range adaptation, the parameter must be set to value 1.
The change of parameter must be stored in the FEPROM of the drive (see P971), and a power on reset must be executed.
If the travel range adaptation is active, parameter P703 shows value 1.

NOTICE:
Please read b e f o r e activation of the function the full description in the Online Help of SimoComA. (Menu: Help –> Brief instructions SimoComA –> Menu-Button ”index” –> traversing range adaptation)

Note:
If the traversing range adaptation is active (compare P0704), the destination area will be deactivated with the setting P0011 = 0.
Available from SW3.1 and higher.

P0703 / 2BE current mode of travel range adaptation

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	I2	RO

If the travel range adaptation is active, parameter P703 shows value 1.

NOTICE:
Please read b e f o r e activation of the function the full description in the Online Help of SimoComA. (Menu: Help –> Brief instructions SimoComA –> Menu-Button ”index” –> traversing range adaptation).

Note:
If the traversing range adaptation is active (compare P0704), the destination area will be deactivated with the setting P0011 = 0.
Available from SW3.1 and higher.

P0880 / 370 N-SETPOINT normalization

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–100000	4096	100000	rpm	C4	immed.

This parameter defines the normalization as to which speed sets in at the gear output when a setpoint of 1000h (4096d) is specified via the control word (STW).

P0918 / 396 PROFIBUS node address

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	I2	RO

The node address is read from address switch S1.

P0928 / 3A0 Control authority PZD

300W 075W

Min	Standard	Max	Unit	Data type	Effective
1	1	2	–	V2	immed.

Request for control authority from a Class 2 DP master.
Note:
Available from SW 1.4.

P0930 / 3A2 Actual operating mode

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	I2	RO

This parameter indicates the active operating mode.
P930 = 2 means: Positioning operating mode
software version 2.0 and higher: P930 = 1 means: Speed setpoint operating mode.

P0947 / 3B3 Faults

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	I2	RO

The parameter indicates, bit-coded, which faults are present.
Bit0 corresponds to Fault 700,
Bit1 corresponds to Fault 701, etc.
Note:
SimoCom A:
Read about possible faults in the online help:
Help —> Help topics —> Index —> 700...715
User Manual:
The description of the faults, how they can be acknowledged as well as a list of all the faults is provided in Section ”Fault handling and diagnostics”.
Refer to the index entry ”Faults”.

P0953 / 3B9 Warnings

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	I2	RO

The parameter indicates, bit-coded, which alarms are present.
Bit0 corresponds to Warning 800,
Bit1 corresponds to Warning 801, etc.
Note:
SimoCom A:
Read about possible warnings in the online help:
Help —> Help topics —> Index —> 800...812
User Manual:
The description of the warnings, how they can be acknowledged as well as a list of all the warnings is provided in Section ”Fault handling and diagnostics”.
Refer to the index entry ”Warnings”.

P0954 / 3BA Additional information on faults/warnings

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	I2	RO

The parameter indicates, bit-coded, which supplementary information is available.
The additional information allows to diagnose the faults and warnings exactly.
Bit0 corresponds to Supplementary information 900,
Bit1 corresponds to Supplementary information 901, etc.
Note:
SimoCom A:
Read about possible supplementary information in the online help:
Help —> Help topics —> Index —> 900...911
User Manual:
The description of the faults/warnings, how they can be acknowledged as well as a list of all the faults/warnings is provided in Section ”Fault handling and diagnostics”.
Refer to the index entry ”Faults/Warnings”.
See also P947 and P953.
Available from SW 1.4.

P0964:8 / 3C4 Drive identification

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	V2	RO

Indices:

0	Siemens = 42d	
1	Drive type POSMO A 75W/300W = 1201/1202	
2	Firmware version	(x.yy.zz)
3	Firmware date (year)	(xxxx decimal)
4	Firmware date (day/month)	(ddmm decimal)
5	No. of axes	(always 1)
6	No. of option modules	(always 0)
7	Gearbox code	

Note:
Available from SW 1.4.

P0967 / 3C7 Control word

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	V2	immed.

This parameter corresponds to the control signals ”control word (STW)”.
Note:
The following applies from SW 1.4:
If the Class 2 DP master has control authority, then control is realized via this parameter.

The following applies from SW 2.0:
The meanings of bits 4, 5, 6, 8, 9, 11, 12, 13 and 14 depend on the active operating mode.
SimoCom A:
Please consult the online help for more detailed information:
Help —> Help topics —> Index —> PROFIBUS diagnostics
User Manual:
Bit assignment, refer to Section ”Communications via PROFIBUS-DP”.
Refer to the index entry ”Process data”.

P0968 / 3C8 Image of current status word

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	V2	RO

This parameter corresponds to the status signals ”status word (ZSW)”.

The following applies from SW 2.0:
The meanings of bits 8, 10, 11, 12, 14 depend on the active operating mode (P930).
Note:
SimoCom A:
Please consult the online help for more detailed information:
Help —> Help topics —> Index —> PROFIBUS diagnostics
User Manual:
Bit assignment, refer to Section ”Communications via PROFIBUS-DP”.
Refer to the index entry ”Process data”.

P0970 / 3CA Factory default download

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	1	1	Hex	V2	immed.

1/0 —> Download the factory default
Note:
Downloading is automatically acknowledged with a 1.

P0971 / 3CB Write into FEPROM

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	1	Hex	V2	immed.

0/1 —> Save parameter set in a non-volatile memory
Note:
Saving is automatically acknowledged by a 0.

P0972 / 3CC Select block number and PZD start byte/n-setpoint

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	FFFF	Hex	V2	immed.

This parameter corresponds to the control signals ”select block number” and ”start byte”.
If the Class 2 DP master has control authority, then control is realized via this parameter.
Note:
Available from SW 1.4.

The following applies from SW 2.0:
The speed setpoint is transferred using these bits in the ”Speed setpoint” operating mode (P930).
The setpoint specifies the speed at the gear output.

P0973 / 3CD Actual block number and checkback byte/n-actual

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	Hex	V2	RO

For the complete PZD status, the actual block number and the return byte in the PKW channel are signaled here.
Note:
Available from SW 1.4.

The following applies from SW 2.0:
The actual speed value is returned using these bits in the ”Speed setpoint” operating mode (P930).
The actual value represents the speed at the gear output.

0980:116 / 3D4 Supported parameters

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	I2	RO

All of the parameters supported by the device are listed here in an increasing sequence.
P980:0 —> no significance
P980:1 = 1 (P1)
...
P980:77 = 990 (P990)

0990:116 / 3DE Changes with respect to the factory default

300W 075W

Min	Standard	Max	Unit	Data type	Effective
–	–	–	–	I2	RO

All of the parameters which have been changed over the factory default are listed here in an increasing sequence.
P990:0 —> no significance
P990:1 = 4 (e.g. P4)
P990:2 = 990 (P990)
P990:3 = after the end of the list
Note:
For parameters with index, the parameter number is listed if at least 1 parameter of the array was changed.

P1426 / 592 Tolerance band for actual setpoint value

300W

Min	Standard	Max	Unit	Data type	Effective
0	100	3800	rpm	C4	immed.

075W

Min	Standard	Max	Unit	Data type	Effective
0	100	3600	rpm	C4	immed.

This parameter defines the tolerance band for the actual speed value.
If the actual speed value is within this tolerance band around the specified setpoint, the bit ”Speed within tolerance band” is output (ZSW.8).
Note:
This parameter is visible in SimoCom A only in operating mode ”Speed setpoint” (P930).
Available with software version 2.0 and higher.

P1427 / 593 Delay time Nsetpoint has elapsed

300W 075W

Min	Standard	Max	Unit	Data type	Effective
0	0	15000	ms	T2	immed.

This parameter defines the delay time following which the bit "Ramp-up complete" (ZSW.10) is output.
If the actual speed value for the specified time is within the tolerance band (P1426), ZSW.10 is output.
Note:
This parameter is visible in SimoCom A only in operating mode "Speed setpoint" (P930).
Available with software version 2.0 and higher.

5.6.3 Gearbox–dependent parameters, factory default settings

Gearbox–dependent parameters

Depending on the gearbox used, the parameters listed in Table 5-10 are pre–set before the equipment is supplied:

Table 5-10 Gearbox–dependent parameters (factory presetting – default)

Gearboxes		P964:7	P3	P10	P16	P22	P28
Type	Step-down ratio $i_{Gearbox}$	Gear-box code	Gearbox step-down ratio –	Maximum velocity [mm/min]	Maximum overcur-rent [A]	Maximum accel-eration [mm/s^2]	Maximum current [A]
75 W motor: Gearbox–dependent parameters (factory default setting)							
without gearbox		2049	1	30000	18.0	1000	9.0
Planetary gearbox	4.5	2050	4.5	6660	13.33	225	7.8
	8	2058	8	3750	7.5	125	4.6
	20.25	2059	20.25	1480	18.0	50	9.0
	36	2060	36	830	11.11	30	7.9
	50	2061	50	600	8.0	20	5.6
	126.5625	2062	126.5625	237	9.48	8	7.8
	162	2063	162	185	7.4	6	6.0
Worm gearbox	5	2064	5	6000	18.0	200	9.0
	24	2065	24	1250	7.3	40	7.3
	75	2066	75	400	2.7	13	5.3

Table 5-10 Gearbox–dependent parameters (factory presetting – default), continued

Gearboxes		P964:7	P3	P10	P16	P22	P28
Type	Step-down ratio $i_{Gearbox}$	Gear-box code	Gearbox step-down ratio –	Maximum velocity [mm/min]	Maximum overcur-rent [A]	Maximum accel-eration [mm/s^2]	Maximum current [A]
300 W motor: Gearbox–dependent parameters (factory default setting)							
Without gearboxes	Keyway	2051[1)]	1	30000	42.0	4000	21.0
		2067[2)]					
	Smooth shaft (without keyway)	2075[1)]					
		2076[2)]					
Planetary gearbox	4	2052	4	7500	42.0	1000	21.0
		2068					
	7	2053	7	4285	42.0	570	21.0
		2069					
	12	2054	12	2500	37.5	330	21.0
		2070					
	20	2055	20	1500	26.25	200	21.0
		2071					
	35	2056	35	855	15.7	115	14.8
		2072					
	49	2057	49	610	11.2	80	10.6
		2073					
	120	2078	120	250	10.4	33	10.4
		2079					

1) Upper value —> gearbox code for the motor without holding brake
2) Lower value —> gearbox code for the motor with holding brake

Notice

After another gearbox type has been mounted, the gearbox–dependent parameters no longer match the gearbox and must therefore be changed corresponding to Table 5-10.

P964:7 (gearbox code) can only be changed with ”SimoCom A” using the drive configuration.

■

Space for your notes

Fault Handling and Diagnostics

6

6.1 LED fault display

LED fault display

An LED with the following significance is provided on the rear of the positioning motor for diagnostics LED:

Table 6-1 What does an LED mean when it is bright?

LED display		Is the bus OK?	What status does the drive have? What are the fault possibilities?
Color	**How is it lit?**		
None	**off**	no	• The equipment is powered down or is defective • The power supply is incorrectly connected (incorrect polarity)
Red	**Steady light**	no	• Critical hardware defect, CPU cannot be used • Briefly after power up, even if the unit is OK Disappears after the system has completely run up.
	Flashing	yes	• Fault present, drive not ready • Read–out the fault number —> refer to Chapter 6.2
Red/yellow	**Alternating flashing light**	no	• Bus communications interrupted
Green	**Steady light**	yes	• Standard operation
	Flashing	yes	• Run–up, bus being initialized (baud rate adjustment, configuration, parameterization) • No bus connection established: – Bus cables not OK – Address incorrectly set – Bus parameterizing error
Yellow	**Steady light**	no	• Bus run–up, incorrect configuration telegram
	Flashing	no	• Bus run–up, incorrect parameterizing telegram
Yellow/ green (from SW 1.2)	**Alternating flashing light**	no	• Standalone mode is active —> Refer to Chapter 5.5.12 • From SW 3.0: P701 = 1 (telegram substitution activated) and the received STW.10 = 0. The drive is presently using the last valid STW (with STW.10 = 1).

6.2 Faults and warnings

6.2.1 General information on faults and warnings

Preliminary comment

When a fault or warning is detected then this is displayed in the positioning motor by setting the appropriate status signal and the fault/warning bits in P947, P953 and P954.

The faults and warnings can be evaluated as follows:

- Via PROFIBUS in cycle operation

  By reading the status signal and evaluating the bit–coded parameter values for the faults and warnings (P947, P953 and P954).

- Via SimoCom A in online operation

  The faults or warnings that have occurred are converted into an appropriate fault/warning number and displayed.

Table 6-2 Overview of faults and warnings

Fault bit Warning bit	Fault number Warning number for SimoCom A	Status signal	Meaning
P947.0 ... P947.15	700 ... 715	ZSW.3 (faults present)	Fault 700 ... Fault 715
P953.0 ... P953.15	800 ... 815	ZSW.7 (warning present)	Warning 800 ... Warning 815
P954.0 ... (from SW 1.4) P954.15	900 ... 915	ZSW.3 or ZSW.7	Supplementary information 900 ... Supplementary information 915

Difference between faults and warnings?

What is the difference between a fault and a warning?

- Faults (refer to Table 6-2)
  - A fault causes an appropriate response for the positioning motor.
  - Faults must be acknowledged after the fault cause has been removed.
  - The motor signals ”fault present” using its diagnostics LED – red flashing light.
- Warnings (refer to Table 6-2)
  - Warnings are automatically deleted after the cause of the fault has been removed.

Faults

Faults indicate to the user positioning motor states where the motor can only be shut down or switched into a no current condition.

How does the DP master evaluate faults?

1. By reading the status signal ZSW.3 (fault present)

   A ”1” signal indicates that there is at least 1 fault.

2. By reading P947 ($3B3_{hex}$)

   The parameter value indicates, bit–coded, which faults are present (refer to Table 6-2 and Chapter 6.2.2).

3. By reading P954 ($3BA_{hex}$) (from SW 1.4)

   The parameter value indicates, bit–coded, which supplementary information is present (refer to Table 6-2 and Chapter 6.2.2).

How are the faults acknowledged?

1. Remove the cause of this fault (refer to Chapter 6.2.2).
2. STW.7 (reset the fault memory) = set 0/1 signal edge.
3. Set the STW.0 (ON/OFF 1) to ”0” and ”1”.

Note

If the status signal ZSW.3 (fault effective) is not ”0”, then the above points should be repeated for the fault or faults that are still present.

SIMODRIVE POSMO A can only resume normal operation after all of the faults that are present have been acknowledged.

The faults are described in detail in Chapter 6.2.2.

Fault suppression

Fault suppression should only be used for start–up purposes or for special traversing programs. When fault suppression(s) are active, the correct program execution must be monitored by the higher–level control.

- ”Speed controller at endstop” fault suppression

  The fault is converted to a warning.

  This fault suppression should only be used for the function ”travel to fixed stop”.

  If this fault suppression is used in other traversing programs, the appearance of the warning ”Speed controller at endstop” must be handled by the higher–level control. In addition, the bit of the status word ”Position setpoint reached” (ZSW.10) must be evaluated to ensure that a target position was reached correctly despite the occurrence of warnings.

- ”Undervoltage” fault suppression

  This fault suppression serves to suppress a fault suppression upon switching on the drive if the load power supply is connected separately and is switched on only after the electronics power supply.

  The fault suppression must be deactivated before starting a traversing movement.

  If a voltage dip occurs during a positioning instruction while the fault ”Load power supply undervoltage” is suppressed, this positioning instruction is aborted.

Warnings

Warnings indicate to the user motor statues that do not necessarily mean that operation must be interrupted.

How does the DP master evaluate warnings?

1. By reading the status signal ZSW.7 (warning effective)

   A ”1” signal indicates that there is at least 1 warning present.

2. By reading P953 ($3B9_{hex}$)

   The parameter value indicates, bit–coded, which warnings are present (refer to Table 6-2 and Chapter 6.2.2).

3. By reading P954 ($3BA_{hex}$) (from SW 1.4)

   The parameter value indicates, bit–coded, which supplementary information is present (refer to Table 6-2 and Chapter 6.2.2).

Note

If the status signal ZSW.7 (warning effective) is not ”0”, then the above points must be repeated for the warning or warnings that are still present.

Warnings are described in detail in Chapter 6.2.2.

Remedy

For faults and warnings, measures are described which can be applied to remove/withdraw the fault/warning.

In this case, one of the possibilities specified is to replace the positioning motor. For POSMO A – 300 W, it is also possible, corresponding to the information given as counter–measure, to only change the drive unit.

- Replacing the positioning motor
  —> refer to Chapter 7.1
- Replacing the drive unit (only POSMO A – 300 W)
  —> refer to Chapter 7.3.2

6.2.2 List of faults and warnings

Reader's note

The faults and warnings, listed in the following, are valid for all software releases of SIMODRIVE POSMO A.

The complete list is updated corresponding to the Edition of the documentation (refer to the Edition status in the header line) and corresponds to the software release of SIMODRIVE POSMO A documented here.

The individual faults and warnings are not designated as a function of the software release.

Version: 05.03.02

700 / P947.0 Overvoltage

Cause	The load voltage has exceeded 35 V (75 W motor) or 60 V (300 W motor). When braking, the braking energy is excessive which causes an inadmissible increase in the load voltage.
Remedy	Provide regenerative feedback protection.
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

701 / P947.1 Undervoltage of the load current supply

Cause	The load voltage has fallen below 17 V. The load power supply is overloaded. SITOP: The load voltage was powered-down when braking due to overvoltage. The following applies as of SW 3.0: this fault only occurs if the drive is to be switched from follow-up mode to control mode. If no enable signals are set in the control word and only the power supply to the electronics is switched on, the alarm "Undervoltage load power supply" is signalled. This alarm automatically disappears when the load power supply is switched in. The response to the fault can be set with P56.14.
Remedy	Increase load power supply rating. SITOP: Provide regenerative feedback protection.
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

702 / P947.2 Electronics temperature

Cause	The electronics temperature is > 90 degrees Celsius and has been present for longer than specified in P29 (electronics temperature tolerance time). An excessive electronics temperature is first signaled using warning 800 (warning, electronics temperature). The ambient temperature is too high.
Remedy	Observe the de-rating characteristic. Reduce ambient temperature.
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Braking with maximum acceleration (P22)

703 / P947.3 Overcurrent fault

Cause	The current limit has been exceeded. The motor or the electronics is defective.
Remedy	Replace the positioning motor.
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

704 / P947.4 Encoder fault

Cause	The signal sequence for the rotor position identification is not permissible. The number of increments between two rotor position signals lies outside the permissible tolerance. The motor or the electronics is defective.
Remedy	Replace the positioning motor.
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

705 / P947.5 Standstill monitoring

Cause	The motor was moved out of the standstill area (P14) in the closed-loop controlled status. Note: The fault can be changed-over to a warning using P30 (fault suppression).
Remedy	Check P14 (standstill area).
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

706 / P947.6 Software limit switch, start

Cause	The actual position lies outside the range defined by the software limit switch. When traversing to a software limit switch, the motor is always stopped. SW 1.6 and higher: This fault is also signalled if the traversing range limits of the axis (+/– 200000mm or degrees or inches) are reached. In this case, the Additional information 910 (P954.10) is output. SW 2.0 and higher: This error is also output when the corresponding hardware limit switch (start) has been overrun. In this case, additional information 911 (P954.11) is output. Note: The fault can be changed-over to a warning using P30 (fault suppression).
Remedy	Move away in the opposite direction. Check P6 (software limit switch, start).
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Braking with maximum acceleration (P22)

707 / P947.7 Software limit switch, end

Cause	The actual position lies outside the range defined by the software limit switch. When traversing to a software limit switch, the motor is always stopped. SW 1.6 and higher: This fault is also signalled if the traversing range limits of the axis (+/– 200000mm or degrees or inches) are reached. In this case, the Additional information 910 (P954.10) is output. SW 2.0 and higher: This error is also output when the corresponding hardware limit switch (end) has been overrun. In this case, additional information 911 (P954.11) is output. Note: The fault can be changed-over to a warning using P30 (fault suppression).
Remedy	Move away in the opposite direction. Check P7 (software limit switch, end).
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Braking with maximum acceleration (P22)

708 / P947.8 Speed controller at stop

Cause	The speed controller is at its limit for more than 200 ms. The required speed is not reached. The load or friction is too high or the drive is too small. The current limit (P28, P16) is set too low. The drive is defective. Note: The fault can be changed-over to a warning using P30 (fault suppression).
Remedy	Reduce load. Increase current limit. Replace the positioning motor. Check the drive parameterization.
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

709 / P947.9 Bus communications

Cause	Bus communications between the master and slave has failed. The bus cable has been withdrawn or is defective The EMC faults on the bus cable are too high.
Remedy	Check fieldbus.
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

710 / P947.10 Hardware watchdog reset

Cause	After a restart, after initiating the CPU monitoring, the positioning motor goes into a fault condition. Note: The following applies from SW 1.3: Afterwards the positioning motor is no longer referenced.
Remedy	POSMO A 75W : Replace the positioning motor. POSMO A 300W : Replace the drive unit.
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

711 / P947.11 Flying measurement/actual value setting

Cause	The ”flying measurement/actual value setting” function has not been correctly parameterized. The bit combination for the program control word (PSW) is illegal. No function is executed. When the function is running, terminal 1 was re-parameterized as output. The motion is cancelled and the axis is braked with the maximum deceleration. From SW 2.1: This fault is also signaled if a fault has occurred during the execution of the function ”Reference to occurring zero mark” (see P80, P31/32, P56). In this case, the supplementary information 912 is also signaled. The function ”Reference to forthcoming zero mark” cannot be used together with P80:x.9, P80:x.10 or P80:x.11. From SW 3.1: This fault is also reported when in any type of referencing the reference point or the dynamically calculated reference point is outside the adaptation band. In this case, the additional information 913 is given.
Remedy	Check program control word (PSW.9, PSW.10, PSW.11). Check terminal parameterization (P31 = 27 or other input parameterization).
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

712 / P947.12 Holding brake, undervoltage

Cause	At least the following voltage characteristics are required in order to open and hold the integrated holding brake: Open Load power supply > 24 V Stop Load power supply > 18 V The drive is stopped if the load power supply voltage is too low. Note: This fault can be disabled for a motor without holding brake (P56.5 = 0).
Remedy	Check the load power supply and increase rating.
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

713 / P947.13 Reference position lost

Cause	During shutdown, the drive was in motion. Therefore, the reference positon has not been accepted. The drive is not referenced.
Remedy	Reference drive.
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

714 / P947.14 Error in the FEPROM

Cause	We have detected a fault in the non-volatile memory (FEPROM).
Remedy	Additional information? —> Evaluate P954
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

715 / P947.15 System error

Cause	An internal fault was detected in the drive.
Remedy	Activate/deactivate positioning motor. Check and correct the motor data. POSMO A 75W : Replace the positioning motor. POSMO A 300W : Replace the drive unit.
Acknowledgement	Remove cause, set STW.7 = 1/0 and STW.0 = 0/1
Stop response	Pulse suppression

800 / P953.0 Electronics temperature warning

Cause	The electronics temperature is > 90 degrees Celsius. If the permissible maximum electronics temperature is exceeded for longer than the time specified in P29 (electronics temperature tolerance time), then a fault is output and the drive is powered-down. The ambient temperature is too high.
Remedy	Observe the de-rating characteristic. Reduce ambient temperature.
Acknowledgement	not required
Stop response	None

801 / P953.1 Motor i2t monitoring

Cause	The I2t limiting for the motor current is active, the current is limited to Irated. The load or the load duty cycle is too high.
Remedy	Reduce load duty cycle.
Acknowledgement	not required
Stop response	None

802 / P953.2 Standstill monitoring

Cause	The motor was moved out of the standstill area (P14) in the closed-loop controlled status. Note: The warning is only signaled if the appropriate fault is suppressed.
Remedy	–
Acknowledgement	not required
Stop response	None

803 / P953.3 Software limit switch, start

Cause	The actual position lies outside the range defined by the software limit switch. When traversing to a software limit switch, the motor is always stopped. SW 1.6 and higher: This warning is also signalled if the traversing range limits of the axis (+/– 200000 mm or degrees or inches) are reached. In this case, the additional information 910 (P954.10) is output. SW 2.0 and higher: This warning is also output when the corresponding hardware limit switch (start) has been overrun. In this case, additional information 911 (P954.11) is output. Note: The warning is only signaled if the appropriate fault is suppressed.
Remedy	Move away in the opposite direction. Check P6 (software limit switch, start).
Acknowledgement	not required
Stop response	None

804 / P953.4 Software limit switch, end

Cause	The actual position lies outside the range defined by the software limit switch. When traversing to a software limit switch, the motor is always stopped. SW 1.6 and higher: This warning is also signalled if the traversing range limits of the axis (+/– 200000 mm or degrees or inches) are reached. In this case, the additional information 910 (P954.10) is output. SW 2.0 and higher: This warning is also output when the corresponding hardware limit switch (end) has been overrun. In this case, additional information 911 (P954.11) is output. Note: The warning is only signaled if the appropriate fault is suppressed.
Remedy	Move away in the opposite direction. Check P7 (software limit switch, end).
Acknowledgement	not required
Stop response	None

805 / P953.5 Jogging: Jogging not possible

Cause	Drive not enabled. Jogging already selected. Traversing block being processed. Note: Additional information? —> evaluate P954
Remedy	–
Acknowledgement	not required
Stop response	None

806 / P953.6 Referencing: Position not accepted

Cause	When referencing, the position was not accepted. Motor moving (ZSW.13 = 1). Drive not enabled. Traversing block being processed. After power-on: The motor has still not moved. Note: Additional information? —> evaluate P954
Remedy	The motor must be stationary and closed-loop controlled.
Acknowledgement	not required
Stop response	None

807 / P953.7 Speed controller at stop

Cause	The speed controller is at its limit for more than 200 ms. The required speed is not reached. The load or friction is too high or the drive is too small. The current limit (P28, P16) is set too low. The drive is defective. For the ”traverse to fixed endstop” function, this warning is output when the fixed endstop is reached. Note: The warning is only signaled if the appropriate fault is suppressed.
Remedy	Reduce load. Increase current limit. Replace the positioning motor.
Acknowledgement	not required
Stop response	None

808 / P953.8 Start absolute block not possible

Cause	A block with absolute position data can only be started for a referenced drive.
Remedy	Reference drive.
Acknowledgement	not required
Stop response	None

809 / P953.9 Program cannot be started

Cause	Drive not enabled. Invalid block number selected. Enable signals missing. A traversing block is already being processed. STW.11 (start referencing) is set. Traversing block with absolute position data and drive not referenced. Positioning mode not enabled (STW.4, STW.5) Note: Additional information? —> evaluate P954
Remedy	–
Acknowledgement	not required
Stop response	None

810 / P953.10 Invalid program selection

Cause	An attempt was made to either select block 0 or a block > 27.
Remedy	Select valid block (1 to 27).
Acknowledgement	not required
Stop response	None

811 / P953.11 Speed limiting active

Cause	The required axis velocity requires a higher speed than that specified in P8 (max. speed). Up to SW 1.5: The velocity is limited to the maximum speed. The following applies from SW 1.6: P24 ”Override speed” is limited so that maximum speed is used.
Remedy	Enter lower velocity. Adapt P10 (max. velocity). Adapt P8 (max. speed).
Acknowledgement	not required
Stop response	None

812 / P953.12 Undervoltage of the load current supply

Cause	The following applies from SW 1.6: The load voltage has fallen below 17 V. The load power supply is overloaded. SITOP: The load voltage was powered-down when braking due to overvoltage.
Remedy	Increase load power supply rating. SITOP: Provide regenerative feedback protection.
Acknowledgement	not required
Stop response	None

900 / P954.0 Operation not enabled

Cause	Bits to enable the drive missing.
Remedy	Set enable signals in the control word (STW).
Acknowledgement	not required
Stop response	None

901 / P954.1 Illegal operating status

Cause	If the program is running, jogging or referencing is not possible.
Remedy	–
Acknowledgement	not required
Stop response	None

902 / P954.2 Single block active

Cause	If the program is running and in the single block mode, jogging or referencing is not possible.
Remedy	–
Acknowledgement	not required
Stop response	None

903 / P954.3 Both jogging signals active

Cause	–
Remedy	–
Acknowledgement	not required
Stop response	None

904 / P954.4 Positioning mode not enabled

Cause	Operating condition for program missing (STW.4).
Remedy	–
Acknowledgement	not required
Stop response	None

905 / P954.5 Axis has still not been moved

Cause	The axis was still not moved after power-on.
Remedy	–
Acknowledgement	not required
Stop response	None

906 / P954.6 FEPROM error upon writing or deletion

Cause	Presumably, there is a hardware fault in the non-volatile memory (FEPROM).
Remedy	Replace the positioning motor.
Acknowledgement	not required
Stop response	None

907 / P954.7 FEPROM No positional data available

Cause	In order to restart, the drive requires positional data. This has not been saved correctly upon the last ramp-down.
Remedy	If necessary, reference the drive. Activate/deactivate positioning motor. Replace the positioning motor.
Acknowledgement	not required
Stop response	None

908 / P954.8 FEPROM No factory setting available

Cause	Presumably, there is a hardware fault in the non-volatile memory (FEPROM).
Remedy	Replace the positioning motor.
Acknowledgement	not required
Stop response	None

909 / P954.9 FEPROM No user parameters available

Cause	Presumably, the drive was deactivated when saving the user parameters into the non-volatile memory (FEPROM). There may also be a hardware fault in the non-volatile memory (FEPROM).
Remedy	Check and correct the motor data. Restore the data in the FEPROM. Replace the positioning motor.
Acknowledgement	not required
Stop response	None

910 / P954.10 Traversing range limit reached

Cause	Axis has reached a traversing range limit. The traversing range limits of the axis are +/– 200000 mm or degrees or inches.
Remedy	For drives turning endlessly, a modulo value must be entered in Parameter 1.
Acknowledgement	not required
Stop response	None

911 / P954.11 Hardware limit switch crossed/reached

Cause	The axis has reached or crossed a hardware limit switch. The exact limit switch is defined by the simultaneously output error or warning of the software limit switch.
Remedy	Acknowledge fault. Continued travel in opposite direction. Note: Continued travel is generally only possible in the opposite direction. If the hardware limit switch is crossed, continued travel in the original direction is only possible if travel continues in the opposite direction following fault acknowledgement and if the hardware switch is crossed again. This ensures that the axis is within the permitted traversing range.
Acknowledgement	not required
Stop response	None

912 / P954.12 No cams occurred before the zero mark

Cause	This supplementary information has been reported together with the fault 711 ”Flying measurement/actual value setting”: The function ”Reference to occurring zero mark” has been activated in the current traversing block. In addition, an input terminal has been parameterized with the function ”Cam monitoring”. However, a reference cam edge was not detected before the zero mark occurred. The drive has therefore been dereferenced for safety reasons.
Remedy	Ensure that the input terminal connected to the cam is correctly parameterized and that the cam is connected to the correct input terminal. Ensure that the type of BERO (NC contact/NO contact) corresponds to P56 (bit7).
Acknowledgement	not required
Stop response	None

913 / P954.13 Invalid reference point data

Cause	This supplementary information has been reported together with the fault 711 ”Flying measurement/actual value setting”: The selected reference point in P5 or the reference point in P85:27 is outside the valid adaptation band. The drive was not referenced again.
Remedy	Check P5 and P85:27 with the permissible value limits (see P702). Parameterize reference points only in such a way that they are not positioned on the limit values of the adaptation band.
Acknowledgement	not required
Stop response	None

6.3 Analog test outputs

Description

Analog test outputs are provided at the rear of the SIMODRIVE POSMO A which are only accessible after the cover has been unscrewed.

Caution

Measurements may only be made in exceptional cases by appropriately trained personnel. The ”correct” text sockets must be used, as short–circuits will permanently damage the module (refer to Fig. 6-1).

The following parameters are available for the analog test sockets:

- P33, P34, P35 address, shift factor and offset for DAU 1
- P36, P37, P38 address, shift factor and offset for DAU 2

Which signal is output via the test outputs?

- This is defined by entering an appropriate address in P33 or P36.

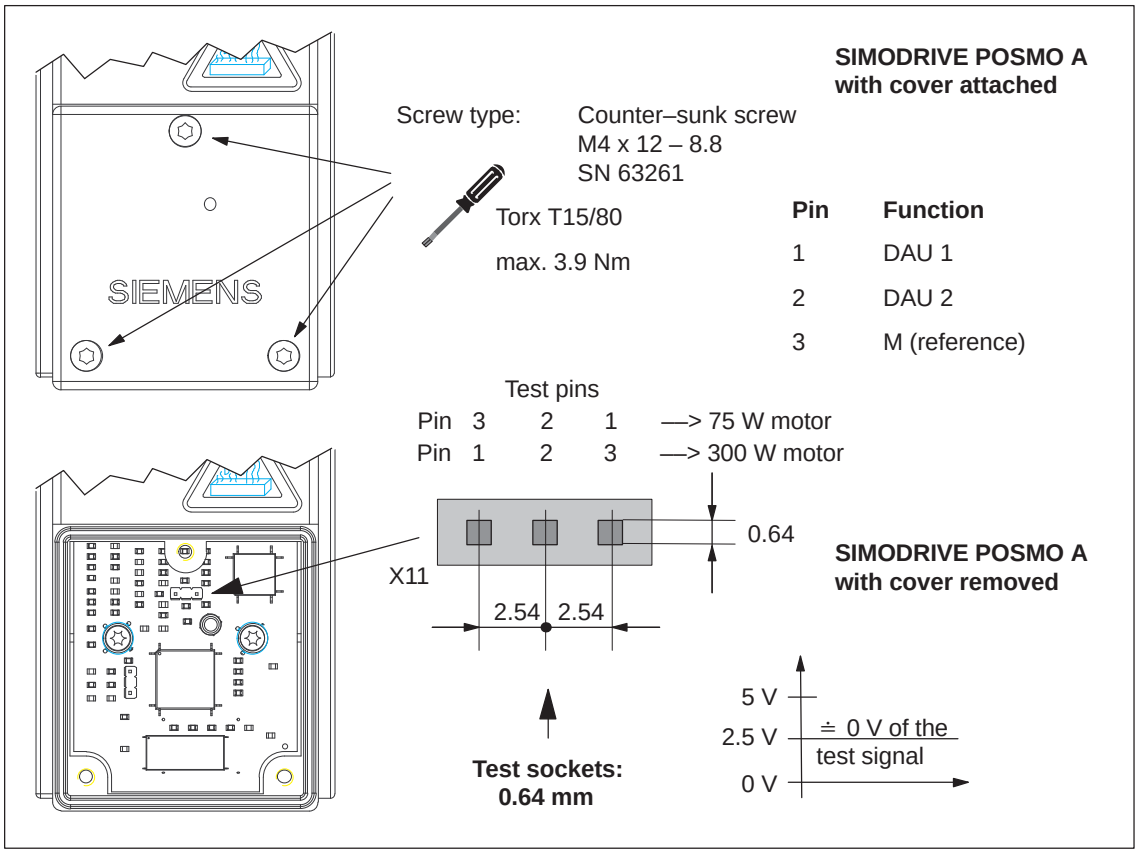


Fig. 6-1 SIMODRIVE POSMO A test sockets with the cover removed

Caution

In order to guarantee the degree of protection of SIMODRIVE POSMO A, after measurements have been made at the analog test sockets, the cover must be screwed back on.

Standard assignment

The test sockets provide the following signals as standard:

- DAU 1 (current actual value)

  P33 (ADDRESS: $FC32_{hex} \doteq 64562_{dec}$)
  P34 Shift factor = 7:
  $\Delta V = 1.9\ V \doteq 9\ A$ —> 75 W motor
  $\Delta V = 1.0\ V \doteq 12\ A$ —> 300 W motor
  P35 Offset = $80_{hex} \doteq 128_{dec}$

- DAU 2 (speed actual value)

  P36 (ADDRESS: $FC66_{hex} \doteq 64614_{dec}$)
  P37 Shift factor = 0: ($\Delta U = 0.625\ V \doteq 1000$ rpm)
  P38 Offset = $80_{hex} \doteq 128_{dec}$

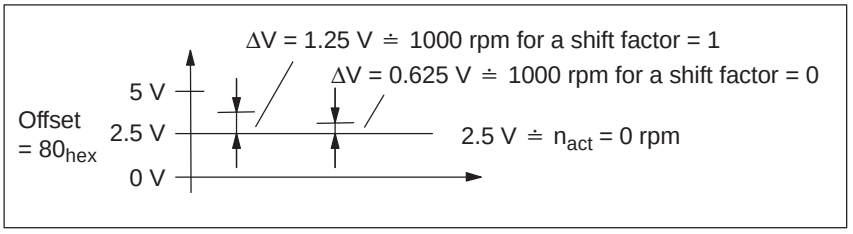


Fig. 6-2 Voltage values when measuring the speed actual value

Note

With offset = 80_{hex} a voltage of 2.5 V is output for ”0”.

- A shift factor change of +1 corresponds to doubling the value
- A shift factor change of –1 corresponds to halving the value

Additional possible addresses

The following supplementary addresses are available:

- Speed setpoint:
  $FC00_{hex} \doteq 64512_{dec}$ the same normalization as the speed actual value
- Position actual value:
  $FC6A_{hex} \doteq 64618_{dec}$
  shift factor
  = 6: 1 motor revolution ≙ 4 V —> 75 W motor
  = 4: 1 motor revolution ≙ 5 V —> 300 W motor
- I_{set} (n controller):
  $FC38_{hex} \doteq 64568_{dec}$ the same normalization as the current actual value
- I_{set} (smoothed):
  $FC3A_{hex} \doteq 64570_{dec}$ the same normalization as the current actual value

Reader's note

The signals are shown in Chapter 3.3.1.

6.4 Bus monitor AMPROLYZER for PROFIBUS–DP

Description

The AMPROLYZER bus monitor can be used to diagnose, monitor and trace data transfer in PROFIBUS networks.

AMPROLYZER (Advanced Multicard PROFIBUS Analyzer)

Internet address

The software is freeware and is available from the Internet as follows:

—> http://www.ad.siemens.com/simatic–cs

—> search for the article number 338386

The self–extracting EXE file can be downloaded.

For more information on the AMPROLYZER bus monitor, please refer to the information in the Internet and the files supplied.

■

Installation and Service

7

7.1 Replacing the motor

Replacing the motor

We recommend the following procedure when the positioning motor has to be replaced:

1. Save the parameters of the SIMODRIVE POSMO A.

   The parameters will be required again for the new motor.

2. Cancel the pulses: Control signal STW.1 (OFF 2) = 0
3. Power–down the load and electronics power supplies.
4. Release the connection cover of the positioning motor and remove (2 screws).

   Protect the connection cover and the positioning motor against dirt – cover all of the open components.

5. Unscrew the complete defective positioning motor together with the gearbox.
6. Bolt on the new complete SIMODRIVE POSMO A. Before installing, clean the shaft ends thoroughly of anti–corrosion agents with a typical solvent.
7. Release and withdrawn the connection cover of the new SIMODRIVE POSMO A (2 screws).

   Protect the connection cover and the positioning motor against dirt – cover all of the open components.

8. Locate the wired ”old” cover on the new positioning motor which has been bolted into place and tighten the screws (2 screws).
9. Power–up the load and electronics power supplies.
10. Re–load the parameters saved under the first point.
11. Check: Does the positioning motor run fault–free?
    - if yes —> then the ”old” connection cover is O. K.
    - if no —> the ”old” connection cover may be defective; replace the connection cover
12. Screw the connection cover back onto the positioning motor.
13. Return to the following address.

Addresses to return the positioning motor

You can also obtain the address of your local regional spare parts center at the following Internet address

- Address: http://www.siemens.com/automation/partner
- Product group: SIMODRIVE

Note

If the ”old” connection cover of the SIMODRIVE POSMO A is not defective, then it should be left at the mounting location and should then be re–mounted on the ”new” positioning motor with the existing wiring.

7.2 Mounting or replacing a gearbox (only relevant for 300 W motors)

What is required to mount or replace gearboxes?

The following materials and tools are required to mount or replace a gearbox:

1. Four retaining screws per motor (M6 x 20 acc. to DIN 6912)
2. Tools: SW 4 and SW 5 Allen keys
3. Sealing agent: (e.g. Fluid D from Teroson)
4. Loctite: (e.g. Loctite Type 649)
5. Solvent: (e.g. Seevenax 72)
6. New gearbox: refer to the modular gearboxes in Chapter 2.5.2

What preparations have to be made?

The following preparations must be made before mounting or changing gearboxes:

- This point is only valid if the gearbox is be replaced
  - Remove the cover from the mounting hole
  - Rotate the clamping hub with respect to the adapter plate in order to line–up the mounting holes
  - Release the clamping hub coupling of the gearbox
  - Release the 4 screws between the motor and gearbox
  - Remove the gearbox
- Prepare the gearbox to be mounted
  - Clean the opening for the gearbox input shaft
  - Clean the mounting surface and remove any possible damage (e.g. impressions in the mating surfaces, burs)
- Preparing the motor
  - Clean the motor shaft
  - Clean the mounting surface and remove any possible damage (e.g. impressions in the mating surfaces, burs)
  - Apply a sealing agent to the motor flange

What are the steps when mounting a gearbox?

When mounting a gearbox, proceed as follows:

1. Carefully locate the gearbox on the motor by applying gentle pressure until there is no longer a gap between the motor and gearbox.
2. Tighten the clamping hub coupling
   - Tool: Allen key SW 4
   - Torque: max. 6 Nm
3. Establish the connection between the motor and gearbox
   - Tool: Allen key SW 5
   - Tighten the screws diagonally
   - Torque: max. 5 Nm ±10 %
4. Secure the screws (Loctite)

Notice

If another gearbox has been mounted, the gearbox–dependent parameters no longer match the gearbox being used and these parameters must be appropriately changed.

—> Refer to Chapter 5.6.3

7.3 Spare parts for SIMODRIVE POSMO A

7.3.1 List of spare parts for the 300 W motors

What spare parts are there?

The following spare parts are available for SIMODRIVE POSMO A – 300 W:

- Drive unit 6SN2157–0AA01–0BA1
- 300 W connection module GWE: 462028741001
- Planetary gear, degree of protection IP54
  —> Only available as a new part with a delivery time of 10 days.
  - Planetary gearbox i = 4 6SN2157–2BD10–0BA0
  - Planetary gearbox i = 7 6SN2157–2BF10–0BA0
  - Planetary gearbox i = 12 6SN2157–2BH10–0BA0
  - Planetary gearbox i = 20 6SN2157–2CK10–0BA0
  - Planetary gearbox i = 35 6SN2157–2CM10–0BA0
  - Planetary gearbox i = 49 6SN2157–2CP10–0BA0
  - Planetary gearbox i = 120 6SN2157–2DU10–0BA0
- Planetary gear, degree of protection IP65
  —> Only available as a new part with a delivery time of 10 days.
  - Planetary gearbox i = 4 6SN2157–2BD20–0BA0
  - Planetary gearbox i = 7 6SN2157–2BF20–0BA0
  - Planetary gearbox i = 12 6SN2157–2BH20–0BA0
  - Planetary gearbox i = 20 6SN2157–2CK20–0BA0
  - Planetary gearbox i = 35 6SN2157–2CM20–0BA0
  - Planetary gearbox i = 49 6SN2157–2CP20–0BA0

The following spare parts are available for SIMODRIVE POSMO A – 75 W:

- 75 W connection module GWE: 462028740101

Reader’s note

For spare parts, refer to the Siemens Spare Parts Catalog:

https://pridanet.automation.siemens.com/ek/

7.3.2 Drive unit as spare part (only the 300 W motor)

Replacing the drive unit

We recommend the following procedure if a drive unit is to replaced:

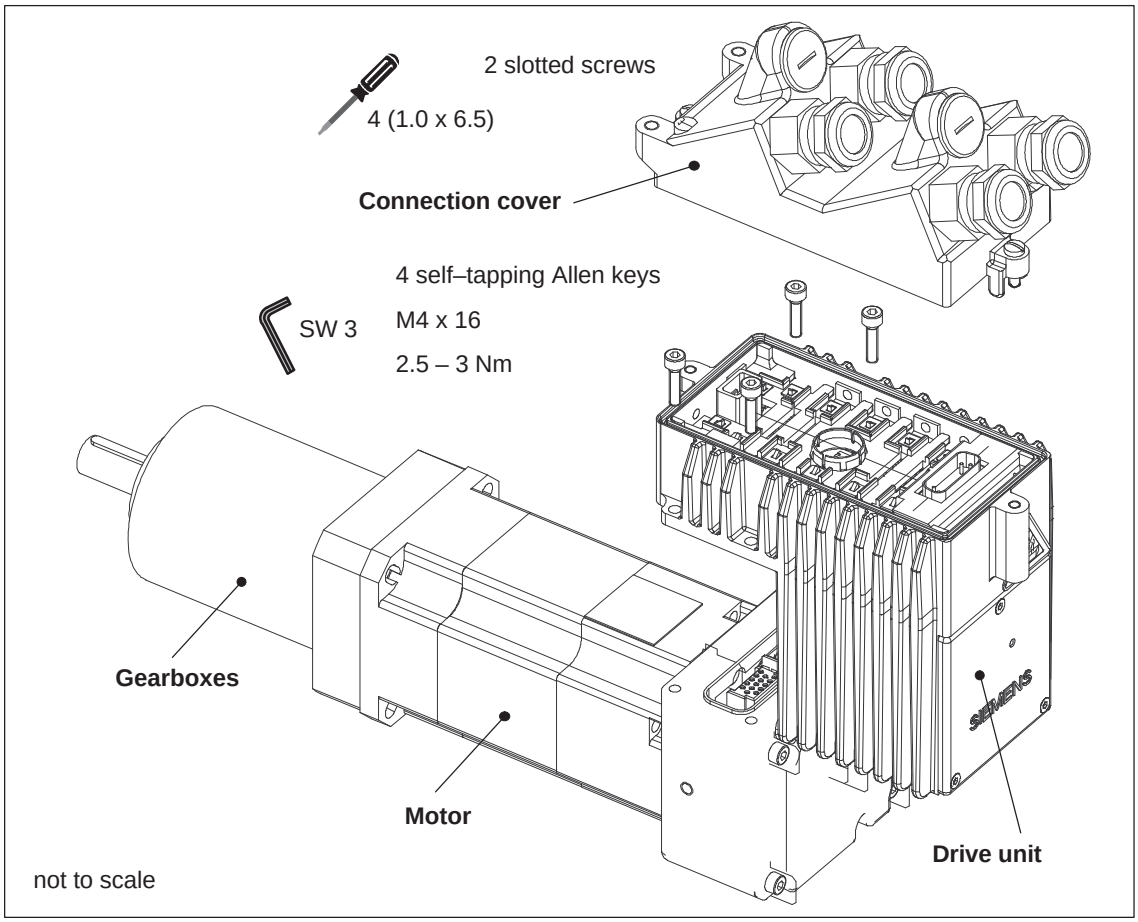


Fig. 7-1 Replacing the drive unit

Reader's note

Up–to–date and binding information on this subject should be taken from the documentation provided with the spare parts "Installation and mounting instructions, replacing the drive unit".

What is required to replace the drive unit?

The following are required to replace the drive unit:

1. Tools
   - Screwdriver Size 4 (1.0 x 6.5)
   - Allen key SW 3
2. New drive unit
3. Parameter sets of the old drive unit (save and make available)

How do you replace the drive unit?

The drive unit is replaced as follows:

Caution

The positioning motor must be brought into a no–voltage condition before the drive unit is replaced.

1. Remove the connection cover
   – Tool Screwdriver, Size 4 (1.0 x 6.5)
2. Release the four screws retaining the drive unit
   – Tool Allen key SW 3
3. Remove the old drive unit
4. Mount the new drive unit
5. Tighten the four screws retaining the drive unit
   – Tool Allen key SW 3
   – Tighten the screws diagonally
   – Tightening torque 2.5 – 3 Nm
6. Locate the connection cover and tighten the screws
   – Tool Screwdriver, Size 4 (1.0 x 6.5)
7. Load the parameter set

   The parameter set provided must be downloaded into the new drive unit from the old drive unit.
8. Test the positioning motor

Note

For the separate version where the motor and drive unit are separated, the installation sequence when replacing the drive unit is the same. However, in this case, the drive unit is removed from the extension set ”separate version”.

Order No. (MLFB)

The spare drive unit has the following Order No:

Order No. (MLFB): 6SN2157–0AA01–0BA1

Address to return the drive unit (300 W motor)

Refer to Chapter 7.1 under ”Address to return the positioning motor” for the address of the regional spare parts department that is responsible for you.

7.3.3 Connection module as spare part

Replacing the connection module

We recommend the following procedure if a connection module is to replaced:

Caution

The positioning motor must be brought into a no–voltage condition before the connection module is replaced.

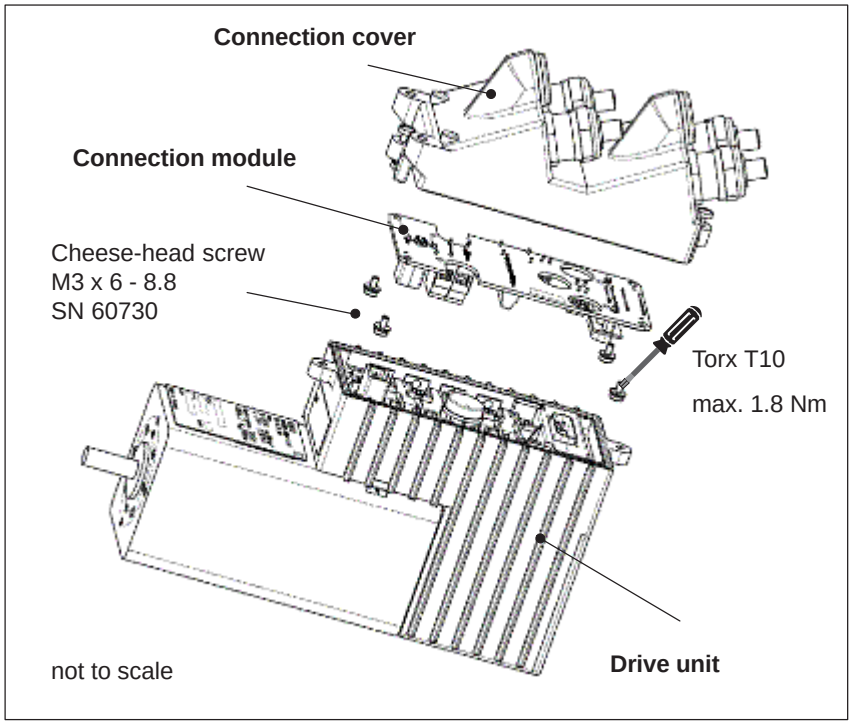


Fig. 7-2 Replacing the connection module, e. g. SIMODRIVE POSMO A – 75 W

What is required to replace the connection module?

The following are required to replace the connection module:

1. Tools
   - – Screwdriver Size 4 (1.0 x 6.5)
   - – Screwdriver Torx T10
2. New connection module

How do you replace the connection module?

The connection module is replaced as follows:

Caution

The positioning motor must be brought into a no–voltage condition before the connection module is replaced.

1. Release the power and signal cables (refer to Chapter 2.3.1)
2. Remove the connection cover
   – Tool Screwdriver, Size 4 (1.0 x 6.5)
3. Release the four screws retaining the connection module
   – Tool Screwdriver Torx T10
4. Mount the new connection module to the drive unit
5. Tighten the four screws retaining the drive unit
   – Tool Screwdriver Torx T10
   – Tightening torque max. 1.8 Nm
6. Locate the connection cover and tighten the screws
   – Tool Screwdriver, Size 4 (1,0 x 6,5)
7. Connect the power and signal cables (refer to Chapter 2.3.1)
8. Test the positioning motor

■

Space for your notes

List of Abbreviations

A

ABS	Absolute
AC	Alternating current
AK	Task and response ID
AktSatz	Actual block number: Part of the status signals
AMPROLYZER	Advanced Multicard PROFIBUS Analyzer: Bus monitor for PROFIBUS
AnwSatz	Select block number: Part of the control signals
Bin	Abbreviation for binary number
BLDC	Brushless Direct Current: Permanent–magnet brushless servomotor
C1 master	PROFIBUS master, Class 1
C2 master	PROFIBUS master, Class 2
C4	PROFIBUS parameter format
COM	Communications module
CP	Communications processor
CPU	Central Processing Unit
DC	Direct current
Dec	Abbreviation for decimal number
DIL	Dual–In–Line
DP	Distributed I/O
DPMC1, 2	DP Master Class 1, 2 DP Master Class 1, 2
EMC	Electro–Magnetic Compatibility
EN	European standard
EPROM	Program memory with permanently written program
ESD	Modules/components that can be destroyed by electrostatic discharge
ESDS	Electrostatic Discharge Sensitive Devices: components sensitive to electrostatic discharge
FB	Function block
FLASHEPROM	Flash EPROM: Memory which can be read and written into
FOC	Fiber–optic cable

FW	Firmware
GSD	Master device file: describes the features of a DP slave
HEX	Abbreviation for a hexadecimal number
HW	Hardware
HWE	Hardware limit switches
i	Gearbox step–down ratio
I	Input
I2	PROFIBUS parameter format
I4	PROFIBUS parameter format
IB	Input byte
IBN	Commissioning
IEC	International Electrotechnical Commission: International standard in electrical technology
IN	Input
IND	Sub–index, sub–parameter number array index: Part of a PKW
INT	Integer: Integer number
IW	Input word
Kv	Position loop gain (Kv factor)
LED	Light Emitting Diode
M	Ground
MB	Mega byte
MDI	Manual Data Input
MLFB	Machine Readable Product Designation: Order No.
MPI	Multi Point Interface: Multi–point serial interface
MSR	Dimension system grid
N2	PROFIBUS parameter format
nact	Speed actual value
NN	Standard zero (average sea level)
nset	Speed setpoint
O	Output
OB	Output Byte
OC	Operating Condition
OW	Output word
Out	Output

P	Parameter
PAB	Peripheral output byte
PAW	Peripheral output word
PC	Personal Computer
PEB	Peripheral input byte
PELV	Protective extra low voltage The protective low voltage PELV must have protective separation, be grounded and must be safe to touch.
PEW	Peripheral input word
PG	Programming device
PKE	Parameter identification: Part of a PKW
PKW	Parameter identification value: Parameterizing part of a PPO
PLC	Programmable logic controller (e.g. SIMATIC S7)
PMM	Power Management Module
PNO	PROFIBUS User Organization
PNU	Parameter numbers
PO	POWER ON
POSMO A	Positioning Motor Actuator: Positioning motor
PPO	Parameter process data object: Cyclic data telegram when transferring data with PROFIBUS–DP and the ”variable–speed drives” profile
PROFIBUS	Process Field Bus: Serial data bus
PSW	Program control word
PZD	Process data: Process data section of a PPO
Q	Output
RAM	Random Access Memory Program Memory, i.e. program memory that can be read and written to
REL	Relative
RMB	Checkback signal byte
RO	Read Only
S1	Continuous duty
S3	Intermittent duty
SN	Siemens Standard
SNR	Block number
SS	Interfaces

STB	Start byte
STW	Control word
SV	Power supply
SW x.y	Software x.y
SW x	Key size x mm
SWE	Software limit switch
T4	PROFIBUS parameter format
Term	Terminal
VDE	Verband Deutscher Elektrotechniker [Association of German Electrical Engineers]
VDI	Verein Deutscher Ingenieure [Association of German Engineers]
VS	Supply voltage
xact	Position actual value
xset	Position setpoint value
ZSW	Status word

■

References

B

General Documentation

/KT654/ Catalog DA 65.4 • 2005
SIMODRIVE 611 universal and POSMO
Order No.: E86060–K5165–A401–A4

/BU/ Catalog NC 60 • 2004
Automation Systems for Machine Tools
Order No.: E86060–K4460–A101–B1
Order No.: E86060–K4460–A101–B1 –7600 (English)

/Z/ MOTION–CONNECT
Connection technology & system components for SIMATIC, SINUMERIK, MASTERDRIVES and SIMOTION
Catalog NC Z
Order No.: E86060–K4490–A001–B1
Order No.: E86060–K4490–A001–B1–7600 (English)

/ST7/ SIMATIC
SIMATIC S7 Programmable Logic Controllers
Catalog ST 70
Order No.: E86 060–K4670–A111–A9

/KT101/ SITOP power, Power Supplies
Catalog KT 10.1 2004
Order No.: E86060–K2410–A101–A5

/SI1/ SITOP modular 48V/20A power supplies (6EP1 457–3BA00)
Operating Instructions 07.2002
Order No.: C98130–A7552–A1–1–6419

/STEP7/ Automation with STEP 7 in STL
SIMATIC S7–300/400 Programmable Logic Controllers
SIEMENS; Publicis MCD Verlag; Hans Berger
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ISBN 3–89578–036–7

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/IKPI/ Catalog IK PI • 2005
Industrial communications and field devices
Order No.: E86060–K6710–A101–B4
Order No.: E86060–K6710–A101–B4–7600 (English)

/P1/ PROFIBUS–DPV1, Basics, Tips and Tricks for Users
Hüthig; Manfred Popp
EN50170
ISBN 3–7785–2781–9

/P2/ PROFIBUS–DP, Fast Entry
PROFIBUS User Organisation e.V.; Manfred Popp
Order No.: 4.071

/P3/ PROFIBUS, Profile for Variable–Speed Drives, PROFIDRIVE
September 1997 Edition
PROFIBUS User Organization e.V.
76131 Karlsruhe, Haid–and–Neu–Straße 7;
Order No.: 3.071

/P4/ Decentralization with PROFIBUS–DP
Design, Configuring and
Using PROFIBUS–DP with SIMATIC S7
SIEMENS; Publics MCD Verlag; Josef Weigmann, Gerhard Kilian
Order No.: A19100–L531–B714
ISBN 3–89578–123–1

/P5/ Manual for PROFIBUS Networks
SIEMENS;
Order No.: 6GK1 970–5CA10–0BA0

Manufacturer/Service Documentation

/POS1/ SIMODRIVE POSMO A (10.07 Edition)
User Manual
Order No.: 6SN2 197–0AA00–1BP1

/POS2/ SIMODRIVE POSMO A (08.03 Edition)
Installation Instructions 75/300 W motor (is provided with each drive)
Order No.: On request

/posa_mv/ SIMODRIVE POSMO A – 300 W (08.06 Edition)
Installation Instructions, extension set ”separate version”
Order No.: On request

/posa_mta/ SIMODRIVE POSMO A – 300 W (12.01 Edition)
Installation Instructions, replace drive unit
Order No.: On request

/posa_mtg/ SIMODRIVE POSMO A (02.04 Edition)
Installation Instructions, replace gearbox
Order No.: On request

/S7H/ SIMATIC S7–300 (2002 Edition)
Software Installation Manual for Technological Functions
– Reference Manual: CPU data (HW description)
– Reference Manual: Module Data
Order No.: 6ES7 398–8AA03–8BA0

/S7HT/ SIMATIC S7–300 (03.97 Edition)
Manual: STEP 7, Basic Know–How, V. 3.1
Order No.: 6ES7 810–4AC02–8BA0

/S7HR/ SIMATIC S7–300 (03.97 Edition)
Manual: STEP 7, Reference Manuals, V. 3.1
Order No.: 6ES7 810–4CA02–8BR0

/ET200X/ SIMATIC (05.01 Edition)
Distributed ET 200X I/O Devices
Manual EWA 4NEB 780 6016–01 04
Part of the package with Order No.
6ES7 198–8FA01–8BA0

/EMV/ SINUMERIK, SIROTEC, SIMODRIVE (06.99 Edition)
EMC Guidelines
Configuration Manual (HW)
Order No.: 6FC5 297–0AD30–0BP1

The current Declaration of Conformity is in the Internet under
http://support.automation.siemens.com

Please enter here the ID number: 15257461 in the field ’Search’ (top right) and then click on ’go’.

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Dimension Drawings

C

C.1 Dimension drawings for SIMODRIVE POSMO A – 75W

Contents

The dimension drawings for the SIMODRIVE POSMO A – 75W positioning motor with the following gearboxes are provided in this chapter:

- Motor without gearbox —> refer to Fig. C-1
- Motor with planetary gearbox, stages 1, 2, 3 —> refer to Fig. C-2
- Motor with worm gearbox —> refer to Fig. C-3

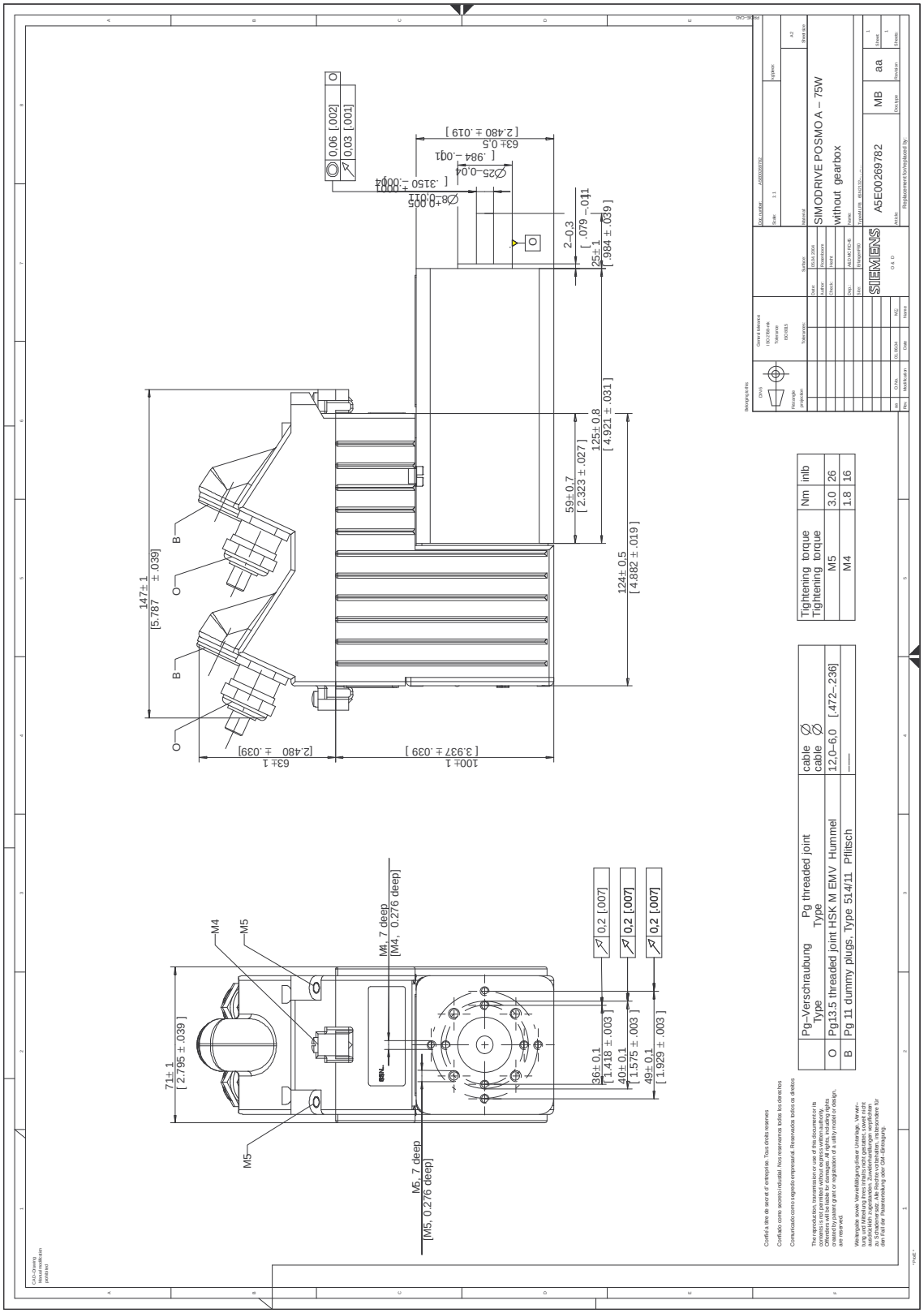


Fig. C-1 Dimension drawing: SIMODRIVE POSMO A – 75 W without gearbox

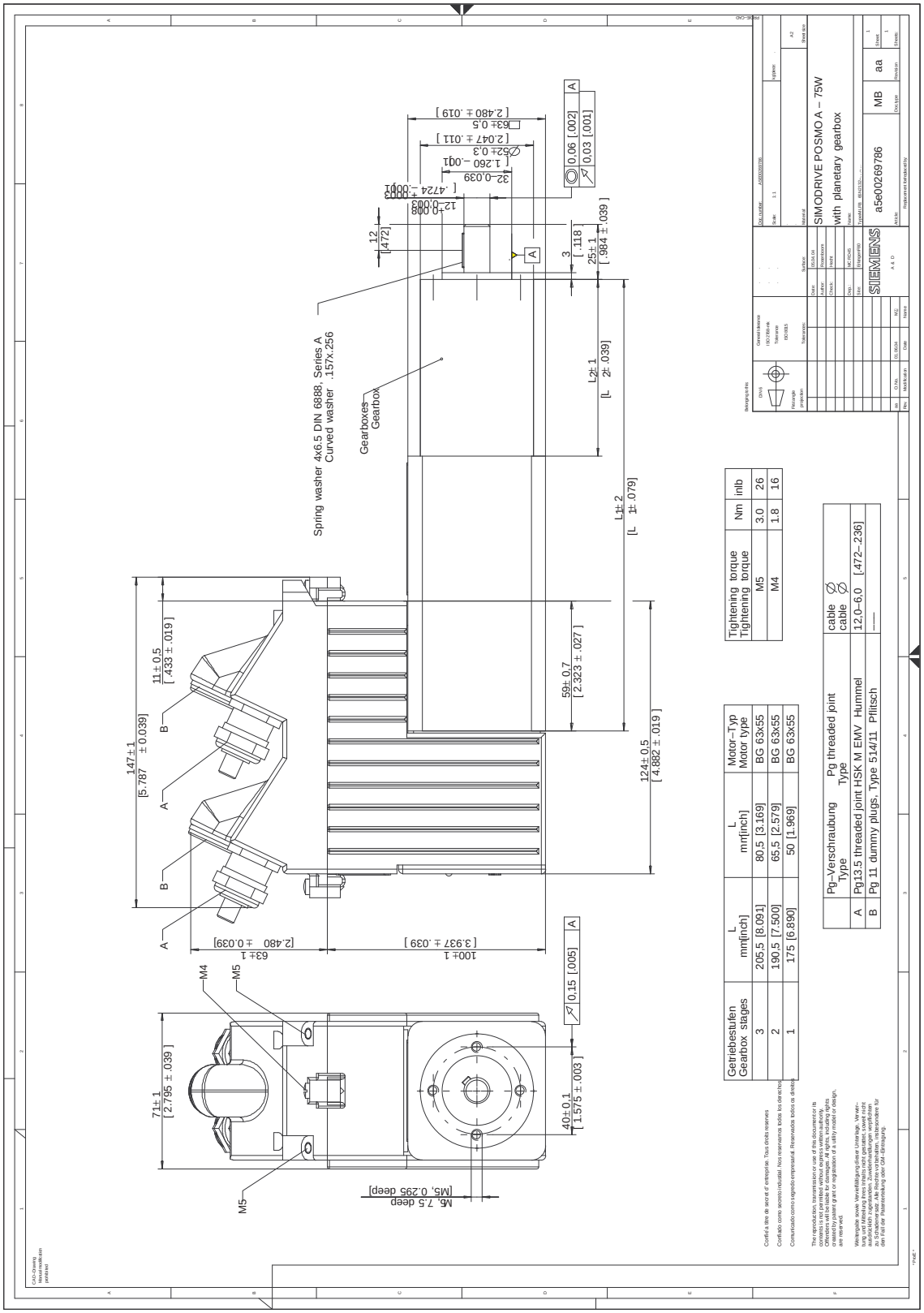


Fig. C-2 Dimension drawing: SIMODRIVE POSMO A – 75 W with planetary gearbox

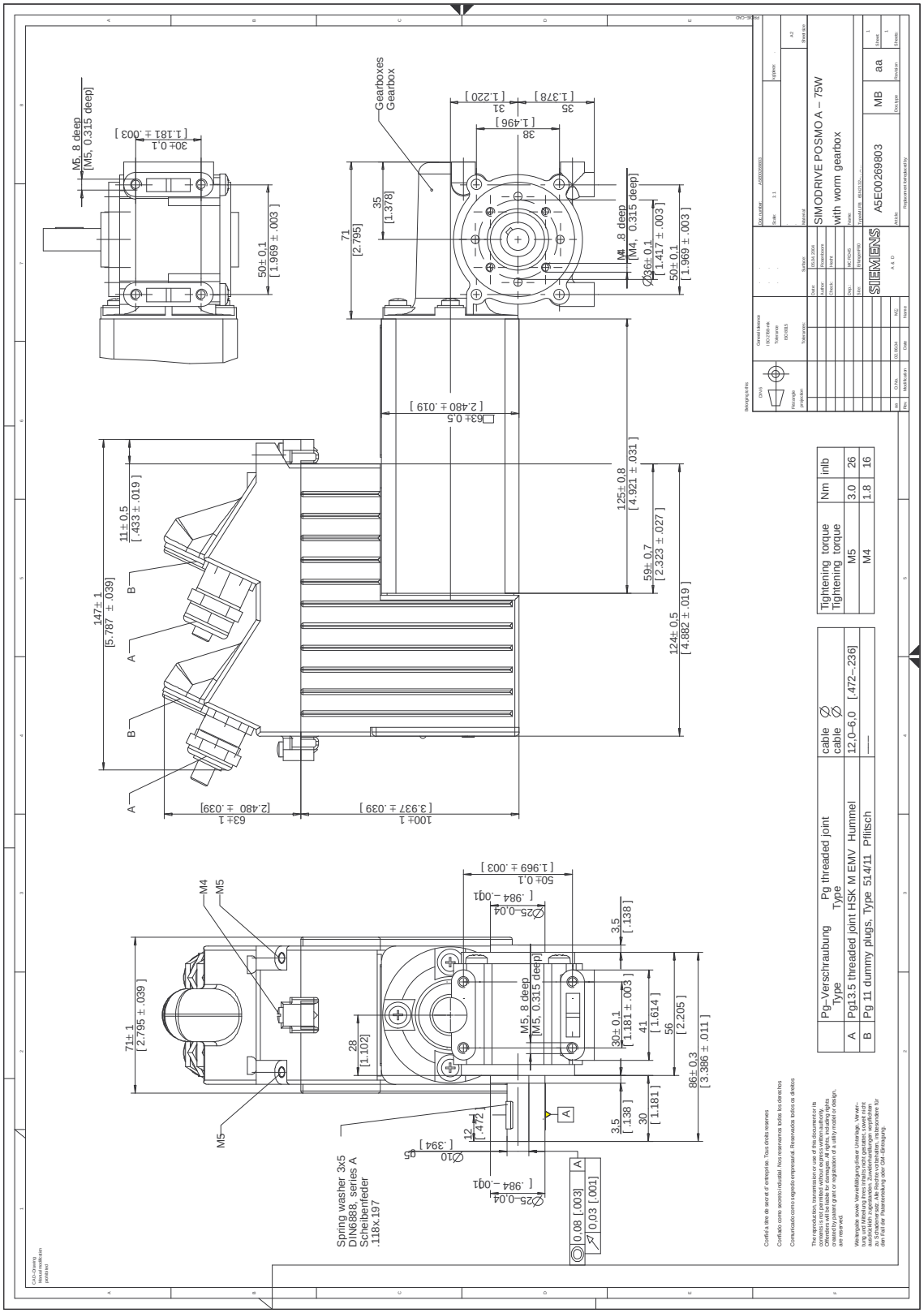


Fig. C-3 Dimension drawing: SIMODRIVE POSMO A – 75W with worm gearbox

C.2 Dimension drawings for SIMODRIVE POSMO A – 300W

Contents

The dimension drawings for the SIMODRIVE POSMO A – 300W positioning motor with the following gearboxes are provided in this chapter:

- Motor without gearbox —> refer to Fig. C-4
- Motor with planet. gearb. (1–stage, 2–stage) —> refer to Fig. C-5
- Motor with planetary gearbox (3–stage) —> refer to Fig. C-6
- SIMODRIVE POSMO A – 300 W extension set ”separate version”
  - Motor without gearbox —> refer to Fig. C-7
  - Motor with planet. gearb. (1–stage, 2–stage) —> refer to Fig. C-8
  - Motor with planetary gearbox (3–stage) —> refer to Fig. C-9

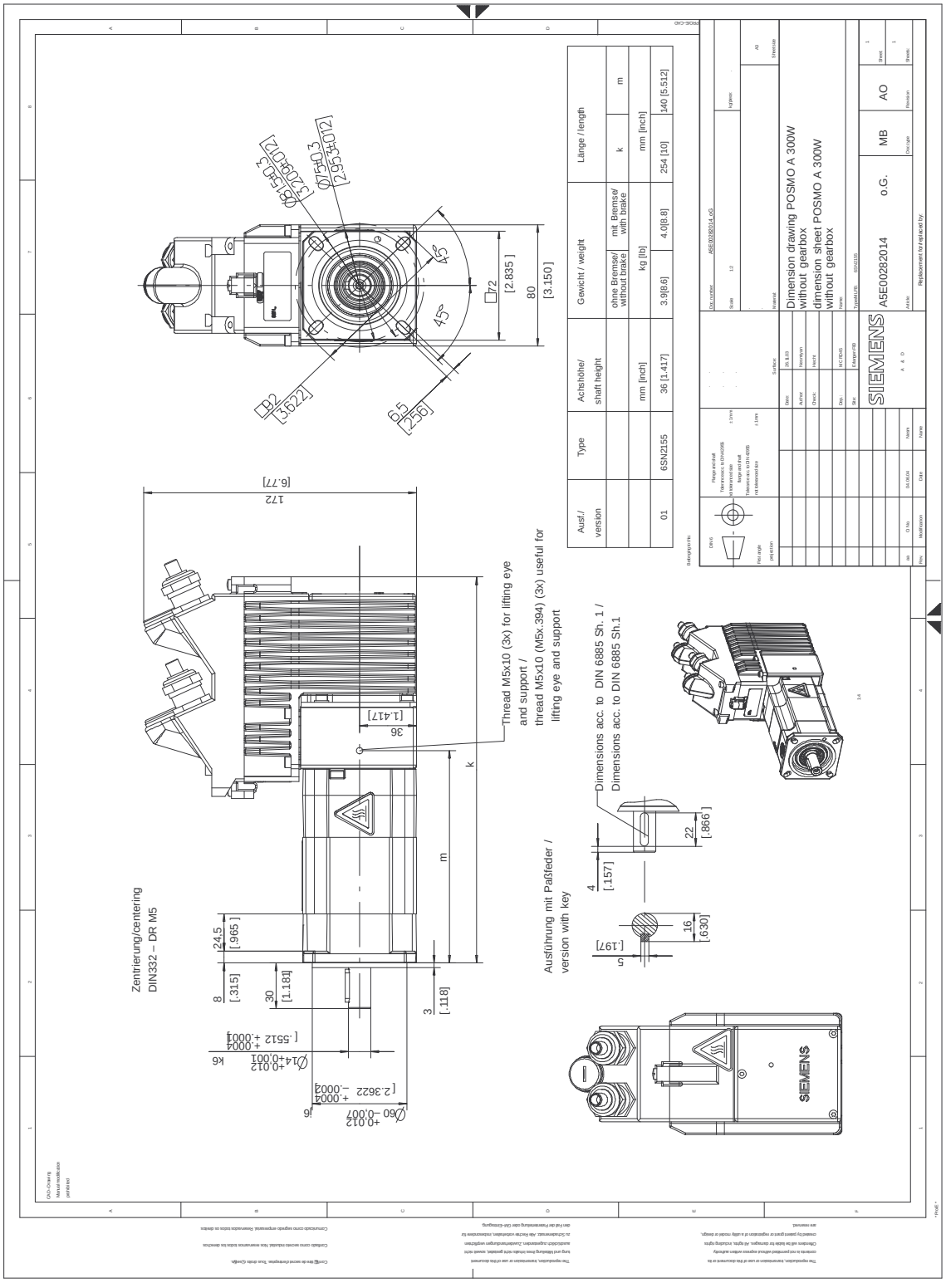
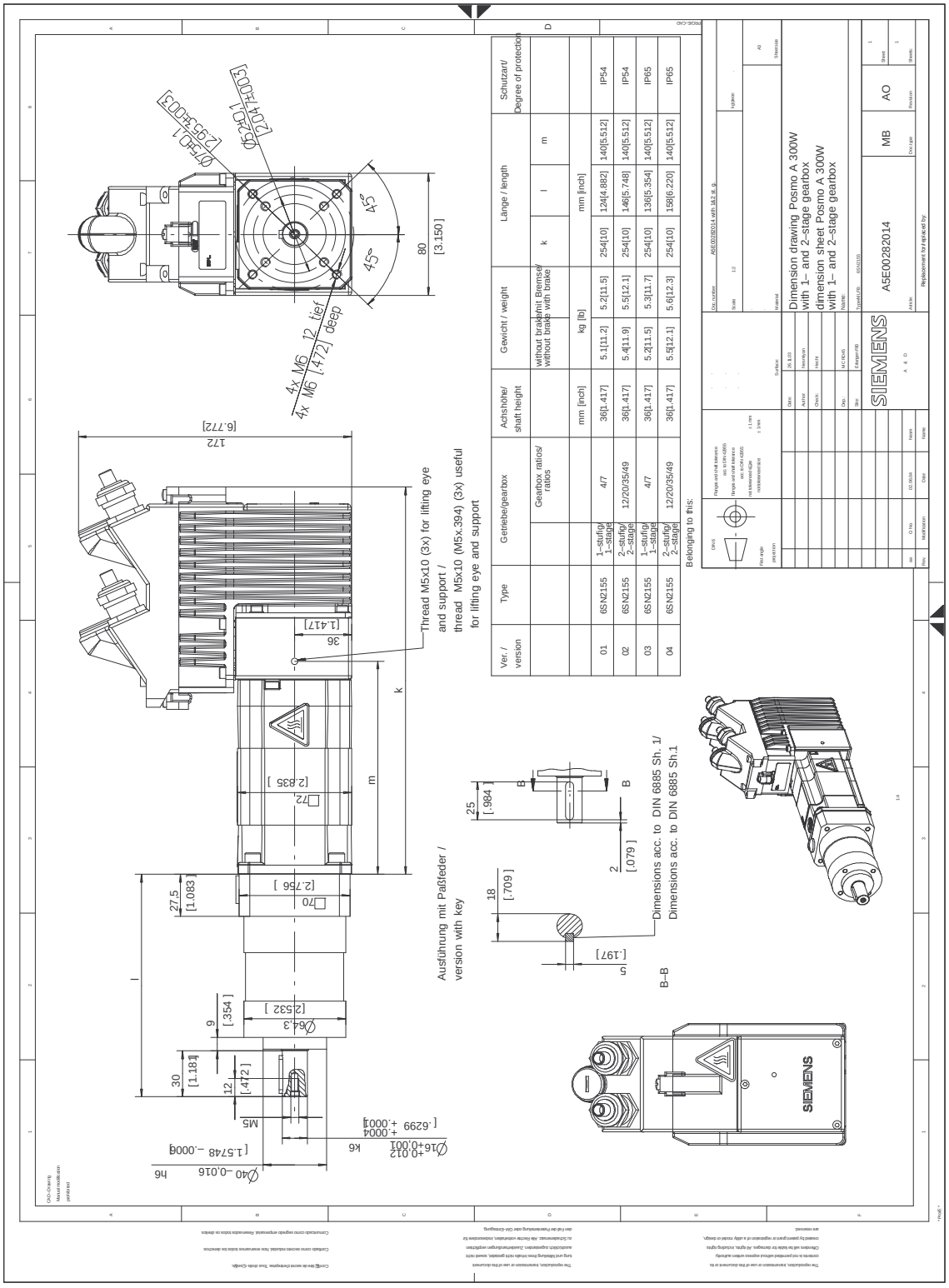


Fig. C-4 Dimension drawing: SIMODRIVE POSMO A – 300 W without gearbox



Ver. / version	Type	Getriebe/gearbox		Achshöhe/ shaft height	Gewicht / weight		Länge / length			Schutzart/ Degree of protection
			Gearbox ratios/ ratios		without brake/mit Bremse/ without brake with brake		k	l	m	
				mm [inch]	kg [lb]		mm [inch]			
01	6SN2155	1–stufig/ 1–stage	4/7	36[1.417]	5.1[11.2]	5.2[11.5]	254[10]	124[4.882]	140[5.512]	IP54
02	6SN2155	2–stufig/ 2–stage	12/20/35/49	36[1.417]	5.4[11.9]	5.5[12.1]	254[10]	146[5.748]	140[5.512]	IP54
03	6SN2155	1–stufig/ 1–stage	4/7	36[1.417]	5.2[11.5]	5.3[11.7]	254[10]	136[5.354]	140[5.512]	IP65
04	6SN2155	2–stufig/ 2–stage	12/20/35/49	36[1.417]	5.6[12.1]	5.6[12.3]	254[10]	158[6.220]	140[5.512]	IP65

Fig. C-5 Dimension drawing: SIMODRIVE POSMO A – 300W with planetary gearbox (1–stage, 2–stage)

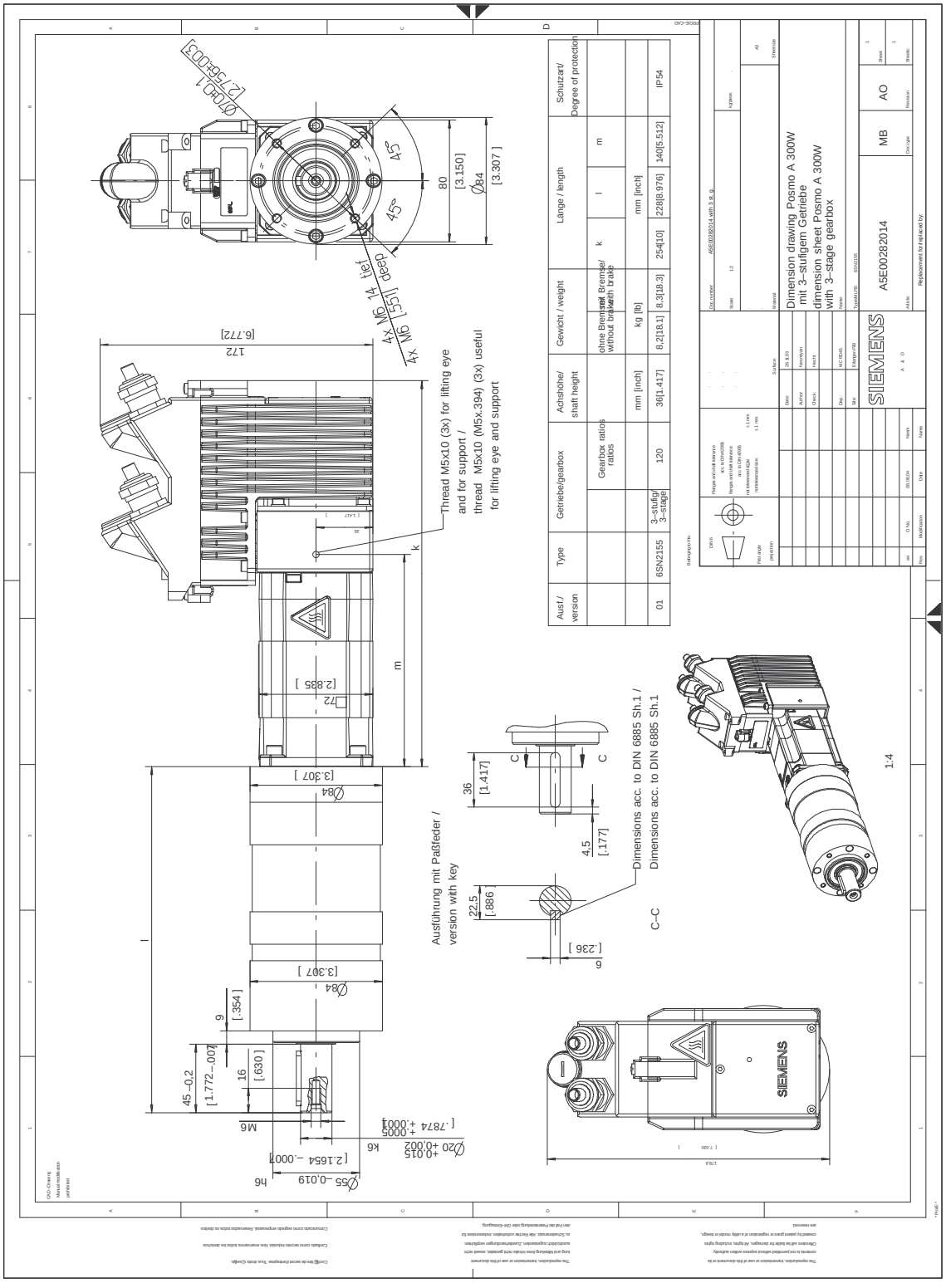


Fig. C-6 Dimension drawing: SIMODRIVE POSMO A – 300W with planetary gearbox (3–stage)

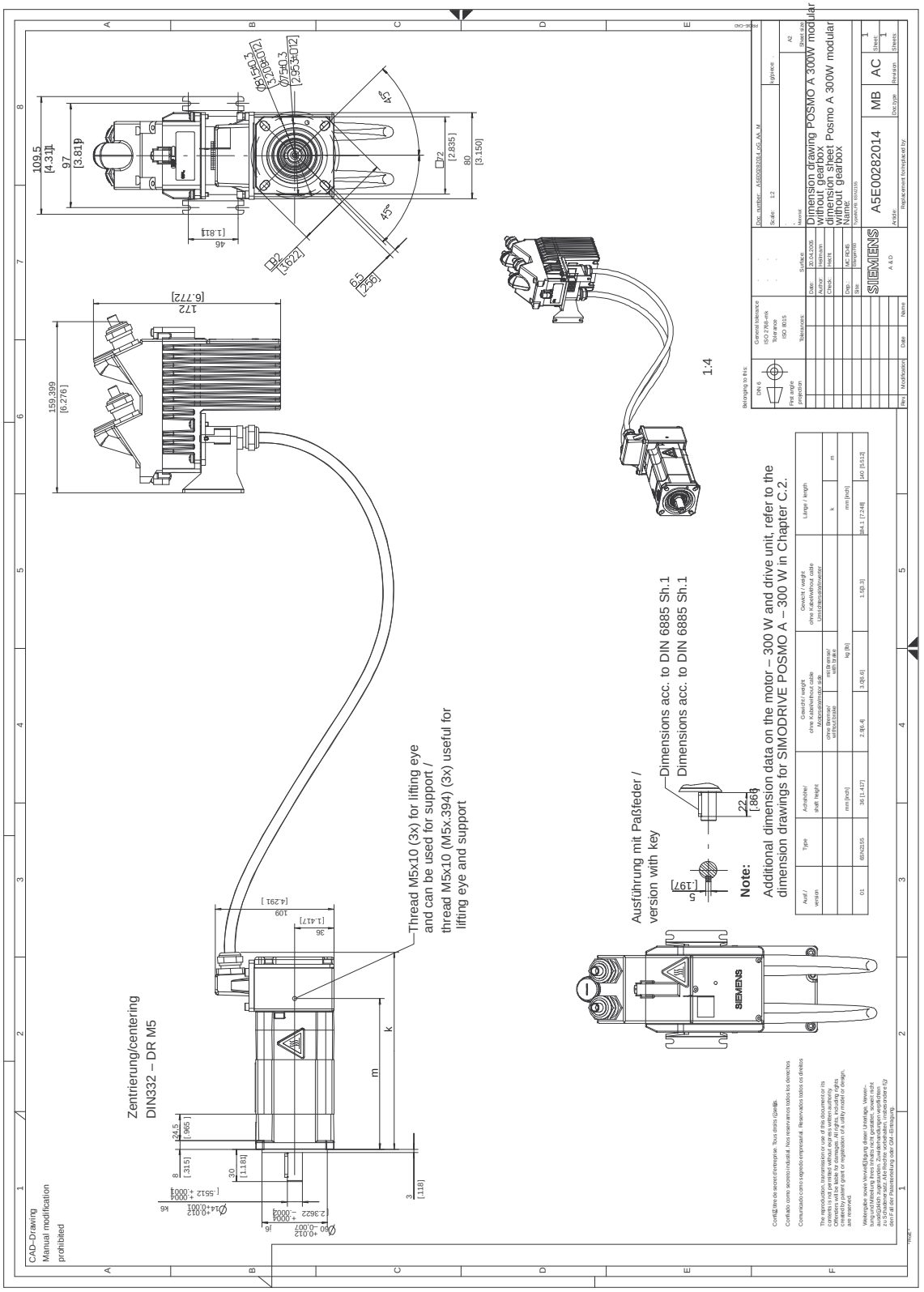
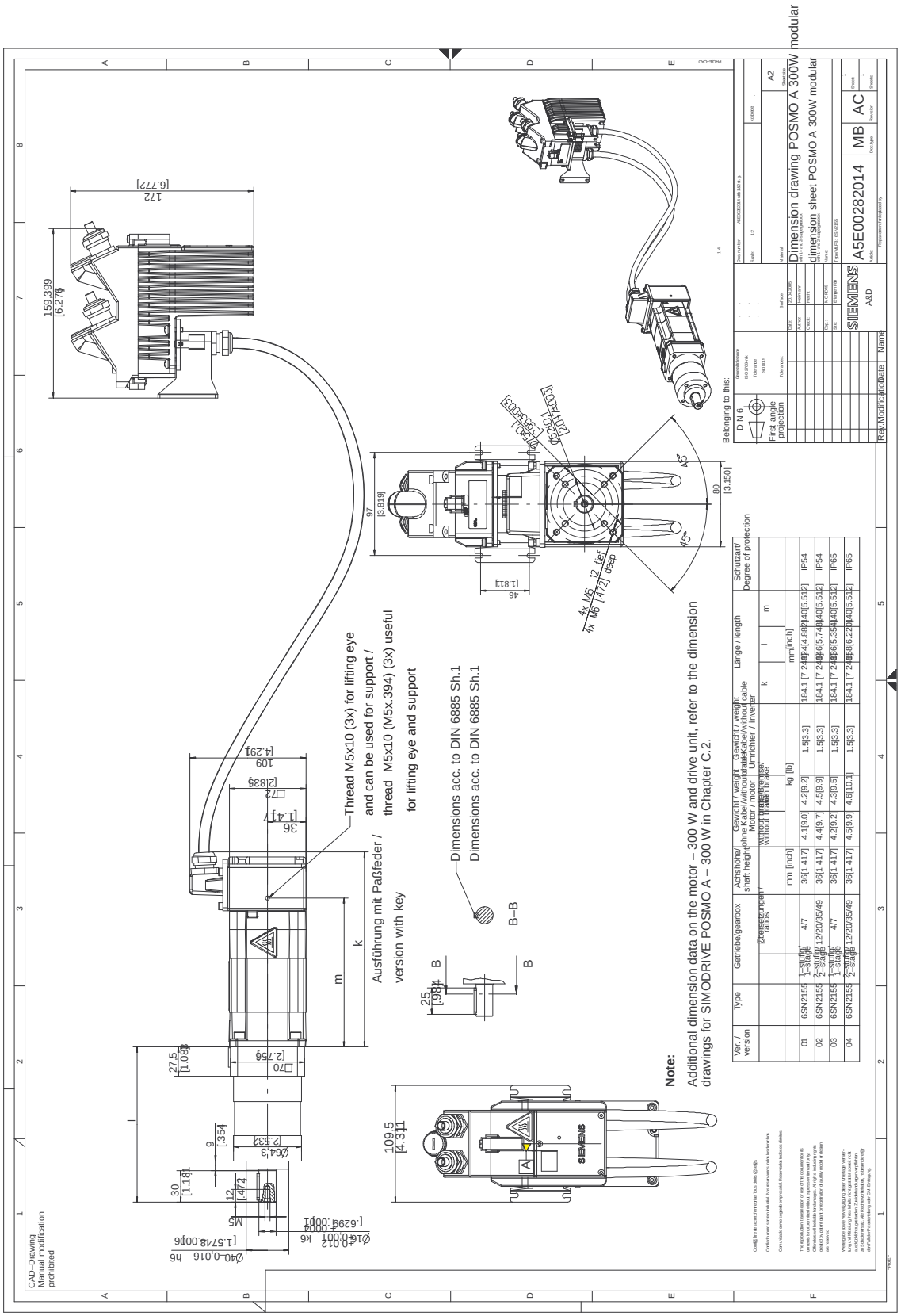


Fig. C-7 Dimension drawing: SIMODRIVE POSMO A – 300 W extension set ”separate version” without gearbox

C



Ver. / version	Type	Getriebe/gearbox		Achshöhe/ shaft height	Gewicht / weight ohne Bremse/ without brake	mit Bremse/ with brake	Länge / length k	l	m	Schutzart/ Degree of protection
			Übersetzungen/ ratios	mm [inch]	kg [lb]		mm[inch]			
01	6SN2155	1–stufig/ 1–stage	4/7	36[1.417]	4.1[9.0]	4.2[9.2]	1.5[3.3]	184.1 [7.24]	192 [4.88]	140[5.512] IP54
02	6SN2155	2–stufig/ 2–stage	12/20/35/49	36[1.417]	4.4[9.7]	4.5[9.9]	1.5[3.3]	184.1 [7.24]	166[5.748]	140[5.512] IP54
03	6SN2155	1–stufig/ 1–stage	4/7	36[1.417]	4.2[9.2]	4.3[9.5]	1.5[3.3]	184.1 [7.24]	166[5.354]	140[5.512] IP65
04	6SN2155	2–stufig/ 2–stage	12/20/35/49	36[1.417]	4.5[9.9]	4.6[10.1]	1.5[3.3]	184.1 [7.24]	158[6.22]	140[5.512] IP65

Fig. C-8 Dimension drawing: SIMODRIVE POSMO A – 300 W extension set ”separate version” with planetary gearbox (1–stage, 2–stage)

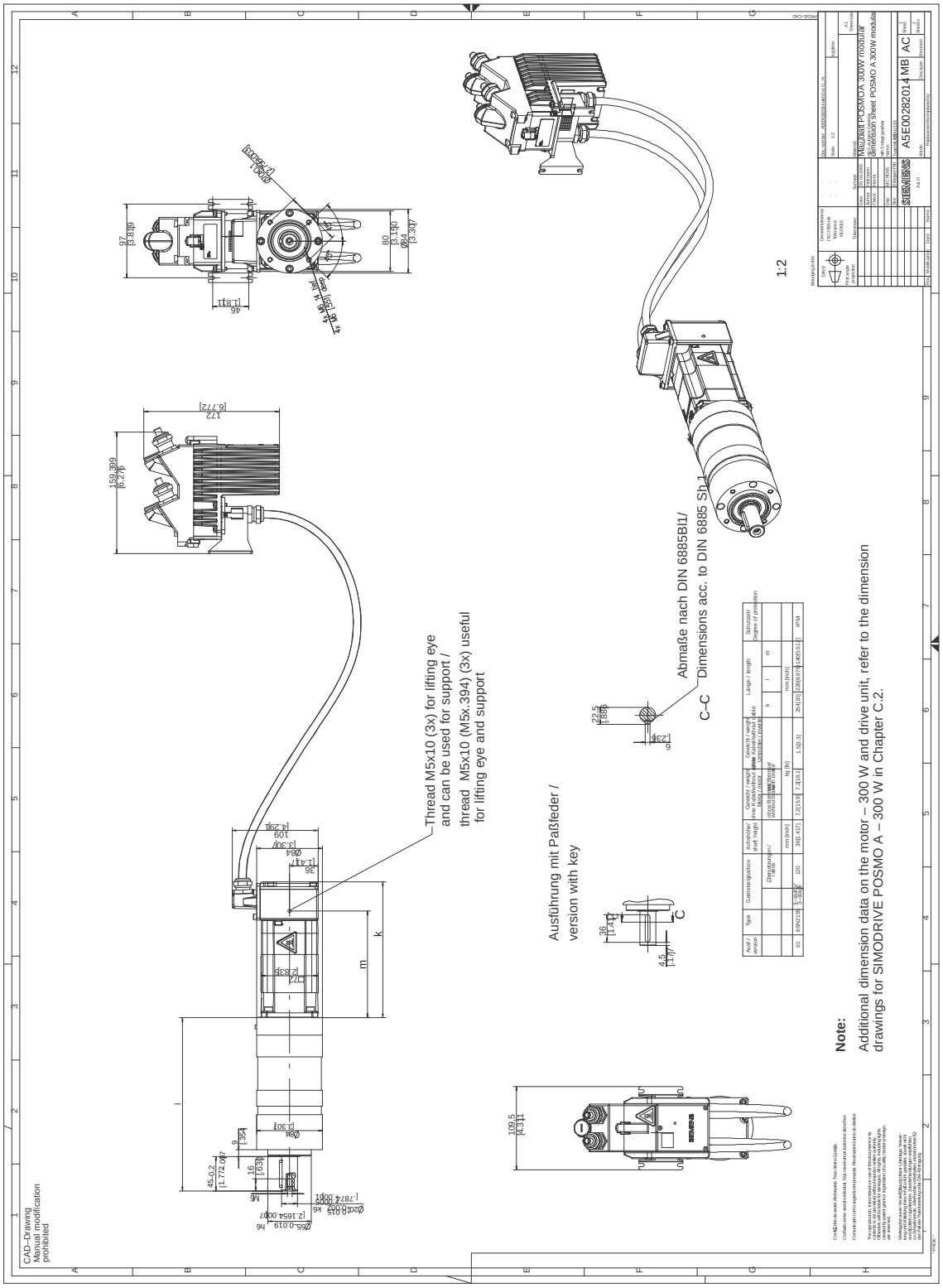


Fig. C-9 Dimension drawing: SIMODRIVE POSMO A – 300 W extension set ”separate version” with planetary gearbox (3–stage)

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EC Declaration of Conformity

D

Note

An excerpt of the EC Declaration of Conformity for SIMODRIVE POSMO A is provided in the following.

The complete EC Declaration of Conformity can be found as follows:

Reference: /EMC/ EMC Configuring Guidelines

SIEMENS

EG-Konformitätserklärung

EC Declaration of Conformity

No. E002 Version 07/04/30

Hersteller: *Manufacturer:*	SIEMENS AG
Anschrift: *Address:*	SIEMENS AG; A&D MC Frauenauracherstraße 80 91056 Erlangen
Produkt-bezeichnung: *Product description*	**SINUMERIK** 802D, 802S, 805, 805SM-P, 805SM-TW, 810, 810D 820, 840C, 840CE, 840D, 840DE, 840Di, 840D sl, FM NC **SIMOTION** C230-2, P350, D4, CX32, E510 **SIMATIC** FM 353, FM 354, FM 357 **SIROTEC** RCM1D, RCM1P **SIMODRIVE** 610, 611, MCU, FM STEPDRIVE, POSMO A / SI / CA / CD **SINAMICS** S

Die bezeichneten Produkte stimmen in den von uns in Verkehr gebrachten Ausführungen mit den Vorschriften folgender Europäischer Richtlinie überein:

The products described above in the form as delivered is in conformity with the provisions of the following European Directives:

89/336/EWG Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit
(geändert durch 91/263/EWG, 92/31/EWG, 93/68/EWG und 93/97/EWG).

Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility (amended by 91/263/EEC, 92/31/EEC, 93/68/EEC and 93/97/EEC).

Die Einhaltung dieser Richtlinie setzt einen EMV-gerechten Einbau der Produkte gemäß EMV-Aufbaurichtlinie (Best. Nr. 6FC 5297-□AD30-0AP□) in die Gesamtanlage voraus. Anlagenkonfigurationen, bei der die Einhaltung dieser Richtlinie nachgewiesen wurde, sowie angewandte Normen, siehe:

For keeping the directive, it is required to install the products according to "EMC Mounting regulation" (Order No. 6FC 5297-1AD30-0BP0). For details of the system configurations, which meet the requirements of the directives, as well as for the standards applied see:

- Anhang A (Anlagenkonfigurationen)	*- Annex A*	*(system configurations)*	**: Version 07/04/30**
- Anhang B (Komponenten)	*- Annex B*	*(components)*	**: Version 00/01/14**
- Anhang C (Normen)	*- Annex C*	*(standards)*	**: Version 06/03/01**

Erlangen, den / *the* 30.04.2007

Siemens AG

R. Müller
Entwicklungsleitung

Name, Funktion *Name, function* — Unterschrift *signature*

i.V. K. Krause
Qualitätsmanagement

Name, Funktion *Name, function* — Unterschrift *signature*

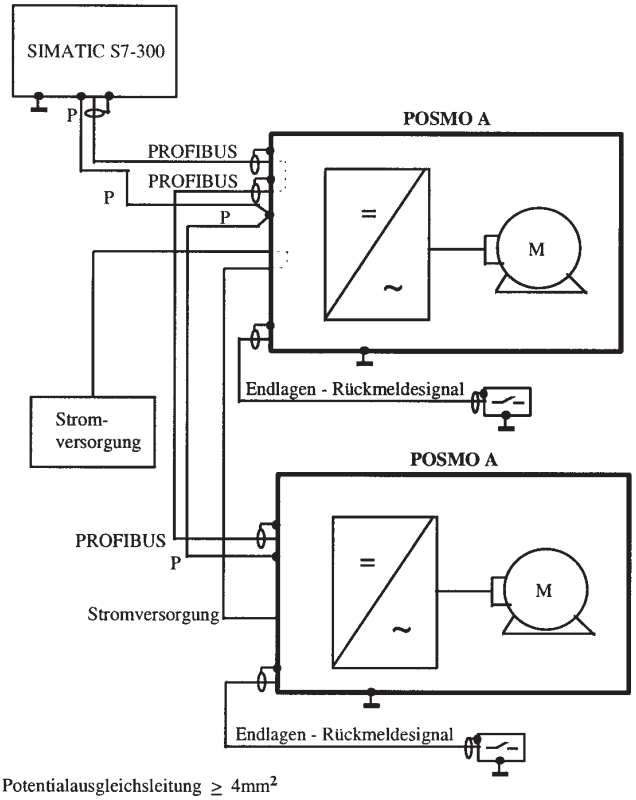
Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, stellt jedoch keine Beschaffenheits- und Haltbarkeitsgarantie gemäß § 443 BGB dar. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity to the specified directives but contains no condition and durability guarantee to § 443 BGB. The safety instructions in the product documentation shall be considered in detail.

Fig. D-1 EC Declaration of Conformity

Anhang A zur EG-Konformitätserklärung Nr. E002

A15: Typische Anlagenkonfiguration

SIMODRIVE POSMO A



P = Potentialausgleichsleitung ≥ 4mm²
(Abstand zwischen PROFIBUS und P so nahe wie möglich)

- Alle Komponenten, die gemäß Bestellunterlage für den Anlagenverbund von SIMODRIVE POSMO A zugelassen sind, erfüllen im Verbund die Richtlinie 89/336/EWG
- Normenkonformität siehe Anhang C

Hinweis:

In der Skizze der Anlagenkonfiguration werden nur die grundsätzlichen Maßnahmen zur Einhaltung der Richtlinie 89/336/EWG einer typischen Anlagenkonfiguration aufgezeigt. Zusätzlich, besonders bei Abweichung von dieser Anlagenkonfiguration, sind die Installationshinweise für EMV-gerechten Anlagenaufbau der Produktdokumentation und der EMV-Aufbaurichtlinie für SINUMERIK; SIROTEC, SIMODRIVE (Bestell Nr.:6FC 5297-0AD30-0APX) zu beachten.

Version 02/01/10
konf/erkl/002/anh_a
A-15/23

Fig. D-2 Annex A to the EC Declaration of Conformity (excerpt)

Anhang C zur EG-Konformitätserklärung Nr. E002

Die Übereinstimmung der Produkte mit der Richtlinie des Rates 89 / 336 / EWG inklusive Änderungen 91 / 263 / EWG, 92 / 31 / EWG, 93 / 68 / EWG und 93 / 97 / EWG wurde durch Überprüfung gemäß nachfolgender Produktnorm, Fachgrundnormen und der darin aufgelisteten Grundnormen nachgewiesen.

Produktnorm:		Titel:
EN 61800-3	1)	Drehzahlveränderbare elektrische Antriebe; EMV-Produktnorm einschließlich spezieller Prüfverfahren

Fachgrundnorm Störaussendung / Industriebereich: EN 61000-6-4 2)

Grundnormen:		Prüfung Phänomen
EN 55011 + Bbl. 1 + A1 + A2	3)	Funkstörungen

Fachgrundnorm Störfestigkeit / Industriebereich: EN 61000-6-2 4)

Grundnormen:		Prüfung Phänomen:
EN 61000-4-2 + A1	5)	Statische Entladung
EN 61000-4-3 +A1	6)	Hochfrequente Einstrahlung (amplitudenmoduliert)
EN 61000-4-4	7)	Schnelle Transienten (Burst)
EN 61000-4-5	8)	Stoßspannungen (Surge)
EN 61000-4-6	9)	HF- Bestromung auf Leitungen
EN 61000-4-8	10)	Magnetfelder mit energietechnischen Frequenzen
EN 61000-4-11	11)	Spannungseinbrüche und Spannungsunterbrechungen

Miterfüllte Normen:

1)	VDE 0160 Teil 100 IEC 61800-3	7)	VDE 0847 Teil 4-4 IEC 61000-4-4
2)	VDE 0839 Teil 6-4 IEC 61000-6-4	8)	VDE 0847 Teil 4-5 IEC 61000-4-5
3)	VDE 0875 Teil 11 + Bbl. 1 + A1 + A2 IEC / CISPR 11 (CISPR TR 28)	9)	VDE 0847 Teil 4-6 IEC 61000-4-6
4)	VDE 0839 Teil 6-2 IEC 61000-6-2	10)	VDE 0847 Teil 4-8 IEC 61000-4-8
5)	VDE 0847 Teil 4-2 +A1 IEC 61000-4-2 + A1	11)	VDE 0847 Teil 4-11 IEC 61000-4-11
6)	VDE 0847 Teil 4-3 IEC 61000-4-3 + A1		

 Version 06/03/01

konf/erkl/002/anh_c C-1/1

Fig. D-3 Annex C to the EC Declaration of Conformity (excerpt)

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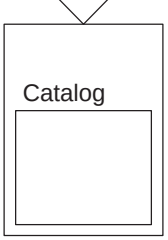
SIMODRIVE POSMO A

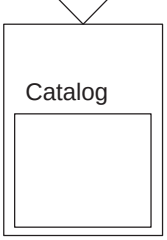
General Documentation/Catalogs

Catalog DA 65.4
SIMODRIVE 611 universal and POSMO

Catalog NC 60
Automation Systems for Machine Tools



SL 01	System Solutions
IK PI	Industrial Communication and Field Devices
CA 01	Components for Automation & Drives



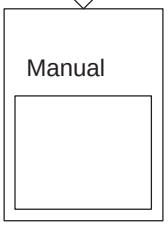
KT 10.1	Power supplies SITOP power
ST 70	SIMATIC
ST 80	SIMATIC HMI

Manufacturer/Service Documentation

User Manual

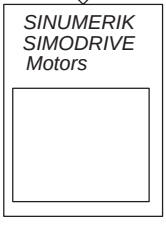
Mounting Instructions
75 W motor
300 W motor
(supplied with each drive)

EMC Design Guidelines
SINUMERIK
SIROTEC
SIMODRIVE



Distributed
I/O System ET200
(PROFIBUS Configuring Guidelines)

Electronic Documentation



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