Servodyn-D, Servodyn-M

Parameter Manual

Edition 102

Rexroth
Bosch Group

Servodyn-D, Servodyn-M

Parameter Manual

1070 066 038-102 (02.06) GB

Discretionary charge 18.– EUR

Contents

1 Safety instructions

★ You should use this manual in order to find out the meaning of individual drive parameters.

★ Store this manual in a place to which all users have access at any time.

1.1 Intended use

This manual contains information required for the intended use of this product.

The drive inverters described

- have been developed, manufactured, tested and documented in compliance with the safety standards. These products pose no danger to persons or property if they are used in accordance with the handling stipulations and safety notes prescribed for their configuration, mounting, and proper operation.
- comply with the requirements of
  - the EMC Directives (89/336/EEC, 93/68/EEC and 93/44/EEC)
  - the EMC product standard EN 61800-3 + A11
  - the Low-Voltage Directive (73/23/EEC)
  - the harmonized standards EN 50178 (VDE 0160) and EN 60146-1-1 (VDE 0558-11)
- are designed for operation in industrial environments, i.e.
  - no direct connection to public low-voltage power supply,
  - connection to the medium- or high-voltage system via a transformer.

  In residential environments, in trade and commerce as well as small enterprises class A equipment may only be used if the following warning is attached:

☞ **This is a Class A device. In a residential area, this device may cause radio interference. In such case, the user may be required to introduce suitable countermeasures, and to bear the cost of the same.**

Before putting the drive inverters into operation, ensure that the machine which the inverters are to be installed in meets the stipulations of the machinery directive (89/392/EEC) and the EMC directive (89/336/EEC).

The faultless, safe functioning of the product requires proper transport, storage, erection and installation as well as careful operation.

1.2 Qualified personnel

The requirements as to qualified personnel depend on the qualification profiles described by ZVEI (central association of the electrical industry) and VDMA (association of German machine and plant builders). Please refer to the following publication (in German language):
Weiterbildung in der Automatisierungstechnik
edited by: ZVEI and VDMA
MaschinenbauVerlag
Postfach 71 08 64
D-60498 Frankfurt

The present manual is designed for **drive engineers**. They need special knowledge of the structure and adjustment of the drive parameters available.

Programming, start and operation as well as the modification of program parameters is reserved to properly trained personnel! This personnel must be able to judge potential hazards arising from programming, program changes and in general from the mechanical, electrical, or electronic equipment.

Interventions in the hardware and software of our products, unless described otherwise in this manual, are reserved to specialized Rexroth personnel.

Tampering with the hardware or software, ignoring warning signs attached to the components, or non-compliance with the warning notes given in this manual can result in serious bodily injury or property damage.

Only electrotechnicians as recognized under IEV 826-09-01 (modified) who are familiar with the contents of this manual may install and service the products described.

Such personnel are

- those who, being well trained and experienced in their field and familiar with the relevant norms, are able to analyze the jobs being carried out and recognize any hazards which may have arisen.
- those who have acquired the same amount of expert knowledge through years of experience that would normally be acquired through formal technical training.

With regard to the foregoing, please note our comprehensive range of training courses. Please visit our website at http://www.boschrexroth.de for the latest information concerning training courses, teachware and training systems. Personal information is available from our Didactic Center Erbach,
Telephone: (+49) (0) 60 62 78-600.

1.3 Safety markings on products

Warning of dangerous electrical voltage!

Electrostatically sensitive components!

Warning of hazardous light emissions (optical fibre cable emitters)!

Pin for connecting PE conductor only!

Connection of shield conductor only

1.4 Safety instructions in this manual

DANGEROUS ELECTRICAL VOLTAGE
This symbol is used to warn of a **dangerous electrical voltage**. The failure to observe the instructions in this manual in whole or in part may result in **personal injury**.

DANGER
This symbol is used wherever insufficient or lacking compliance with instructions may result in **personal injury**.

CAUTION
This symbol is used wherever insufficient or lacking compliance with instructions may result in **damage to equipment or data files**.

☞ This symbol is used to draw the user's attention to special circumstances.

★ This symbol is used if user activities are required.

1.5 Safety instructions concerning the product described

DANGER
Danger of life through inadequate EMERGENCY-STOP devices!
EMERGENCY-STOP devices must be active and within reach in all system modes. Releasing an EMERGENCY-STOP device must not result in an uncontrolled restart of the system!
First check the EMERGENCY-STOP circuit, then switch the system on!

DANGER
Danger for persons and equipment!
Test every new program before starting up a system!

DANGER
Retrofits or modifications may adversely affect the safety of the products described!
The consequences may include severe injury, damage to equipment, or environmental hazards. Possible retrofits or modifications to the system using third-party equipment therefore have to be approved by Rexroth.

DANGER
Health hazards through destroyed electrical components!
Do not destroy any built-in components. Dispose of destroyed components in a proper manner.

DANGER
Please note your local, system-specific regulations and requirements as well as the proper use of tools, hoisting and transport equipment as well as the applicable standards, regulations, and accident prevention regulations.

DANGEROUS ELECTRICAL VOLTAGE
Unless described otherwise, maintenance works must be performed on inactive systems! The system must be protected against unauthorized or accidental reclosing.
Measuring or test activities on the live system are reserved to qualified electrical personnel!

DANGEROUS ELECTRICAL VOLTAGE
Lethal voltages of up to 375 VDC against ground on all power connections and DC link connections!
The drives must not be switched on unless all covers have been fitted!
When the drive has been disconnected from mains, wait for up to 5 minutes until the system is de-energized before removing any covers.
The drive must always be examined for safe isolation from supply!

CAUTION
Use only spare parts approved by Rexroth!

CAUTION
Observe all precautions for ESD protection when handling modules and components! Avoid electrostatic discharge!

The following protective measures must be observed for modules and components sensitive to electrostatic discharge! (ESD)!

- Personnel responsible for storage, transport, and handling must have been trained for ESD protection.
- ESD-sensitive components must be stored and transported in their prescribed protective packaging.
- ESD-sensitive components may only be handled at special ESD-workplaces.
- Personnel, working surfaces, as well as all equipment and tools which may come into contact with ESD-sensitive components must have the same potential (e.g., by grounding).
- Wear an approved grounding bracelet. The grounding bracelet must be connected with the working surface through a cable with an integrated resistor of 1 MΩ.
- ESD-sensitive components must by no means come into contact with chargeable objects, including most plastic materials.
- When ESD-sensitive components are installed in or removed from equipment, the equipment must be de-energized.

1.6 Documentation, software release and trademarks

Documentation

The present manual provides information on

- the structure and effect of drive parameters.

Being a reference book, it contains all drive parameters of the Servodyn-D and Servodyn-M series (without CANopen), sorted according to parameter numbers. Depending on the interface used (SERCOS interface, analog, MC, CANrho, PROFIBUS-DP), however, only a subset of all parameters described may be available in the drive.

Overview of available documentation	Part no. German	English	French	Italian
Servo motors SF, SR	1070 066 004	1070 066 024	1070 066 048	1070 066 046
Asynchronous motors DU	1070 066 007	1070 066 027	–	–
Servodyn-D, Configuration - Manual for overview and rating	1070 066 009	1070 066 029	1070 066 059	1070 066 049
Servodyn-D, Connectivity Manual	1070 066 010	1070 066 030	1070 066 060	1070 066 050
Servodyn-D, - Connectivity Manual - Stand alone version	1070 066 016	1070 066 036	1070 066 066	1070 066 056
Servodyn-D, Servodyn-M - Parameter manual (without CANopen)	1070 066 018	1070 066 038	1070 066 068	1070 066 058
Servodyn-D, Servodyn-M - Parameter manual CANopen	1070 066 094	1070 066 095	–	–
Servodyn-D with SERCOS interface - Parameter and commissioning manual	1070 066 011	1070 066 031	–	1070 066 051
Servodyn-D with analog interface - Commissioning manual	1070 066 014	1070 066 034	–	–
Servodyn-D with CANrho interface - Commissioning manual	1070 066 017	1070 066 037	–	–
Servodyn-D with motion control - Commissioning manual	1070 066 015	1070 066 035	–	–
Servodyn-D with PROFIBUS-DP - Commissioning manual	1070 066 090	1070 066 091	–	–
Servodyn-D DM/DS..8001 (ASM) Parameter and commissioning manual	1070 066 008	1070 066 028	–	1070 066 053
Diagnostics, maintenance	1070 066 012	1070 066 032	1070 066 062	1070 066 052
RSU, Redundant safety monitoring	1070 066 006	1070 066 026	1070 066 081	1070 066 082
EMC manual	1070 066 072	1070 066 074	1070 066 075	1070 066 076
External load switching module	1070 066 077	1070 066 080	–	–

Release

The descriptions contained in this manual apply to the following software releases:

- Servodyn-D with SERCOS interface: as of V0.049
- Servodyn-D with CANrho interface: as of V0.017
- Servodyn-D with analog interface: as of V0.017
- Servodyn-D with PROFIBUS-DP interface: as of V0.004
- Servodyn-D with Motion Control: as of V0.010

- The current software release number can be viewed by selecting parameter S-0-0030 with the DSS-D Commissioning and Service System, or in the ”Software” field of the module configuration display (DIAGNOSTICS ▶ MODULE CONFIGURATION).

- For information concerning the current DSS software release, refer to HELP ▶ ABOUT...
- The current VM..B,C,D,F software release can only be read from the 7-segment display during test operation. For this purpose, turn dip switch ”T” on the VM’s personality module ”on”:

  The following appears in a running, flashing display:
  “**Cxx.ZZ.ddmmyyyy**“

  Where:
  xx = software release number
  ZZ = (internal)
  dd = software creation day
  mm = software creation month
  yyyy = software creation year

☞ **If rho3 from Rexroth is used as the higher-level control unit, rho3 software as of version TO 12 A must be used.**

Trademarks

All trademarks for software installed on Rexroth products upon delivery are the property of the respective manufacturers.

Upon delivery, all installed software is copyright-protected. The software may only be reproduced with the approval of Rexroth or in accordance with the license agreement of the respective manufacturer.

MS-DOS® and Windows™ are registered trademarks of Microsoft Corp.

PROFIBUS® is a registered trademark of the PROFIBUS Nutzerorganisation e.V. (user organization).

SERCOS interface® is a registered trademark of Interessengemeinschaft SERCOS interface e.V.

2 Introduction

Inverters of the Servodyn-D series are available with different interfaces:

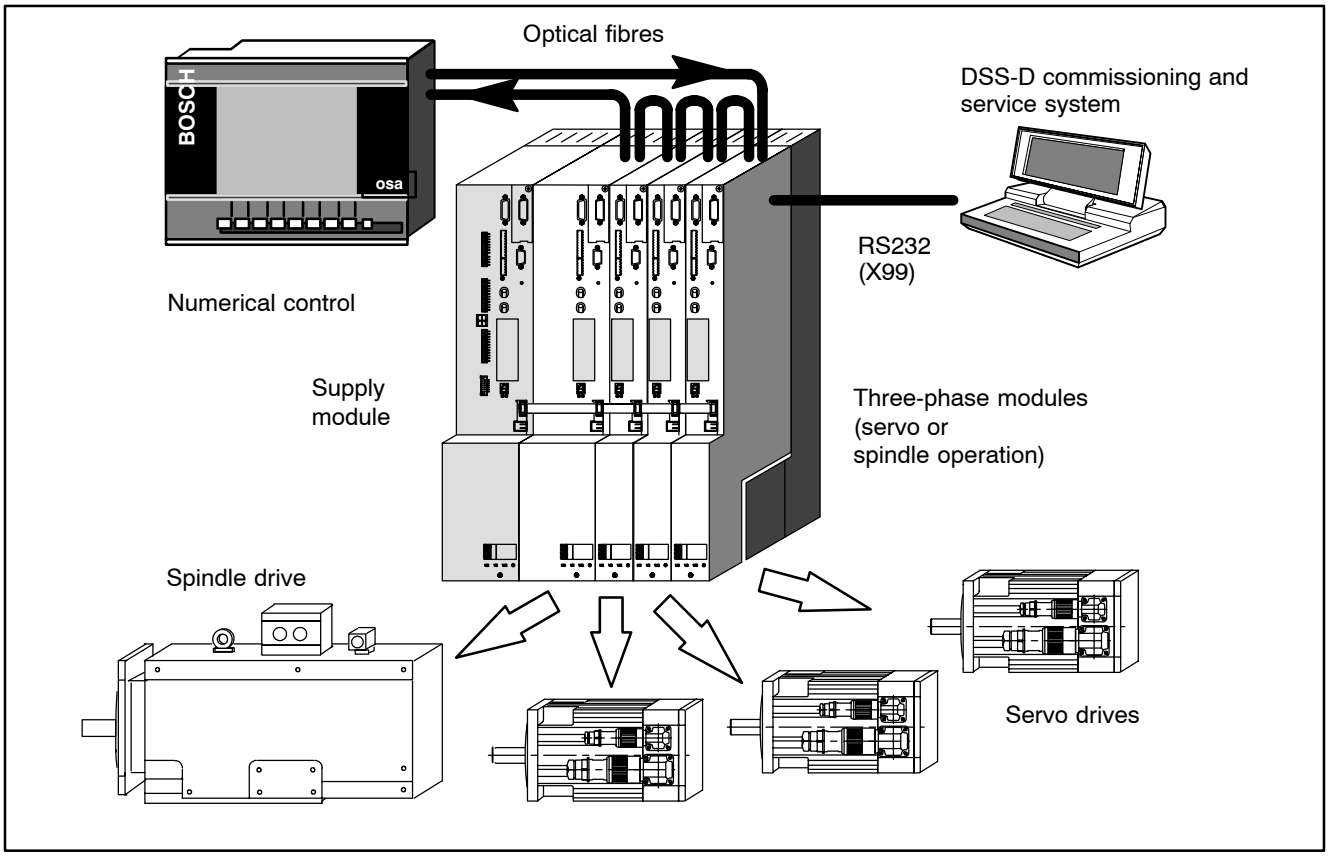
- Servodyn-D with SERCOS interface
  (for connection to a higher-level control unit with SERCOS interface, e.g. Typ3 osa by Bosch)
- Servodyn-D with CANrho interface
  (for connection to a higher-level robot control rho3 or rho4 by Bosch)
- Servodyn-D with analog interface
  (for connection to a higher-level control unit with analog command value output)
- Servodyn-D with PROFIBUS-DP interface
  (for connection to a PROFIBUS-DP master)
- Servodyn-D with Motion Control
  (drive with integrated positioning control).

For commissioning, optimizing and diagnosing, you will usually use the DSS-D commissioning and service system.
This system is connected to the serial RS232 interface X99 of the inverter in question. DSS-D offers access to the entire parameter range of the drive.

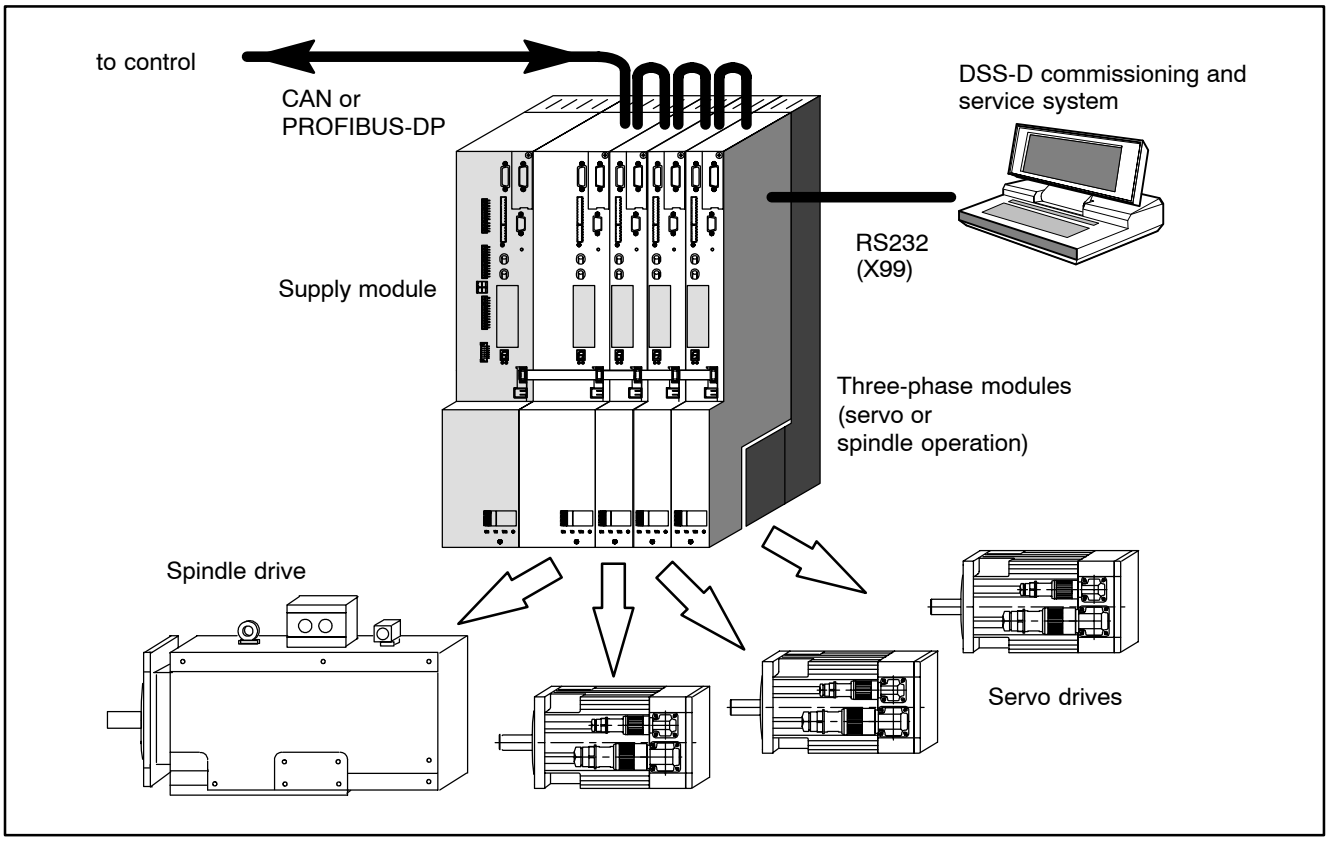
For interface types ”SERCOS interface” and ”CANrho”, the required parameters can also be downloaded to the inverter from the connected ”master” (= higher-level control unit; e.g. CNC or robot control) when needed or whenever the system is switched on. For this application, all relevant parameters must have previously been entered in the corresponding master.

The exchange of setpoints and actual values between the inverter and the connected control unit depends on the interface type used:

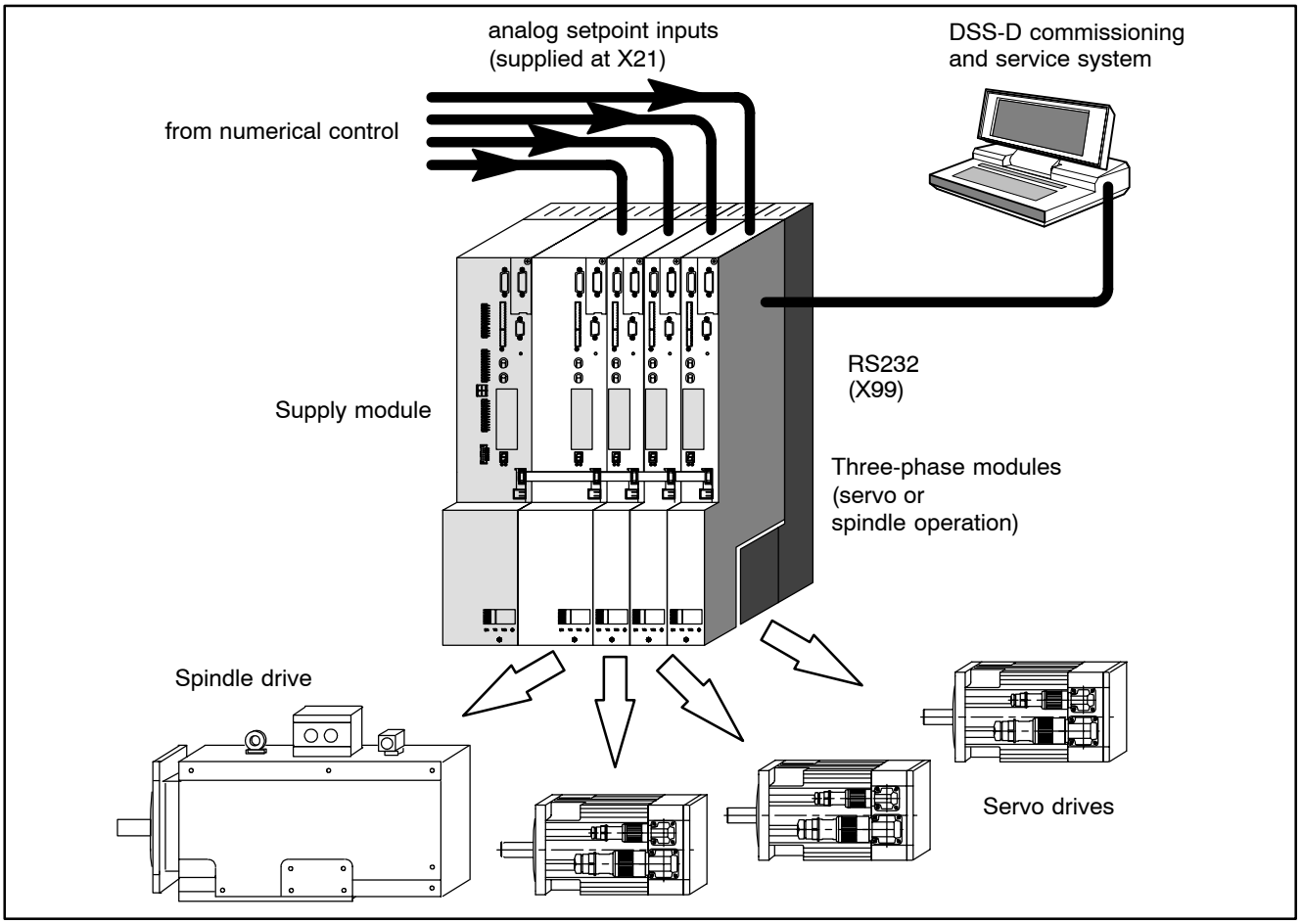
- in case of SERCOS interface and CANrho, these data are transmitted cyclically via a bi-directional connection as “messages” or “telegrams”.
- Inverters with analog interface are provided with the setpoint via X21 (pin 1 and 2; resolution: 12 bits; optionally: 16 bits). In case of this interface, the actual values are transmitted via separate wiring directly from the measuring system used to the higher-level control unit.
- Inverters with PROFIBUS-DP interface are operated in the operating modes ”block-controlled operation” or ”interpolation in the drive”:
  - in case of ”block-controlled operation” up to 32 blocks (consisting of the position, speed, acceleration and deceleration) are loaded into the inverter via DSS-D in advance. It is then possible from the master to select and start individual blocks via PROFIBUS-DP. The inverter also uses PROFIBUS-DP to return status information to the master.
  - in the operating mode ”interpolation in the drive”, the master uses PROFIBUS-DP to specify all the data (position, speed, acceleration and deceleration) for one traversing movement. Loading the blocks in advance and limitation to a maximum of 32 blocks (as is the case for ”block-controlled” operation”) does not apply here.
- Inverters with MC interface (MC: Motion Control) contain a complete integrated positioning control. Positioning blocks are programmed via the DSS-D and transmitted to the internal positioning control. By means of suitable I/O signals, individual positioning blocks can be selected (e.g. via a PLC) to initiate traversing movements. During positioning, the drive is in position control mode. Communication between positioning control and the drive is effected through special parameters.



Communication principle of SERCOS interface (measuring system feedback is not shown)



Communication principle of CANrho and PROFIBUS-DP (measuring system feedback is not shown)



Communication principle analog interface (measuring system feedback is not shown)

2.1 Data exchange between the drive and the DSS-D commissioning and service system

Between the DSS-D and the drive, data is exchanged in the form of operating data and commands.

Operating data and commands are marked by ”ident. numbers”:

S-0-0036

S = standard data
P = product data

Parameter set 0 to 7
X = all parameter sets

Data block number

In this manual, these ident. numbers are sometimes also simply referred to as ”parameters”.
If the ”X” character is shown instead of the parameter set number (0 through 7) in this manual, the parameter can be assigned to different parameter sets. For details, please refer to parameter S-0-0217 (parameter set preselection) in the ”Parameter description” section.

For drive parametrization and diagnostics via DSS-D, it is possible to

- modify individual parameters directly online in ”monitor”.

To do this, you must be familiar with the effects and encoding of the parameters. For this purpose, please refer to the ”Parameter description” section.

Scope of data exchange:

- Transmission of the entire data contents of an ident. number
- Transmission of commands
- Modification of limit values on demand
- Modification of controller parameters on demand
- Diagnostics functions

Initialization

After being switched on, the drive runs though the initialization phases 0 to 3 before finally reaching the normal operating mode (phase 4). Here, we only want to mention the phases important for parameterization:

- **Phase 2**
  Setting of fundamental drive parameters. The drive checks all basic configuration parameters (e.g. definitions of the structure of individual data telegrams, or weightings in the drive) for their validity and completeness.
  Then it switches to phase 3.
- **Phase 3**
  Parametrization of all operating data.
  After the drive has checked that error-free operation is possible, it switches to phase 4.
- **Phase 4**
  Normal operation. The drive has been completely parameterized.

☞ **Various parameters can only be changed in certain initialization phases or defined conditions of the drive (also refer to Chapter 3 section “Explanations on the attributes bar”).**
In order to change this type of parameters, you first have to switch the drive to the required phase via the DSS-D user interface.

3 Parameter description

This Chapter contains the parameters of **all interface types** – sorted according to parameter numbers.

☞ **The number of parameters available in the drive depends on the type of interface used. See ”Explanations on the types bar”.**

Explanations on the ”types bar”

For every parameter, a ”types bar” is provided.
This types bar shows the interface type for which this parameter is available and can be used:

SER: SERCOS interface
CANr: CANrho interface
ANA: analog interface
MC: Motion Control
DP: PROFIBUS-DP interface

An example of a types bar is shown on the next page.

Explanations on the ”attributes bar”

For every parameter, an “attributes bar” is provided.
The individual fields of the attributes bar contain the following information:

- Field “**changeable**”:
  Specifies in which phase the parameter can be changed. If nothing is entered here, the parameter can only be read.

- Field “**Init**”:
  Specifies in which phase the parameter has to be initialized in the drive. If nothing is entered here, the drive initializes the parameter itself through its firmware.

- Field “**real–time bit**”:
  Specifies whether the parameter can be transmitted between the master (or DSS-D) and the drive in real time. For example, this is necessary for signaling certain events, or for triggering actions.
  “M → D” means: transfer from master to drive possible
  “D → M” means: transfer from drive to master possible.

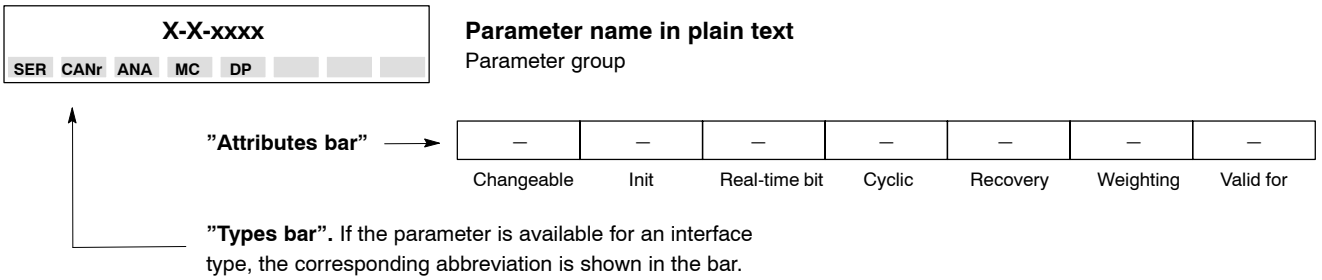
- Field “**cyclic**”:
  Specifies whether the parameter can be transmitted cyclically between the master (or DSS–D) and the drive in real time. This is necessary, e.g., for the transmission of setpoints or actual values.
  “MDT” means: cyclical transfer from master to drive
  “DT” means: cyclical transfer from drive to master

- Field “**recovery**”:
  Specifies whether the parameter can be saved in the drive’s FEPROM. If yes, ”FEPROM” has been entered in this field.

- Field “**weighting**”:
  Specifies the weighting parameters used for interpreting the data of the corresponding parameter.

- Field ”**valid for**”:
  The attribute values of some parameters are different for the individual interface types. In these cases, several attributes bars are given.
  This field specifies the interface type for which the attributes bar is valid. If it is valid for all types, there will be no entry in this field.

Example: ”Types” and ”attributes bar”



3.1 Description of all parameters

S-0-0001
SER

NC cycle time (TNcyc)
Communication

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Time between two setpoint inputs of the master.

Range: Integral multiples of the SERCOS interface cycle time.
Entry in master in [µs].

S-0-0002
SER CANr

SERCOS interface cycle time (TScyc) / CAN cycle time
Communication

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Time between two master synchronization telegrams (MST).

Range: 500 µs, 1...8 ms in integral steps, 10, 12, 14, 16 ms
Entry in master in [µs].

S-0-0003
SER

Transmission reaction drive telegram (T1min)
Communication

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Minimum time required by drive between the end of the received MST and the start of drive telegram transmission (DT).
The time required depends on whether preferred telegrams or configured telegrams are to be transmitted in normal operation. Using this information, the master calculates the time of transmission T1 of the DT.

S-0-0004
SER

Switchover time transmit/receive (TATMT)
Communication

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Time required by drive after transmitting the DT to be ready to receive the next master data telegram (MDT). Using this information, the master calculates the time of transmission T2 of the MDT.

S-0-0005
SER

Minimum time actual value measurement (T4min)
Communication

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Minimum time required by drive between the end of the received MST and the start of the actual value measurement. The master uses this value to determine the time of measurement of the actual values T4 for all drives.

S-0-0006
SER

Transmission time of drive telegram (T1)

Communication

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
2	–	–	–	FEPROM	–	

Transmission time of the DT after the end of the MST, valid from communication phase 3.

S-0-0007
SER

Measuring time actual values (T4)

Communication

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
2	2	–	–	FEPROM	–	

Time of measurement of the actual values at the end of the MST. The same value should be assigned for **all** drives, so that a synchronous actual value measurement is guaranteed.

Range: T4 ≦ TScyc – T4min
Entry in master in [µs].

S-0-0008
SER

Time for setpoint valid (T3)

Communication

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
2	2	–	–	FEPROM		

Time after end of MST, at which the drive may access the new setpoint. The same time can be specified for all drives.

S-0-0009
SER

Start address master data telegram

Telegram configuration

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
2	–	–	–	FEPROM	–	

Start address of the data set for the respective drive in the MDT, expressed as a byte position.

S-0-0010
SER

Length – Master Data Telegram

Telegram configuration

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
2	–	–	–	FEPROM	–	

Length of the MDT with the data sets of all drives, expressed in bytes.

S-0-0011

SER CANr ANA MC DP

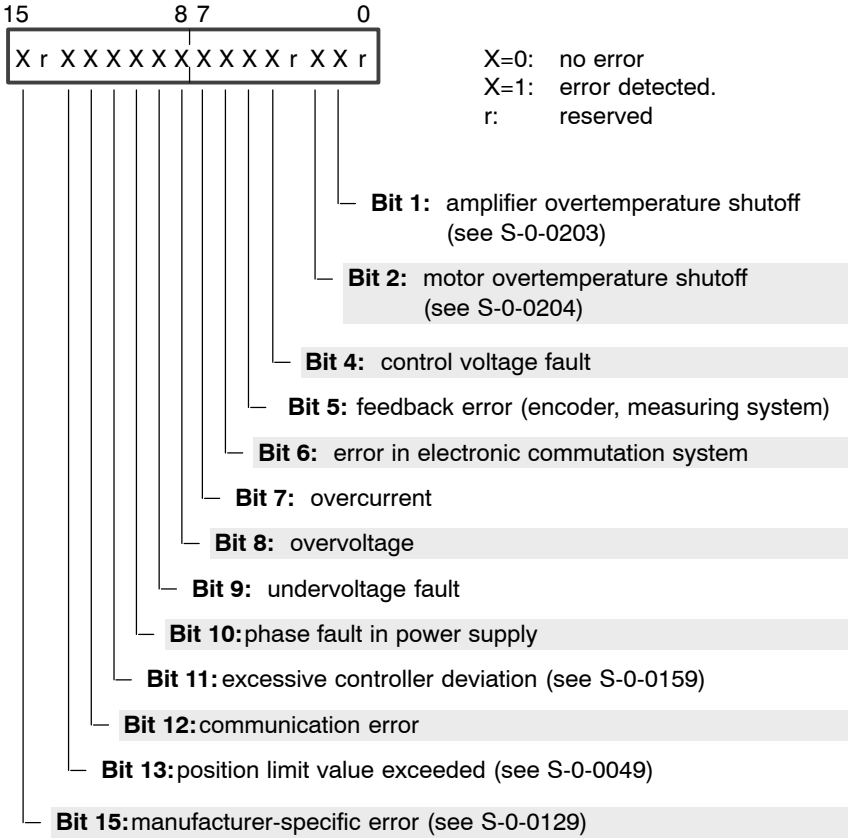
Diagnostics class 1

Diagnostics, errors

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains any **errors** which have occurred and which caused the drive to be locked (optimum drive halting with subsequent torque removal).
Each error is assigned 1 bit. If the corresponding bit is high, the related error is currently present.

Parameter configuration:



As soon as one of the errors listed above occurs, the drive sets bit 13 of parameter S-0-0135 (drive status word) to ”1” (alteration bit diagnostics class 1).

The drive cannot be **unlocked** unless this alteration bit assumes the value ”0”. The following conditions must be met for unlocking the drive:

- no errors of diagnostics class 1 are present any more, **and**
- the ”reset diagnostics class 1” (S-0-0099) command has been given.

S-0-0012

SER CANr ANA MC DP

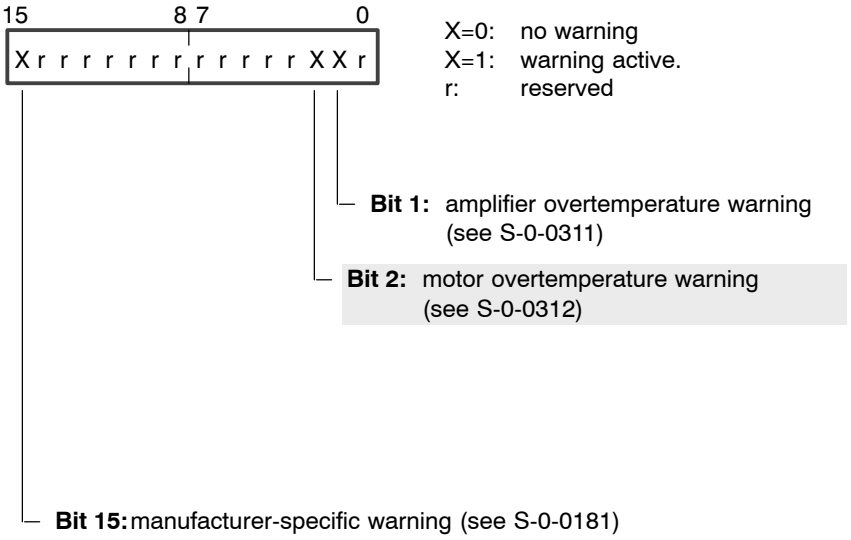
Diagnostics class 2

Diagnostics, warning

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains all **warnings** that have occurred and that may eventually cause the drive to be switched off.
Each warning is assigned 1 bit. If the corresponding bit is high, the related warning is currently present.

Parameter configuration:



As soon as one of the warnings listed above occurs or disappears, the drive sets bit 12 of parameter S-0-0135 (drive status word) to ”1” (alteration bit diagnostics class 2), unless the corresponding warning has been suppressed by parameter S-0-0097.

The ”alteration bit diagnostics class 2” can only be reset by reading parameter S-0-0012.

S-0-0013

SER CANr ANA MC DP

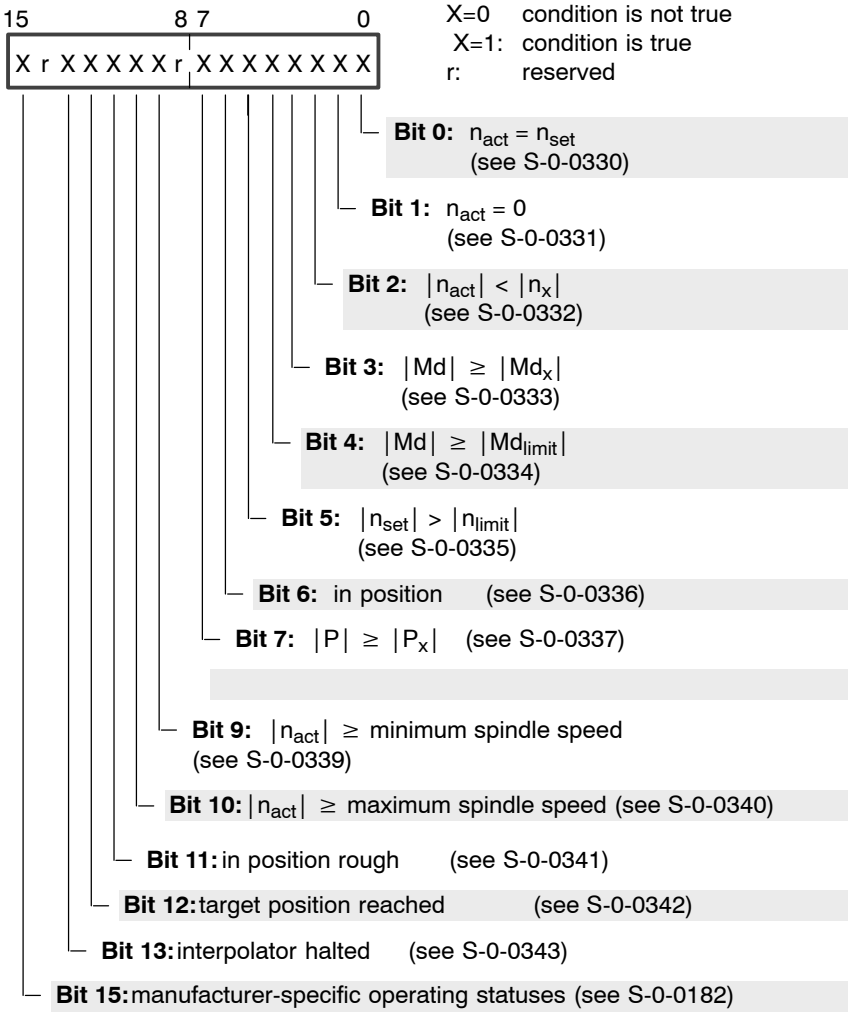
Diagnostics class 3

Diagnostics, status

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains **operating statuses** of the drive.
Each status is assigned 1 bit. If the corresponding bit is high, the related operating status is currently true.

Parameter configuration:



As soon as one of the statuses listed above changes, the drive sets bit 11 of parameter S-0-0135 (drive status word) to ”1” (alteration bit diagnostics class 3), unless the corresponding status has been suppressed by parameter S-0-0098.

The ”alteration bit diagnostics class 3” can only be reset by reading parameter S-0-0013.

S-0-0014

SER

Interface status

Diagnostics, status

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the current communication phase and all interface errors that may have occurred.

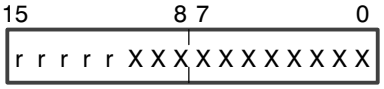
In the event of an interface error, the drive returns to communication phase 0. The error is stored in the interface status together with the communication phase and can be read out when start-up to phase 2 has been repeated.
In addition, the ”communication error” bit is set in diagnostics class 1.

The error bit in diagnostics class 1 will be cleared when:

- no interface error is active any more, **and**
- the command ”reset diagnostics class 1” (S-0-0099) was received through service channel.

Even without an interface error, the current communication phase can be queried via the interface status.

Parameter configuration:



X is assigned:
0 = no error
1 = error detected (bits 3–15).
r = reserved

Bits 0–2: communication phase

Bit 3: MST failure (master synchronization telegram)

Bit 4: MDT failure (master data telegram)

Bit 5: invalid communication phase (> 4)

Bit 6: error in next phase selection (sequence)

Bit 7: error in previous phase selection (not when returned to phase 0)

Bit 8: phase shift without ready message

Bit 9: changeover to non-initialized operating mode

Bit 10: drive with identical address already available in ring

S-0-0015

SER

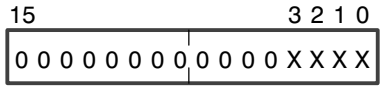
Telegram type parameters

Telegram configuration

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Determines which telegrams are to be transferred cyclically between master and drive. In addition to different ”preferred telegrams” (with already defined contents), it is also possible to select a ”freely configurable” telegram.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 0 0	Preferred telegram 0
0 0 1	Preferred telegram 1
0 1 0	Preferred telegram 2
0 1 1	Preferred telegram 3
1 0 0	Preferred telegram 4
1 0 1	Preferred telegram 5
1 1 0	Preferred telegram 6
1 1 1	freely configurable telegram

0 Position actual value 1 (motor encoder)
1 Position actual value 2 (external encoder)

☞ **The setting is only activated in the master and in the drive from communication phase 3 on.**

Telegram definitions:

Telegram	MDT (S-0-0024)	DT (S-0-0016)
Preferred telegram 0	no data	no data
Preferred telegram 1	S-0-0080 (torque setpoint)	no data
Preferred telegram 2	S-0-0036 (speed setpoint)	S-0-0040 (speed actual value)
Preferred telegram 3	S-0-0036 (speed setpoint)	S-0-0051 or S-0-0053 (position actual value 1 or 2; selectable via bit 3)
Preferred telegram 4	S-0-0047 (position setpoint)	S-0-0051 or S-0-0053 (position actual value 1 or 2; selectable via bit 3)
Preferred telegram 5 (for spindle operation)	S-0-0047, S-0-0036 (position setpoint, speed setpoint)	S-0-0051 or S-0-0053, S-0-0040 (position actual value 1 or 2; selectable via bit 3; additionally speed actual value)
Preferred telegram 6	S-0-0036 (speed setpoint)	no data
freely configurable telegram	manual specification via S-0-0024	manual specification via S-0-0016

☞ **Preferred telegram 0 is used to switch off the cyclic setpoint input (e.g. to enter the setpoints via the service channel using the setpoint box).**
For more information on freely configurable telegrams, see also P-0-1536.

The telegram definition used should correspond to the selected operating mode of the drive (see S-0-0032).

S-0-0016
SER DP

Configuration list DT
Telegram configuration

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Individual specification of the freely configurable telegram (DT). In this parameter, you specify the parameters to be transmitted cyclically by the drive (max. 8).
You may enter all parameters with the ”DT” entry in the ”cyclic” column of the attributes bar.

Example:
The speed actual value and the position actual value 1 are to be cyclically transmitted to the master by the DT:
S-0-0016 = S-0-0040,S-0-0051

S-0-0017
SER CANr ANA MC

List of all operating data
Operating data lists

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter contains the ident. numbers of all operating data available in the drive. For parameters that initiate commands, please refer to S-0-0025.

S-0-0018
SER

List of operating data of communication phase 2

Operating data lists

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Ident. numbers of all communication parameters to be transmitted in phase 2. Change-over to phase 3 is not possible unless this list has been processed.

S-0-0019
SER

List of operating data of communication phase 3

Operating data lists

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Ident. numbers of all operating parameters to be transmitted in phase 3. Change-over to phase 4 is not possible unless this list has been processed.

S-0-0020
SER

List of operating data of communication phase 4

Operating data lists

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

ID numbers of all operating parameters that may be changed online in phase 4.

S-0-0021
SER CANr ANA MC DP

List of invalid operating data of communication phase 2

Diagnostics, error

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

If the drive cannot be switched to communication phase 3 (see S-0-0127), you should check the contents of S-0-0021 where you will find all parameter numbers still required to switch the drive to the next phase. This list will be empty when the next phase has been successfully reached.

S-0-0022
SER CANr ANA MC DP

List of invalid operating data of communication phase 3

Diagnostics, error

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

If the drive cannot be switched to communication phase 4 (see S-0-0128), you should check the contents of S-0-0022 where you will find all parameter numbers still required to switch the drive to the next phase. While the fixed data exchange contents are still available in PROFIBUS-DP when the next phase has been successfully reached, the list of the remaining interface types is empty.

S-0-0023
SER

List of invalid operating data of communication phase 4

Diagnostics, error

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Ident. number list of the operating data which are recognized as invalid data by the drive in normal operation after change-over to phase 4.

S-0-0024

SER DP

Configuration list MDT

Telegram configuration

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Individual specification of the freely configurable Master Data Telegram (MDT). This ident. no. is used to specify the parameters to be expected by the drive during cyclic transmission (max. 8). You may enter all those parameters which have the ”MDT” entry in the ”cyclic” column of the attributes bar.

Example:

The MDT is expected to provide for cyclic transmission of the speed setpoint and speed setpoint additive parameters by the master:
S-0-0024 = S-0-0036,S-0-0037

☞ **In case of PROFIBUS-DP, only the fixed data exchange contents are displayed here.**

S-0-0025

SER CANr ANA MC DP

List of all commands

Operating data lists

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This ident. no. contains the numbers of all parameters available in the drive that initiate commands. For parameters that contain operating data, please refer to S-0-0017.

S-0-0026

SER

Configuration list signal status word

Telegram configuration

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Here you enter the ident. numbers of the signals which are to be transmitted in the signal status word (S-0-0144) (max. 16 signals).
The first ident. number in the configuration list defines bit 0, the last ident. number defines bit 15 in the signal status word.
You may enter all parameters with the ”D → M” entry in the ”real-time bit” column of the attributes bar.

Example:

In S-0-0144, bit 2, the ”status position actual values” (S-0-0403) information is to be transferred to the master:
S-0-0026 = S-0-0000,S-0-0000,S-0-0403

S-0-0027
SER

Configuration list signal control word

Telegram configuration

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In the configuration list, the ident. numbers of the signals which are to be transmitted in the signal control word (S-0-0145) (max. 16 signals) are stored.
The first ident. number in the configuration list defines bit 0, the last ident. number defines bit 15 in the signal control word.
You may enter all parameters with the ”M → D” entry in the ”real-time bit” column of the attributes bar.

S-0-0028
SER

MST error counter

Diagnostics, errors

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The MST error counter counts all invalid master synchronization telegrams (MST) during communication phases 3 and 4:

- Upon failure of an MST, synchronization is maintained. However, a drive telegram (DT) will only be transmitted when another MST has been received.
- If two successive MSTs fail, the drive automatically returns to communication phase 0 and expects an MST of phase 0. Rotating motors are halted within the best time possible.
- If more than two successive MSTs fail, additional failures will not be counted.

In the event of a heavily disturbed transmission, the error counter may contain the maximum value of 65 535 after a long time.

S-0-0029
SER

MDT error counter 1

Diagnostics, errors

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The MDT error counter counts all invalid master data telegrams (MDT) in communication phase 4:

- Upon failure of an MDT, operation is maintained. The drive calculates the missing telegram on the basis of the last setpoints received.
- If two successive MDTs fail, the drive concerned will be halted within the best time possible. The drive automatically returns to communication phase 0 and expects an MST of phase 0.

In the event of a heavily disturbed transmission, the error counter may contain the maximum value of 65 535 after a long time.

S-0-0030

SER CANr ANA MC DP

Manufacturer version

Info, version

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Example:

SM-D Vx.xxx .xxxxxx

Software type:
SM = servo function
SPM = spindle function

Version

Software index (0 or *; *=field test)

Software release (serial no.)

Date (DD.MM.YY)

S-0-0032

SER CANr ANA MC DP

Main operating mode

Operating mode

2	–	–	–	FEPROM	–	SER
2	2	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Defines the main operating mode (e.g. speed or position control) of the drive. You thus determine how the drive processes the setpoint.

In connection with parameters S-0-0033 to S-0-0035, secondary modes may be specified, except for interface type PROFIBUS-DP, some of which may also be directly selected during operation (see P-0-00127).

☞ **In case of PROFIBUS-DP:**
Selection of the operating mode (main operating mode) is performed exclusively during start-up. A change of operating mode (to a secondary mode) is not possible.

☞ **The main operating mode and all secondary modes must be programmed. If this is not the case, the drive stops in phase 2 when starting and reports the missing/invalid operating data in S-0-0021.**

Depending on the interface type and functionality of a drive, only specific main/secondary mode combinations are allowed.

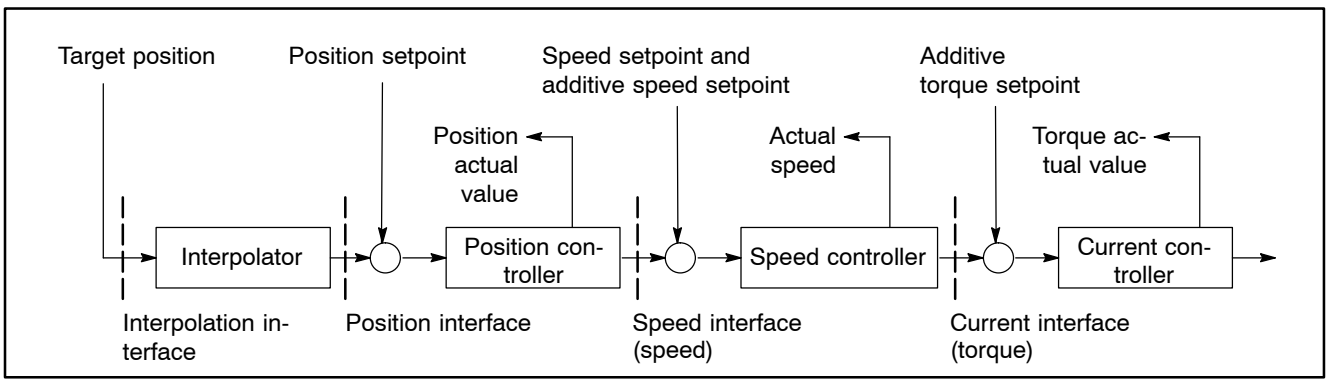
Permitted combinations for servo drives:

Main operating mode S-0-0032	Interface type SER	CANr	ANA	MC	DP	Secondary operating modes S-0-0033, S-0-0034 or S-0-0035:	Interface type SER	CANr	ANA	MC	DP
– Speed control – Speed control with position actual value	❍		❍		❍ ❍	– Speed control – Position control with motor encoder – Position control with external encoder – Torque control	❍ ❍ ❍		❍ ❍		–
– Position control with motor encoder	❍	❍			❍	– Position control with motor encoder – Interpolation with motor encoder – Speed control	❍ ❍ ❍	❍			–
– Position control with external encoder	❍					– Position control with external encoder – Interpolation with external encoder – Speed control	❍ ❍ ❍				–
– Interpolation with motor encoder – Interpolation with motor encoder with potentiometer	❍				❍ ❍	– Interpolation with motor encoder – Position control with motor encoder	❍ ❍				–
– Interpolation with external encoder	❍					– Interpolation with external encoder – Position control with external encoder	❍ ❍				–
– Block-controlled operation with motor encoder – Block-controlled operation with motor encoder with potentiometer				❍	❍ ❍	– Block-controlled operation with motor encoder				❍	–
Torque control			❍			– Torque control – Speed control			❍ ❍		–

”Interpolation”: Position control with additional interpolation in the drive.

Please note for operating mode change:

- For position control, and for interpolation in the drive, the encoder is specified during initialization. The encoder cannot be switched over during operation.
- For speed control, the encoder for the command ’drive-controlled referencing’ is specified in the referencing parameter S-0-0147.
- The feed-forward control (see parameter configuration: bit 3, position control without following distance) can be switched on during position control and also during additional interpolation in the drive.



”Infeed” of the setpoint into the controlled variable, depending on the selected operating mode (for servo function)

Permitted combinations for spindle drives:

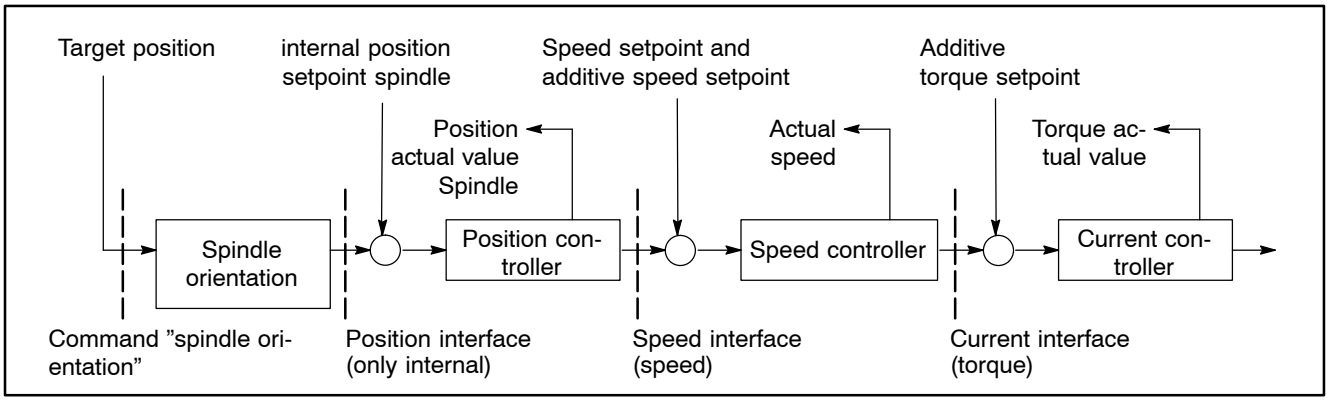
Main operating mode S-0-0032	Interface type SER	CANr	ANA	MC	DP	Secondary operating modes S-0-0033, S-0-0034 or S-0-0035:	Interface type SER	CANr	ANA	MC	DP
Speed control	❍		❍			– Speed control – Position control with motor encoder – Position control with external encoder – Interpolation with motor encoder – Interpolation with external encoder – Torque control	❍ ❍ ❍ ❍ ❍		❍ ❍		
Position control with motor encoder	❍					– Position control with motor encoder – Interpolation with motor encoder – Speed control	❍ ❍ ❍				
Position control with external encoder	❍					– Position control with external encoder – Interpolation with external encoder – Speed control	❍ ❍ ❍				
Interpolation with motor encoder	❍					– Interpolation with motor encoder – Position control with motor encoder – Speed control	❍ ❍ ❍				
Interpolation with external encoder	❍					– Interpolation with external encoder – Position control with external encoder – Speed control	❍ ❍ ❍				
Block-controlled operation with motor encoder						– Block-controlled operation with motor encoder					
Torque control			❍			– Torque control – Speed control			❍ ❍		

”Interpolation”: Position control with additional interpolation in the drive.

Please note for operating mode change:

- Switching over from spindle to C axis takes place by switching over from speed control to position control.
  For SERCOS interface: the change-over phase takes several SERCOS interface cycles.
- For the C axis, the encoder setting is fixed. Therefore, the encoder cannot be switched over.
- The position encoder for the command ”spindle orientation” is specified in the spindle positioning parameter S-0-0154.
- Feed-forward control for C axis (see parameter configuration: bit 3, position control without following distance) can be switched on during position control, as well as during additional interpolation in the drive.

The following parameter configuration of the S-0-0032 parameter also applies to parameters S-0-0033 to S-0-0035.



"Infeed" of the setpoint into the controlled variable, depending on the selected operating mode (for spindle function)

Setting of the individual operating modes

Operating modes	Interface type					Parameter value (S-0-0032, S-0-0033, S-0-0034, S-0-0035)
	SER	CANr	ANA	MC	DP	
Speed control	❍		❍		❍	0b 0000.0000.0000.0010 0b 1000.0000.0000.0010
Position control with motor encoder (with following distance)	❍	❍			❍	0b 0000.0000.00000.0011
Position control with external encoder (with following distance)	❍					0b 0000.0000.00000.0100
Position control with motor encoder (without following distance)	❍	❍			❍	0b 0000.0000.00000.1011
Position control with external encoder (without following distance)	❍					0b 0000.0000.00000.1100
Interpolation with motor encoder (with following distance)	❍				❍	0b 0000.00000.00010.0011
Interpolation with external encoder (with following distance)	❍					0b 0000.00000.00010.0100
Interpolation with motor encoder (without following distance)	❍				❍	0b 0000.00000.00010.1011
Interpolation with external encoder (without following distance)	❍					0b 0000.00000.00010.1100
Block-controlled operation with motor encoder (with following distance)				❍	❍	0b 0000.0000.0000.0010
Block-controlled operation with ext. encoder (with following distance)						0b 0000.0000.0000.0010
Block-controlled operation with motor encoder (w/o following distance)				❍	❍	0b 0000.0000.0000.0010
Block-controlled operation with external encoder (w/o following distance)						0b 0000.0000.0000.0010
Torque control			❍			0b 1000.0000.0000.0001

Meaning of the individual bits in S-0-0032...S-0-0035

☞ **Bits 3, 4 and 5 are of relevance for position control only.**

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

```
15 14          8 7 6 5 4 3 2 1 0
X X r r r r r X X X X X X X X X
```

0	0 0 0 0 0 0 0 0	no operating mode defined
0	0 0 0 0 0 0 0 1	– reserved –
0	X X 0 0 0 0 1 0	Speed control
0	X X X X 0 1 1	Position control with motor encoder
0	X X X X 1 0 0	Position control with external encoder
0	X X X X 1 0 1	– not assigned –
0	0 0 0 0 0 1 1 0	– reserved –
0	0 0 0 0 0 1 1 1	Operating mode without control
	0	Position control with following distance
	1	Position control without following distance (= feed-forward control)
0	0 0 0 0	no more complex operating mode
0	0 0 0 1	Interpolation in the drive
0	0 0 1 0	– not assigned –
0	0 0 1 1	– reserved –
0	0 1 0 0	Synchronous operation (for spindle drive only)
0	1 0 0 0	Electronic gear box (for servo drive only)
	0	no drive-controlled operating mode change
	1	Drive-controlled operating mode change
	0	cyclic setpoint input
	1	Setpoint input via service channel
0		SERCOS operating modes
1		other operating modes (e.g. setpoint generator)

S-0-0033

SER CANr ANA MC

Secondary mode 1

Operating mode

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

See parameter S-0-0032.

S-0-0034

SER CANr ANA MC

Secondary mode 2

Operating mode

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

See parameter S-0-0032.

S-0-0035

SER CANr ANA MC

Secondary mode 3

Operating mode

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

See parameter S-0-0032.

S-0-0036
SER CANr ANA MC DP

Speed setpoint
Speed

3,4	–	–	MDT	–	Speed	SER
4	–	–	MDT	–	Speed	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Setpoint in the speed control operating mode.

Range: dependent on the inverter motor combination
Weighting according to S-0-0044.

S-0-0037
SER CANr ANA MC DP

Speed setpoint additive
Speed

3,4	–	–	MDT	–	Speed	SER
4	–	–	MDT	–	Speed	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Additional setpoint which is added to the speed setpoint S-0-0036 by the drive.

Range: dependent on the inverter motor combination
Weighting according to S-0-0044.

☞ **To influence/limit S-0-0037, see P-0-2019.**

S-0-0040
SER CANr ANA MC DP

Speed actual value
Measuring point

–	–	–	DT	–	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the current speed actual value.
The polarity can be adjusted in S-0-0055. Weighting according to S-0-0044.

S-X-0041
SER MC DP

Referencing speed
Referencing

3,4	2	–	–	FEPROM	Speed	SER
3,4	3	–	–	FEPROM	Speed	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Parameter required for drive-controlled referencing (see S-0-0148).

Range: 0 ... 90% n_{max}
Weighting according to S-0-0044.

S-X-0042
SER MC DP

Referencing acceleration
Referencing

3,4	2	–	–	FEPROM	Accel.	SER
3,4	3	–	–	FEPROM	Accel.	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Parameter required for drive-controlled referencing (see S-0-0148).
The drive uses this value for accelerating to the referencing speed (see S-0-0041) and brakes to n=0 when the reference mark is reached.
The referencing acceleration is symmetrically effective in both directions.
Weighting in accordance with S-0-0160.

S-0-0043

SER ANA MC DP

Speed polarities parameter

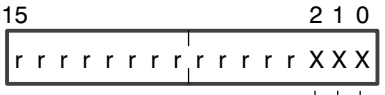
Polarity

2	–	–	–	FEPROM	–	SER
2, 3, 4	2	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The polarities of the speed setpoint and speed actual value within the controlled system remain unchanged, they can only be adjusted at the input and output.
A positive speed setpoint corresponds to clockwise rotation when looking at the motor shaft. A clockwise rotating motor shaft will result in positive actual speed values.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved



Bit 0: Speed setpoint

0 Positive polarity
1 Negative polarity

Bit 1: Speed setpoint additive

0 Positive polarity
1 Negative polarity

Bit 2: Speed actual value

0 Positive polarity
1 Negative polarity

S-0-0044

SER CANr ANA MC DP

Type of weighting for speed data

Weighting

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You specify the way in which the drive interprets **speed data internally**.

☞ **For CANrho: always in rpm!**

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

15							6	5	4	3	2	1	0
r	r	r	r	r	r	r	r	X	X	X	0	0	X	X

Bits 2-0: Type of weighting

X	0	0	0	0	0	0	Incremental weighting
X	X	X	0	0	0	1	Translatory weighting
X	X	0	0	0	1	0	Rotary weighting

Bit 3: Preferred weighting

0

Bit 4: Translatory unit of measure

0 Meter [m]
1 Inch [in]

Bit 4: Rotary unit of measure

0 Revolution [rev]
1 – reserved –

Bit 5: Unit of time

0 Minute [min]
1 Second [s]

Bit 6: Data reference

0 at the motor shaft
1 at the load

Relationship between type of weighting and internal resolution of calculation:

- Incremental weighting: 1 LSB= 1 increment
- Translatory weighting (metric): 1 LSB= 1×10^{-6} m/min
  (inch): 1 LSB= 1×10^{-5} inch/min
- Rotary weighting: (minute): 1 LSB= 1×10^{-4} rpm
  (second): 1 LSB= 1×10^{-6} rev/sec

☞ **For analog interface: please note that the internal resolution is independent from setpoint resolution at the input (downstream the A/D converter)!**

★ **If you want to change weighting data, you should note the following:**

- The weighting of speed, acceleration and position data should always be identical with respect to bits 0 to 4. This refers to parameters
  - S-0-0044 (speed)
  - S-0-0160 (acceleration)
  - S-0-0076 (position)
- Bit 6 (data reference) in these parameters and in parameter S-0-0086 (type of weighting for torque/force data) must be set to identical values.
- Changes to S-0-0044 will also affect parameters
  - S-0-0041 (referencing speed)
  - S-0-0091 (bipolar speed limit value)
  - S-0-0157 (speed window)
  - S-0-0259 (positioning speed)
  - P-0-0103 (ADC adjustment: maximum speed)

S-0-0045
SER

Weighting factor of speed data
Weighting

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the weighting factor for the internal interpretation of the speed data by the drive.

1 LSB = S-0-0045 x 10 $^{\text{exponent}}$

Since the preferred weighting is permanently set in bit 3 of weighting type S-0-0044, this parameter is determined depending on the unit of measure (S-0-0044, bit 4) and cannot be overwritten.

S-0-0046
SER

Weighting exponent of speed data
Weighting

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the weighting exponent for the internal interpretation of the speed data by the drive.

1 LSB = factor x 10 $^{\text{S-0-0046}}$

Since the preferred weighting is permanently set in bit 3 of weighting type S-0-0044, this parameter is determined depending on the unit of measure (S-0-0044, bit 4) and cannot be overwritten.

S-0-0047
SER CANr MC DP

Position setpoint
Position

3,4	–	–	MDT	–	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Setpoints in the position control operating mode.

Range: -2^{31} ... $+2^{31}$
Weighting according to S-0-0076.

S-X-0049
SER MC DP

Position limit value positive
Limit value

3,4	2	–	–	FEPROM	Position	SER
3,4	3	–	–	FEPROM	Position	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Maximum path in positive direction. The limit value is always active for the MC interface type. For the other interface types it is active only if it has been activated in the position polarity parameter (S-0-0055) **and** all position data refer to the reference point.
If the limit value is exceeded, the drive sets an error message in the diagnostics class 1. Weighting according to S-0-0076.

S-X-0050
SER MC DP

Position limit value negative
Limit value

3,4	2	–	–	FEPROM	Position	SER
3,4	3	–	–	FEPROM	Position	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Maximum path in negative direction. Otherwise as S-X-0049.

S-0-0051
SER CANr ANA MC DP

Position actual value 1 (motor encoder)
Measuring point

–	–	–	DT	–	Motor position encoder	SER
–	–	–	DT	–	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The parameter contains the position actual value of the motor encoder. The polarity can be adjusted in S-0-0055. Weighting according to S-0-0076.

S-X-0052
SER MC DP

Reference dimension, position actual value 1
Referencing

3	2	–	–	FEPROM	Motor position encoder	SER
3	3	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Distance between machine zero point and reference point of the motor measuring system. Weighting according to S-0-0076.

S-0-0053
SER

Position actual value 2 (external encoder)
Measuring point

–	–	–	DT	–	External encoder	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The parameter contains the position actual value of the external encoder. The polarity can be adjusted in S-0-0055. Weighting according to S-0-0076.

☞ **In connection with the ”pre-initialization of the external position actual value by an absolute motor encoder” function, the following applies to non-absolute external encoders:**
If bit 1 of parameter P-0-0510 is high, the absolute value of the motor encoder is copied to the position actual value 2 as a starting value.
The starting value can be adjusted via S-0-0177 (absolute dimension, offset 1) to the desired machine position, however, the axis has not been referenced.

S-X-0054

SER

Reference dimension, position actual value 2

Referencing

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3	2	–	–	FEPROM	External encoder	SER
3	3	–	–	FEPROM	External encoder	others

Distance between machine zero point and reference point of the external measuring system. Weighting according to S-0-0076.

S-0-0055

SER MC DP

Position polarities parameter

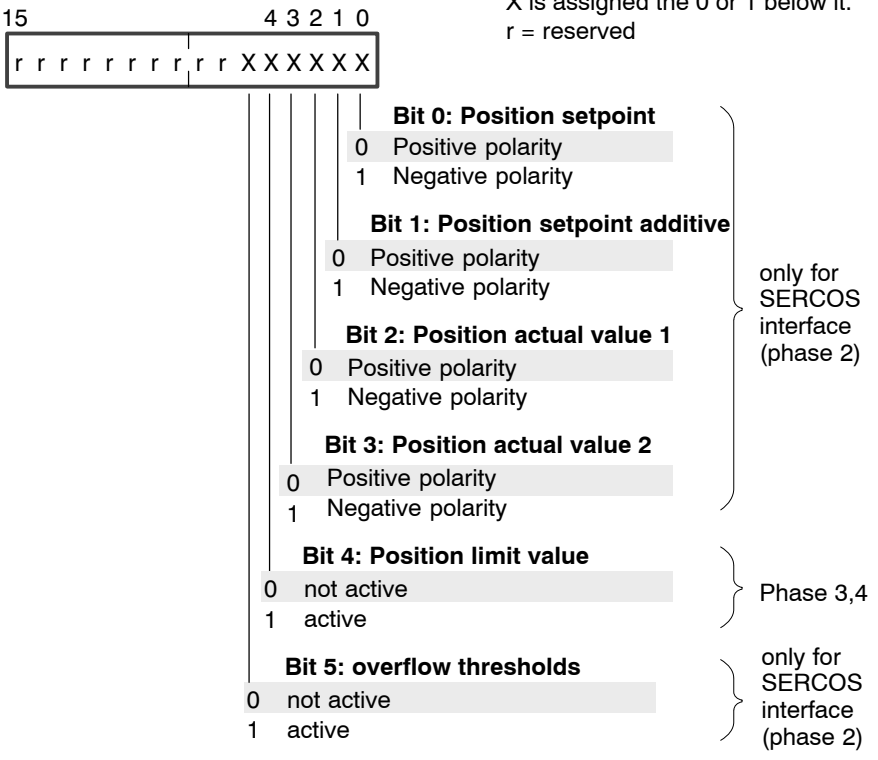
Polarity

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
2,3,4	–	–	–	FEPROM	–	SER
2,3,4	3	–	–	FEPROM	–	others

- Bit 0...3 only for SERCOS interface:
  determines the polarity at the interface when reading position actual values and position setpoints. The encoder polarity remains unchanged.
- Bit 4 activates position limit values (see S-0-0049; S-0-0050).
- Bit 5 only for SERCOS interface:
  indicates whether overflow thresholds have been activated for the ”absolute endless axis” function. Such thresholds are active whenever ”rotary weighting” and ”absolute format” (bit 7) have both been set in S-0-0076.
  For a definition of the overflow thresholds, refer to S-0-0280 and S-0-0281.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved



S-X-0057
SER MC DP

Positioning window fine
Limit value

3,4	2	–	–	FEPROM	Position	SER
3,4	3	–	–	FEPROM	Position	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The positioning window is used to determine the maximum permissible following distance, for which the drive outputs the message ”in position” (see S-0-0336). The message takes place if the amount of the difference between the position setpoint and the position actual value (= following distance) is smaller than the positioning window.
Weighting according to S-0-0076.

☞ **If this value is too low, the ”in position” message may never be output! Therefore, you should note the encoder tolerances when programming the positioning window:**
SF motors (with incremental encoders): +/– 20 angular sec.
SR motors (with resolver): +/– 10 angular min.

S-X-0058
SER

Backlash
Compensation

3,4	2	–	–	FEPROM	Position	SER
3,4	3	–	–	FEPROM	Position	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Defines the amount of the batches between motor and load if the direction is reversed. Thus, the drive can automatically balance the mechanical play between the motor and the load if the direction of rotation is changed. Weighting according to S-0-0076.

★ **With activated axis error compensation of a connected CNC, parameter S-0-0058 must be set to ’0’.**

S-0-0059
SER

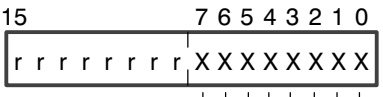
Position switching point parameter
Message

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the status of the position switching points. See also S-0-0060 to S-0-0067.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved



0 Position actual value < position switching point 1
1 Position actual value ≥ position switching point 1
0 Position actual value < position switching point 2
1 Position actual value ≥ position switching point 2
⋮
0 Position actual value <position switching point 8
1 Position actual value ≥ position switching point 8

S-0-0060

SER

Position switching points

Limit value

3,4	2	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

When the position actual position reaches or exceeds the preselected position switching point, the corresponding bit is set in the position switching point parameter (S-0-0059).
The function can be activated or deactivated using P-0-0510 in bit 0.

S-0-0060 Position switching point 1
S-0-0061 Position switching point 2
S-0-0062 Position switching point 3
S-0-0063 Position switching point 4
S-0-0064 Position switching point 5
S-0-0065 Position switching point 6
S-0-0066 Position switching point 7
S-0-0067 Position switching point 8

Weighting and preferred weighting in accordance with S-0-0086.

S-0-0076

SER CANr ANA MC DP

Type of weighting for position data

Weighting

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You specify the way in which the drive interprets **position data internally**.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

15							7	6	5	4	3	2	1	0
r	r	r	r	r	r	r	r	X	X	0	X	0	0	X	X

Bits 0-2: Type of weighting

0	X	0	0	0	0	0	0	Incremental weighting
0	1	0	X	0	0	0	1	Translatory weighting
X	X	0	0	0	0	1	0	Rotary weighting

Bit 3: Preferred weighting

0

Bit 4: Translatory unit of measure

0 Meter [m]
1 Inch [in]

Bit 4: Rotary unit of measure

0 Angular degree
1 – reserved –

Bit 5: reserved

0

Bit 6: Data reference

0 at the motor shaft
1 at the load

Bit 7: Processing format

0 Absolute format
1 Modulo format

Relationship between type of weighting and internal resolution of calculation:

- Incremental weighting: 1 LSB= 1 increment
- Translatory weighting (metric): 1 LSB= 0.0001 mm
  (inch): 1 LSB= 0.001 in

- Rotary weighting: 1 LSB= 0.0001 angular degree (see S-0-0079)

★ **If you wish to change S0-0076, please note the following:**

- The weighting of speed, acceleration and position data should always be identical with respect to bits 0 to 4. This refers to parameters
  - S-0-0044 (speed)
  - S-0-0160 (acceleration)
  - S-0-0076 (position)
- Bit 6 (data reference) in these parameters and in parameter S-0-0086 (type of weighting for torque/force data) should be set to identical values.
- Only for SERCOS interface:
  If "rotary weighting" (see bits 0 to 2) as well as "absolute format" (bit 7=0) are both set, the overflow thresholds will be activated in the position polarities parameter S-0-0055.
- Changes to S-0-0076 will also affect parameters
  - S-0-0049 (position limit value positive)
  - S-0-0050 (position limit value negative)
  - S-0-0052 (Reference dimension actual value 1)
  - S-0-0055 (Position polarities parameter, bit 5; only if bit 7 of S-0-0076 is changed)
  - S-0-0057 (Positioning window)
  - S-0-0103 (Modulo value)
  - S-0-0150 (Reference dimension, offset 1)
  - S-0-0175 (Shift parameter 1)
  - S-0-0177 (Absolute dimension, offset 1)
  - S-0-0261 (Positioning window rough)

S-0-0080

SER CANr ANA MC DP

Torque setpoint

Torque

–	–	–	DT	–	Torque	SER
3,4	–	–	MDT	–	Torque	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the current torque setpoint. Weighting according to S-0-0086.

S-0-0081

SER CANr ANA MC DP

Torque setpoint additive

Torque

3,4	–	–	MDT	–	Torque	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Cyclically transferred additional setpoint, added up in the drive to torque setpoint S-0-0080.

Range: -2^{15} ... $+2^{15}$
Weighting according to S-0-0086.

S-X-0082
SER DP

Positive torque limit value
Limit value

3,4	2	–	–	FEPROM	Torque	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Limit value for positive torque.
When the limit value is reached, the drive sets the message **|Md|** > $\mathbf{Md_{limit}}$ in diagnostics class 3.

Weighting and preferred weighting in accordance with S-0-0086.

Use S-X-0082 and S-X-0083 for asymmetrical loads (e.g. applications involving vertical axes). For symmetrical loads, see S-0-0092.

S-X-0083
SER DP

Negative torque limit value
Limit value

3,4	2	–	–	FEPROM	Torque	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Limit value for negative torque.
When the limit value is reached, the drive sets the message **|Md|** > $\mathbf{Md_{limit}}$ in diagnostics class 3.

Weighting and preferred weighting in accordance with S-0-0086.

Use S-X-0082 and S-X-0083 for asymmetrical loads (e.g. applications involving vertical axes). For symmetrical loads, see S-0-0092.

S-0-0084
SER CANr ANA MC DP

Torque actual value
Measuring point

–	–	–	DT	–	Torque	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Current torque actual value.
Smoothing according to P-0-0020. Weighting in accordance with S-0-0086.

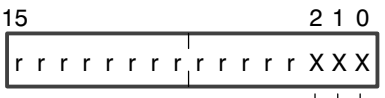
S-0-0085
SER

Torque polarities
Polarity

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The polarities of torque setpoints and torque actual value within the controlled system remain unchanged, they can only be adjusted at the input and output.
With a positive polarity and a positive torque setpoint, a clockwise rotation from the point of view of the motor shaft is specified.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

Bit 0: Torque setpoint
0 Positive polarity
1 Negative polarity

Bit 1: Torque setpoint additive
0 Positive polarity
1 Negative polarity

Bit 2: Torque actual value
0 Positive polarity
1 Negative polarity

S-0-0086

SER ANA MC DP

Type of weighting – torque/force data

Weighting

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You specify the way in which the drive interprets **torque or force data internally.**

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

15 6 5 4 3 2 1 0

r r r r r r r r X 0 X 0 0 X X

Bits 0-2: Type of weighting

X 0 0 0 0 0 0 Weighting in percent
X 0 X 0 0 0 1 Translatory weighting (force)
X 0 X 0 0 1 0 Rotary weighting (torque)

0 **Bit 3: Preferred weighting**

Bit 4: Unit of measure for force

0 Newton [N]
1 pound-force [lbf]

Bit 4: Unit of measure for torque

0 Newton meter [Nm]
1 inch pound-force [inlbf]

0 **Bit 5: reserved**

Bit 6: Data reference

0 at the motor shaft
1 at the load

Relationship between type of weighting and internal resolution (resolution of calculation):

- Weighting in percent: 1 LSB= 0.1 % of motor zero-speed torque
- Translatory weighting (Newton): 1 LSB= 1 N
  (pound force): 1 LSB= 0.1 lbf
- Rotary weighting: (Nm): 1 LSB= 0.01 Nm
  (Inlbf): 1 LSB= 0.1 inlbf

★ **If you want to change weighting data, you should note the following:**

- Bit 6 (data reference) should be set to identical values in parameters
  S-0-0044 (speed)
  S-0-0086 (type of weighting – torque/force data)
  S-0-0076 (position)
  S-0-0160 (acceleration)
- Changes to S-0-0076 will also affect parameters
  - S-0-0082 (torque limit value positive)
  - S-0-0083 (torque limit value negative)
  - S-0-0092 (torque limit value bipolar)
  - S-0-0126 (torque threshold Mdx)
  - P-0-0104 (ADC adjustment: maximum torque)
  - P-0-0124 (torque setpoint filtered)

S-0-0088
SER

Recovery time receive/receive (TATSY)
Communication

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Time required by drive between the end of the received MDT and readiness to receive the next MST. The master takes this value into account when calculating the time slot for the MDT (transmission time T2).

S-0-0089
SER

Time of transmission master data telegram (T2)
Communication

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Time of transmission of the MDT after the end of the MST.
If not all conditions can be fulfilled during the calculation of T2, either a longer SERCOS interface cycle time TScyc must be selected, or the drives must be divided between several rings.

S-0-0090
SER

Copying time setpoints (TMTSG)
Communication

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Time required by the drive to provide the setpoints after reception of the MDT.
The time required depends on whether preferred telegrams or configured telegrams are to be transmitted in normal operation. Using this information, the master calculates the time for setpoint valid T3.

S-X-0091
SER CANr ANA MC DP

Bipolar speed limit value
Limit value

3,4	2	–	–	FEPROM	Speed	SER
3,4	3	–	–	FEPROM	Speed	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Maximum admissible speed in both directions.

Range: 0 ... 90 % n_{max}
Weighting according to S-0-0044.
n_{max} is shown on the electronic rating plate.

☞ **For analog interface:**
P-0-0111 (encoder simulation: number of divisions) and P-0-0118 (encoder simulation: maximum frequency of the transmission) are dependent on S-0-0091!
The maximum parametrizable number of divisions can be increased by reducing S-0-0091. At the same time, the programmable maximum frequency of the transmission decreases.

☞ **For analog interface:**
If S-0-0091 is overwritten in phase 3, the drive checks the limits for P-0-0111 and P-0-0118 and adapts them accordingly.
This check is not performed if S-0-0091 is overwritten in phase 4. In this case, the limits are only monitored again when a phase switch-back and another start-up to phase 4 has taken place.

S-X-0092
SER CANr ANA MC DP

Bipolar torque limit value
Limit value

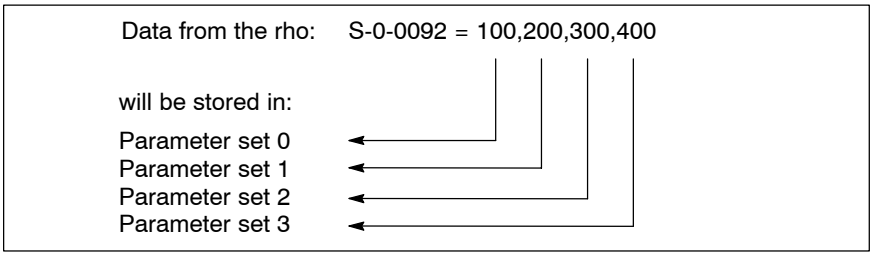
3,4	2	–	–	FEPROM	Torque	SER
3,4	3	–	–	FEPROM	Torque	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Symmetrical torque limit in both directions.
When the limit value is reached, the drive sets the message **Md** ≥ **Md_{limit}** in diagnostics class 3.

Range: 0 ... 500 % M_{max}
Weighting according to -0-0086.

See also S-X-0082 and S-X-0083.

☞ **The rho robot control transfers a total of 4 values during parameter download for S-X-0092, which are always separated by commas. Then, one of the values transferred can be activated by the change parameter set command (see S-0-0216). The following shall apply:**



S-0-0093
SER

Weighting factor – torque/force data
Weighting

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter contains the weighting factor for the internal interpretation of the torque/force data by the drive:

$$1\ LSB = S\text{-}0\text{-}0093 \times 10^{\ exponent}$$

Since the preferred weighting is permanently set in bit 3 of weighting type S-0-0086, this parameter is determined depending on the unit of measure (S-0-0086, bit 4) and cannot be overwritten.

S-0-0094
SER

Weighting exponent of torque/force data
Weighting

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter contains the weighting factor for the internal interpretation of the torque/force data by the drive:

$$1\ LSB = factor \times 10^{\ S\text{-}0\text{-}0094}$$

Since the preferred weighting is permanently set in bit 3 of weighting type S-0-0086, this parameter is determined depending on the unit of measure (S-0-0086, bit 4) and cannot be overwritten.

S-0-0095

SER CANr ANA MC DP

Diagnostics

Diagnostics, status

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the current operating status of the drive in plain text. All texts are permanently stored in the drive and cannot be changed.

☞ **From software version V0.046 on, a modified format is used for interface type SERCOS interface.**

Error (in case of diagnoctics class 1 (ZSK1) errors):

`[XXyyyyy]text` where: text = error in the plain text
XX = Module display code
yyyyy = extended error code

Status (when no errors or warnings are active):

`[Syyyyyy]text` where: text = status in the plain text
S = Status display
yyyyyy = Status code

SERCOS enable
SERCOS halt
Enable central
Enable external
Drive halt
Special operation

★ For information on the possible code, see Diagnostics manual.

S-0-0096

SER

Slave identification (SLKN)

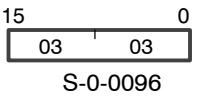
Communication

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

A single programmable machine axis may comprise several drives (slaves) in some applications (e.g. parallel axes). This parameter specifies the way in which the present drive is integrated into such a ”slave chain” within a configuration of this type. For this purpose, it contains an appropriate address for enabling the master to calculate the optimum time slots.

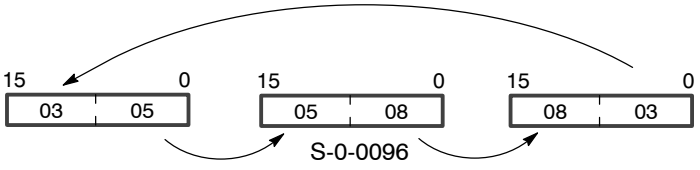
Bits 8 – 15: own drive address of the slave (1 to 254)
Bits 0 – 7: drive address (1 to 254) of the next ”concatenated” slave:
– if **no** concatenated slaves are available, these bits contain the own drive address.
– if concatenated slaves are available, these bits contain the higher next address, and the last drive in the chain the lowest address of the ”slave chain”.

Example: no concatenated slaves. The address of the present drive is 3.



S-0-0096

Example: 3 concatenated slaves. The address of the present drive is 5. The other two drives’ addresses are 3 and 8:



S-0-0096

S-0-0097

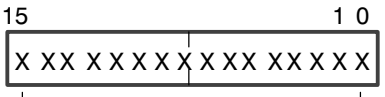
SER

Suppress diagnostics class 2

Diagnostics, warning

2,3,4	–	–	MDT	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

As soon as a warning occurs or disappears (see S-0-0012), the drive sets bit 12 of parameter S-0-0135 (drive status word) to ”1” (alteration bit diagnostics class 2), unless the corresponding warning has been suppressed by parameter S-0-0097.



X is assigned the 0 or 1 below it.
r = reserved

0 Prewarning suppressed
1 Prewarning not suppressed

S-0-0098

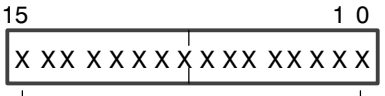
SER

Suppress diagnostics class 3

Diagnostics, status

2,3,4	–	–	MDT	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

As soon as a status defined in parameter S-0-0013 changes, the drive sets bit 11 of parameter S-0-0135 (drive status word) to ”1” (alteration bit diagnostics class 3), unless the corresponding bit has been suppressed by S-0-0098.



X is assigned the 0 or 1 below it.
r = reserved

0 Status suppressed
1 Status not suppressed

S-0-0099

SER CANr ANA MC DP

Command ”reset diagnostics class 1”

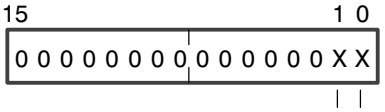
Diagnostics, errors

2,3,4	–	M → D	–	–	–	CANr,ANA
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Using this command, you may unlock the drive when a ”diagnostics class 1” error (see S-0-0011) has occurred.
Before, all causes of errors must have been corrected.

When the drive executes this command, it will reset the following bits:

- all bits of S-0-0011diagnostics class 1,
- all bits of S-0-0014 interface status,
- all bits of S-0-129 manufacturer diagnostics class 1, and
- bit 13 of S-0-0135 drive status



X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

S-X-0100

SER CANr ANA MC DP

P-component of speed controller

Controller

3,4	–	–	–	FEPROM	Controller	SER
2,3,4	2	–	MDT	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You influence the proportional gain of the speed controller.

Range: 1 ... 6000

In the case of many applications, the default setting is adequate. If an adaptation is necessary, the P-component is adjusted to the transient response of the speed actual value.

The objective of this adjustment is to minimize the transient response time with the lowest possible overshoot behavior. If the control behavior is not optimally adjusted, the step response will be characterized by strong overshoot (> 10 % of the steady-state condition) or excessive attenuation. Thus, the maximum possible drive dynamics will be reduced, and the accuracy of the contour will be negatively affected.

☞ **The proportional gain of the speed controller can also be influenced in dependence on the current speed. See S-X-0211.**

In order to check the transient response behavior of an axis, e.g., the OM 04 supplementary board and an external storage oscilloscope may be used. The internal digital actual speed values and speed setpoints are converted to appropriate analog output voltages via OM 04 and can be visualized by the storage oscilloscope.
These measurements should only be performed with the axis mechanics linked to the process and an average load, if possible, in order to obtain practical data.

S-X-0101

SER CANr ANA MC DP

Integral-action component of speed controller

Controller

3,4	2	–	–	FEPROM	Controller	SER
2,3,4	2	–	MDT	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You influence the integral-action behavior (correction time) of the speed controller. In the case of many applications, the default setting is adequate. If an adaptation is necessary, the integral-action component is adjusted to the transient response of the speed actual value.

Range: 10 ... 2^{16}–1 ms
Entering the maximum value deactivates the correction time.

☞ **The correction time of the speed controller can also be influenced in dependence on the current speed. See S-X-0212.**

S-0-0102
SER

D-component, speed controller
Controller

3,4	2	–	–	FEPROM	–	SER
2,3,4	3	–	MDT	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You influence the differential behavior of the speed controller.
In the case of many applications, the default setting of the D-component is adequate. If an adaptation is necessary, the D-component is adjusted to the transient response of the speed actual value.

Range: 0 ... 1.0 ms

S-X-0103
SER MC DP

Modulo value
Position

3	2	–	–	FEPROM	Position	SER
3	3	–	–	FEPROM	Position	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The modulo value specifies the position from which the drive must perform a modulo calculation. Thus, the current position is permanently transformed to a position range between 0 and the value entered in this parameter (e.g. for endless axes).
For this purpose, the processing format (bit 7) must have been set to " modulo format" in parameter S-0-0076.

Weighting also according to S-0-0076.

S-X-0104
SER CANr MC DP

Loop gain factor of position controller
Controller

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This factor specifies the loop gain of the position control circuit over the entire speed range. Enlarging the loop gain factor will reduce the following distance. Calculate the loop gain factor to be entered by the following formula:

$$KV = 1 / t_m * 16.67$$

t_m : Acceleration time of the drive under load (with axis mechanics linked to system and average operating load) to max. speed in seconds.

Range: 0 ... 655.35
Weighting 0.01 (m/min)/mm

S-0-0106
SER CANr ANA MC DP

P-component 1, current controller
Controller

3,4	2	–	–	FEPROM	Controller	SER
2,3,4	2	–	MDT	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The P-component **1** influences the **torque-forming** current. In the case of most applications, the default setting may remain unchanged. See also S-0-0119.

Range: 0 ... 200.00

S-0-0107
SER CANr ANA MC DP

Integral-action component 1, current controller
Controller

3,4	2	–	–	FEPROM	Controller	SER
2,3,4	2	–	MDT	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The integral-action component 1 influences the **torque-forming** current. In the case of most applications, the default setting may remain unchanged. See also S-0-0120.

Range: 70 ... 6500 µs

S-0-0108
SER CANr MC DP

Feedrate override
Speed

3,4	–	–	MDT	FEPROM	–	SER
3,4	3	–	MDT	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Effective only for drive-controlled traverse commands.
The feedrate override has a multiplying effect (unit of measure: %) on the speed set-points calculated by the drive.

Range: 0 ... 120.00 %

S-0-0109
SER CANr ANA MC DP

Motor peak current
Limit value

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter specifies the maximum permitted motor current (depending on motor; data is read from the electronic rating plate). At the same time, it limits the maximum peak current of the amplifier (S-0-0110), in order to prevent damages to the motor.

See also P-0-0061 and P-0-0062.

S-0-0110
SER CANr ANA MC DP

Amplifier peak current
Limit value

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Limits the amplifier peak current. Thus, the maximally attainable torque limit values for ”oversized” motors are also determined indirectly because S-0-0110 may never exceed S-0-0109. For the amplifier peak current, also refer to P-0-0060.

S-0-0111
SER CANr ANA MC DP

Motor zero-speed current
Amplifier

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Specifies the current necessary for the motor to develop its permanent zero-speed torque as indicated on the data sheet.

☞ **For all synchronous motors, the ”zero-speed current” is a reference dimension for all other motor-related current and torque values.**

S-0-0112
SER CANr ANA MC DP

Amplifier nominal current
Amplifier

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Admissible permanent current of the control unit.

S-0-0113
SER CANr ANA MC DP

Maximum motor speed (n_{max})
Limit value

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Unit of measure: rpm.
This value is automatically downloaded from the ”electronic rating plate” of the motor after power-on and must not be changed.
The software refers to the 1.2-fold nominal speed.

S-0-0115
SER

Type of position encoder (external encoder)
Encoder

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You adjust the drive to an **external** encoder.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

15									5	4	3	2	1	0
r	r	r	r	r	r	r	r	r	X	X	X	X	X	X

Bit 0: Type of encoder
0 Rotary encoder (S-0-0117)
1 Linear encoder (S-0-0118)

Bit 1: Distance-coded measuring system
0 No distance-coded reference mark
1 distance-coded reference marks (S-0-0165)

Bit 2: Measuring system resolution
0 metric
1 inch

Bit 3: Direction of movement
0 not inverted
1 inverted

Bit 4: Number of reference marks
0 One reference mark
1 Several reference marks

Bit 5: Configuration of distance-coded measuring system
0 pos. counting direction with pos. traversing direction
1 negative counting direction with positive traversing direction

S-0-0116

SER CANr ANA MC DP

Rotary encoder 1, resolution (motor encoder)

Encoder

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter contains the number of divisions of the motor encoder (divisions per revolution). This value is automatically downloaded from the ”electronic rating plate” of the motor after power-on and cannot be changed.

- SF and DU motors with STG/MTG: 2048 division/rev.
- DU motors with gear encoder: 256 divisions/rev.

S-0-0117

SER

Rotary encoder 2, resolution (external encoder)

Encoder

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter contains the number of divisions of an external rotary encoder (required option: direct measuring system).

Range: 0 ... 2^{31} only **integer** values
Default setting: 1

S-0-0118

SER

Linear encoder resolution (external encoder)

Encoder

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Range: 0 ... 2^{31} only **integer** values
Default setting: 0

If you use an external linear encoder instead of an external rotary encoder (required option: direct measuring system), you should enter here

- **when using the OM 01 or OM 02 measuring system board**

the resolution of this encoder (divisions/mm or divisions/inch; depending on S-0-0115, bit 2) in accordance with the following formula:

$$\text{S-0-0118} = \frac{1}{\text{Lattice constant}}$$

If the linear encoder is equipped with circuitry for impulse multiplication, you have to adjust the input value for S-0-0118 in accordance with the following formula while multiplication in the encoder is active:

$$\text{S-0-0118} = \frac{\text{Current multiplication}}{\text{Lattice constant}}$$

- **when using the OM 03 measuring system board**

the lattice constant of the encoder in micrometers.

S-0-0119
SER CANr ANA MC DP

P-component 2, current controller
Controller

3,4	2	–	–	FEPROM	Controller	SER
2,3,4	2	–	MDT	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The P component**-2** influences the **flow-forming** current. In the case of most applications, the default setting may remain unchanged. See also S-0-0106.

Range: 0 ... 200.00

S-0-0120
SER CANr ANA MC DP

Integral-action component 2, current controller
Controller

3,4	2	–	–	FEPROM	Controller	SER
2,3,4	2	–	MDT	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The integral-action component **2** influences the **flow-forming** current. In the case of most applications, the default setting may remain unchanged. See also S-0-0107.

Range: 70 ... 6500 µs

S-X-0121
SER MC DP

Load gearbox input revolutions
Gearbox

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The drive can automatically account for the transmission ratio of a connected gearbox if bit 6 is set (data reference at the load) in parameters
– S-0-0044, S-0-0076, S-0-0086 and S-0-0160 (”Type of weighting of ...”).
For this purpose, it calculates the transmission ratio using the data in S-X-0121 and S-X-0122.

★ **If no gearbox exists, parameters S-0-0121 and S-0-0122 must be set to ”1”.**

Range: 1 ... 255, only **integer** values for S-X-0121.
Default setting:1

S-X-0122
SER MC DP

Load gearbox output revolutions
Gearbox

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

For an explanation, see S-0-0121.

Range: 1 ... 255, only **integer** values for S-X-0122.
Default setting: 1

S-0-0123
SER MC DP

Feedrate constant
Encoder

2	2	–	–	FEPROM	–	SER
2	–	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The rotary motor movement is converted to a translatory movement of a linear axis via the feedrate constant. For this purpose, you have to enter the pitch of the existing spindle mechanics for 1 revolution.

Default setting: 1,0000

Example: Ball castor spindle with 10 mm spindle pitch:
Feedrate constant = 10 mm/rev.
Entry: 10.0000

S-0-0124
SER

Standstill window
Limit value

3,4	2	–	–	FEPROM	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The standstill window describes the speed deviation from n = 0 in both directions of rotation.

Range: Speed value in the range 0 ... 90% n_{max}
For weighting and preferred weighting see S-0-0044.

S-X-0125
SER

Speed threshold n_x
Limit value

3,4	2	–	–	FEPROM	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Threshold value for speed in both directions.

Range: 0 ... 90% n_{max}
For weighting and preferred weighting see S-0-0044.

S-0-0127

SER

Switching preparations for comm. phase 3

Communication

2	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The master uses this command to complete transmission of the communication parameters in phase 2 and requests change-over to phase 3.
The command is completed error-free if the drive can follow the inputs of the MST from communication phase 3. When a positive command acknowledgment has been received, the master must delete the command and then proceed to phase 4.

Parameter configuration:

15 1 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

If errors have occurred, see S-0-0021.

S-0-0128

SER

Switching preparations for comm. phase 4

Communication

3	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The master uses this command to complete transmission of the communication parameters in phase 3 and requests change-over to phase 4.
The command is completed error-free if the drive can follow the inputs of the MST from communication phase 4. When a positive command acknowledgment has been received, the master must delete the command and then proceed to phase 4.

Parameter configuration:

15 1 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

If errors have occurred, see S-0-0022.

S-0-0129

SER CANr ANA MC DP

Manufacturer's diagnostics class 1 (1st group)

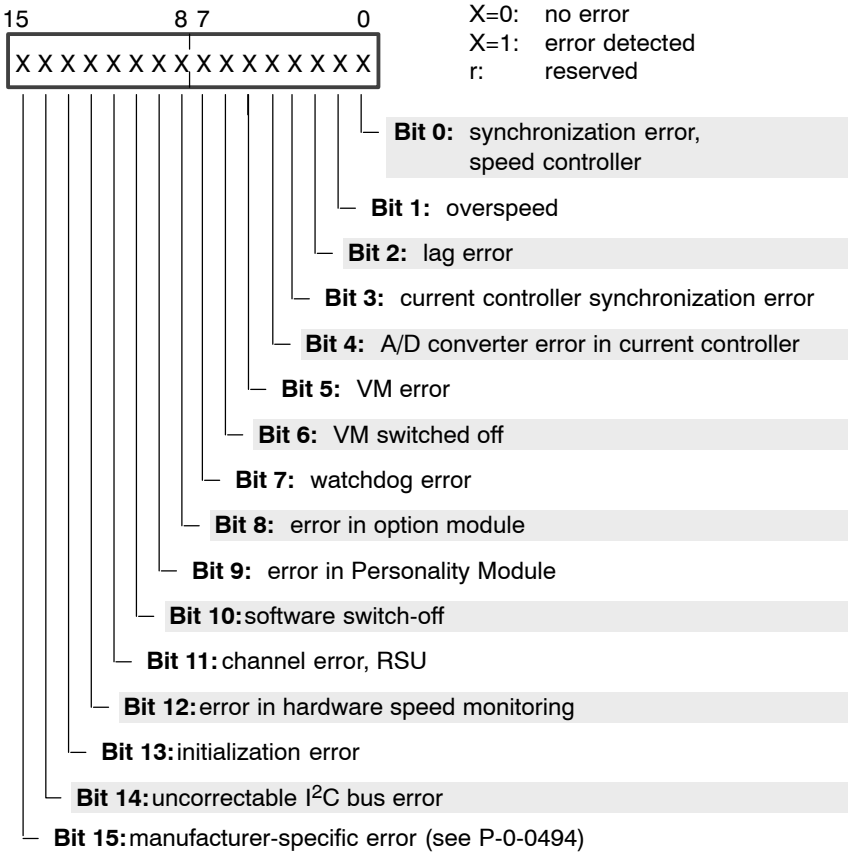
Diagnostics, Errors

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains any **Errors** which have occurred and which caused the drive to be locked (optimum drive halting with subsequent torque removal).
Every error is assigned 1 bit. If the corresponding bit is high, the related error is currently present.

☞ **For further manufacturer diagnostics class 1 errors (2nd group) see P-0-0493.**

Parameter configuration:



As soon as one of the errors listed above has occurred, the drive will set bit 15 of parameter S-0-0011 (diagnostics class 1) to "1" (Manufacturer-specific error).

For unlocking the drive, please refer to the description of parameter S-0-0011.

S-0-0130

SER

Measured value 1 (positive)

Probe

–	–	–	DT	–	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

With a **positive edge** from probe 1 (S-0-0401), the drive saves the position actual value of the active encoder specified in the operating mode (S-0-0032 to S-0-0035) in this parameter during the measuring cycle.
The value can be read out by the master later on.

S-0-0131
SER

Measured value 1 (negative)
Probe

–	–	–	DT	–	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

With a **negative edge** from probe 1 (S-0-0401), the drive saves the position actual value of the active encoder specified in the operating mode (S-0-0032 to S-0-0035) in this parameter during the measuring cycle.
The value can be read out by the master later on.

S-0-0134
SER

Master control word
Drive ON/OFF

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The master control word contains control commands for the drive:

Bit 13 Drive halt

1 Setpoints are active

1–>0 The drive decelerates according to the preselected deceleration ramp (ident. number 00138) until it comes to a stop and remains under control as long as bits 14 and 15 = 1.

0 Drive halt, setpoints are inhibited

0–>1 Drive accelerates according to the preselected acceleration ramp (ident. number 00138) up to the specified setpoint.

Bit 14 Drive enable

1 Drive has been enabled

1–>0 Torque is immediately removed, regardless of bits 13 and 15. The drive comes to a stop without setpoint control.

0 Not enabled

Bit 15 Drive ON

1 Drive ON

1–>0 Drive is braked in the shortest possible time until it is completely stopped, then the torque is removed. Only possible for as long as bit 14 = 1.

0 Drive OFF

☞ **Bits 13, 14 15 = 1: ready, the drive is controlled by setpoint inputs.**

This parameter provides for additional support for commissioning and troubleshooting of the SERCOS interface ring by displaying the master control word on the master's monitor through the service channel.

S-0-0135

SER

Drive status

Diagnostics, Status

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter serves to display the drive status on the master's monitor through the service channel as part of the drive telegram.

Parameter configuration:

15 0

X X X X X 0 X X X X X 0 0 X X X

X is assigned the 0 or 1 below it.

0/1 **Bit 0: Transmission handshake**

Bit 1: Busy

0 step has been completed

1 processing step

0/1 **Bit 2: Error in service channel**

Bit 5: Alteration bit commands

0 no change in command status

1 change in command status

Bit 6/7: Real-time status bits

0/1 Real-time status bit 1 (S-0-0304)

0/1 Real-time status bit 2 (S-0-0306)

Bit 8–9: Actual mode

0 0 drive in main mode (defined by S-0-0032)

0 1 drive in secondary mode 1 (defined by S-0-0033)

1 0 drive in secondary mode 2 (defined by S-0-0034)

1 1 drive in secondary mode 3 (defined by S-0-0035)

0/1 **Bit 11: Alteration bit diagnostics class 3** (S-0-0013)

0/1 **Bit 12: Alteration bit diagnostics class 2** (S-0-0012)

Bit 13: Error in diagnostics class 1 (S-0-0011)

0 no errors

1 drive interlocked because of error

Bit 14–15: Ready

0 0 drive not ready for connection to SERCOS system (internal check not yet completed)

0 1 drive ready for connection to SERCOS system

1 0 drive control unit and SERCOS system ready, drive without torque

1 1 drive operating: "Drive enable" and "Drive on" have been set and are active, drive has torque.

☞ **Note:**
Bit 15 changes from 1 → 0 only in the event of EMERGENCY OFF.

S-0-0138

SER CANr ANA MC DP

Acceleration bipolar

Interpolation

3,4	2	–	–	FEPROM	Accel.	SER
3,4	–	–	MDT	FEPROM	Accel.	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Defines the maximum possible acceleration. Higher inputs are automatically limited by the drive to this value. Applies to both directions of rotation.

Range: 0 ... 2^{31}
Weighting according to S-0-0160.

S-0-0139

SER

Command "Parked axis"

Park axis

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

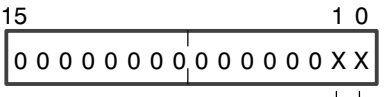
This command switches all monitoring functions related to the measuring system off in the drive.

- Position control
- Measuring loop monitoring (encoder hardware)
- Monitoring of the position window (S-0-0057)

The position actual values status (S-0-0403) is deleted by the drive and it reports no errors of the diagnostics class 1 (S-0-0011).
When all monitoring functions have been switched off, the command alteration bit is set in the data status for acknowledgement to the master.

When the command is deleted, all above-named monitoring functions are switched back on and the drive must perform referencing in order to be able to relate the position actual values to the reference point again.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

S-0-0140
SER CANr ANA MC DP

Controller device type
Info, Version

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Example:

Bosch – DM 8 K

Manufacturer

VM = Supply module
DM = Three-phase module

Maximum current with f_s = 2 kHz

Module width: A = approx. 50 mm
B = approx. 100 mm
C = approx. 150 mm
D = approx. 200 mm
F = approx. 300 mm
K = compact mechanics

S-0-0141
SER CANr ANA MC DP

Motor type
Info, Version

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the type designation of the connected motor.

S-0-0142
SER

Type of application
Info, Version

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter may be used to enter data on the application of the drive, such as main spindle drive, rotary axis, etc.

S-0-0143
SER

SERCOS interface version
Info, Version

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Version of the implemented SERCOS interface specification.

S-0-0144

SER

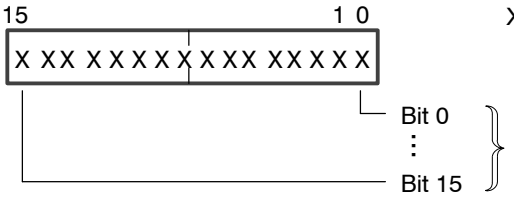
Signal status word

Telegram configuration

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The signal status word can be used to transmit signals in real time from the drive to the master. For this purpose, the signal status word must be integrated into the drive telegram (DT) as cyclic data.
The bits of the signal status word can be freely defined via the ”signal status word configuration list” (S-0-0026).

Parameter configuration:



X is assigned the 0 or 1 below it.

S-0-0145

SER

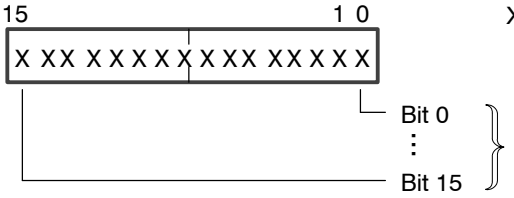
Signal control word

Telegram configuration

3,4	–	–	MDT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The signal control word can be used to transmit signals in real time from the master to the drive. For this purpose, the signal control word must be integrated into the master data telegram (MDT) as cyclic data.
The bits of the signal control word can be freely defined via the ”signal control word configuration list” (S-0-0027).

Parameter configuration:



X is assigned the 0 or 1 below it.

S-0-0146

SER

Command “NC-controlled referencing”

Referencing

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Parameter configuration:

15 1 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

X is assigned the 0 or 1 below it.

0 0 No command

1 1 Execution of command

The proper execution of this command requires the following assignments to the real-time control or status bits:

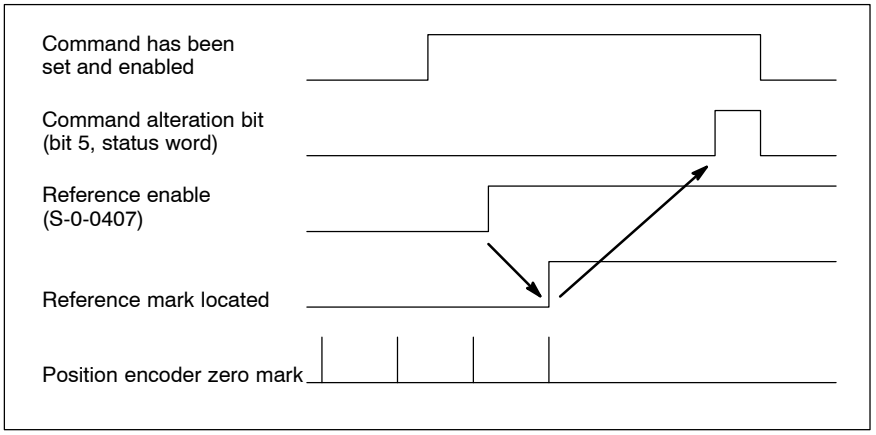
- Real-time control bit: Reference enable (S-0-0407)
- Real-time status bit: Reference mark located (S-0-0408).

For NC-controlled referencing, the referencing logic of the control unit is active. All setpoint inputs for motor movements are generated by the CNC.

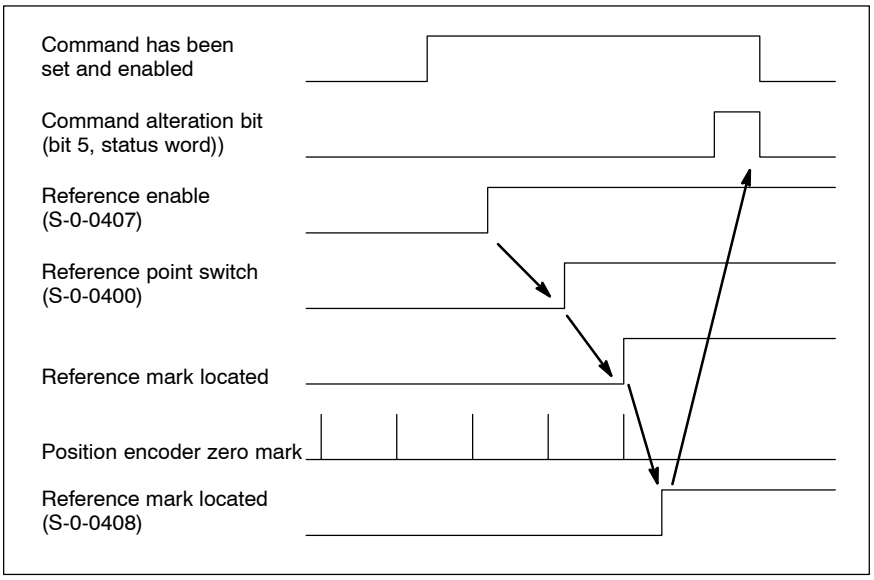
Two different cases have to be distinguished:

- **Case 1**: the reference point switch is connected to the control. The control activates reference enable (S-0-0407) via the real-time control bit. The drive only evaluates the reference enable signal.
- **Case 2**: the reference point switch is connected to the drive. The control activates reference enable (S-0-0407) via the real-time control bit. The drive evaluates the reference enable (S-0-0407) signal as well as the reference point switch (also refer to S-0-0400).

The case which is to be relevant is defined by setting bit 4 of the referencing parameter S-0-0147.



Bit sequence for Case 1 in NC-controlled referencing



Bit sequence for Case 2 in NC-controlled referencing

The command starts the search for the marker in the drive. When the marker is reached, the position actual value is stored in the marker position A (S-0-0173) and the bit ”Reference mark located” (S-0-0408) is set.
This applies for all encoder types with markers, including gear encoders as motor encoders.
The absolute encoders integrated in the SF motors have no markers, however, they generate a reference mark when they traverse the reference point switch. The next time the reference mark is detected, the absolute position is evaluated and the marker position A is determined. In order to be able to use the critical range around the zero point of the absolute value for referencing as well, the position of the reference point switch is stored in the parameter cam position status (P-0-0504).
The cam position status must be stored after first referencing with the command ”Save working memory” (S-0-0264). When restarting with a change in the cam position, the cam position status must be reset to “0” and saved.

With a distance-coded measuring system, a second marker is sought and stored in the marker position B (S-0-0174). In this context, please observe the note under S-0-0147!

If the reference point lies within one revolution, e.g. for a rotary axis, the reference point can be detected without a cam. This is set in the referencing parameter S-0-0147 with bit 5 = 1.

S-0-0147

SER MC DP

Referencing parameter

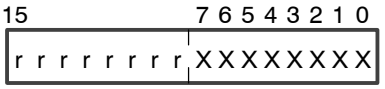
Referencing

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
2,3	–	–	–	FEPROM	–	SER
2,3	3	–	–	FEPROM	–	others

The referencing parameter controls the referencing processes.
For drive-controlled referencing, only bits 0, 1, 2, 3, 5, 6 are active.
For NC-controlled referencing only bits 1, 3, 4 are active.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved



Bit 0: Referencing direction

0 positive (clockwise rotation from the point of view of the shaft)
1 negative (counter-clockwise rotation)

Bit 1: Position encoder reference mark

0 first zero mark after positive edge of the reference point switch
1 first zero mark after negative edge of the reference point switch

Bit 2: Reference point switch

0 connected to NC
1 connected to drive

Bit 3: Referencing

0 with motor encoder
1 with external encoder

Bit 4: Evaluation in the drive

0 Reference point switch and reference enable
1 reference enable only

Bit 5: Evaluation of reference point switch

0 is evaluated
1 is not evaluated

Bit 6: Evaluation of position encoder reference mark

0 is evaluated
1 is not evaluated

Bit 7: Position after drive-controlled referencing

0 drive in any position
1 drive on reference point

An encoder selected in S-0-0032 to S-0-0035 is used for referencing. If no encoder is specified, bit 3 in the referencing parameter applies.

☞ **If the axis is located before the end of the traversing range in case of referencing with distance-coded measuring systems and the path for reading 2 markers is not sufficient, the status of the reference point switch will always be evaluated. If its signal is**
– active, the referencing direction is automatically rotated.
– inactive, the search for the marker according to bit 0 is initiated.

The length of the reference point switch has to correspond to at least the distance between two cyclical encoder marks in both instances.
If the reference point switch is executed with inverted logic, the referencing direction (see bit 0) needs to be rotated.

S-0-0148

SER MC DP

Command “Drive-controlled referencing”

Referencing

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

With this command, the drive detaches itself from the position setpoints and generates its own position specifications. For this, it uses the parameters referencing speed S-0-0041 and referencing acceleration S-0-0042. The functions:

- Search marker
- Calculate shift
- Perform shift to reference system

are executed independently by the drive. Bit 2 in S-0-0147 must be high.
If bit 7 in S-0-0147 is high, the drive will be located exactly on the reference point after referencing.
See also P-0-0504.

☞ **The command ”drive-controlled referencing” is set via the control word (see P-0-2800 bit 7) in case of interface types ”Motion Control” and ”PROFIBUS-DP”.**

S-0-0149

SER

Command ”Traverse to fixed stop”

Axis clamping

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This command is for clamping a part.
The drive receives a position input ”within” the part, so that a lag arises which the position controller cannot eliminate. Therefore, all controller monitoring functions are switched off in the drive in every operating mode, otherwise they would lead to an error message in diagnostics class 1 when the drive is blocked by the fixed stop.

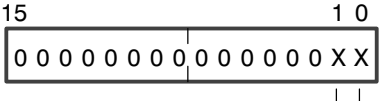
The command is acknowledged by setting the command alteration bit in the data status, if:

- all controller monitoring functions have been switched off
- $|M_d| \geq |M_{dlimit}|$
- $n_{act} = 0$ (is monitored by the master while the command is running)

If the running command is interrupted, the controller monitoring functions are not switched off.

Before deleting the command, the master must accept the position actual value to its position setpoint. After the command has been deleted, the controller monitoring functions are reactivated

Parameter configuration:



X is assigned the 0 or 1 below it.

0 0	No command
1 1	Execution of command

S-X-0150
SER MC DP

Reference dimension, offset 1

Referencing

3	2	–	–	FEPROM	Motor position encoder	SER
3	3	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Distance between reference mark of the motor encoder and the position actual value 1 reference dimension (S-0-0052).
Weighting according to S-0-0076.
Using S-X-0150, the reference point can be shifted in positive and negative direction, irrespective of the referencing direction.
Positive values: shift in negative direction
Negative values: shift in positive direction

S-X-0151
SER

Reference dimension, offset 2

Referencing

3	2	–	–	FEPROM	Ext. encoder	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Distance between reference mark of the external encoder and the position actual value 2 reference dimension (S-0-0054). Effect analogous to S-X-0150.
Weighting according to S-0-0076.

S-0-0152
SER

Command "Position spindle" (spindle orientation)

Spindle orientation

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Following this command, the drive first tries to reach the spindle positioning speed S-0-0222 by decelerating from a higher speed or accelerating from a lower speed or from standstill.

Following this command, the drive immediately switches to internal position control in the case of speeds ≦ spindle positioning speed (S-0-0222) and performs referencing of the spindle. Depending on the setting in S-0-0154 the drive

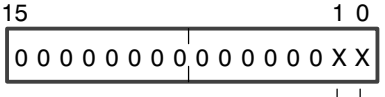
- performs absolute movement to the spindle angular position (S-0-0153), or
- performs incremental movement according to the spindle path (S-0-0180).

During the command, the drive does not account for the cyclic speed setpoints. Changes of the spindle angular position or spindle path through the service channel are however accepted.

When the drive **interpolator** reaches its final position, the "Target position reached" (S-0-0342) message will be set. The "In-Position rough" (S-0-0341) or "In-Position" (S-0-0336) messages will be updated accordingly by the drive.

When the command has been deleted, the drive switches back to the operating mode specified in the control word.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

S-0-0153
SER

Spindle angular position
Spindle orientation

3,4	2	–	MDT	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Value of the absolute angular position with respect to the reference point in connection with the commands ”Position spindle” and ”Drive-controlled synchronous operation”. See also S-0-0154.

Range: -2^{31} ... $+2^{31}-1$
Weighting and preferred weighting in accordance with S-0-0076.

S-0-0154
SER

Spindle positioning parameter
Spindle orientation

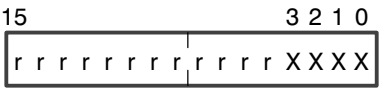
2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The spindle positioning parameter determines:

- the direction of rotation for spindle orientation from standstill
- the traversing method for spindle orientation:
  - absolute movement to the spindle angular position (see S-0-0153) or
  - incremental movement according to spindle path (see S-0-0180)
- active encoder

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved



Bit 0. 1: Direction of rotation

0 0	clockwise
0 1	counter-clockwise
1 X	shortest path

Bit 2: Angle/Path

0	spindle angular position
1	spindle path

Bit 3: Encoder

0	motor encoder
1	external encoder

S-X-0155
SER

Friction torque compensation
Compensation

3,4	2	–	–	FEPROM	Torque	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter is used to compensate for the static friction for **acceleration from standstill and for reversing the direction of rotation**.
For this purpose, you should enter the desired compensation value in S-X-0155. This compensation value automatically receives the same sign as the torque setpoint to which it is superposed additively.
For conditions for activation, see P-0-0506.

Weighting and preferred weighting see S-0-0086.

☞ **The friction compensation via torque is particularly suited for higher feedrates in connection with the feed-forward control.**
For special compensation of errors at the quadrant transition of circles (circle compensation), see P-0-0536 to P-0-0540 and P-0-0510 bit 4.

S-X-0157

SER CANr ANA MC DP

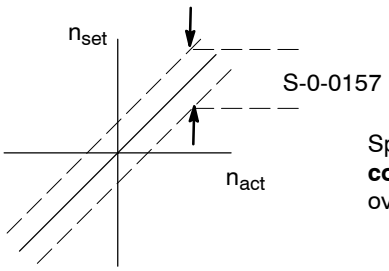
Speed window

Limit value

3,4	2	–	–	FEPROM	Speed	SER
3,4	3	–	–	FEPROM	Speed	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter influences the type and size of the tolerance band for speed-dependent messages (e.g. S-0-0330 Message n_{act}=n_{set}).

Range: dependent on the inverter-motor combination
Weighting according to S-0-0044.



Speed window
constant
over the speed range.

Please also note parameter S-0-0272.

S-0-0158

SER

Output threshold P_x

Limit value

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Value for output threshold P_x.

Range: 0 ... 2^{31} [W]

S-0-0159

SER CANr MC DP

Monitoring window

Limit value

3,4	2	–	–	FEPROM	–	SER
3,4	3	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Monitoring of speed setpoint by evaluating the deviation between the position actual value and the position setpoint. When the monitoring window (entry in % of maximum speed) is exceeded, the drive sets the error message 'excessive controller deviation' in parameter diagnostics class 1 (see S-0-0011).

Range: 0 ... 500.0 %,
100 % : maximum speed in accordance with S-0-0091.

Default setting: 120 %

☞ **For dynamic lag monitoring, see P-0-0530 and P-0-0531.**

S-0-0160

SER ANA MC DP

Type of weighting of acceleration data

Weighting

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You specify the way in which the drive interprets **acceleration data internally**.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

15 6 5 4 3 2 1 0

r r r r r r r r X 0 X 0 0 X X

Bits 0-2: Type of weighting

X 0 0 0 0 0 0 Incremental weighting
X 0 X 0 0 0 1 Translatory weighting
X 0 X 0 0 1 0 Rotary weighting

0 **Bit 3: Preferred weighting**

Bit 4: Translatory unit of measure

0 Meter [m]
1 Inch [in]

Bit 4: Rotary unit of measure

0 Radiant [rad]
1 – reserved –

Bit 5: Unit of time

0 Second [s]
1 – reserved –

Bit 6: Data reference

0 at the motor shaft
1 at the load

Relationship between type of weighting and internal resolution (resolution of calculation):

- Incremental weighting: 1 LSB= 1 increment
- Translatory weighting (metric): 1 LSB= 1×10^{-6} m/s^2
  (inch): 1 LSB= 1×10^{-5} inch/s^2
- Rotary weighting: (Radiant): 1 LSB= 1×10^{-3} rad/s^2

★ If you want to change weighting data, you should note the following:

- The weighting of speed, acceleration and position data should always be identical with respect to bits 0 to 4. This refers to parameters
  - S-0-0044 (Speed)
  - S-0-0160 (Acceleration)
  - S-0-0076 (Position)
- Bit 6 (Data reference) in these parameters and in parameter S-0-0086 (Type of weighting for torque/force data) must be set to identical values.
- Changes to S-0-0160 will also affect parameters
  - S-0-0042 (Referencing acceleration)
  - S-0-0138 (Acceleration bipolar)
  - S-0-0260 (Positioning acceleration)

S-0-0161
SER

Weighting factor of acceleration data
Weighting

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Since the preferred weighting is permanently set in bit 3 of weighting type S-0-0160, this parameter is determined depending on the unit of measure (S-0-0160, bit 4) and cannot be overwritten.

1 LSB = S-0-0161 x $10^{exponent}$

S-0-0162
SER

Weighting exponent of acceleration data
Weighting

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter cannot be overwritten, see S-0-0161.

1 LSB = factor x $10^{S\text{-}0\text{-}0162}$

S-0-0165
SER

Distance-coded reference dimension A
Encoder

2	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In case of a measuring system with distance-coded reference marks, the **larger** periodical distance between 2 reference marks is entered here.
For additional explanations, see S-0-0166.

Range: 0 ... 2^{32}–1
Weighting according to number of divisions of measuring system.

☞ **In case of incremental systems at OM1, the multiplication of the EXE has to be taken into account: S-0-0165 = measuring system divisions *5**

☞ **Following a software update to V0.46, the value stored in S-0-0165 must now be entered in S-0-0166, and a new value must be determined for S-0-0165.**

S-0-0166
SER

Distance-coded reference dimension B

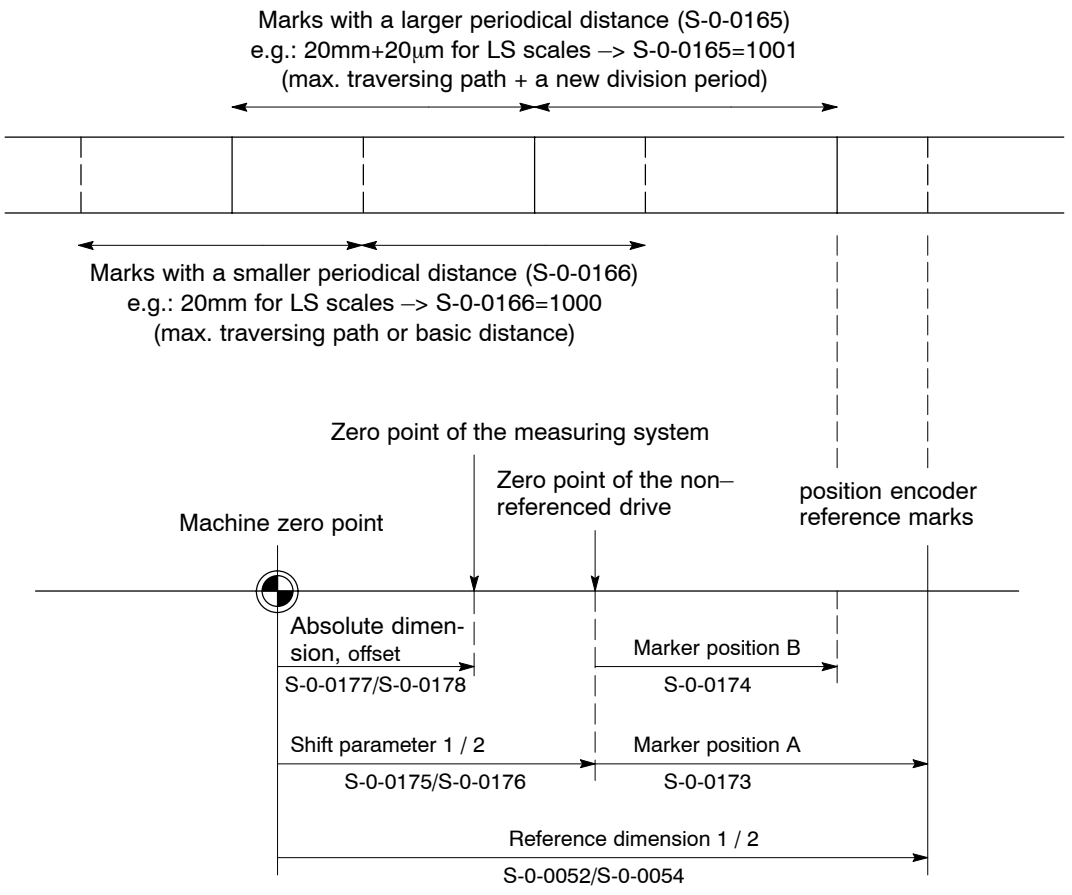
Encoder

2	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In case of a measuring system with distance-coded reference marks, the **smaller** periodical distance between 2 reference marks is entered here.

Range: 0 ... 2^{32}–1
Weighting according to number of divisions of measuring system.

☞ **In case of incremental systems at OM1, the multiplication of the EXE has to be taken into account: S-0-0166 = measuring system divisions *5**



Distance-coded measuring system

S-0-0169
SER

Probe control parameter
Probe

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Specifies the active edge for the probe measuring cycle (positive, negative, both edges).

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

15 … 1 0

r r r r r r r r r r r r r r X X

Bit 0: Probe 1, positive edge
0 positive edge not active
1 positive edge active

Bit 1: Probe 1, negative edge
0 negative edge not active
1 negative edge active

S-0-0170
SER

Command "Probe cycle"
Probe

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Initiates the measuring process.

Parameter configuration:

X is assigned the 0 or 1 below it.

15 … 1 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

0 0 No command
1 1 Execution of command

S-0-0171
SER

Command "Calculate shift"
Referencing

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

By setting and enabling this command, the drive calculates the shift between the old and new (referenced) setpoint/actual value system, from the parameters:

- Reference dimension, position actual value
- Reference dimension, offset
- Marker position

Parameter configuration:

X is assigned the 0 or 1 below it.

15 … 1 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

0 0 No command
1 1 Execution of command

The encoder for which the shift is to be calculated is selected in the referencing parameter S-0-0147, Bit 3.

Command execution sequence:

1. The control activates the ”Calculate shift” command.
2. The drive calculates the distance to the machine zero point:

With incremental measuring systems

Distance to machine zero point = Reference dimension + Reference dimension, Offset

Reference dimension: S-0-0052 or S-0-0054 (depending on encoder)
Reference dimension, Offset: S-0-0150 or S-0-0151 (depending on encoder)
The signs depend on the machine configuration!

With distance-coded measuring systems:

The distance to the machine zero point is calculated from the ”Marker position A”, ”Marker position B” and ”Absolute dimension, Offset” parameters.

Marker position A: S-0-0173
Marker position B: S-0-0174
Absolute dimension, Offset: S-0-0177 or S-0-0178 (depending on encoder)

3. The drive calculates the shift between the machine zero and the zero point of the non-referenced drive, taking into account the signs:

Shift = distance to the machine zero point – marker position A

Distance to the machine zero point: For calculation, see above
Marker position A: S-0-0173

4. Depending on the encoder type, the drive stores the result in shift parameter 1 (S-0-0175) or shift parameter 2 (S-0-0176).
   Then it outputs a positive acknowledgment of the command.
5. The control unit reads the corresponding shift parameter, sets the position setpoint to the referenced system and clears the ”Calculate shift” command.

S-0-0172
SER

Command ”Shift to reference system”
Referencing

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Parameter configuration:

15 1 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

The proper execution of this command requires the following assignments to the real-time control or status bits:

- Real-time control bit: position setpoints status (S-0-0404)
- Real-time status bit: position actual values status (S-0-0403).

The bit “position setpoints status” must be set by the NC, independent of the operating mode.

By setting the ”position setpoints status” bit, the drive switches to the referenced position actual value system, enters the referenced Position actual value 1 (S-0-0051) or Position actual value 2 (S-0-0053) into the DT and reports this to the NC in the ”Position actual values status” bit (S-0-0403).

The command is positively acknowledged by the drive as soon as both bits are high.

S-0-0173
SER

Marker position A
Referencing

–	–	–	–	–	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

If the drive identifies the encoder marker during referencing, it saves the current, unreferenced position actual value in marker position A.
Weighting according to S-0-0076.

S-0-0174
SER

Marker position B
Referencing

–	–	–	–	–	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

With a distance-coded measuring system, a second marker is sought and stored in marker position B.
Marker position B is also required in order to be able to calculate the absolute position relative to the zero point of the measuring system.
Weighting according to S-0-0076.

S-0-0175
SER

Shift parameter 1
Referencing

3,4	–	–	–	–	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

When the **motor encoder** has been selected (see parameters S-0-0032 to S-0-0035; if no encoder has been specified there, bit 3 of the referencing parameter S-0-0147 shall be applicable), the drive here saves the difference between the old position system and the referenced position system, calculated with the command ”Calculate shift”.
Weighting according to S-0-0076.

S-0-0176
SER

Shift parameter 2
Referencing

3,4	–	–	–	–	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

When the **external encoder** has been selected (see parameters S-0-0032 to S-0-0035; if no encoder has been specified there, bit 3 of the referencing parameter S-0-0147 shall be applicable), the drive here saves the difference between the old position system and the referenced position system, calculated with the command ”Calculate shift”.
Weighting according to S-0-0076.

S-0-0177
SER 'MC DP

Absolute dimension, offset 1

Encoder

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	2	–	–	FEPROM	Motor position encoder	SER
3,4	3	–	–	FEPROM	–	others

Distance from machine zero point to zero point of the **motor encoder** with absolute measurement. Weighting according to S-0-0076.

S-0-0178
SER

Absolute dimension, offset 2

Encoder

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	2	–	–	FEPROM	Ext. encoder	SER
3,4	3	–	–	FEPROM	Ext. encoder	others

Distance from machine zero point to zero point of the **external measuring system** with absolute measurement. Weighting according to S-0-0076.

S-0-0179
SER

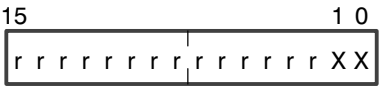
Measured value status

Probe

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	–	–	–	–	

When the drive saves one or more measured values while the command ”probe cycle” is active, it sets the corresponding bit in the measured value status at the same time. Both bits are deleted again when the master deletes the probe 1 enable.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

Bit 0: Measured value 1 positive transferred
0 not transferred
1 transferred

Bit 1: Measured value 1 negative transferred
0 not transferred
1 transferred

S-0-0180
SER

Spindle path

Spindle orientation

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	2	–	–	FEPROM	Position	

Incremental value added up by the drive to the absolute position setpoint P-0-1029. Thus, the spindle can be traversed for a certain number of revolutions. This value is only active in combination with the command ”Position spindle”.

Range: -2^{31} ... $+2^{31}-1$
Weighting and preferred weighting in accordance with S-0-0076.

S-0-0181

SER CANr ANA MC DP

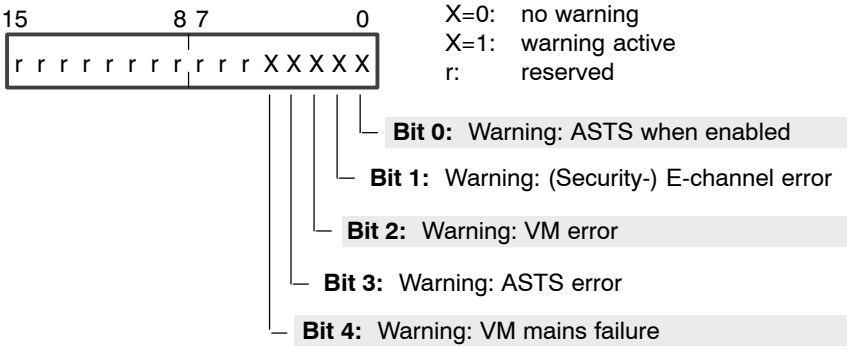
Manufacturer's diagnostics class 2

Diagnostics, warning

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains all **warnings** that have occurred and that may eventually cause the drive to be switched off.
Each warning is assigned 1 bit. If the corresponding bit is high, the related warning is currently present.

Parameter configuration:



As soon as one of the warnings listed above occurs or disappears, the drive sets bit 15 of parameter S-0-0012 (diagnostics class 2) to "1" (manufacturer-specific warning).

A high bit in S-0-0181 can only be reset by reading parameter S-0-0181. The "Alteration bit diagnostics class 2" is not affected by this. It can only be reset by reading parameter S-0-0012.

S-0-0182

SER CANr ANA MC DP

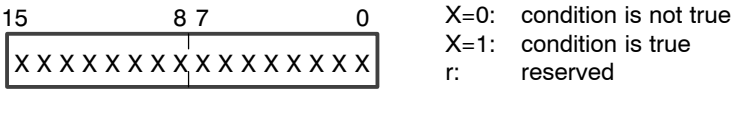
Manufacturer's diagnostics class 3

Diagnostics, status

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains **operating statuses** of the drive.
Each status is assigned 1 bit. If the corresponding bit is high, the related operating status is currently true.

Parameter configuration:



As soon as a status bit changes, the drive sets bit 15 of parameter S-0-0013 (diagnostics class 3) to "1" (manufacturer-specific operating status).

A high bit in S-0-0182 can only be reset by reading parameter S-0-0182. The "Alteration bit diagnostics class 3" is not influenced by this. It can only be reset by reading parameter S-0-0013.

S-X-0183
SER

Synchronous run window for speed
Limit value

3,4	2	–	–	FEPROM	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Difference between n_{set} of the master spindle and n_{act} of the synchronized spindle permitted for synchronous operation.
The drive sets the message speed-synchronous run. This message can be assigned to a real-time status bit in the drive status word and transferred to the NC for further processing.

Range: 0 ... 90 % n_{max}

Translatory preferred weightings

1. Metric: 1×10^{-6} m/min ≙ 1 LSB
2. inch: 1×10^{-5} in/min ≙ 1 LSB

Rotary preferred weightings:

1. Minute: 1×10^{-4} rpm ≙ 1 LSB
2. Second: 1×10^{-6} rev/sec. ≙ 1 LSB

S-X-0184
SER

Synchronous run error limit for speed
Limit value

3,4	2	–	–	FEPROM	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Max. admissible difference between n_{set} of the master spindle and n_{act} of the synchronized spindle. If this value is exceeded, the Synchronous run error message is set. This message can be assigned to a real-time status bit in the drive status word and transferred to the NC for further processing.

Range: 0 ... 90 % n_{max}

Translatory preferred weightings

1. Metric: 1×10^{-6} m/min ≙ 1 LSB
2. inch: 1×10^{-5} in/min ≙ 1 LSB

Rotary preferred weightings:

1. Minute: 1×10^{-4} rpm ≙ 1 LSB
2. Second: 1×10^{-6} rev/sec. ≙ 1 LSB

S-0-0185
SER

Length of the configurable data set in the DT

Telegram configuration

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Maximum data set length in bytes, which the drive can process in the configurable DT.

S-0-0186
SER

Length of the configurable data set in the MDT

Telegram configuration

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Maximum data set length in bytes, which the drive can process in the configurable MDT.

From software version V0.44 on: max. 400 bytes for max. 32 axes.

S-0-0187
SER

List of configurable data in the DT

Telegram configuration

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

List of ident. numbers of operating data that can be cyclically provided as actual values by the drive.
These can be seen in the attributes bar in the manual.

S-0-0188
SER

List of configurable data in the MDT

Telegram configuration

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

List of ident. numbers of operating data that can be cyclically processed as setpoints by the drive.
These can be seen in the attributes bar in the manual.

S-0-0189
SER CANr MC DP

Following distance

Measuring point

–	–	–	DT	–	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter contains the current following distance, i.e. the difference between the position setpoint and the position actual value:

S-0-0189 = S-0-0047 – S-0-0051 (or S-00053)

Weighting according to S-0-0076.

S-0-0190
SER

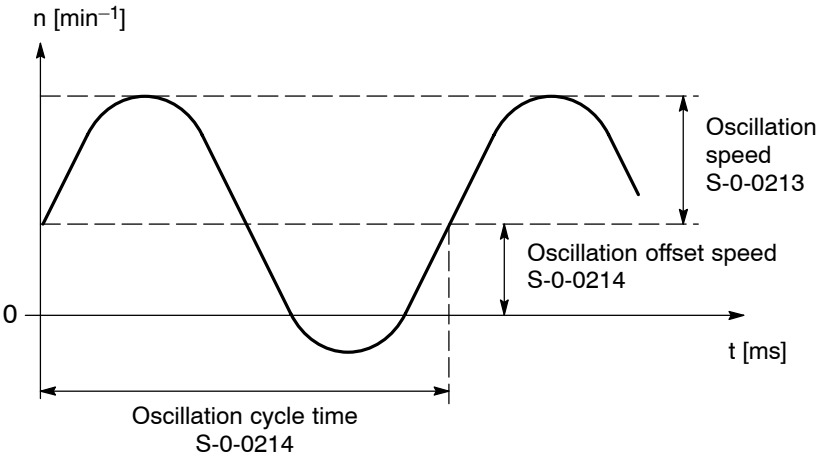
Command ”Drive-controlled oscillation”
Oscillation

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This command initiates an oscillating rotary movement of the drive which is determined by:

- the oscillation speed S-0-0213
- the oscillation offset speed S-0-0214
- the oscillation cycle time S-0-0215.

The cyclic speed setpoints are not active until the command is deleted.



Parameter configuration:

15 1 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

☞ **For as long as the command ”Position spindle” (S-0-0152) is active, ”Drive-controlled oscillation” is not possible. The drive will output an error message.**

S-0-0191
SER

Command ”Delete reference point”
Referencing

2,3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

By setting and enabling this command, the position actual value S-0-0403 is deleted in the drive.

Parameter configuration:

15 1 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

S-0-0192
SER

List of operating data to be saved
Operating data lists

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This list contains all ident. numbers required for operating the drive. The master can create a backup copy of this list of drive parameters.

S-0-0196
SER CANr ANA MC DP

Rated motor current
Limit value

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the rated motor current specified in the motor data sheet.

☞ **For asynchronous motors, the rated current is used as a reference magnitude for all motor-related current values. The resulting rated torque is taken as reference quantity for all torque data.**

S-0-0197
SER

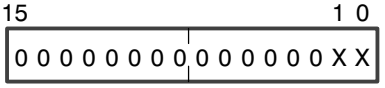
Command ”Set coordinate system”
Coordinate system

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

When this command is activated, the drive ignores position setpoints and accepts the programmed coordinate start value S-0-0198 as drive-internal position setpoint.
In addition, the drive converts all absolute position data (measured values, position limit values, etc.), based on the coordinate start value.
The bits ”position actual values status” (S-0-0403) and ”position setpoints status” (S-0-0404) are not changed by this command.

The command is correctly ended when all conversions have taken place and the drive coordinate system has been set to the coordinate start value. The master must set its coordinate system to that of the drive and then deletes this command. After the command has been deleted, the drive accepts the position setpoint from the master again.
The command is ended with an error, if the drive detects an error in the conversion.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

S-0-0198
SER

Coordinate start value
Coordinate system

3,4	–	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The coordinate system of the drive is set to the value programmed here with the command ”Set coordinate system”.

Range: -2^{31} ... $+2^{31}-1$
Weighting and preferred weighting in accordance with S-0-0076.

S-0-0199

SER

Command ”Shift coordinate system”

Coordinate system

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

With this command, the drive ignores the position setpoints and adds the programmed coordinate shift value S-0-0275 to the drive-internal position setpoint. Furthermore, the drive modifies all absolute position data (measured values, position limit values, etc.), with this coordinate shift value.
The bits ”position actual values status” (S-0-0403) and ”position setpoints status” (S-0-0404) are not changed by this command.

The command is correctly ended when all conversions have taken place and the drive coordinate system has been recalculated. The master must set its coordinate system to that of the drive and then deletes this command. After the command has been deleted, the drive accepts the position setpoint from the master again.
The command is ended with an error, if the drive detects an error in the conversion.

Parameter configuration:

15 1 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

S-0-0200
SER CANr ANA MC DP

Amplifier warning temperature
Limit value

–	2	–	–	FEPROM	Temp.	SER
2,3,4	2	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Temperature warning for inverter monitoring

Range: 0.0 ... 165.0
Weighting according to S-0-0208.

S-0-0201
SER CANr ANA MC DP

Motor warning temperature
Limit value

3,4	2	–	–	FEPROM	Temp.	SER
2,3,4	2	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Temperature warning for motor monitoring.

Range: 0.0 ... 165.0
Weighting according to S-0-0208.

S-0-0203
SER CANr ANA MC DP

Amplifier switch-off temperature
Limit value

–	2	–	–	FEPROM	Temp.	SER
–	2	–	–	–	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Switch-off temperature for inverter monitoring.

Range: 0.0 ... 165.0
Weighting according to S-0-0208.

S-0-0204
SER CANr ANA MC DP

Motor switch-off temperature
Limit value

3,4	2	–	–	FEPROM	Temp.	SER
–	2	–	–	–	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Switch-off temperature for motor monitoring (thermal motor protection).
Default setting: 155.0 °C

Range: 0.0 ... 165.0
Weighting according to S-0-0208.

★ Please also note the ”thermal motor protection factor” P-0-0200!

★ An increase of S-0-0204 to the maximum value is only permitted if
- the motors have a thermal class higher than F, or
- have external ventilation.

S-0-0206

SER CANr ANA MC DP

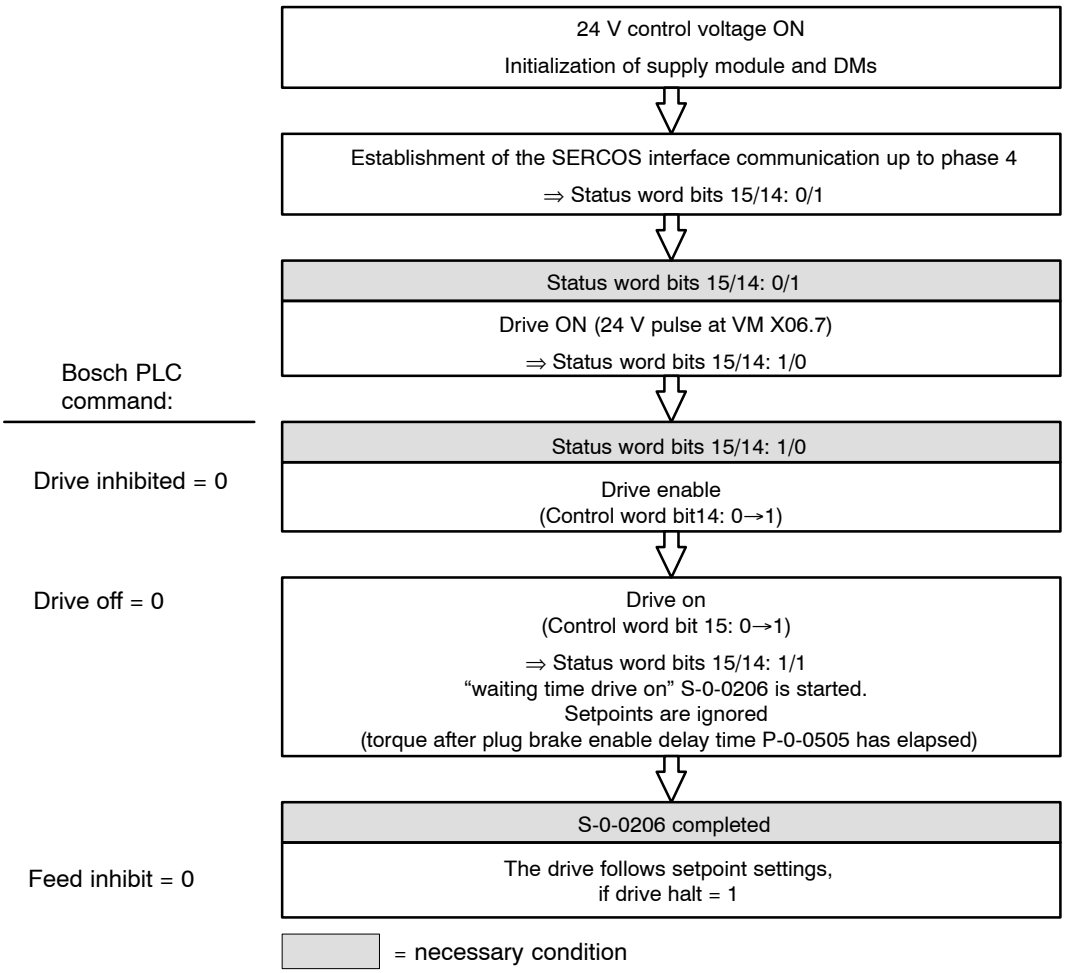
Waiting time drive on

Drive ON/OFF

3,4	2	–	–	FEPROM	–	SER
3,4	3	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

After setting the signals ”drive enable” and ”drive on” (bits 14 and 15 in the control word), the drive does not follow the setpoint inputs until the waiting time specified here has elapsed.
The **torque becomes effective immediately**, regardless of this waiting time.

Range: 0 ... 65535 ms



CAUTION
Strong wear of the holding brake!
The waiting time S-0-0206 may not elapse before the brake has been completely released!

S-0-0207

SER CANr ANA MC DP

Waiting time drive off

Drive ON/OFF

3,4	2	–	–	FEPROM	–	SER
3,4	3	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Range: 0 ... $+2^{15}$
Weighting 0.1 ms

After the signal ”drive on” has been cleared (bit 15 in the control word), the torque is maintained in the drive until the waiting time specified here has elapsed.

CAUTION
Strong wear of the holding brake!
The holding brake is not a working brake and may be operated only when the axis is stationary.
In order to avoid damage to the holding brake, the motor must therefore reach n = 0 before the waiting time S-0-0207 has elapsed.

The following must be observed:

- required braking time of drive until n = 0,
  when halting with ramp (P-0-0004), including ramp time, and the
- Halting time until brake is blocked (see corresponding motor manual).

☞ **See also P-0-0590.**

CAUTION
The holding brake cannot be controlled!
If the SERCOS interface is used in connection with the ”Range switching points” function (see P-0-0523), the holding brake cannot be controlled via the OUT2 hardware output!

S-0-0208

SER CANr ANA MC DP

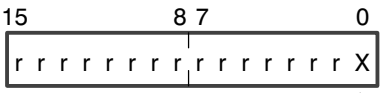
Weighting type for temperature data

Weighting

2	–	–	–	FEPROM	–	SER
2,3,4	–	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You specify the way in which the drive interprets **temperature data internally**.

Parameter configuration:



X is assigned the 0 or 1 below it.
r: reserved

0 Celsius
1 Fahrenheit

Relationship between type of weighting and internal resolution (resolution of calculation):

- Celsius: 1 LSB = 0.1 °C
- Fahrenheit: 1 LSB = 0.1 °F

★ If you want to change weighting data, you should note the following:

- Changes to S-0-0208 will also affect parameters
  - S-0-0200 (Amplifier warning temperature)
  - S-0-0201 (Motor warning temperature)
  - S-0-0203 (Amplifier switch-off temperature)
  - S-0-0204 (Motor switch-off temperature)

S-X-0209

SER ANA MC DP

Lower adaption limit

Controller

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	FEPROM	Speed	ANA
3,4	2	–	–	FEPROM	Speed	others

Range: dependent on the inverter-motor combination
Weighting according to S-0-0044.

Below this speed, S-X-0211 has effect. Above this speed, the speed controller proportional gain changes linearly (in 20 steps) and reaches the value parametrized in S-X-0100 at the ”upper adaption limit” (S-X-0210).

See also S-X-0211 and S-X-0212.

S-X-0210

SER ANA MC DP

Upper adaption limit

Controller

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	FEPROM	Speed	ANA
3,4	2	–	–	FEPROM	Speed	others

Range: dependent on the inverter-motor combination
Weighting according to S-0-0044.

When the speed that has been input here is reached, the value parametrized in S-X-0100 acts as speed controller proportional gain again.
Below this speed, the speed controller proportional gain changes linearly (in 20 steps) and reaches the value determined by S-X-0211 at the ”lower adaption limit” (S-X-0209).

See also S-X-0211 and S-X-0212.

☞ **The speed controller proportional gain can also be influenced above S-X-0210. See P-0-0080 and P-0-0081.**

S-X-0211

SER ANA MC DP

Adaption of proportional gain

Controller

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	FEPROM	–	

Range: 10 ... 5000.0 Weighting 0.1 %

The drive can automatically change the P-component of the speed controller (S-X-0100) depending on the current revolutions or speed. The following applies:

Effective P-component of the speed controller = S-0-0100 * S-X-0211 / 100%

The effective P-component thus defined remains constant below the *lower adaption limit* (S-X-0209).
Above the *upper adaption limit* (S-X-0210) only S-0-0100 will still be active, if
– P-0-0080 = 0 or
– P-0-0080 <= S-X-0210 or
– P-0-0081=100
has been parametrized.
Between the two adaption limits the effective P-component is changed linearly in 20 steps.

To deactivate the function (S-X-0100 is then effective over the entire speed range):
– set S-X-0210 = 0 –or–
– set S-X-0210 <= S-X-0209 –or–
– set S-X-0211 = 100%

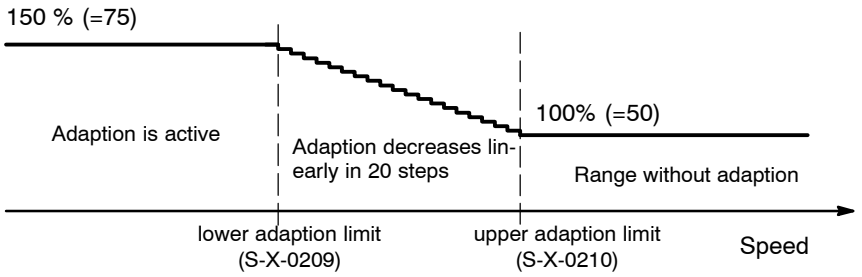
☞ **The speed controller proportional gain can also be influenced above S-X-0210. See P-0-0080 and P-0-0081.**

Example:

In the speed range between 0 and 3 rpm the P-component is to be raised from 50 to a value of 75 (=150% of 50) in order to improve the rigidity.
At 3 rpm or more, this adaption is no longer absolutely necessary for the application in question, and at 8 rpm it becomes entirely unnecessary.
The ”upper adaption” (P-0-0080, P-0-0081) has been switched off in this example.

Preset P-component (S-X-0100):	50
Lower adaption limit (S-X-0209):	3 rpm
Upper adaption limit (S-X-0210):	8 rpm
Adaption of proportional gain (S-X-0211):	150 %
Upper adaption limit 2 (P-0-0080):	0 rpm

Course of the effective P-component:



Adaption of the speed controller

S-X-0212
SER ANA MC DP

Adaption of correction time
Controller

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Range: 10 ... 5000.0
Weighting 0.1 %

Identical function as for S-X-0211, but for the I-component. The following applies:
Effective I-component of the speed controller = S-0-0101 * S-X-0212 / 100%

The effective I-component thus defined remains constant below the **lower adaption limit** (S-X-0209).
Above the **upper adaption limit** (S-X-0210), only S-0-0101 will remain active.
Between the two adaption limits the effective integral-action component is changed linearly in 20 steps.
Example analogous to the example under S-X-0211.

To deactivate the function (S-X-0101 is then effective over the entire speed range):
– set S-X-0210 = 0 –or–
– set S-X-0210 <= S-X-0209 –or–
– set S-X-0212 = 100%

S-0-0213
SER

Oscillation speed
Oscillation

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The oscillation speed limits the maximum speed of the drive in both directions during oscillation.

Range: 0 ... 0.9 n_{max} [min^{-1}]

S-0-0214
SER

Oscillation offset speed
Oscillation

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The offset speed can be superimposed to the oscillating speed.

Range: 0 ... 0.9 n_{max} [min^{-1}]

S-0-0215
SER

Oscillation cycle time
Oscillation

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

During the oscillation cycle time, the drive performs a complete oscillating movement.

Range: 5 x position cycle ... 6553.5 [ms]

S-0-0216
SER ANA

Command "Change parameter set"

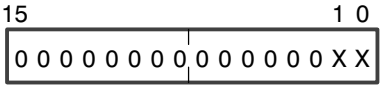
Changing parameters

3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

With this command, the drive changes to the parameter set programmed in the parameter set preselection (S-0-0217).

☞ **In connection with CANrho and parameter set change-over, see also S-0-0092.**

Parameter configuration:



X is assigned the 0 or 1 below it.

0 0	No command
1 1	Execution of command

S-0-0217
SER ANA MC DP

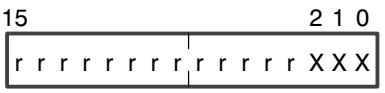
Parameter set preselection

Changing parameters

2,3,4	–	–	–	FEPROM	–	SER
2,3,4	–	M → D	MDT	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Determines the parameter set changed to with command S-0-0216.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

0 0 0	Parameter set 0
0 0 1	Parameter set 1
0 1 0	Parameter set 2
0 1 1	Parameter set 3
1 0 0	Parameter set 4
1 0 1	Parameter set 5
1 1 0	Parameter set 6
1 1 1	Parameter set 7

S-0-0219
SER ANA

List of ident. numbers for parameter set

Changing parameters

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The list of ident. numbers contains all data that can be changed in the parameter sets:

- list **S-0-0219** contains all existing parameters
- lists **S-X-0219** with **X = 1...7** contain all parameters that differ from parameter set 0 in the respective parameter set.

S-X-0222
SER

Spindle positioning speed
Spindle orientation

3,4	2	–	–	FEPROM	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Speed for performing spindle orientation. From a higher speed the drive decelerates to the positioning speed, from standstill it accelerates to the positioning speed.

Range: 0 ... $+2^{31}$ –1, weighting 10^{-4} min^{-1}

S-0-0223
SER

Command "Drive-controlled synchronous operation"
Spindle, synchronous

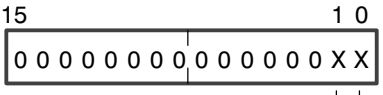
4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This command is used to synchronize the spindle to a master spindle. The type of synchronization is defined in the synchronous operation parameter S-0-0225.

The cyclic speed setpoints are not active until the command is deleted again.

- In the event of an error in diagnostics class 1 of the **synchronized spindle**, synchronous operation is cancelled.
- In the event of an error in diagnostics class 1 of the **master spindle**, synchronous operation is retained.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

S-0-0224
SER

Synchronization setpoint source
Spindle, synchronous

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Defines the setpoints or actual values of the master spindle to be used as setpoints by the synchronized spindle.

- Setpoints from SERCOS interface telegram:
  - speed setpoint S-0-0036
  - position setpoint, spindle P-0-1029
- Actual values from external encoder:
  - external spindle speed actual value P-0-1008
  - actual position value 2, spindle P-0-1031

S-0-0225
SER

Synchronous operation parameter

Spindle, synchronous

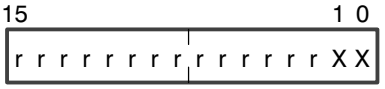
2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Defines the type of spindle synchronization activated with the command ”Drive-controlled synchronous operation”:

- **Speed synchronization**
  Synchronous operation with a programmable speed transmission ratio, monitoring via a synchronous run window for speed (S-0-0183) and the synchronous run error limit of speed (S-0-0184).
- **Absolute angle synchronization**
  Determination via synchronous position offset (S-0-0230) and spindle angular position (S-0-0153).

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved



0 0 synchronous to speed
1 1 synchronous to absolute angle

S-0-0226
SER

Master spindle revolutions

Spindle, synchronous

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The master spindle and synchronized spindles can be operated synchronously with any transmission ratio.
The transmission ratio is calculated from the ratio between the master spindle revolutions and the synchronized spindle revolutions:

$$\text{Transmission ratio} = \frac{\text{master spindle revolutions}}{\text{synchronized spindle revolutions}}$$

Range: -2^{31} ...$+2^{31}-1$ [rpm], integers

S-0-0227
SER

Synchronized spindle revolutions

Spindle, synchronous

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Cf. S-0-0226.

Range: -2^{31} ...$+2^{31}-1$ [rpm], integers

S-X-0228
SER

Synchronous run window, position

Spindle, synchronous

3,4	2	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Difference between the position setpoint of the master spindle and the position actual value of the synchronized spindle permitted for synchronous operation.
The drive sets the message position-synchronous run. This message can be assigned to a real-time status bit in the drive control word and transferred to the NC for further processing.

Range: 0 ... L_{max}

Translatory preferred weightings

1. Metric: 1×10^{-7} m $\triangleq$ 1 LSB
2. inch: 1×10^{-6} in $\triangleq$ 1 LSB

Rotary preferred weightings:

$$\frac{360 \text{ deg.}}{3\,600\,000} = 0.001 \text{ angular degrees } (= 1 \times 10^{-4}) \triangleq 1 \text{ LSB}$$

S-X-0229
SER

Synchronous run error limit, position

Spindle, synchronous

3,4	2	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Maximum permitted difference between the position setpoint of the master spindle and the position actual value of the synchronized spindle. If this value is exceeded, the message Synchronous run error is set. This message can be assigned to a real-time status bit in the drive status word and transferred to the NC for further processing.

Range: 0 ... L_{max}

Translatory preferred weightings

1. Metric: 1×10^{-7} m $\triangleq$ 1 LSB
2. inch: 1×10^{-6} in $\triangleq$ 1 LSB

Rotary preferred weightings:

$$\frac{360 \text{ deg.}}{3\,600\,000} = 0.001 \text{ angular degrees } (= 1 \times 10^{-4}) \triangleq 1 \text{ LSB}$$

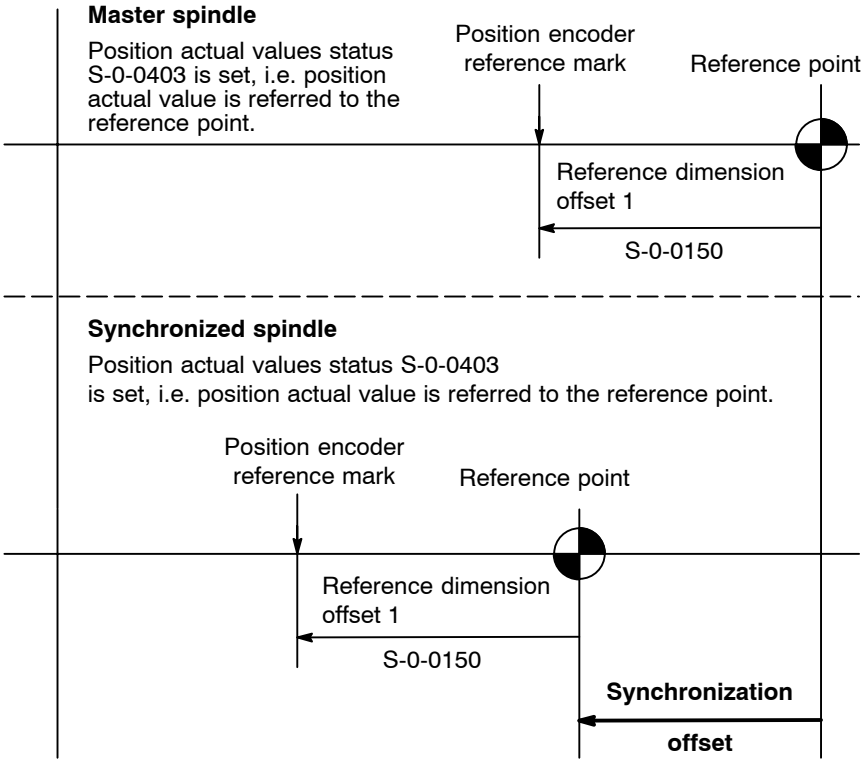
S-X-0230
SER

Synchronization offset

Spindle, synchronous

3	2	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The synchronization offset describes the **angular displacement between the reference points** of the master spindle and the synchronized spindle:



Synchronization offset

Range: -2^{31} ... $+2^{31}-1$

Translatory preferred weightings

1. Metric: 1×10^{-7} m ≙ 1 LSB
2. inch: 1×10^{-6} in ≙ 1 LSB

Rotary preferred weightings:

$\frac{360 \text{ deg.}}{3\,600\,000} = 0.001$ angular degrees $(= 1 \times 10^{-4})$ ≙ 1 LSB

S-0-0254

SER

Current parameter set

Changing parameters

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Using this parameter, the currently active parameter set of the drive can be queried. The parameter set preselection can already be programmed for one of the next parameter sets.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

15													2	1	0	
r	r	r	r	r	r	r	r	r	r	r	r	r	X	X	X	
													0	0	0	Parameter set 0 active
													0	0	1	Parameter set 1 active
													0	1	0	Parameter set 2 active
													0	1	1	Parameter set 3 active
													1	0	0	Parameter set 4 active
													1	0	1	Parameter set 5 active
													1	1	0	Parameter set 6 active
													1	1	1	Parameter set 7 active

S-0-0256
SER CANr ANA MC DP

Multiplication 1 (motor encoder)
Encoder

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Factor by which the drive multiplies the signals of the motor encoder:
S-0-0116 x S-0-0256 = Impulses per revolution

The factor is limited by the required traversing path. A high factor results in a high resolution, however with the consequence of a reduced traversing path.

Range: encoder-dependent, only **integer** values

☞ **If you change the factor, the max. input range for parameters S-0-0049 and S-0-0050 will be changed as well!**

S-0-0257
SER

Multiplication 2 (external encoder)
Encoder

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Factor by which the drive multiplies the signals of an external encoder (required option: direct measuring system):
S-0-0117 x S-0-0257 = Impulses per revolution

- **when using the OM 01 or OM 02 measuring system board**

Range: 1 ... 64, only **integer** values
(2 bits for impulse multiplication + 4 bits for pseudo multiplication for increasing the internal accuracy of calculation).

- **when using the OM 03 measuring system board**

Range: 2 ... 512, only **integer** values

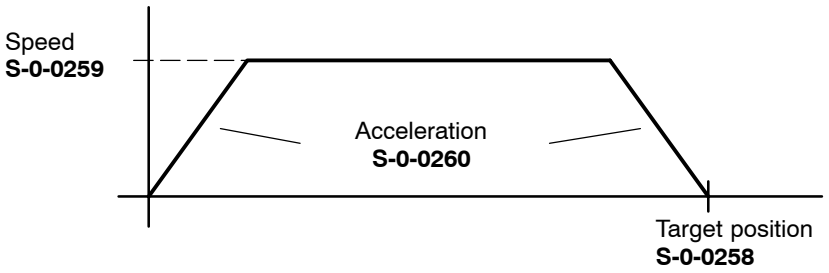
S-0-0258
SER MC

Target position
Interpolation

3,4	–	–	MDT	–	Position	SER
3,4	2	–	MDT	–	Position	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In the ”Interpolation in drive” operating mode (see S-0-0032 to S-0-0035), you specify the desired target position for the drive using this parameter.
The drive approaches the target position, taking into account the positioning speed S-0-0259 and the positioning acceleration S-0-0260.

Range: -2^{31} ... $+2^{31}$
Weighting according to S-0-0076.



Every new target input during an axis movement is immediately accepted if it can be reached with the current braking acceleration setting.

If this is not the case, the axis will first be braked and then approach the new target position.
If position limit values (S-0-0049, S-0-0050) are exceeded by this process, the ”Target position outside the position limit values” warning (see S-0-0323) will be output.

☞ **With SERCOS interface: for modulo axes, also refer to P-0-0510, bit 9.**
With Motion Control: for rotary axes, also refer to P-0-2210.

S-X-0259
SER MC

Positioning speed
Interpolation

3,4	2	–	MDT	FEPROM	Speed	SER
3,4	3	–	–	FEPROM	Speed	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The drive will approach the target position with the speed entered in this parameter (see S-0-0258).
The positioning speed can be changed in all operating modes. If the bipolar speed limit value specified in S-0-0091 is exceeded, the ”Positioning speed > n_{limit}” warning will be output (see S-0-0315).

Range: 0 ... 90 % n_{max}
Weighting according to S-0-0044.

S-X-0260
SER MC

Positioning acceleration
Interpolation

3,4	2	–	MDT	FEPROM	Accel.	SER
3,4	2	–	–	FEPROM	Accel.	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The drive accelerates to the Positioning speed S-0-0259 or brakes from the positioning speed with the acceleration entered in this parameter. Weighting according to S-0-0160.
This parameter can be changed in any operating mode. However, it will not become immediately active unless no braking process is currently taking place.

☞ **For SERCOS interface, bit 8 of P-0-0510 can be set to specify whether the Positioning acceleration in S-0-0260 (bipolar), or in P-0-0511 and P-0-0512 (pos./neg.) is to be active.**

S-0-0261
SER

Positioning window rough
Limit value

3,4	2	–	–	FEPROM	Position	SER
3,4	3	–	–	FEPROM	Position	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter is used to determine the maximum permissible following distance, for which the drive outputs the message ”In-Position rough” (see S-0-0341).
The message ”In-Position rough” can be assigned to a real-time status bit in the drive status word.
Weighting according to S-0-0076.

S-0-0263

SER CANr ANA MC DP

Command ”Load working memory”

Memory access

2	–	–	–	–	–	SER
2,3	–	–	–	–	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This command will load all data necessary for operation (= list S-0-0192) from the FEPROM of the Personality Module (PM) into the working memory of the drive.

☞ **This command will replace the parameters currently available in the working memory.**

Parameter configuration:

15 1 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

S-0-0264

SER CANr ANA MC DP

Command ”Save working memory”

Memory access

2,3,4	–	–	–	–	–	SER
4	–	–	–	–	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This command saves all data necessary for operation (= list S-0-0192) contained in the working memory to the FEPROM of the Personality Module (PM).

☞ **With this command, all data in the FEPROM will be overwritten. If necessary, this data should be previously saved with the help of the master or the commissioning and diagnostics system DSS-D.**

Parameter configuration:

15 1 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

S-0-0265

SER CANr ANA MC DP

Language selection

Language

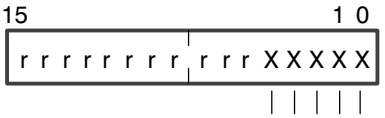
2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Select a language (see S-0-0266).
By changing the language, all texts such as

- names
- units of measure
- diagnostics (S-0-0095)

will be displayed in the newly selected language.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 0 0 0 0	German
0 0 0 0 1	English
0 0 0 1 0	French
0 0 0 1 1	Spanish
0 0 1 0 0	Italian
0 0 1 0 1	Portuguese
0 0 1 1 0	Polish
0 0 1 1 1	Hungarian
0 1 0 0 0	Russian (special character set)
0 1 0 0 1	Swedish
0 1 0 1 0	Danish
0 1 0 1 1	Norwegian

☞ **Please note that you can select only the languages entered in parameter S-0-0266!**

S-0-0266

SER CANr ANA MC DP

List of available languages

Language

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

List of all language codes presently available which can be selected with S-0-0265 (variable length operating data).

S-X-0268

SER

Angular displacement

Spindle, synchronous

3,4	2	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The angular displacement is added to the position setpoint as an offset.
Thus, a displacement between the master spindle and the synchronized spindle can be adjusted for angle-synchronous operation.

Range: -2^{31} .... $+2^{31}-1$

S-0-0272

SER ANA MC DP

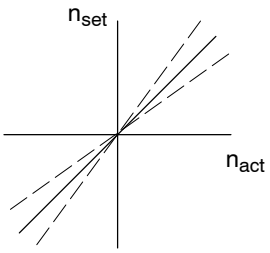
Speed window in percent

Limit value

3,4	–	–	–	FEPROM	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

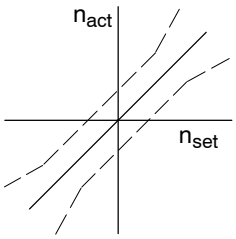
This parameter influences the type and size of the tolerance band for speed-dependent messages (e.g. S-0-0330 Message n_{act}=n_{set}). In contrast to parameter S-0-0157, the size of the tolerance band for a given speed setpoint is not constant in this case, but rather depends on the speed setpoint.

Range: 0 ... 90% of the comparative value in [%]



Percent
speed window

In order to ensure practical messages **even at low speeds**, S-0-0272 may also be combined with parameter S-0-0157:



Constant **and** percent
speed window

S-0-0275

SER

Coordinate shift value

Coordinate system

3,4	2	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The coordinate system of the drive is shifted to the value programmed here with the command ”Shift coordinate system” (S-0-0199).

Weighting and preferred weighting see S-0-0076.

S-0-0276

SER

Command ”Return to modulo range”

Position

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The drive calculates the positive and negative position setpoints and actual values with the modulo value S-0-0103 to produce a new positive position setpoint and actual value.

While the command is active, the drive ignores the cyclic setpoint input.
The master accepts the new position setpoint from the drive and ends the command.
The drive then accepts the setpoints defined for the selected operating mode again.

In contrast to the endless axis, the modulo calculation is performed at standstill for a controlled modulo axis.
The master activates the command ”Return to modulo range” for the drive, at standstill. It is only effective if the processing format ”absolute” is set in the parameter type of weighting for position data S-0-0076 with bit 7 = 0.

S-0-0280
SER

Lower overflow threshold
Position

3	–	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The lower and upper overflow thresholds are only needed in connection with endlessly rotating axes and the ”Position”, ”Interpolation” or ”Block-controlled operation” modes.
They are active if bit 7 of S-0-0055 is high.

When the threshold values are reached or exceeded, the drive will automatically calculate a correction in the position setpoint and the actual position value system. The following applies for the difference between the ”old” and the ”new” position setpoint:

$$\text{max. position setpoint difference} = \frac{\text{S-0-0281} - \text{S-0-0280}}{2}$$

S-0-0281
SER

Upper overflow threshold
Position

3	–	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

See S-0-0280.

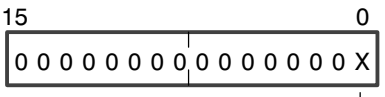
S-0-0300
SER

Real-time control bit 1
Telegram configuration

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter serves to assign an ident. number to be specified in S-0-0301 and thus a certain function to the real-time control bit 1 of the control word of the MDT.

Parameter configuration:

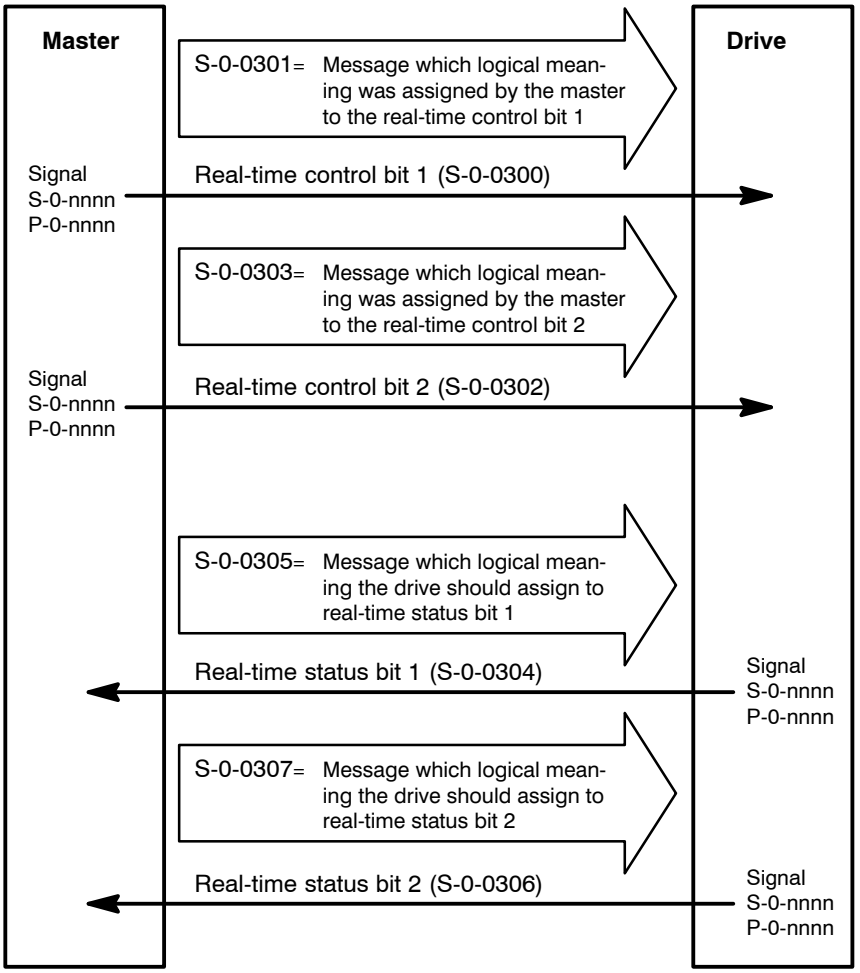


X is assigned the 0 or 1 below it.

0 no assignment
1 ident. no. has been assigned

In the control field of the MDT and in the status field of the DT, two real-time bits are provided for every drive for communicating selected statuses or events of binary operating data (bits, operating signals) in real time.
The assignments are transmitted through the service channel if necessary.

If a write access is made to a control bit assigned to the real-time control bits through the service channel, the drive generates the error message ”data currently write-protected”.



Function of real-time bits

S-0-0301

SER

Assignment of real-time control bit 1

Telegram configuration

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In order to assign a signal to real-time control bit 1, the ident. number of the signal is written into the operating data of this parameter. Afterwards, the signal appears in real-time control bit 1.

S-0-0302
SER

Real-time control bit 2

Telegram configuration

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter serves to assign an ident. number to be specified in S-0-0303 and thus a certain function to the real-time control bit 2 of the control word of the MDT.

Parameter configuration:

15 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

X is assigned the 0 or 1 below it.

0 no assignment
1 ident. no. has been assigned

S-0-0303
SER

Assignment of real-time control bit 2

Telegram configuration

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In order to assign a signal to real-time control bit 2, the ident. number of the signal is written into the operating data of this parameter. Afterwards, the signal appears in real-time control bit 2.

S-0-0304
SER

Real-time status bit 1

Telegram configuration

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter serves to assign an ident. number to be specified in S-0-0305 and thus a certain function to the real-time status bit 1 of the drive status.

Parameter configuration:

15 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

X is assigned the 0 or 1 below it.

0 no assignment
1 ident. no. has been assigned

S-0-0305
SER

Assignment of real-time status bit 1

Telegram configuration

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In order to assign a signal to real-time status bit 1, the ident. number of the signal is written into the operating data of this parameter. Afterwards, the signal appears in real-time status bit 1.

S-0-0306
SER

Real-time status bit 2

Telegram configuration

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter serves to assign an ident. number to be specified in S-0-0307 and thus a certain function to the real-time status bit 2 of the drive status.

Parameter configuration:

15 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

X is assigned the 0 or 1 below it.

0 no assignment
1 ident. no. has been assigned

S-0-0307
SER

Assignment of real-time status bit 2

Telegram configuration

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In order to assign a signal to real-time status bit 2, the ident. number of the signal is written into the operating data of this parameter. Afterwards, the signal appears in real-time status bit 2.

S-0-0308
SER

Position-synchronous run message

Spindle, synchronous

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

With this ident. no., the message ”Position-synchronous run” can be assigned to a real-time status bit (S-0-0305).

The message is set if the difference between:

- the position setpoint of the master spindle, and
- the position actual value of the synchronized spindle

is **within** the programmed position-synchronous run window S-0-0228.

Parameter configuration:

15 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

X is assigned the 0 or 1 below it.

0 no position-synchronous run
1 position-synchronous run reached

S-0-0309

SER

Position-synchronous run error message

Spindle, synchronous

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

With this ident. no., the ”Position-synchronous run error” message can be assigned to a real-time status bit (S-0-0305).

The message is set when the difference between

- the position setpoint of the master spindle, and
- the position actual value of the synchronized spindle

is **outside** the programmed ”Synchronous run error limit for position” S-0-0229.

Parameter configuration:

15 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

X is assigned the 0 or 1 below it.

0 Synchronous run error limit not exceeded
1 Synchronous run error limit exceeded.

S-0-0311

SER CANr ANA MC DP

Amplifier overtemperature warning

Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The message is set when

- Warning temperature S-0-0200 – actual temperature P-0-0015 < 0

Kodierung:

15 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

X is assigned the 0 or 1 below it.

0 no inverter overtemperature warning
1 inverter overtemperature warning present

S-0-0312

SER CANr ANA MC DP

Motor overtemperature warning

Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The message is set when

- Warning temperature S-0-0201 – actual temperature P-0-0016 < 0

Kodierung:

15 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

X is assigned the 0 or 1 below it.

0 no motor overtemperature warning
1 motor overtemperature warning present

S-0-0315
SER

Positioning speed > n_{limit}
Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

A warning message in diagnostics class 2 is set if the positioning speed (S-0-0259) exceeds the speed limit value (S-0-0091).

S-0-0323
SER

Target position outside the position limit values
Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

A warning message in diagnostics class 2 is set if the target position (S-0-0258) exceeds one of the position limit values (S-0-0049, S-0-0050).

S-0-0326
SER

Speed-synchronous run message
Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The message is set when the difference between

- n_{set} of the master spindle, and
- n_{act} of the synchronized spindle

is **within** the speed-synchronous run window S-0-0183.

Parameter configuration:

15 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

X is assigned the 0 or 1 below it.

0 no speed-synchronous run
1 speed-synchronous run reached

S-0-0327
SER

Speed-synchronous run error message
Message

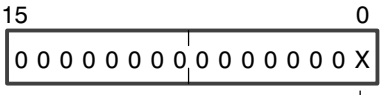
–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The message is set when the difference between

- n_{set} of the master spindle, and
- n_{act} of the synchronized spindle

is **outside** the ”Synchronous run error limit for speed” S-0-0184.

Parameter configuration:



X is assigned the 0 or 1 below it.

0	Speed-synchronous run error limit not exceeded
1	Speed-synchronous run error limit exceeded

S-0-0330

SER CANr ANA MC DP

Message $n_{act} = n_{set}$

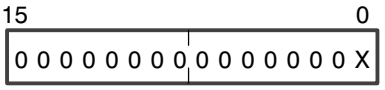
Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This message is set when:

$$|n_{act} - n_{set}| \leqq |n_{set}| \times S\text{-}0\text{-}0272 + S\text{-}0\text{-}0157$$

Kodierung:



X is assigned the 0 or 1 below it.

0	setpoint not reached
1	setpoint reached

S-0-0331

SER CANr ANA MC DP

Message $n_{act} = 0$

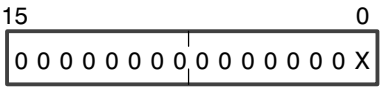
Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This message is set when:

$|n_{act}| - S\text{-}0\text{-}0124 < 0$ (with SERCOS interface) **or**
$|n_{act}| - S\text{-}0\text{-}0157 < 0$ (with all other interface types)

Kodierung:



X is assigned the 0 or 1 below it.

0	no standstill
1	standstill window reached

S-0-0332

SER

Message $|n_{act}| < |n_x|$

Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This message is set when:

$$|n_{act}| - \text{S-0-0125} < 0$$

Parameter configuration:

15 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

0	threshold not exceeded
1	threshold exceeded

X is assigned the 0 or 1 below it.

S-0-0333

SER ANA MC DP

Message Md >= Md_x

Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The message is set if the torque actual value (S-0-0084) reaches or exceeds the torque threshold (S-0-0126).

S-0-0334

SER CANr ANA MC DP

Message Md >= Md_{limit}

Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This message is set when the amount of the torque actual value (S-0-0084) reaches or exceeds the lowest torque limit value from parameters S-0-0082, S-0-0083, or S-0-0092.

Example:

S-0-0082 positive limit value = 20 Nm
S-0-0083 negative limit value = 5 Nm
S-0-0092 bipolar limit value = 10 Nm

The message will be set with: |Md| >= 10 Nm positive torque
|Md| <= 5 Nm negative torque

Kodierung:

15 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

0	limit value not exceeded
1	limit value exceeded

X is assigned the 0 or 1 below it.

S-0-0335

SER CANr ANA MC DP

Message $n_{set} > n_{limit}$

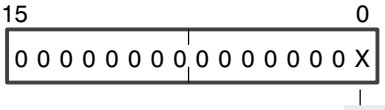
Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This message is set when:

$$|n_{set}| - S\text{-}0\text{-}0091 > 0$$

Kodierung:



X is assigned the 0 or 1 below it.

0 limit value not exceeded
1 limit value exceeded

S-0-0336

SER MC DP

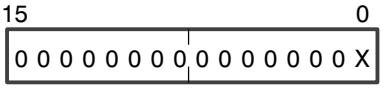
Message “In-Position”

Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The message is set if the position actual value (S-0-0051 or S-0-0053), relative to the position setpoint, lies within the positioning window S-0-0057.
The ”In-Position” message can be assigned to a real-time status bit in the drive status word.

Kodierung:



X is assigned the 0 or 1 below it.

0 outside the positioning window
1 inside the positioning window

S-0-0337

SER CANr ANA MC

Message P >= P_x

Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The message is set if the output yielded reaches or exceeds the preset output threshold (S-0-0158).

S-0-0341

SER MC

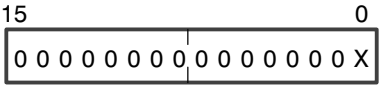
Message “In-Position rough”

Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The message is set if the position actual value (S-0-0051 or S-0-0053), relative to the position setpoint, lies within the ”positioning window rough” (S-0-0261).

Parameter configuration:



X is assigned the 0 or 1 below it.

0 outside the positioning window
1 inside the positioning window

S-0-0342

SER

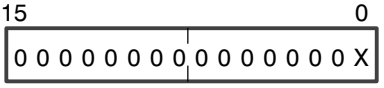
Target position reached

Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This message is defined in diagnostics class 3 (see S-0-0013) and will be set when the position setpoint of the drive interpolator (IPO position setpoint) equals the target position (S-0-0258), or if the spindle orientation position (see S-0-0152) has been reached.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 Target position not reached
1 Target position reached

S-0-0343

SER

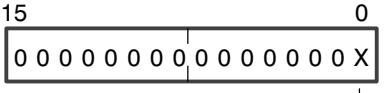
Interpolator halt

Message

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The message is defined in diagnostics class 3 and is set if the interpolator of the drive (IPO) has not yet reached the target position (S-0-0258) and the IPO position set-point change is already zero.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 Interpolator active
1 Interpolator halted

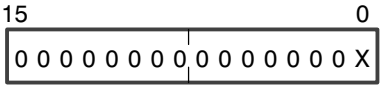
S-0-0400
SER MC DP

Reference point switch
Referencing

–	–	D → M	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The signal of a reference point switch connected to the drive or the ”soft cam” (see P-0-0543) can be assigned to a real-time status bit via this ident. no. (S-0-0305). For NC-controlled referencing, the reference point switch only applies if the reference enable S-0-0407 is available.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 Switch not actuated
1 Switch actuated

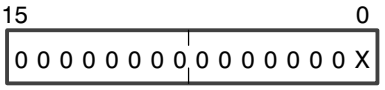
S-0-0401
SER

Probe 1
Probe

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The ”probe 1” can be assigned to a real-time status bit (S-0-0305) via this ident. no. “Probe 1” is set when the preselected probe edge arrives, but is evaluated by the drive only if the command ”probe cycle” is active and the probe is enabled (S-0-0405).

Parameter configuration:



X is assigned the 0 or 1 below it.

0 Probe not actuated
1 Probe actuated

S-0-0403
SER MC DP

Position actual values status
Message

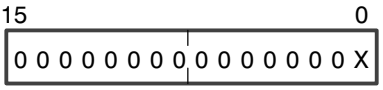
–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

When switching over the position actual values to the coordinate system based on the machine zero point, bit 0 is set by the drive. The master thus receives an indication that the drive will refer all position actual values to the machine zero point from now on.
Bit 0 is cleared, if:

- “Shift to reference system” (S-0-0172) or
- “Drive-controlled referencing” (S-0-0148) is started or

- the drive loses its reference to the machine zero point.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 Position actual values are relative
1 Position actual values refer to the machine zero point

S-0-0404
SER

Position setpoints status
Position

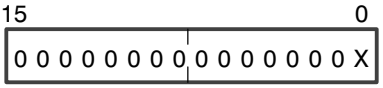
2,3,4	–	M → D	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

When switching over the position setpoints to the coordinate system based on the machine zero point, bit 0 is set by the master. The drive thus receives an indication that the master will refer all position setpoints to the machine zero point from now on. At the same time, the new position setpoint is entered in the cyclic data by the master.

Bit 0 is cleared, if:

- “Shift to reference system” (S-0-0172) is activated.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 Position setpoints are relative
1 Position setpoints refer to the machine zero point

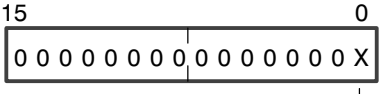
S-0-0405
SER

Probe 1 enable
Probe

4	–	M → D	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The ”probe 1-enable” can be assigned to a real-time control bit (S-0-0300) via this ident. no.
The drive only queries the “probe 1 enable” if the command ”probe cycle” is active. After each measurement, the master must set the enable to “0” and then set it to “1” again for a new measurement.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 Probe not enabled
1 Probe enabled

S-0-0407
SER

Reference enable
Referencing

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	M → D	–	–	–	

The reference enable can be assigned to a real-time control bit (S-0-0300) via this ident. no.
The drive only evaluates the reference enable if the command “NC-controlled referencing” is active.

Parameter configuration:

15 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

X is assigned the 0 or 1 below it.

0 Enable not available
1 Enable is available

S-0-0408
SER

Reference mark located
Referencing

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	D → M	–	–	–	

The ”reference mark located” message can be assigned to a real-time status bit via this ident. no. (S-0-0305).
The drive only sets this parameter for NC-controlled referencing, if reference enable S-0-0407 is available and the marker has been reached. At the same time, the drive saves the current, unreferenced position actual value in the corresponding marker position S-0-0173 or S-0-0174.
Drive-controlled referencing does not set this parameter.

Parameter configuration:

15 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

X is assigned the 0 or 1 below it.

0 Reference mark not detected
1 Reference mark detected

S-0-0409
SER

Measured value 1 (positive) latched
Probe

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	D → M	–	–	–	

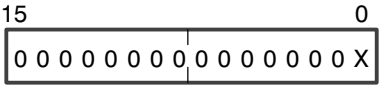
The ”Measured value 1 (positive) latched” is assigned to a real-time status bit (S-0-0305) via this ident. no.
The bit is only set if:

- command “probe cycle” is active (S-0-0170)
- probe 1 enabled (S-0-0405)
- probe 1 reports positive edge (S-0-0401)

At the same time, the drive saves the current position actual value in the parameter measured value1 positive (S-0-0130).

The bit is deleted again when the master deletes the command ”probe cycle” or the probe 1 enable.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 Measured value 1 (positive), not latched
1 Measured value 1 (positive) latched

S-0-0410

SER

Measured value 1 (negative) latched

Probe

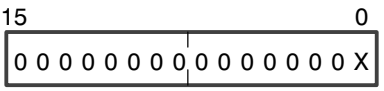
–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The ”Measured value 1 (negative) latched” is assigned to a real-time status bit (S-0-0305) via this ident. no.
The bit is only set if:

- command “probe cycle” is active (S-0-0170)
- probe 1 enabled (S-0-0405)
- probe 1 reports negative edge (S-0-0401)

At the same time, the drive saves the current position actual value in the parameter measured value1 (negative) (S-0-0131).
The bit is deleted again when the master deletes the command ”probe cycle” or the “probe 1 enable”.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 Measured value 1 (negative), not latched
1 Measured value 1 (negative) latched

P-0-0001

SER CANr ANA MC

Operating frequency of the power output stage

Amplifier

2	–	–	–	FEPROM	–	SER
2,3,4	–	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter serves to define the switching frequency of the power output stage. High operating frequencies result in low noise, but also in lower output currents. Thus, the operating frequency must be designed according to the motor-module assignment, i.e. the drive configuration.

Range: 2000 / 4000 / 8000 / 8001 Hz
With 8001 Hz: 16 kHz actual current measurement.

How to change the frequency
(for all interface types except SERCOS interface):

1. Change P-0-0001.
2. Save working memory.
3. Perform reset.

☞ **Following a change of the switching frequency and subsequent start-up, the filter parameters P-0-0107 and P-0-0120 to P-0-0123 are initialized.**

P-0-0002

SER

Active power

Measuring point

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Active electrical power input to the motor in [W].
Smoothing according to P-0-0020.

P-0-0003

SER

rms current

Measuring point

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Total electrical current input (reactive and active current) to the motor in [A_{rms}].
Smoothing according to P-0-0020.

P-0-0004

SER CANr ANA MC DP

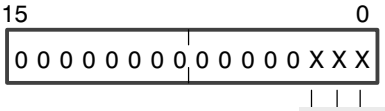
Halting mode with drive off

Drive ON/OFF

2,3,4	–	–	–	FEPROM	–	SER
2,3	3	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter determines how the drive is halted with **delayed** switching to torque-free state (P-0-0125). See also parameter P-0-0590.

Kodierung:



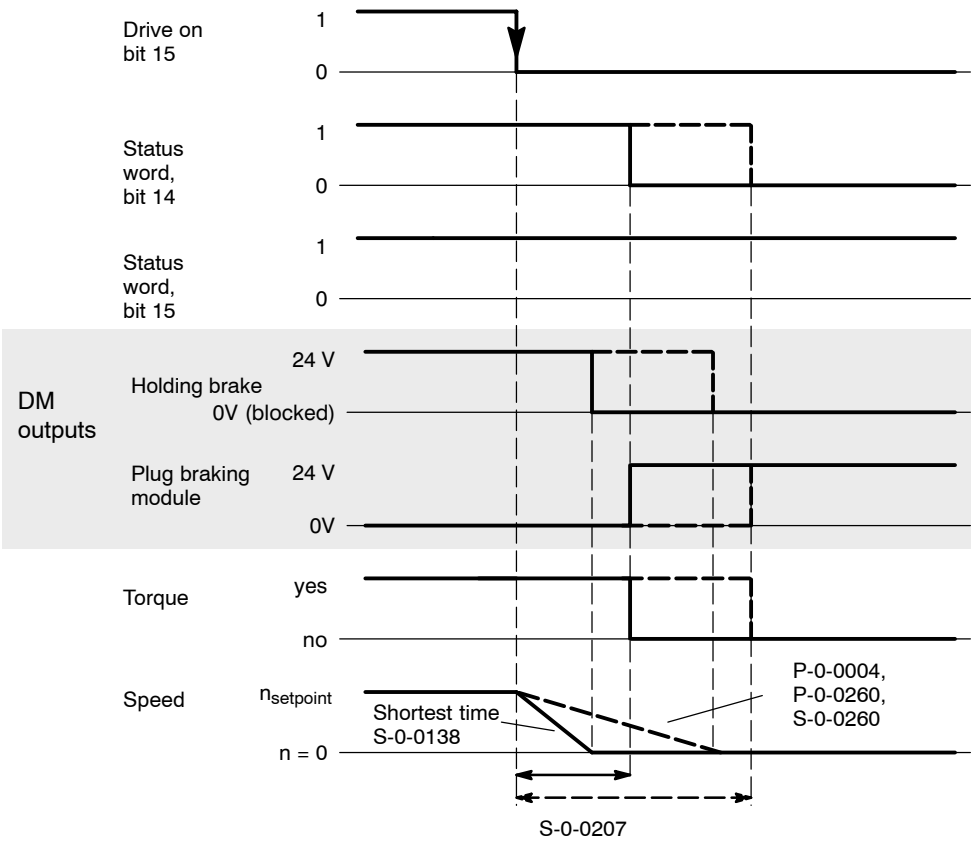
X is assigned the 0 or 1 below it.

0 0 0	halting in shortest possible time without ramp (via S-0-0138; adjustable to machine mechanics)
0 0 1	halting with ramp S-0-0260
0 1 0	setpoint-controlled halting by master
1 0 0	halting with ramp P-0-0260 (for SERCOS interface only)

Precondition:

- External enable FG provided (24 V at X06.3, DM module)
- Drive enable provided (bit 14 = 1)

Delayed switching to torque-free state occurs after an error following EMERGENCY-OFF or when the signal ”Drive on” has been cleared.



CAUTION
Strong wear of the holding brake!
The holding brake is not a working brake and may be operated only when the axis is stationary.
In order to avoid damage to the holding brake, the motor must therefore reach n = 0 before the waiting time S-0-0207 has elapsed.

CAUTION
The holding brake cannot be controlled!
If the SERCOS interface is used in connection with the ”Range switching points” function (see P-0-0523), the holding brake cannot be controlled via the OUT2 hardware output!

P-0-0006

SER MC DP

Position encoder type – motor encoder

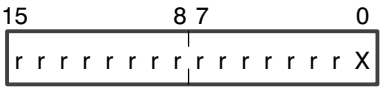
Encoder

2	–	–	–	FEPROM	–	SER
2	2	–	–	–	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Motors are available with single-turn (STG) or multi-turn absolute encoders (MTG). While the STG allows for the determination of the absolute motor position with respect to **1** revolution only, the MTG can signal its absolute position with respect to **4096** revolutions.
Both designs can be operated as incremental or absolute encoders.

- **Incremental encoders:**
  Whenever the system is switched on, the axis in question first has to be referenced in order to obtain the absolute axis position. This position can be re-calculated and updated following axis movements by means of the arriving encoder pulses.
- **Absolute encoders:**
  The axis has to be referenced during initial commissioning only. Afterwards, the encoder will always signal the absolute position **within its maximum traversing range.**

Parameter configuration:



X is assigned the 0 or 1 below it.
r: reserved

0 Incremental encoder
1 Absolute encoder

★ For linear axes, the position encoder should be coded as ”Absolute encoder” only if the motor is equipped with an MTG.
For rotary axes, the type of position encoder may be defined as ”Absolute encoder” even if an STG is fitted to the motor.

P-0-0007

SER CANr MC DP

Cycle time of the position controller / position setpoint generator

Controller

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

For SERCOS interface:

The cycle time of the position controller is calculated by the drive itself from the following input data:

- NC cycle time (S-0-0001) and
- SERCOS interface cycle time (S-0-0002)

The value is between 500 ... 2000 µs. It can only be read.

For CAN rho, Motion Control and PROFIBUS-DP:

P-0-0007 specifies the cycle time of the position setpoint generator.

Range: 2 ... 8 ms.

P-0-0010

SER

Speed controller control/status word

Controller

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Control signals and additional status signals of the drive are combined in this parameter. Whereas the control signal bits (bits 0...7) can be read as well as modified, the status signal bits (bits 8...15) can be read only.

Control signals:

- Switching the linear current setpoint fine interpolation on/off, and
- Switching the linear speed setpoint fine interpolation on/off.
  Switching the factory–set active fine interpolation off can be favorable for the optimization of the drive.
- Switching the stalling monitoring on/off.
- Switchover of the analog signal output OM 04 (for developers only)
- Specifying the number of analog output channels.

Status signals:

- Additional feedback by the drive when the drive is switched off with the error message ”plausibility error of speed controller” (S-0-0129 bit 0, display ”F96”). This allows for more precise diagnostics. See also P-0-0090.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

15 12 10 9 8 7 6 5 4 3 2 1 0

X r r X r X X X X X X X X X X

Bit 0: Linear current fine interpolation
0 no interpolation
1 linear fine interpolation (factory setting)

Bit 1: Linear speed fine interpolation
0 no interpolation
1 linear fine interpolation (factory setting)

Bit 2: Stalling monitoring
0 OFF (factory setting for asynchronous motors)
1 ON (factory setting for synchronous motors)

Bit 3: Signal output OM 04 (for developers only)
0 DAC signals on PSM–DAC, interrupts on OM 04
1 DAC signals on OM 04 (factory setting)

Bits 4 to 7: Number of analog output channels (DAC)

Status signals

Bit 8: Current not reached
1 $I < 80\ \% I_{set}$ after M_{limit} has been active for 5 ms

Bit 9: Acceleration too low
1 $A < 50\ rad/s^2$, after M_{limit} has been active for 20 ms

Bit 10: Inverted acceleration
1 acceler. in wrong direction after M_{limit} has been active for 5 ms

Bit 12: Controller limit of n-controller
0 negative controller limit reached
1 positive controller limit reached

Bit 15: Synchronization
0 no error
1 Synchronization error speed controller

P-0-0012

SER

Set-up speed limit

RSU

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	2	–	–	FEPROM	–	

☞ **For setting and handling the RSU function, you need the "RSU Redundant Safety Monitoring" manual.**

Limit value for the maximum admissible safe speed in the special mode with confirmation key. If the NC specifies setpoints larger than P-0-0012 in this special operating mode, the drive reports "F13" (excessive controller deviation).
Response time until switch-off 1...6 ms.

Range: 0 ... 9000 rpm
Default setting 50 rpm

☞ **Max. 2 entries separated by a comma are permitted as input values (for RSU: 2 values, otherwise 1 value).**

P-X-0013

SER CANr ANA MC DP

Actual value smoothing interval of speed controller

Controller

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	FEPROM	–	SER
2,3,4	2	–	–	FEPROM	–	others

You define whether the drive should calculate a mean value from the arriving actual values for internal further processing.

The entry of "1" or "62.5" turns mean value calculation off.

Range: SERCOS interface: 1 ... 16 cycles
other interface types: 62.5...250 µs
(max. 500 µs at 4 kHz switching frequency)

P-0-0014

SER

Actual value smoothing interval monitoring

Compensation

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	FEPROM	–	

Influences the speed actual values for the following monitoring purposes and without influencing the servo loop:

- for all evaluations in connection with the actual speed
  (e.g.: $n_{act} = n_{set}$; $n_{act} = 0$, and $n_{act} < n_x$)
- for actual value displays

By making appropriate entries, mean value calculation as well as a first order filter can be activated.

Range:
> 1: Mean value calculation for 16 cycles (fixed)
1: no influence on actual values
< 1: First order filter with a time constant according to entry with the following formula:

$$\frac{1}{(\text{entry})} * 250 \quad \text{in } [\mu s]$$

P-0-0015

SER CANr ANA MC DP

Amplifier temperature

Measuring point

–	–	–	DT	–	Temp.	SER
–	–	–	DT	–	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Current inverter temperature. The value is compared cyclically with the amplifier warning temperature S-0-0200 and the amplifier switch-off temperature S-0-0203. Weighting according to S-0-0208.

☞ **Values which are very much outside of the normal temperature range may indicate a break in the temperature sensor cable.**

P-0-0016

SER CANr ANA MC DP

Motor temperature

Measuring point

–	–	–	DT	–	Temp.	SER
–	–	–	DT	–	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Current motor temperature. This value is cyclically compared with the motor warning temperature S-0-0201 and the motor switch-off temperature S-0-0204:
Weighting according to S-0-0208.

Value range: 0...165 °C
Higher or lower values indicate that an error may have occurred.

P-0-0017

SER CANr ANA MC DP

Sync Enable

Supply module

2,3,4	–	–	–	–	–	SER
2,3,4	2	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Serves for synchronization of the entire axis union. Synchronization reduces disturbances by the output stage.

SERCOS interface:

- P-0-0017 = 0:
  The axis module itself does not generate a sync. signal on the module cross connection but it complies with a sync. signal on the module cross connection.
  If all axis modules in combination have been parametrized using P-0-0017=0, each axis module will synchronize itself to SERCOS interface. In this case, the supply module (VM) runs asynchronously.
- P-0-0017 = 1:
  The axis module places a sync. signal on the module cross connection synchronously using SERCOS interface. The supply module (VM) now runs synchronously.
  P-0-0017=1 must only be set for one single axis module!

Analog interface, PROFIBUS-DP:

- P-0-0017 = 0:
  The axis module itself does not generate a sync. signal on the module cross connection but it complies with a sync. signal on the module cross connection.
- P-0-0017 = 1:
  The axis module places a sync. signal on the module cross connection. The axis union runs synchronously.
  P-0-0017=1 must only be set for one single axis module!

- P-0-0017 = 2:
  An external synchronization signal is input at the digital input IN4. The axis module synchronizes itself to the external signal and, in addition, leads it to the module cross connection.
  P-0-0017=2 must only be set for one single axis module!

CANrho:

P-0-0017 is adjusted using the mode switch on the front panel because the rho control unit has no corresponding parameter. Following each power–up, P-0-0017 is set depending on the mode switch.

- Mode switch to ”2” (corresponds to P-0-0017=0):
  The axis module itself does not generate a sync. signal on the module cross connection but it complies with a sync. signal on the module cross connection.
- Mode switch to ”1” (corresponds to P-0-0017=3):
  The CAN controller of the axis module generates a sync. signal. The axis module synchronizes itself to this signal and, in addition, leads it to the module cross connection.
  The mode switch must be set to position ”1” in only one single axis module within the union!

P-0-0018

SER CANr ANA MC DP

Mechanical power

Measuring point

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Active mechanical power input to the motor in [W].
Smoothing according to P-0-0020.

P-0-0019

SER

Motor utilization rate

Measuring point

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Current motor utilization rate in [%] with the following reference:

- **synchronous motor:** M/M_N
- **asynchronous motor:**
  in basic speed range n ... n_N: M/M_N
  in the field weakening range N_N ... n_{max}: P/P_N

Smoothing according to P-0-0020.

P-0-0020

SER

Smoothing time constant for power output

Compensation

3,4	2	–	MDT	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

All parameters containing power data (S-0-0084, P-0-0002, P-0-0003, P-0-0018 and P-0-0019)will be output through a 1^{st} order filter, whose smoothing time constant can be changed with this parameter.

Range: 1 ... 1000 [ms]

P-0-0022
SER

Standstill monitoring angle
RSU

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

☞ **For setting and handling the RSU function, you need the "RSU Redundant Safety Monitoring" manual.**

Tolerance range for the maximum permissible angle of rotation with safe zero speed in the special mode.
Response time until switch-off: 0.5 ... 2 ms

Range: 0 ... 11.2 degrees
Default setting 4 degrees

☞ **Max. 2 entries separated by a comma are permitted as input values (for RSU: 2 values; in all other cases 1 value).**

P-0-0023
SER

Maximum confirmation time
RSU

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

☞ **For setting and handling the RSU function, you need the "RSU Redundant Safety Monitoring" manual.**

Time period for releasing the confirmation key and pressing it again. This time serves for monitoring the keys for unauthorized manipulation.

☞ **This parameter should be set to the same value in all DMs with confirmation key. Otherwise, if the lowest value is exceeded, "Drive halt" will be output, and the fault message will not appear at the halted axis, but rather at the axis with the lowest value.**

Range: 0 ... 6553.5 sec
Default setting 30 sec

P-0-0024
SER

Concurrence channel monitoring
RSU

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Monitoring of the redundant channels for identical information:
the information may differ for the time set here.

☞ **For setting and handling the RSU function, you need the "RSU Redundant Safety Monitoring" manual.**

Range: 0.5 ... 10 sec,
Default setting 2 sec

P-0-0025
SER

Speed actual value
Measuring point

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Current motor speed in rpm.

P-0-0026

SER

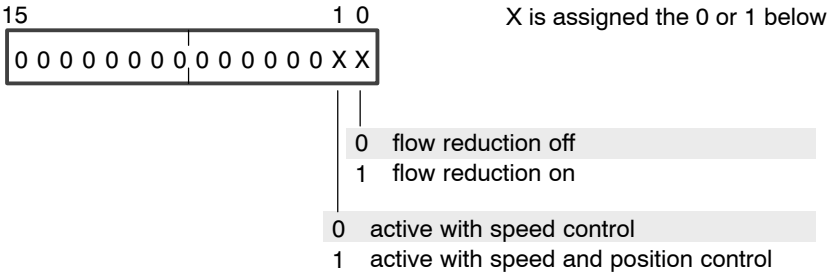
Flow reduction

Limit value

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Reduces the field current for asynchronous motors in the partial load range. This function serves to reduce noise and losses at zero-speed, however, at the expense of limited dynamics.
S6 characteristics of DU motors only apply if flow reduction is active. Corresponds to the low-noise function of SPM-TB/-TD.

Parameter configuration:



X is assigned the 0 or 1 below it.

P-0-0027

SER CANr ANA MC DP

Braking current limitation

Limit value

2,3,4	–	–	–	FEPROM	–	SER
2,3,4	2	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The torque-forming current during ”halting within the shortest possible time” (see P-0-0004) is limited by this parameter. Thus, the braking energy converted in the d.c. link can be reduced.

Range: 0 ...100 % of the admissible maximum current (module or motor)

P-0-0028

SER

Positive hardware limit switch

Limit switch

–	–	D → M	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

See P-0-0029.

P-0-0029
SER

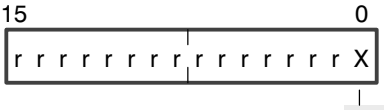
Negative hardware limit switch
Limit switch

–	–	D → M	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Both parameters are images of the limit switch inputs:

- X06.6 (IN2) for positive traversing direction, and
- X06.7 (IN3) for negative traversing direction.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

0	limit switch not exceeded
1	limit switch exceeded (IN = 24V)

Effect with IN = 24V:

→ S-0-0011 Diagnostics class 1, bit 13 is set

☞ **P-0-0028 and P-0-0029 are only valid if the drive is in phase 4!**

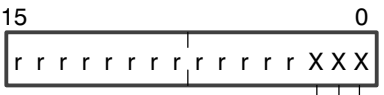
P-0-0030
SER

Hardware limit switch, control parameter
Limit switch

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Configures the function of the hardware limit switches. The monitoring is activated with release of the software limit switches using S-0-0055 bit 4.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

Input logic

0	LOW active
1	HIGH active

Operating mode

0	Independent of polarities
1	Dependent on polarities

Polarities relation

0	Motor–related
1	Load–related

Explanations:

Input logic: LOW active: limit switch responds with 0 V signal.
HIGH active: limit switch responds with 24V signal.

Operating mode: independent of polarities:
Having activated a limit switch, limit switch monitoring has to be switched off via S-0-0055 bit 4.
Only then can the axis be traversed back to the permitted range and the error (”F14”) be reset.

Dependent on polarities
The error can be reset with active limit switch monitoring. The axis can be traversed in direction of the permitted position range. Setpoints in direction of the limit switch will initiate an error again.
Requirement for this functionality:

– a polarity–related wiring of the limit switch and
– the correct parametrization of bit 2 (polarities relation) and
– a sufficiently dimensioned tolerance window in P-0-0502 ”lag limit value standstill”

Polarities relation: motor–related:
The limit switches must be connected in accordance with their polarity in relation to the sense of rotation of the motor shaft. In case of positive sense of rotation of the motor, the working range is limited by the positive limit switch, in case of negative sense of rotation by the negative limit switch.
It is possible to ascertain via P-0-0028 and P-0-0029 that the limit switches are working correctly, if the drive is in phase 4.

Load–related
The limit switches must be connected to the load in accordance with their polarity in relation to the direction of movement. Thus, the limit switches are also dependent on the polarity set in S-0-0055.
In case of positive position setpoint change, the working range is limited by the positive limit switch, in case of negative position setpoint change by the negative limit switch.
It is possible to ascertain via P-0-0028 and P-0-0029 that the limit switches are working correctly, if the drive is in phase 4.

P-0-0031
SER MC DP

Absolute dimension revolution offset 1
Encoder

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	FEPROM	–	SER
3,4	3	–	–	FEPROM	–	others

Distance from the machine zero point to the motor encoder zero point as absolute number of revolutions (for Multiturn absolute value encoders).
The parameter is calculated by the command ”determine offset in revolution” (P-0-0032), so that the position value is located within 1 encoder revolution when the offset is activated. The offset is activated following the command ”delete reference point” (S-0-0191) or the next drive start-up.

P-0-0032
SER MC DP

Command ”Determine offset in revolution”
Encoder

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	–	–	SER
4	–	–	–	–	–	others

Command for reading out (determining) ”absolute dimension revolution offset 1” (P-0-0031) or ”absolute dimension revolution offset 2” (P-0-0045).

☞ **For PROFIBUS-DP, the offset can also be determined via control word P-0-2800. That is where P-0-0031 and S-0-0177 are determined and saved.**

P-0-0033
SER

Control word of fine interpolation
Interpolation

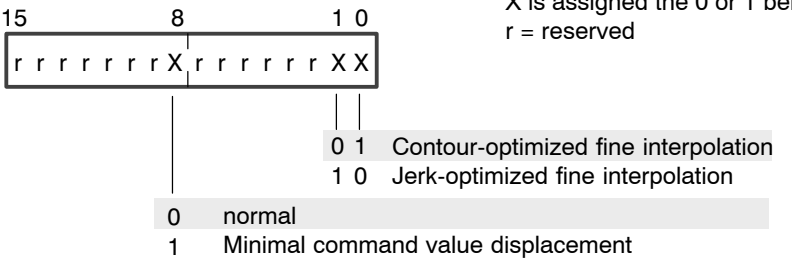
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
2,3	–	–	–	FEPROM	–	

Determines the behavior of fine interpolation between receipt of two position setpoints:

- Contour-optimized fine interpolation: the contour defined by the setpoints is adhered to as precisely as possible.
- Jerk-optimized fine interpolation: the specified position changes are performed as smoothly as possible.
- Transfer of the position setpoint as quickly as possible.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved



CAUTION
For a synchronous axis union, this parameter must be assigned the same value for all axes involved!

P-0-0034
SER

D.C. link voltage
Measuring point

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	–	DT	–	–	

Current d.c. link voltage in [V].

P-X-0035
SER

Dead time compensation
Compensation

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	FEPROM	–	

This parameter compensates the operating times of the power output stage by a voltage precontrol of pulse width modulation.

Settings > 0 are recommended for special cases only!
They lead to an improved current controller gain in the torque zero crossing while having a negative effect on the sinusoidal shape of the output current.

Range: 0 ... 100 %

P-0-0037
SER CANr ANA MC DP

Torque current setpoint
Measuring point

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Amount of the torque-forming component of the current setpoint in [A].
For the servo function, this value corresponds to the entire current setpoint.

P-0-0038
SER CANr ANA MC DP

Field current setpoint
Measuring point

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Amount of the flow-forming component of the current setpoint for spindle function in [A].

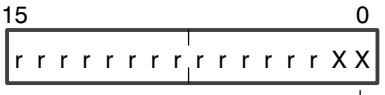
P-0-0040
SER

Current setpoint filter ON
Current setpoint filter

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter activates a first-order current setpoint filter instead of the standard linear fine interpolation of the current setpoints.
Thus, the P-component of the current controller (S-0-0106) can be increased to further improve the controller properties.
The filter time constant can be changed in parameter P-0-0041.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

0 linear fine interpolation
1 1st order filter

☞ **The standard linear fine interpolation can be switched off with bit 0 of P-0-0010.**

P-0-0041
SER

Time constant of current setpoint
Current setpoint filter

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Defines the time constant of the current setpoint filter (P-0-0040).

Range: 0 ... 3000 [µs]

P-0-0042
SER

Winding change-over wait time
Winding change-over

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

If necessary, a wait time can be defined between reception of the acknowledgement signal of the contactors and setting of the internal enable by the drive. For details of the winding change-over see P-0-0150.

Range: 0...32.8 ms,
Factory setting: 20 ms

P-0-0043
SER CANr ANA MC DP

Torque current actual value
Measuring point

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Amount of the torque-forming component of the current actual value in [A].
For the servo function, this value corresponds to the entire current actual value.

P-0-0044
SER CANr ANA MC DP

Field current actual value
Measuring point

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Amount of the flow-forming component of the current actual value for spindle function in [A].

P-0-0045
SER MC

Absolute dimension revolution offset 2
Encoder

3,4	–	–	–	FEPROM	–	SER
3,4	3	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Distance from the machine zero point to the external encoder zero point as absolute number of revolutions (for rotary axes with Multiturn absolute value encoder).
The parameter is calculated by the command ”determine offset in revolution” (P-0-0032), so that the position value is located within 1 encoder revolution when the offset is activated. The offset is only activated with the command ”delete reference point” or following switch–over from phase 3 to phase 4.

P-0-0048
SER CANr ANA MC DP

Current offset U,W
Compensation

–	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The offset values determined automatically for phase currents U and W during start-up can be overwritten with P-0-0048.

First input value in the list: offset in mA of phase U
Second input value in the list: offset in mA of phase W.
Both values must be input separated by a comma.

A **constant automatic** offset adjustment is performed via software, as long as the internal release is deactivated and the value in P-0-0048 is marked as invalid (on the monitor: exclamation mark to the left of the input field).
In this case, the automatically set offset values will be displayed in the parameter list.

If you wish to perform a **manual** current offset adjustment, you must execute the command ”save working memory” after entering and transmitting the relevant values to the drive. Following module reset, the values determined automatically at first are overwritten by parametrized values.
If you wish to deactivate the manual current offset adjustment again, change P-0-0048

- to ”0.0” in case of modules with SERCOS interface
- to ”0x7fff,0x7fff” in case of modules with other interface types

(a writing error may be reported when the change is made).
Then execute command ”save working memory”.

P-0-0049
SER

Phase current U
Measuring point

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	–	DT	–	–	

Level of phase current U in [A].

P-0-0050
SER

Phase current V
Measuring point

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	–	DT	–	–	

Level of phase current V in [A].

P-0-0051
SER

Phase current W
Measuring point

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	–	DT	–	–	

Level of phase current W in [A].

P-0-0053
SER CANr ANA MC DP

Release time motor protection
Limit value

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
2	–	–	–	FEPROM	–	

For parametrization of the bimetal function (I^2t monitoring).
The drive monitors the rms value of the motor current. For this purpose, the motor nominal current from the electronic rating plate is used together with the time constant P-0-0053.

☞ **For drive inverter operation conforming to UL/CSA, it is necessary to activate the I^2t monitoring!**

Range: 0.0 ... 550.0 [s]
Default setting: 0.0 (I^2t monitoring OFF).

Normal value setting: 100 ... 150
(corresponds to the release characteristics of bimetal relays, see next page).

Release time (in s) dependent on current factor and P-0-0053:

P-0-0053	Current factor							
	1.2	1.5	1.7	2	2.5	3	4	6
0.1	0.18	0.08	0.05	0.04	0.02	0.014	0.008	0.004
0.7	1.28	0.54	0.38	0.25	0.15	0.10	0.06	0.024
1	1.83	0.77	0.54	0.36	0.22	0.14	0.08	0.034
7	12.8	5.4	3.8	2.5	1.5	1.01	0.55	0.24
10	18.3	7.7	5.4	3.6	2.2	1.44	0.79	0.34
70	128.4	54.0	38.0	25.2	15.1	10.1	5.5	2.4
100	183.4	77.2	54.2	36.0	21.5	14.4	7.9	3.4
150	275.1	115.8	81.4	54.0	32.3	21.7	11.8	5.1
500	917.2	385.9	271.2	180.1	107.6	72.2	39.3	17.1
585	1073	451.5	317.3	210.7	125.9	84.5	46.0	20.0

P-0-0055
SER

Axis error compensation: control word
Compensation

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Initiates axis error compensation when the axis has been referenced.

Parameter configuration:

15 8 7 0

r r r r r r r r r r r r r r r X

X is assigned:
0 = no error
1 = error detected
r = reserved

Bit 0: activation

0	no axis error compensation
1	axis error compensation active

Procedure:

1. Define table start position and enter value in P-0-0056.
2. Determine ”ds” center point distance and enter value in P-0-0057.
3. Determine compensation value table using a suitable measuring instrument (e.g. a laser interferometer) and store value in P-0-0058 (via SERCOS interface or DSS-D).
4. Activate axis error compensation by setting parameter P-0-0055, bit 0.

P-0-0056
SER

Axis error compensation: compensation table start position
Compensation

3	2	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The start position is the lowest compensated position value which thus defines the beginning of the compensation range. For negative position polarity (S-0-0055), the highest compensated position value must be entered.

Weighting and preferred weighting see S-0-0076.

P-0-0057
SER

Axis error compensation: compensation table center point distance
Compensation

3	2	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter defines the distance between two adjacent table values (see P-0-0058). The center point distance is identical for the entire working range between the table start position and the table end position:

$$ds\ [mm] = \frac{A\ [mm]}{499}$$

ds = center point distance
A = working range

Range: 0.0000001 ... 0.1 [m]
0.0001 ... 100 [degrees]
For preferred weighting of position data, see S-0-0076.

P-0-0058
SER

Axis error compensation: compensation value table
Compensation

3	2	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter contains a list of 1000 values.
Compensation values 1-500 are designed for positive speed setpoints, values 501-1000 for negative speed setpoints.
The following applies: compensation value = position setpoint – "correct" position actual value.

Range: –0.005 ... +0.005 mm
For preferred weighting of position data, see S-0-0076.

★ **If not all center point distances are needed, the unused table values must be set to 0.**

P-0-0059
SER

Axis error compensation: current compensation value
Compensation

–	–	–	–	–	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the current compensation value.
This value depends on the position polarity parameter S-0-0055.

P-0-0060
SER

Current reduction with supply module overload
Supply module

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

When the utilization of the supply module reaches 100%, the currently permitted peak current of the drive module (see S-0-0110) can be reduced. The following applies:

Maximum peak current at supply module overload = S-0-0110 * P-0-0060 / 100

☞ **S-0-0110 is also limited internally in the drive by the motor-dependent peak current (S-0-0109)!**

P-0-0061
SER

Current limit value deceleration

Limit value

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In order to prevent a **permanent** (thermal) overload of the motor with frequent start/stop operations, the maximum permitted motor peak current (absolutely defined by S-0-0109) can be reduced for braking operations. The following applies:

Synchronous motor: Current limit = S-0-0111 * P-0-0061 / 100
Asynchronous motor: Current limit = S-0-0196 * P-0-0061 / 100

P-0-0062
SER

Current limit value acceleration

Limit value

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

For acceleration processes, otherwise as P-0-0061.

P-0-0065
SER

Polarity rotate motor encoder

Position monitoring 2 encoder

2	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In conjunction with ”evaluation of motor encoder” (P-0-0550), the counting direction of the motor encoder can be adapted to the external encoder here.

P-0-0066
SER MC DP

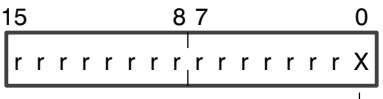
Type of position encoder, external encoder

Position monitoring 2 encoder

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Enter the type of external encoder. You thus establish the reference for the second measuring system (see also P-0-0552). The adaptation is performed via S-0-0178.

Parameter configuration:



X is assigned the 0 or 1 below it.
r: reserved

0 Incremental encoder
1 Absolute value encoder

P-0-0071

SER

Error memory: decoding of feedback error F11

Diagnostics

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Decodes feedback error F11. The meaning and relevance of the individual bits depends on the encoder system used.
Motor measuring system: x000.000x.xxxx.xxxx (x: bit is relevant)
External measuring system: 0000.0000.0000.xxxx (x: bit is relevant)

Meaning of the bits using an external encoder and OM 03:

Bit 0: voltage amplitude of the encoder signals too small.
Error which occurred during initialization but is only displayed in the phase start-up when the external measuring system is parametrized.

Bit 2: two active counting edges have occurred simultaneously.

Bit 3: short circuit between encoder signals and GND or voltage supply.

Bits 4–7: without meaning.

Meaning of the bits using an external encoder and OM 01/OM 02:

Bit 8: two active counting edges have occurred simultaneously.

Bit 9: too many pulses per revolution.

Bit 10: too few pulses per revolution.

Bit 11: A and $\overline{A}$ not inverse.

Bit 12: A and $\overline{B}$ not inverse.

Bit 13: R and $\overline{R}$ not inverse.

Meaning of the bits using the motor encoder:

Bit 0: voltage amplitude of the encoder signals too small.

Bit 1: error in the analog value recording.

Bit 2: two active counting edges have occurred.

Bit 3: motor speed during absolute value recording less than 500 rpm.

Bit 4: short circuit between encoder signals and GND or voltage supply.

Bit 5: for RSU only: group error for redundant encoder monitoring.

Bits 6–7: for RSU only: dragging encoder.

Bit 8: for RSU only: breaking of the encoder coupling; maybe wrong encoder has been connected.

Bits 9–14: without meaning.

Bit 15: for RSU only: watchdog for RSU functions.

P-0-0080

CANr ANA MC DP

Upper adaption limit 2

Controller

3,4	–	–	–	FEPROM	Speed	ANA
3,4	2	–	–	FEPROM	Speed	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Range: dependent on the inverter motor combination
Weighting according to S-0-0044.

S-X-0100 is effective below this speed. From this speed on, the speed controller proportional gain changes to the value determined via P-0-0081.

For details, refer to P-0-0081.

P-0-0081

CANr ANA MC DP

Upper adaption proportional gain 2

Controller

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	FEPROM	–	

Range: 10 ... 5000.0 Weighting 0.1 %

The drive can automatically change the P-component of the speed controller (S-X-0100) depending on the current revolutions or speed. The following shall apply:

Effective P-component of the speed controller = S-0-0100 * P-0-0081 / 100%

The effective P-component thus defined remains constant above the **upper adaption limit 2** (P-0-0080).

To deactivate the function:
– set P-0-0800 = 0 –or–
– set P-0-0080 <= S-X-0210 –or–
– set P-0-0081 = 100%.

☞ **The speed controller proportional gain can also be influenced below P-0-0080. See S-X-0211.**

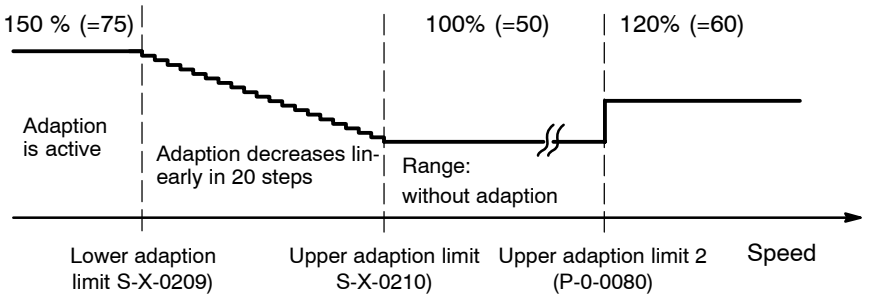
☞ **The speed controller proportional gain is automatically changed to the value determined via P-0-0081, only if**
– S-X-0210 is not equal 0 –and–
– S-X-0210 >= S-X-0209 –and–
– S-X-0211 is not equal 100
has been programmed.

Example:

In the speed range between 0 and 3 rpm the P-component is to be raised from 50 to a value of 75 (=150% of 50) in order to improve the rigidity.
At 3 rpm or more, this adaption is no longer absolutely necessary for the application in question, and at 8 rpm to 500 rpm it becomes entirely unnecessary. Only at 500 rpm and higher the P-component is to be raised up to the max. speed from 50 to 60 (=120% of 50).

Default setting of P-component (S-X-0100):	50
Lower adaption limit (S-X-0209):	3 rpm
Upper adaption limit (S-X-0210):	8 rpm
Adaption proportional gain (S-X-0211):	150 %
Upper adaption limit 2 (P-0-0080):	500 rpm
Upper adaption proportional gain 2 (P-0-0081):	20 %

Course of the effective P-component:



Adaption of the speed controller

P-0-0090

CANr ANA MC DP

Function release

Function release

2	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Parameter configuration:

15 1 0

r r r r r r r r r r r r r r X X

r: reserved
X is assigned the 0 or 1 below it.

0 No reading of the absolute value during phase start-up
1 Reading of the absolute value during phase start-up

0 Speed plausibility test OFF
1 Speed plausibility test ON

Meaning of the bits:

Bit 0: if the bit is high, the absolute value of the encoder (Singleturn or Multiturn absolute value encoder) is read again. The position actual value (P-0-2553) thus obtained is always located in the range of the absolute value encoder.
Precondition: the encoder has an EnDat interface.

If the bit is low, the drive reads the absolute value of the encoder only once when the software is started, incrementing the value in the course of operation when position changes are performed. If the axis was traversed so that it exceeded the absolute range of the encoder, this has no influence on the position actual value (P-0-2553) in a new phase start-up.

Bit 1: if this bit is set, the speed plausibility test is activated:
If the torque actual value for 200 ms remains at the positive (negative) torque limit and subsequently has a negative (positive) acceleration, the output stage is switched off and error F96 occurs.
If the speed plausibility test is switched off (bit 1=0), the calculation of the acceleration actual value (P-0-0083) is also suppressed.

P-0-0101

ANA

ADC adjustment: command

ADC adjustment

2,3,4	–	M → D	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The setpoint (speed or torque; depending on S-0-0032) supplied is an analog value that is transmitted to the drive via an ADC. Using the ”ADC adjustment” function, the possible input voltage range of the ADC can be adjusted to the maximum speed or the maximum torque of the drive. Furthermore, this function adjusts a zero offset of the setpoint, if available.

☞ **Depending on disturbances with regard to setpoint ”0 V” (standstill), it may be necessary to program a very small standstill window with P-0-0108.**

After having defined in P-0-0102 whether the zero offset or the maximum value is to be measured, you can start the relevant measurement with P-0-0101. A total of 64 values will be measured and their mean value will be calculated in order to determine the current setpoint.

☞ **Within the ”ADC adjustment” function, several parameters act in combination. The user interface of the DSS-D leads you through the entire measurement during the ADC adjustment. Thus, you need not worry about the structure of the parameters used.**
However, if you do not use the DSS-D for communicating with the drive, detailed knowledge of the structure of all parameters used is absolutely necessary.

Parameter configuration:

15 … 1 0 — X is assigned the 0 or 1 below it.

0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

0 0 No command
1 1 Execution of command

P-0-0102

ANA

ADC adjustment: control parameters

ADC adjustment

2,3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Parameter configuration:

15 … 1 0 — X is assigned the 0 or 1 below it.

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X

0 Measure zero offset
1 Measure maximum value

You determine whether the voltage present at the command value input is to be interpreted as a zero or a maximum value (with respect to P-0-0103 and P-0-0104) during measurement (see P-0-0101).
In principle, you thus determine the input voltage for the digital 0_{hex} value and the maximum value (12-bit: $7FF_{hex}$; 16-bit: $7FFF_{hex}$) output by the ADC.

☞ **Make sure that no ADC overflow is likely to occur after the adjustment due to excessive setpoint inputs.**

P-0-0103
ANA

ADC adjustment: maximum speed

ADC adjustment

2,3,4	–	–	–	FEPROM	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The speed value entered in this parameter is assigned to the maximum value measured at the setpoint input.
When the firmware bootstrap has been performed, this parameter is assigned the default value n_{nom}.
Weighting according to S-0-0044.
The upper input limit of P-0-0103 depends on S-0-0091.

P-0-0104
ANA

ADC adjustment: maximum torque

ADC adjustment

2,3,4	–	–	–	FEPROM	Torque	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The torque value entered in this parameter is assigned to the maximum value measured at the setpoint input.
When the firmware bootstrap has been performed, this parameter is assigned the default value M_{nom}.
Weighting according to S-0-0086.

P-0-0105
ANA

ADC adjustment: calibration factor

ADC adjustment

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The setpoint output by the ADC can be calibrated by P-0-0105 if necessary. You may activate the calibration setting with P-0-0106.

Range: 0.01 ... 10.00

Default setting: 1.00

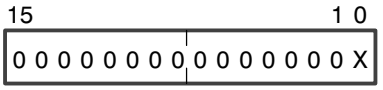
P-0-0106
ANA

ADC adjustment: calibration control parameter

ADC adjustment

2,3,4	–	M → D	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Parameter configuration:



X is assigned the 0 or 1 below it.

0 Deactivate calibration
1 Activate calibration

See P-0-0105.

P-0-0107

ANA

ADC adjustment: filter time

ADC adjustment

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You change the limit frequency of the digital low-pass filter connected downstream the ADC output.
Thus, the slope of the command value input can be reduced if there is a great difference between the controller scan time and the CNC interpolator cycle (=time interval in which the values at the setpoint input are updated by the higher-level control unit).

Range: 0.00 ... 2.55 ms

Default setting: 0.06 ms

P-0-0108

ANA

ADC adjustment: LSB filter

ADC adjustment

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

If the adjustment to the zero offset at the setpoint input (see P-0-0102; bit 0=0) is not sufficient, a ”standstill window” can be parametrized additionally. Input voltages in the area of the standstill window always result in the output of speed n=0. In this manner, an ”unsteadiness” of the LSB at the output of the analog–to–digital converter at active standstill setpoint is suppressed effectively.
In case of speed setpoints > standstill, the value of the standstill window is deducted for the resulting setpoint (at the output of the analog–to–digital converter). The resulting speed is dependent on the parametrized calibration (see P-0-0105).

Range: 0 ... 4000

Default setting: 0 (no LSB filter activated)

P-0-0110

ANA

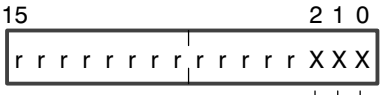
Encoder simulation: control word

Encoder simulation

2	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

By using the encoder simulation function, an encoder for the axis is no longer necessary.
The position data of the motor encoder are provided at X81. Suitable CNC measuring system inputs with a limit frequency ≥ 50 kHz can be directly connected to this terminal.
P-0-0110 is used to enter the basic settings for encoder simulation.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

Bit 0: Activate/Deactivate simulation

0 Deactivate encoder simulation
1 Activate encoder simulation

Bit 1: Encoder mode

0 Single-turn encoder, resolver
1 Multi-turn encoder with absolute value transmission

Bit 2: Counting direction

0 Clockwise=up
1 Clockwise=down
(always when looking at the motor shaft)

☞ **For technical data and the pin assignment of the X81 interface, please refer to the ”Servodyn-D interface conditions” manual.**

In the ”Single-turn encoder, resolver” encoder mode, the function of an incremental encoder will be simulated.
In the ”Multi-turn encoder with absolute value transmission” encoder mode it is furthermore possible to transmit the absolute motor encoder position to the higher-level control unit when the system has been switched on (see P-0-0116).
A multi-turn absolute encoder (MTG) must be fitted to the motor in order to use the ”multi-turn encoder with absolute value transmission” encoder mode.

P-0-0111

ANA

Encoder simulation: divisions

Encoder simulation

3	3	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Enter the required number of divisions of the emulated encoder per motor revolution as an **integer value**.

Range: 1 ... 16000 divisions/rev.
The highest value that can be input is limited by the drive to P-0-0111(max) = P-0-0118 / S-0-0091!

Default setting: 1000

The number of divisions influences the minimum value that can be entered in P-0-0118 (encoder simulation: maximum frequency of transmission) because higher numbers of divisions also demand higher transmission frequencies. Please note:

Smallest value that can be input in P-0-0118 = S-0-0091 [min^{-1}] x P-0-0111

☞ **Values in P-0-0118 which are too low are automatically raised by changing P-0-0111 or S-0-0091.**

In return, the setting of P-0-0118 (encoder simulation: maximum frequency of transmission) also influences the highest value that can be entered in P-0-0111 (e.g. reducing the value in P-0-0118 permits higher numbers of divisions).
Please note:

Highest value that can be input in P-0-0111 = DIV_{max} = $\frac{\text{P-0-0118 [kHz]}}{\text{S-0-0091 [min}^{-1}\text{]}}$

☞ **Values in P-0-0111 which are too high are automatically reduced by changing P-0-0118 or S-0-0091, if required.**

☞ **P-0-0111 and P-0-0118 are dependent on S-0-0091!**
The maximum parametrizable number of divisions can e.g. also be increased by reducing S-0-0091.

☞ **If S-0-0091 is overwritten in phase 3, the drive checks the limits for P-0-0111 and P-0-0118 and adapts them accordingly.**
This check is not performed if S-0-0091 is overwritten in phase 4. In this case, the limits are only monitored again when a phase switch-back and another start-up to phase 4 has taken place.

P-0-0112
ANA

Encoder simulation: current counter status

Encoder simulation

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	–	–	–	–	

Contains the current counter status (impulses) of the encoder simulation with quadruple evaluation.
Depending on parameter P-0-0111, the counter is changed by the value P-0-0111 * 4 in the course of a complete motor revolution (multiplication=4).
Whether the counter is incremented or decremented depends on the direction of rotation of the motor and the selected counting direction of the encoder simulation (see parameter P-0-0110, bit 2).

P-0-0112 initially refers to the motor encoder zero. When the command P-0-0115 has been executed (encoder simulation: store zero position command) the value refers to the zero position of the encoder simulation.

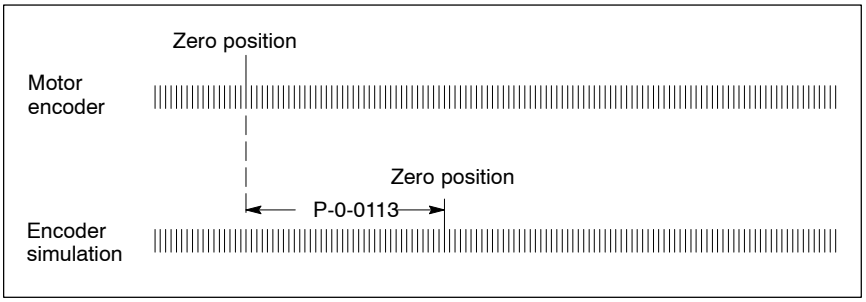
P-0-0113
ANA

Encoder simulation: Zero position

Encoder simulation

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
2,3	3	–	–	FEPROM	–	

Contains the ”displacement” between the motor encoder zero position and the zero position of the encoder simulation. The value is determined and entered by the drive in this parameter whenever the command P-0-0115 (encoder simulation: store zero position command) has been executed.



P-0-0114

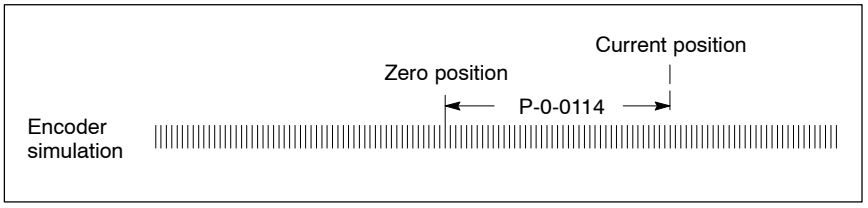
ANA

Encoder simulation: Zero displacement

Encoder simulation

2,3,4	3	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Defines the ”displacement” between the current position of the encoder simulation and the zero position of the encoder simulation for the command P-0-0115 (encoder simulation: store zero position command).
The new zero position of the encoder simulation is moved relative to the current position by the displacement defined in this parameter.



For motors with single-turn encoders, P-0-0114 can be used to shift the zero impulse within **one** motor revolution.

P-0-0115

ANA

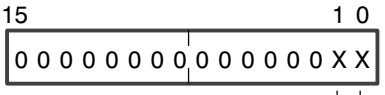
Encoder simulation: Store zero position command

Encoder simulation

2,3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This command ”synchronizes” the counter of the encoder simulation (see P-0-0112) to the zero position of the motor encoder.
If only an incremental encoder is to be emulated, P-0-0115 is of no significance.

Parameter configuration:



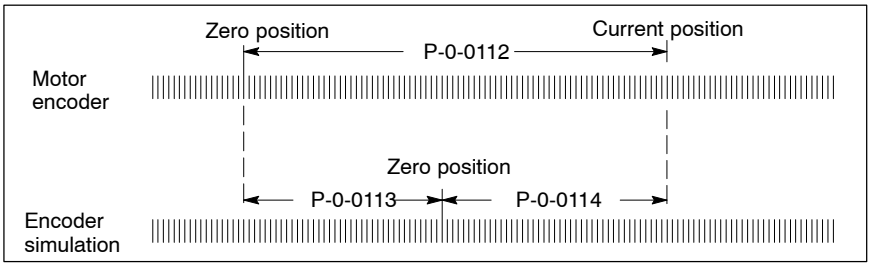
X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

The command initiates the following activities in the drive:

- The current counter status of the encoder simulation (P-0-0112) is assigned the zero position displacement from P-0-0114.
- The displacement between the motor encoder zero position and the zero position of the encoder simulation is saved in P-0-0113.
- During the output of the current encoder simulation position, the zero position (P-0-0113) and the zero displacement (P-0-0114) are permanently accounted for.

The current counter status of the encoder simulation has now been synchronized to the zero position of the motor encoder, thus containing exactly the number of encoder impulses which are – starting from position ”0” – required for reaching the current position.



P-0-0116

ANA

Encoder simulation: Start absolute value transmission

Encoder simulation

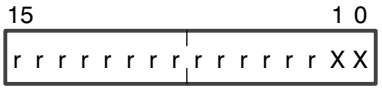
2,3,4	–	M → D	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In the ”Multi-turn encoder with absolute value transmission” encoder mode (see P-0-0110, bit 1), the drive can transmit the absolute motor encoder position to the higher-level control. For this purpose, it transmits exactly the number of encoder impulses required for reaching the current position, starting with position ”0”, via the X81 interface. The drive takes the number of required encoder impulses from parameter P-0-0112.

Absolute value transmission starts when bit 0 in P-0-0116 is set. The higher-level control unit can influence bit 0 accordingly through a digital 24 VDC signal input (INx). The drive signals the end of transmission via parameter P0–0117.

☞ **The allocation between P-0-0116 bit 0 and one of the digital inputs is configurable and may therefore deviate from the standard assignment (input IN2; X06 pin 6) in your system!**

Parameter configuration:



r: reserved

0 not active
1 Start absolute value transmission
X Positive edge at bit 1 reinitializes encoder simulation.

Prior to a reinitialization of the encoder simulation (positive edge at bit 1), bit 0 must be 0. Subsequently, absolute value transmission can be started again.

☞ **A multi-turn absolute encoder (MTG) must be fitted to the motor in order to use the ”multi-turn encoder with absolute value transmission” encoder mode.**

P-0-0117

ANA

Encoder simulation: Absolute value transmission finished

Encoder simulation

–	3	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The drive signals the end of absolute value transmission by setting bit 0 (bit 0 = 1) in P-0-0117. The higher-level control unit can query the status of bit 0 at one of the digital outputs of the drive (OUTx).

☞ **The allocation between P-0-0117 bit 0 and one of the digital outputs is configurable and may therefore deviate from the standard assignment in your system!**

As a standard, bit 0 in P-0-0117 influences the status of the **OUT1** relay contact (X34, pins 5 and 4 or pins 5 and 6).

P-0-0118

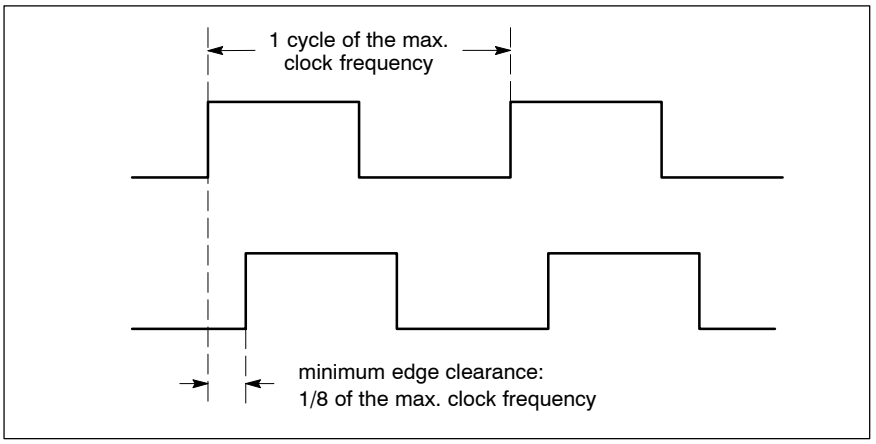
ANA

Encoder simulation: Maximum transmission frequency

Encoder simulation

3	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Specifies the maximum clock frequency for encoder simulation. The minimum edge clearance is 1/8 of this frequency.
The measuring system input of the higher-level control unit must be capable of processing both characteristic values.



The following values (in kHz) are permitted as input values for P-0-0118:
50..54, 56..58, 60, 61, 63, 64, 66, 68, 69, 71, 74, 76, 78, 81, 83, 86, 89, 93, 96, 100, 104, 109, 114, 119, 125, 132, 139, 147, 156, 167, 179, 192, 208, 227, 250, 278, 313, 357, 417, 500, 625, 833, 1250

The setting of P-0-0118 also influences the highest value that can be entered in P-0-0111 (e.g. reducing the value in P-0-0118 permits higher numbers of divisions). Please note:

$$\text{Highest value that can be input in P-0-0111} = DIV_{max} = \frac{\text{P-0-0118 [kHz]}}{\text{S-0-0091 [min}^{-1}\text{]}}$$

☞ **Values in P-0-0111 which are too high are automatically reduced by changing P-0-0118 or S-0-0091, if required.**

In return, the number of divisions (P-0-0111) influences the minimum value that can be entered in P-0-0118 because higher numbers of divisions also demand higher transmission frequencies. Please note:

$$\text{Smallest value that can be input in P-0-0118} = \text{S-0-0091 [min}^{-1}\text{]} \times \text{P-0-0111}$$

☞ **Values in P-0-0118 which are too low are automatically raised by changing P-0-0111 or S-0-0091.**

☞ **P-0-0111 and P-0-0118 are dependent on S-0-0091!**
By reducing P-0-0091 it is e.g. possible to reduce the smallest parametrizable value for P-0-0118.

☞ **If S-0-0091 is overwritten in phase 3, the drive checks the limits for P-0-0111 and P-0-0118 and adapts them accordingly.**
This check is not performed if S-0-0091 is overwritten in phase 4. In this case, the limits are only monitored again when a phase switch-back and another start-up to phase 4 has taken place.

P-0-0120

SER CANr ANA MC DP

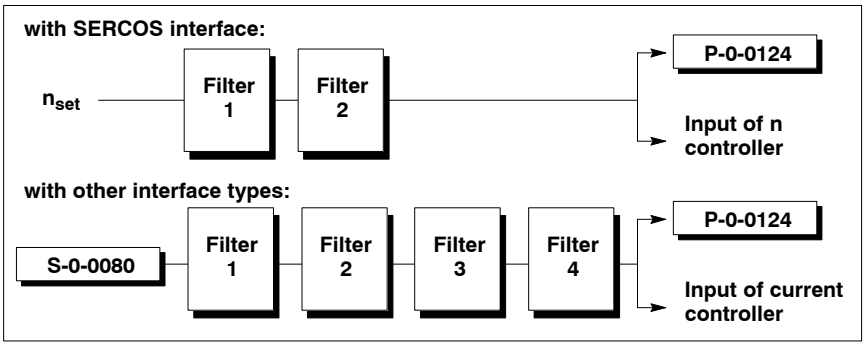
Current setpoint filter: selection of filter type

Current setpoint filter

2,3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The drive has 4 (with SERCOS interface: 2) 2nd order digital filters connected in series. In case of drives with SERCOS interface, the filters are effective at the input of the speed controller, in case of the remaining interface types, the torque setpoint (S-0-0080) is guided via the filters to the current controller input. Furthermore, the drive stores the filtered torque setpoint in parameter P-0-0124 for further processing, if necessary. Thus, the setpoint characteristic of the drive can be optimized precisely to the requirements of your respective application.

Each of the filters can be parameterized as a low pass filter or as a band rejection filter. Furthermore, every filter can be completely switched off.



With P-0-0120 you can define the type of every individual filter. For this purpose, you may use the following identifications:

”0”: filter off
”1”: low pass filter
”2”: band rejection filter

Enter the identifications for the individual filters in P-0-0120 separated by commas. For further relevant parameters, see P-0-0121 to P-0-0123.

Example:

Filter 1: low pass filter
Filter 2: band rejection filter
Filter 3: filter off
Filter 4: band rejection filter

Required parameters:: P-0-0120=1,2,0,2

P-0-0121

SER CANr ANA MC DP

Current setpoint filter: Limit frequency of low pass filter

Current setpoint filter

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Enter the limit frequency of the low pass filters in Hz in P-0-0121. As a result, the signal range above the specified frequency will be attenuated with –20 dB per decade. Any value entered will be used only if the corresponding filter was configured in P-0-0120 as low pass filter.

Example:

Filter 1: low pass filter, limit frequency: 100 Hz
Filter 2: band rejection filter
Filter 3: filter off
Filter 4: band rejection filter

Required parameters: P-0-0121=100.0,<*value2*>,<*value3*>,<*value4*>

<*value2*> to <*value4*> must be parametrized but are not relevant in this context because only filter 1 has been configured as low pass.

P-0-0122

SER CANr ANA MC DP

Current setpoint filter: Quality of band rejection filter

Current setpoint filter

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

For the filters configured as band rejection filters in P-0-0120, the quality is entered in P-0-0122 and the center frequency is entered in Hz in P-0-0123. As a result, the signal range will be reduced by more than –40 dB at the specified frequency.
The quality determines the slope of the filter edge. The higher the quality, the narrower is the band of the suppressed frequency range.

Entered values will be used only if the corresponding filter was configured as band rejection filter.

Example:

Filter 1: low pass filter
Filter 2: band rejection filter; center frequency: 2100 Hz, quality: 5
Filter 3: filter off
Filter 4: band rejection filter; center frequency: 1000 Hz, quality: 1

Required parameters:
P-0-0122=<*value1*>,5.0,<*value3*>,1.0
P-0-0123=<*value1*>,2100.0,<*value3*>,1000.0

<*value1*> and <*value3*> must be parametrized but are not relevant in this context because only filters 2 and 4 have been configured as band rejection filters.

P-0-0123

SER CANr ANA MC DP

Current setpoint filter: Center frequency of band rejection filter

Current setpoint filter

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

See P-0-0122.

P-0-0124

CANr ANA MC DP

Torque setpoint, filtered

Measuring point

–	–	–	–	–	Torque	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

See P-0-0120. Weighting according to S-0-0086.

P-0-0125

CANr ANA MC DP

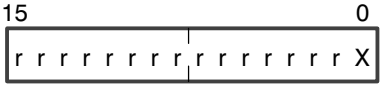
Control word, external enable

Drive ON/OFF

2,3	3	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You specify in which way the drive should be halted when the external enable signal has been removed.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

0 Halting according to P-0-0004:
1 Drive is halted without setpoint control

P-0-0126

CANr ANA MC DP

Status word, internal enable

Drive ON/OFF

–	3	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Displays individual internal enable statuses. Thus it possible to analyze which statuses lead to removal of internal enable.

Meaning of the individual bits:

Bit 0: 0: initialization incorrect.
1: initialization completed correctly.

Bit 1: 0: diagnostics class 1 error detected.
1: no diagnostics class 1 error

Bits 2–3: –

Bit 4: 0: external enable FG missing.
1: external enable FG available.

Bit 5: 0: central enable FGZ missing.
1: central enable FGZ available.

Bit 6 0: halting request via module cross connection.
1: no halting request present.

Bit 7 0: STA contact open.
1: STA contact closed.

Bit 8 0: controller in halting mode
1: controller not in halting mode, current operating mode selected.

Bit 9: 0: output stage inactive, right-hand LED OFF.
1: output stage active, right-hand LED ON.

Bit 10: 0: Out 3 (controlling the holding brake) LOW: brake closed.
1: Out 3 (controlling the holding brake) HIGH: brake open.

Bit 11: 0: Out 4 (controlling plug braking contactor (KSB)) LOW: KSB closed, short-circuit braking active.
1: Out 4 (controlling plug braking contactor (KSB)) HIGH: KSB open, no short-circuit braking.

Bit 12: 0: interface does not give enable.
1: interface gives enable.

Bits 13–15: –

P-0-0127

CANr ANA MC

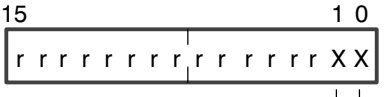
Control word, operating mode

Operating mode

2,3,4	2	M → D	MDT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Changes over between the individual operating modes of the drive.

Parameter configuration:



X is assigned the 0 or 1 below it.

Bits 0–1: Operating mode selection

0 0	Main mode (S-0-0032)
0 1	Secondary mode 1 (S-0-0033)
1 0	Secondary mode 2 (S-0-0034)
1 1	Secondary mode 3 (S-0-0035)

This parameter has been created as a real-time control bit, therefore, it can also be influenced by 2 input signals of the I/O interface.
See also S-0-2000 and S-0-2001.

P-0-0200

SER CANr ANA MC DP

Thermal motor protection factor

Limit value

2,3,4	2	–	–	EPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The parameter determines how fast the motor is switched off after quick temperature rises of the winding circuit.

Input: 0...15 (0: motor protection OFF)

Default setting: 15.0
(best motor protection without impairment in nominal operation)

CAUTION
Overheating of the motor winding may cause irreparable damage to the motor!
We therefore strongly recommend to maintain the default settings of P-0-0200 and S-0-0204 (motor overtemperature shutoff)!

☞ **The I^2t monitoring (bimetal function) is also available for protection of the motor. See P-0-0053.**

P-0-0260

SER

Halting acceleration

Interpolation

3,4	2	–	MDT	FEPROM	Accel.	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Following ”drive OFF”, the drive decelerates to standstill using the value entered here, if P-0-0004 has been parametrized accordingly.
Weighting in accordance with S-0-0160.
This parameter can be modified in any operating status. However, it will become immediately active only if no braking process is currently taking place.

P-0-0400

SER CANr ANA MC DP

Setpoint generator: command ”Start setpoint generator”

Setpoint generator

4	–	M → D	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

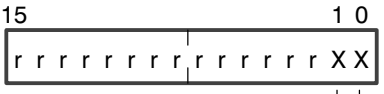
The drive is capable of generating a variety of setpoint profiles by means of the integrated setpoint generators (SWG).
In this manner, it is possible to test and optimize the drive’s behavior in advance already (e.g. without the control unit having been connected yet).

☞ **For detailed information on the setpoint generators, refer to P-0-0401.**

P-0-0400 can be used to generally activate the setpoint generator functionality and to determine its status. When the function is active the cyclical setpoint input of a higher-level control unit is no longer evaluated by the drive. When the setpoint generator function is deactivated, the cyclical setpoint input becomes effective again.

Relevant bits for write access to P-0-0400 (command input):

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

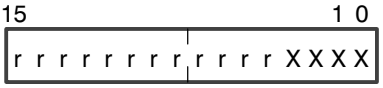
0 Data valid
1 Set command in drive

0 Interrupt execution of command
1 Enable execution of command

CAUTION
Motor movement possible following activation of the setpoint generator function!
Please ensure that no situations may arise which may endanger or damage persons or property!

The status of the setpoint generator function is determined via read access to P-0-0400.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

0 Command not set in drive
1 Command set

0 Execution of command interrupted
1 Execution of command enabled

0 Command executed
1 Command not yet executed

0 No error
1 Error: execution of command not possible

Setpoint generator control procedure

1. Parametrize the functioning of the setpoint generator:
   Depending on the required functioning, different parameters have to be assigned specific values. See P-0-0401.
2. Activating:
   Set bit 0 and bit 1 in P-0-0400 to ”1”.
   The drive activates the setpoint generator and from this time on ignores cyclical setpoint inputs from the higher-level control unit.
   The drive checks the validity of the relevant parameters depending on the type of setpoint generator used. If invalid data has been parametrized, the command error bit (bit 3 in P-0-0400) is set.
3. Starting:
   Set bit 0 in P-0-0432 to ”1” (data change-over from 0 to 1 required).
   The setpoint generator will start setpoint input according to its current parametrization.

☞ **Automatic start and parameter changes in connection with setpoint generator types without position monitoring (P-0-0401 bit 4=0):**

- **following activation of the setpoint generator, bit 0 in P-0-0432 is automatically set to ”1”.**
- **any parametrization changed during setpoint generator operation becomes effective in the next cycle already.**

4. Stopping:
   Set bit 0 in P-0-0432 to ”0” (data change-over from 1 to 0 required).
   The drive goes into HALT condition, the motor stops.
   In this condition, it is possible to modify the entire parametrization of the setpoint generator.
   For information on restart, see item 3.
5. Deactivating:
   Set bit 0 and bit 1 in P-0-0400 to ”0”.
   The setpoint generator is deactivated. The cyclical setpoint input by the higher-level control unit is effective again.

P-0-0401

SER CANr ANA MC DP

Setpoint generator: control parameter

Setpoint generator

3,4	–	–	–	FEPROM	–	SER
4	–	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Using the control parameter you determine behavior and type of setpoint generator function.
Current, speed or position can be input as setpoint. You use parameters to adapt the setpoint profile to your requirements.

Parameter configuration:

15 8 7 0

r r r r r r X X X X X X X X

X is assigned the 0 or 1 below it.

Bits 0–4: Setpoint generator type

0 0 0 0 0 0 0 0 0 1 standard position generator
X X X 0 0 0 0 1 0 speed generator
X X X 0 0 0 1 0 0 torque current generator
X X X 0 0 1 0 0 0 field current generator
X X 1 0 0 0 1 position-controlled position generator
X X 1 0 0 1 0 position-controlled speed generator

Bit 5: operating mode for position-controlled setpoint generator

0 Reversing
1 Single step

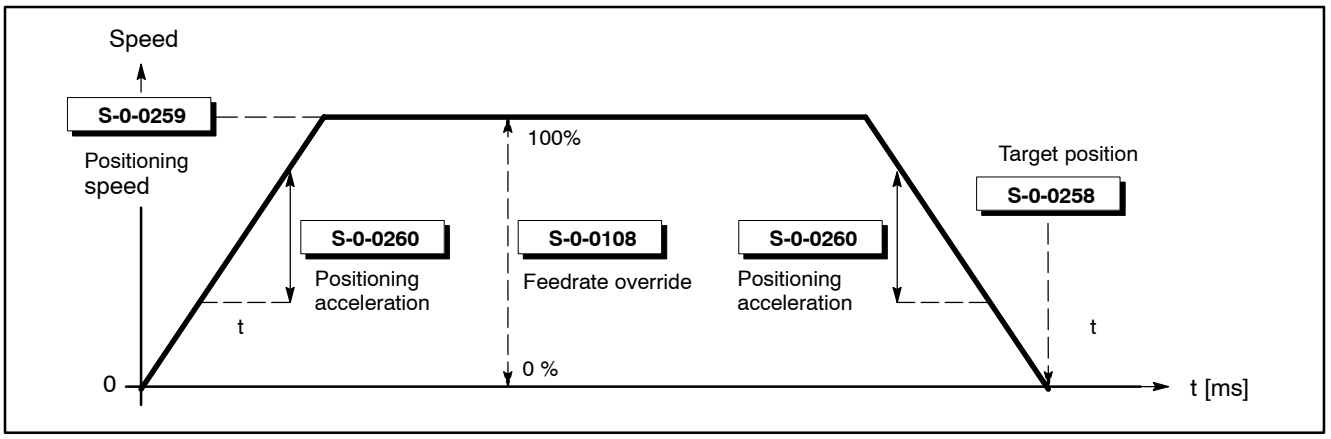
Bit 6: Autorepeat

0 Off
1 On

Bits 7–8: Signal condition for speed/current setpoints

0 0 according to P-0-0403 ... P-0-0408 (cycle generator)
0 1 according to P-0-0402, P-0-0407 (table generator)
1 0 according to P-0-0403, P-0-0404 and P-0-0407 (sine generator, possible for SERCOS interface only.)

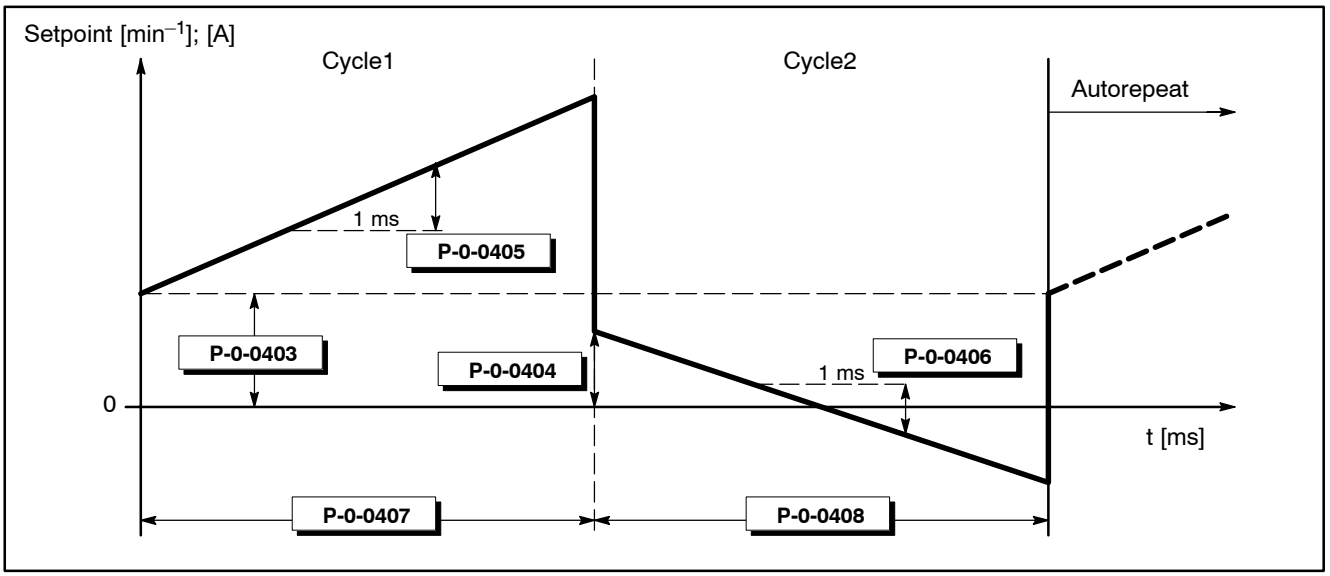
Parameters for standard position generator (see P-0-0401 bits 0...4):



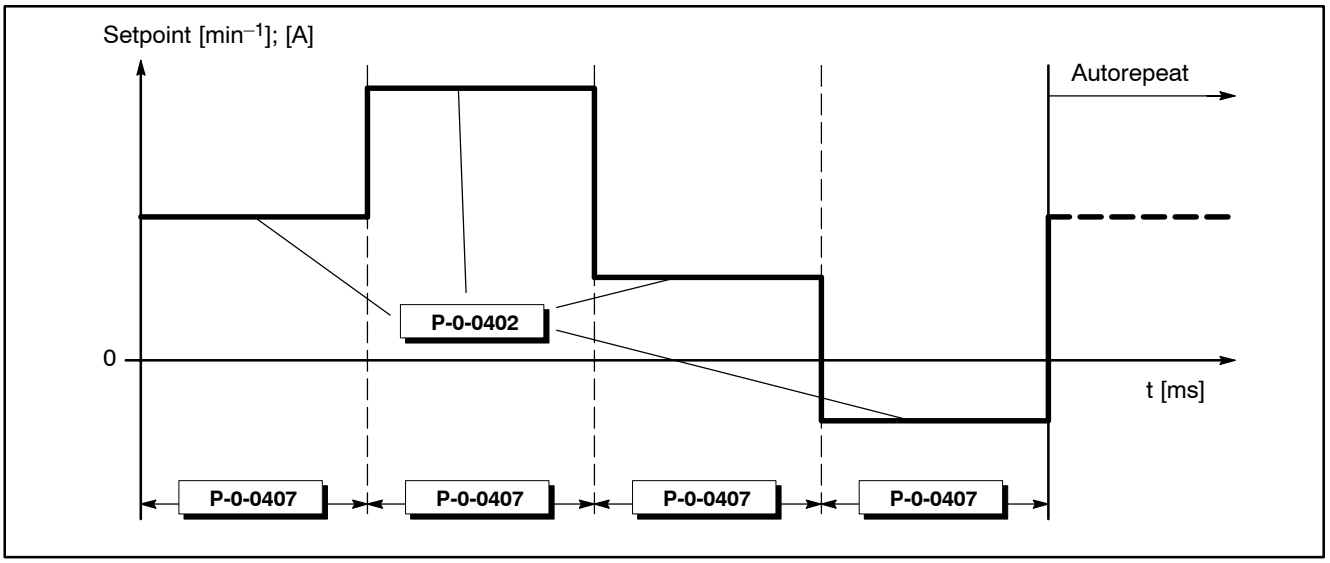
The following values are monitored when the standard position generator is active:

S-0-0315 Positioning speed > n_{limit} (ZSK2; S-0-0012 bit 5)
(ZSK = diagnostics class)
S-0-0323 Target position outside of position limit values (ZSK2;S-0-0012 bit 13)
S-0-0342 Target position reached (ZSK3; S-0-0013 bit 12)
S-0-0343 Interpolator halt (ZSK3; S-0-0013 bit 13)

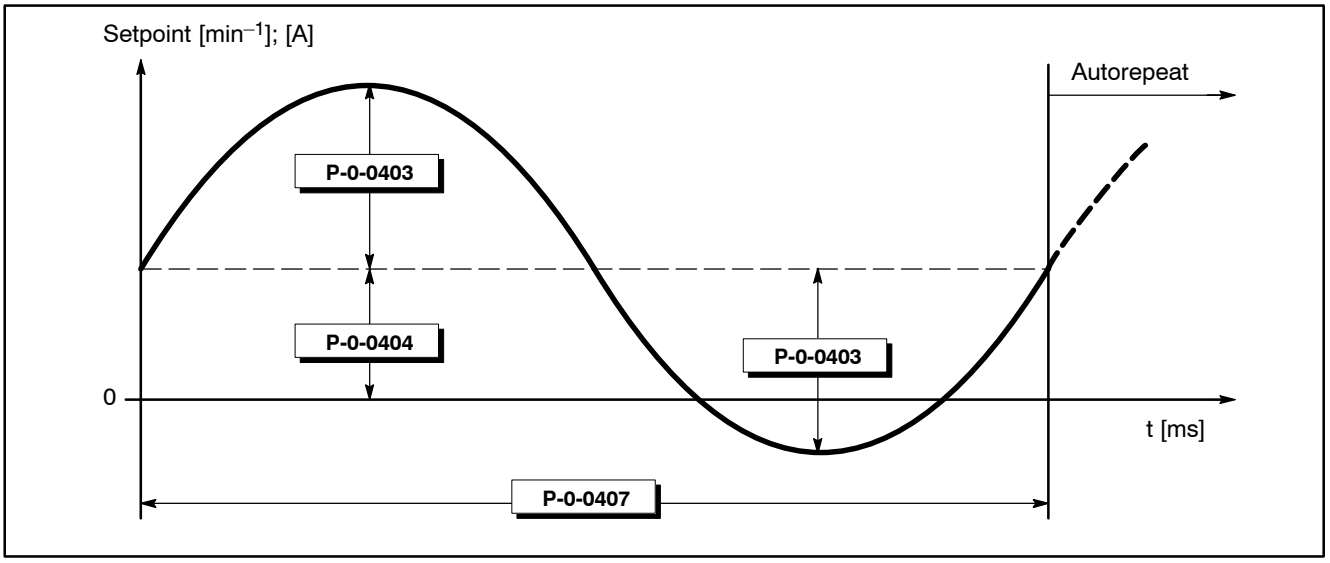
Parameters for speed and current inputs for cycle generators (see P-0-0401 bits 7 and 8):



Parameters for speed and current inputs for the table generator (see P-0-0401 bits 7 and 8):



Parameters for speed and current inputs for the sinus generator (see P-0-0401 bits 7 and 8):



Parameters for position-monitored position generator (see P-0-0401 bits 0...4):

The position-monitored position generator has a limited traversing range (P-0-0433 positive position limit value; P-0-0434 negative position limit value) and generates its position setpoints by means of the internal interpolator (speed, dynamics etc.).

The operating modes ”reversing” and ”single step” can be selected (see P-0-0401 bit 5).

Reversing:

1. The drive first traverses to the positive position limit value (P-0-0433).
2. The motor stops for the duration of the setpoint generator dwell time (P-0-0437).
3. The drive traverses to the negative position limit value (P-0-0434).
4. If autorepeat (P-0-0401 bit 6) has been activated, the drive repeats the entire cycle until the setpoint generator start (P-0-0432 bit 0) is set to logic 0.

Single step

1. The drive moves the distance of a position step (P-0-0435), starting from the current position. The traversing direction is determined by the sign in P-0-0435.
2. The motor stops for the duration of the setpoint generator dwell time (P-0-0437).
3. If autorepeat (P-0-0401 bit 6) has been activated, the drive repeats the items 1 and 2 until the setpoint generator start (P-0-0432 bit 0) is set to logic 0.
   If a position limit is reached, the motor stops and moves to the opposite position limit value after the setpoint generator dwell time (P-0-0437).

Parameters for position-monitored speed generator (see P-0-0401 bits 0...4):

The position-monitored speed generator, like the position-monitored position generator, also has a limit traversing range (P-0-0433 positive position limit value; P-0-0434 negative position limit value). The position-monitored speed generator generates its setpoints, although not by means of the internal interpolator but via setpoint generator speed P-0-0436. This means that the required deceleration distances for approaching the position limit values are not taken into account; position limit values are thus exceeded to different extents depending on the axis dynamics.

The operating modes ”reversing” and ”single step” can be selected (see P-0-0401 bit 5).

Reversing:

1. The drive first traverses to the positive position limit value (P-0-0433).
2. The motor stops for the duration of the setpoint generator dwell time (P-0-0437).
3. The drive traverses to the negative position limit value (P-0-0434).
4. If autorepeat (P-0-0401 bit 6) has been activated, the drive repeats the entire cycle until the setpoint generator start (P-0-0432 bit 0) is set to logic 0.

Single step

1. The drive traverses the distance of a position step (P-0-0435) at setpoint generator speed (P-0-0436). The traversing direction is determined by the sign in P-0-0435.
2. If a position limit is reached, the drive stops for the duration of the setpoint generator dwell time (P-0-0437) and then moves to the opposite position limit value.
   If no position limit is reached, the drive stops for the duration of the setpoint generator dwell time (P-0-0437). Continue with item 1.
3. If autorepeat (P-0-0401 bit 6) has been activated, the drive repeats the items 1 and 2 until the setpoint generator start (P-0-0432 bit 0) is set to logic 0.

P-0-0402

SER CANr ANA MC DP

Setpoint generator: Setpoint table

Setpoint generator

3,4	–	–	–	FEPROM	Setpoint generator	SER
4	–	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter serves to generate a stepped signal format (see "**Parameter for speed and current inputs for the table generator**", page 3–133). You can program max. 32 amplitude values (separated by commas) which are then activated at the time interval of P-0-0407. The output of programmed values can be repeated via "autorepeat" (see P-0-0401, bit 6).

Range: Current signal: $-I_{max}$ ... $+I_{max}$ [mA]
Speed signal: $-n_N$ ... $+n_N$ Weighting i.a.w. S-0-0044

P-0-0403

SER CANr ANA MC DP

Setpoint generator: initial amplitude, cycle 1

Setpoint generator

3,4	–	–	–	FEPROM	Setpoint generator	SER
4	–	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Function see page 3–133 ff.

Range: Current signal: $-I_{max}$ ... $+I_{max}$ [mA]
Speed signal: $-n_N$ ... $+n_N$ Weighting i.a.w. S-0-0044

P-0-0404

SER CANr ANA MC DP

Setpoint generator: initial amplitude, cycle 2

Setpoint generator

3,4	–	–	–	FEPROM	Setpoint generator	SER
4	–	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Function see page 3–133 ff.

Range: Current signal: $-I_{max}$ ... $+I_{max}$ [mA]
Speed signal: $-n_N$ ... $+n_N$ Weighting i.a.w. S-0-0044

P-0-0405

SER CANr ANA MC DP

Setpoint generator: acceleration, cycle 1

Setpoint generator

3,4	2	–	–	FEPROM	Setpoint generator	SER
4	–	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Function see page 3–133 ff.

Range: Current signal: –100 ... +100 [mA/ms]
Speed signal: –500 ... +500 [(rpm)/ms] or [(m/min)/ms]

P-0-0406

SER CANr ANA MC DP

Setpoint generator: acceleration, cycle 2

Setpoint generator

3,4	2	–	–	FEPROM	Setpoint generator	SER
4	–	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Function see page 3–133 ff.

Range: Current signal: –100 ... +100 [mA/ms]
Speed signal: –500 ... +500 [(rpm)/ms] or [(m/min)/ms]

P-0-0407

SER CANr ANA MC DP

Setpoint generator: duration of cycle 1

Setpoint generator

3,4	2	–	–	FEPROM	–	SER
4	–	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Function see page 3–133 ff.

Range: 1 ... 65535 [ms], integers only

P-0-0408

SER CANr ANA MC DP

Setpoint generator: duration of cycle 2

Setpoint generator

3,4	2	–	–	FEPROM	–	SER
4	–	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Function see page 3–133 ff.

Range: 1 ... 65535 [ms], integers only

P-0-0410

SER CANr ANA DP

Oscilloscope: Start command

Oscilloscope

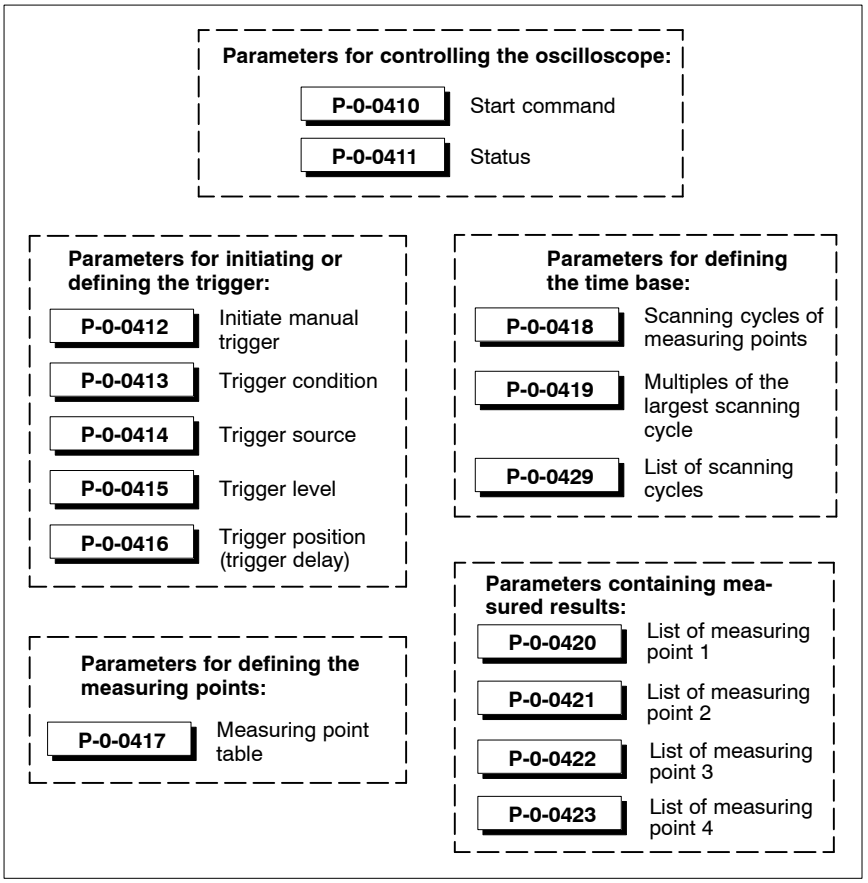
3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

With the help of the ”oscilloscope” function, internal **drive data** can be scanned **as a function of time** for the purpose of testing or optimization. Additional external measuring instruments or wiring are not necessary. Starting up a machine or axis thus becomes much easier.
The oscilloscope is controlled by a number of parameters. In analogy to a ”normal” oscilloscope, you can set the trigger, time base and up to 4 measuring channels (measuring points).

☞ **Within the oscilloscope function, several parameters have a combined effect. The DSS-D user interface provides support for measurement settings, data handling and the graphics display of measured values by the integrated ”oscilloscope” diagnostics program. Thus, you need not know the structure of the parameters used.**
However, if you do not use DSS-D for communicating with the drive, it is absolutely necessary to have detailed knowledge of the structure of all parameters used.

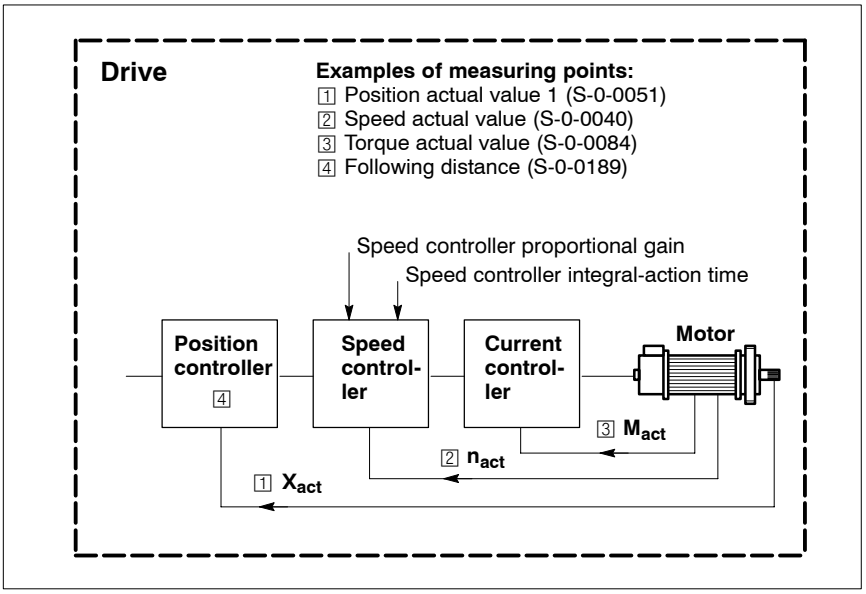
☞ **To use the function ”drive oscilloscope”, it has to be enabled for all relevant interface types (except SERCOS interface) in the DSS:**
– write character sequence OSC1 in monitor P-0-0489.
– execute DSS reset.

The parameters relevant for the oscilloscope and their functional assignment is shown in the following figure.



As a rule, the values of most drive parameters can be scanned and used as trigger sources. However, only scanning of values that change over time makes sense. These include, e.g., position, speed, torque, but also messages concerning certain events (in-position, $n_{act}=0$, $n_{act}=n_{set}$, etc.).

The following block diagram shows an example of some ”measuring points” where data can be ”picked up ”:



During measurement, values relating to a maximum of 4 parameters (measuring points) can be scanned simultaneously. An internal ring memory with a capacity of 4096 32-bit words is available for this purpose, which is automatically subdivided by the drive depending on the required number of measuring points and the scanning cycle setting (scanning frequency) and which the drive constantly fills having received the command "command start" (P-0-0410).

The trigger conditions are set by yourself to determine from which event onward the internal ring memory shall be filled again with measured values maximally once before scanning is finished.

When measurement has been completed, all measured values can be output from the drive and further processed externally after adequate data preparation.

The oscilloscope can be started and stopped with **P-0-0410**.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

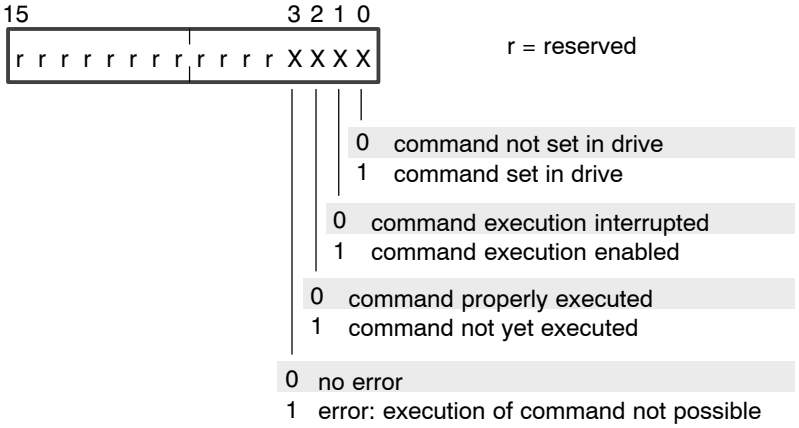
15														1	0
r	r	r	r	r	r	r	r	r	r	r	r	r	r	X	X

0	0	stop oscilloscope
1	1	start oscilloscope
	0	valid data
	1	set command in drive
0		interrupt execution of command
1		enable execution of command

The command acknowledgement feedback can be used to check whether:

- the oscilloscope was properly started (oscilloscope is active), and
- the measurements have been completed (oscilloscope not active, but not yet stopped).

Parameter configuration:



☞ **Other conditions within an active oscilloscope can be queried with P-0-0411.**

Measurement procedure

1. Assign appropriate values to parameters P-0-0413 to P-0-0419 one by one.
   All parameters must be given valid values. For detailed information, please refer to the description of the individual parameters.
2. Start the oscilloscope (set bit 0 and bit 1 of P-0-0410 to ”1”).
   The drive checks the previously assigned parameters for their validity. In the event of invalid data in parameters P-0-0412 to P-0-0417, the command error bit (bit 3 of command acknowledgement) will be set.
   The oscilloscope then waits for the trigger event. In this course, the current values at the measuring points are permanently written to the internal ring memory with the selected scanning frequency.
   When the trigger event has occurred, the oscilloscope will fill the internal ring memory maximally 1 time with measured values (depending on the trigger position defined). The scanned data is standardized, min. and max. values will be determined, and the command alteration bit is set (bit 2 of command acknowledgement changes to ”0”).
   Then P-0-0420 to P-0-0423 will be output.
3. Stop the oscilloscope (set bit 0 and bit 1 of P-0-0410 to ”0”).
   The drive switches the oscilloscope off and resets the command alteration bit.

P-0-0411

SER CANr ANA DP

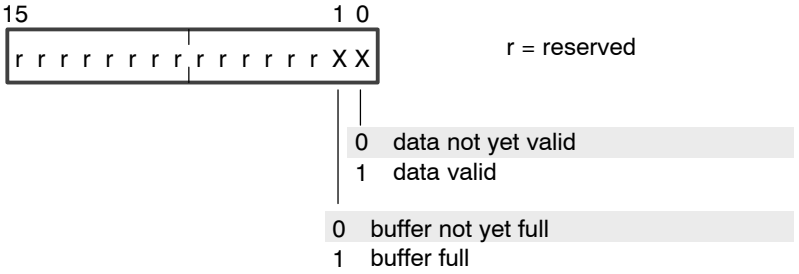
Oscilloscope: status

Oscilloscope

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You determine the current status of an active oscilloscope (active: bit 0 and bit 1 of P-0-0410 have the value ”1”).

Parameter configuration:



Bit 0 indicates whether standardization of the measured data has been completed (”data valid”). Afterwards, the drive sets the command alteration bit.

Bit 1 indicates whether the ring memory is full (”buffer full”).
Bit 1 carries the value ”0” when

- the trigger event has not yet been initiated
- the ring memory is not completely filled because of a suitable specification in the trigger position parameter (P-0-0416).

P-0-0412

SER CANr ANA DP

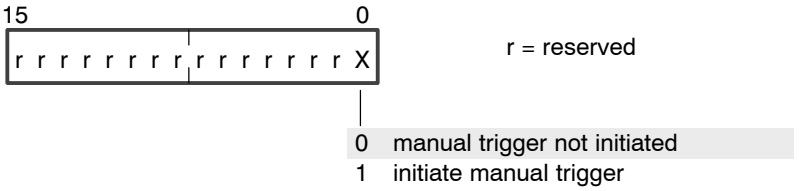
Oscilloscope: Initiate manual trigger

Oscilloscope

3,4	–	M → D	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

When ”manual trigger” has been set as trigger condition in parameter P-0-0413, the change of bit 0 to value ”1” will initiate the trigger event.

Parameter configuration:



☞ **Since this parameter belongs to the group of real-time control bits, you may also enter it in P-0-2000, thus assigning one of the 10 digital inputs to the manual trigger. In this case, bit 0 is a logical image of the corresponding hardware input.**
A high level at this input will then initiate the manual trigger.
Concerning the initialization and scanning frequency of the hardware inputs, please refer to the description of parameter P-0-2000.

P-0-0413

SER CANr ANA DP

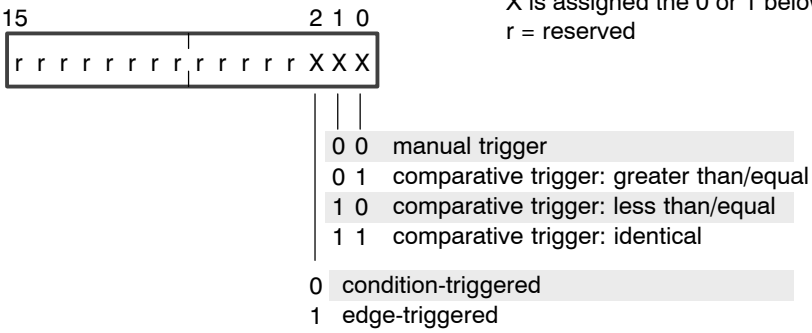
Oscilloscope: trigger condition

Oscilloscope

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You specify whether the ”manual trigger” (see also P-0-0412) or the ”comparative trigger” shall be activated.
If you do **not** select the ”manual trigger” in P-0-0413, the comparative trigger will automatically be active.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

”Manual trigger”:
The trigger is exclusively initiated by P-0-0412. Bit 2 has no significance in this case. The trigger source (P-0-0414) and trigger level (P-0-0415) parameters will not be considered, however, they must be assigned valid values.

”Comparative trigger: greater than/equal” and ”condition-triggered”:
The trigger is initiated when the value of the trigger source (P-0-0414) was greater than or equal to the trigger level (P-0-0415) in at least 2 consecutive scanning cycles. The condition of P-0-0412 will not be considered.

”Comparative trigger: greater than/equal” and ”edge-triggered”:
The trigger is initiated when the value of the trigger source (P-0-0414) is initially less, but then greater than or equal to the trigger level (P-0-0415) in 2 consecutive scanning cycles.
The condition of P-0-0412 will not be considered.

”Comparative trigger: less than/equal” and ”condition-triggered”:
The trigger is initiated when the value of the trigger source (P-0-0414) is less than or equal to the trigger level (P-0-0415) in at least 2 consecutive scanning cycles.
The condition of P-0-0412 will not be considered.

”Comparative trigger: less than/equal” and ”edge-triggered”:
The trigger is initiated when the value of the trigger source (P-0-0414) is initially greater, but then less than or equal to the trigger level (P-0-0415) in 2 consecutive scanning cycles.
The condition of P-0-0412 will not be considered.

”Comparative trigger: identical”:
The trigger is initiated when the value of the trigger source (P-0-0414) is exactly identical to the trigger level (P-0-0415) in 2 consecutive scanning cycles. Bit 2 is of no significance in this case.
The condition of P-0-0412 will not be considered.

P-0-0414

SER CANr ANA DP

Oscilloscope: trigger source

Oscilloscope

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Specifies the parameter to be triggered.
For this purpose, you only need to enter the desired parameter number in the data of P-0-0414.
As a rule, most drive parameters can be used as trigger sources.

☞ **Parameter P-0-0414 must be defined before parameter P-0-0415.**

P-0-0415

SER CANr ANA DP

Oscilloscope: trigger level

Oscilloscope

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The drive compares the values measured at the trigger source (P-0-0414) according to the selected trigger condition (P-0-0413) permanently with the value entered in this parameter.

☞ **This parameter is automatically given attributes, the unit of measure and the limit values of the parameter defined in P-0-0414 for monitoring the validity of the value entered here.**
Therefore, parameter P-0-0414 must be defined before parameter P-0-0415.

P-0-0416

SER CANr ANA DP

Oscilloscope: trigger position

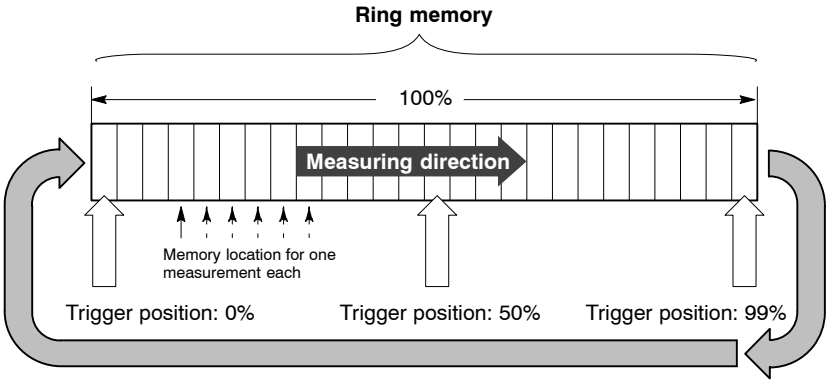
Oscilloscope

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You specify which percentage of the measured values already stored in the ring memory shall be retained when the valid trigger arrives. Thus, you may also check the data measured before occurrence of the trigger event.

Range: 0 ... 99 %, only **integer** values

Default: 0 %



P-0-0417

SER CANr ANA DP

Oscilloscope: Measuring point table

Oscilloscope

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	FEPROM	–	

Defines the measuring points where the oscilloscope is to scan data. For this purpose, enter a maximum of 4 ident. numbers, separated by commas.

In case any parameters specified here are not suitable as measuring points, or if the measuring point table is incorrect, the drive sets the command error bit to ”1” when the oscilloscope has been started (bit 3 of the command acknowledgement). The exact cause of the error can be determined through parameter P-0-0482.

P-0-0418

SER CANr ANA DP

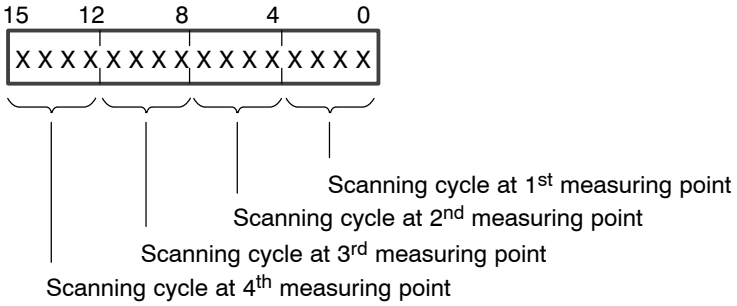
Oscilloscope: Scanning cycles of measuring points

Oscilloscope

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	FEPROM	–	

Specifies a separate scanning cycle for every measuring point. The possible values are stored in parameter P-0-0429.

Parameter configuration:



P-0-0418 must be assigned valid values in ascending order, starting with the scanning cycle at the first measuring point. For this purpose, 4 bits are available for each measuring point into which the binary-coded index of the required scanning cycle from P-0-0429 is entered.

Example:

P-0-0429=250,500,1000,2000. This means:
- 250 (index 1),
- 500 (index 2),
- 1000 (index 3) or
- 2000 µs (index 4)

can be selected as scanning cycle.
Required scanning cycle at the 1st measuring point: 500 µs (index 2 in P-0-0429)
Required scanning cycle at the 2nd measuring point: 2000 µs (index 4 in P-0-0429)
Required scanning cycle at the 3rd measuring point: 1000 µs (index 3 in P-0-0429)
Required scanning cycle at the 4th measuring point: 250 µs (index 1 in P-0-0429)

Required parametrization of P-0-0118: 0001.0011.0100.0010

Parameter P-0-0418 will not be considered if a value ”> 1” is entered in P-0-0419. In this case, the same cycle will be used for scanning data at all defined measuring points (see P-0-0419).

☞ **Even if less than 4 measuring points have been defined in P-0-0417, or if P-0-0418 is not considered because of identical scanning cycles, you must enter only valid values in parameter P-0-0418 .**

P-0-0419

SER CANr ANA DP

Oscilloscope: Multiples of the greatest scanning cycle

Oscilloscope

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

If measurements must be performed for prolonged periods of time for a predetermined number of measuring points, the scanning frequency (measurements/sec) must be reduced because the complete measured data memory available has a constant size of 4096 32-bit words.
For this purpose, you must enter an integer factor (> 1) in P-0-0419. The drive multiplies the greatest scanning cycle – contained in P-0-0429 – with this factor and interprets the result as the desired scanning cycle of **all** defined measuring points.

☞ **If the value ”1” is entered in parameter P-0-0419, the scanning cycles specified in parameter P-0-0418 will be used.**

P-0-0420

SER CANr ANA DP

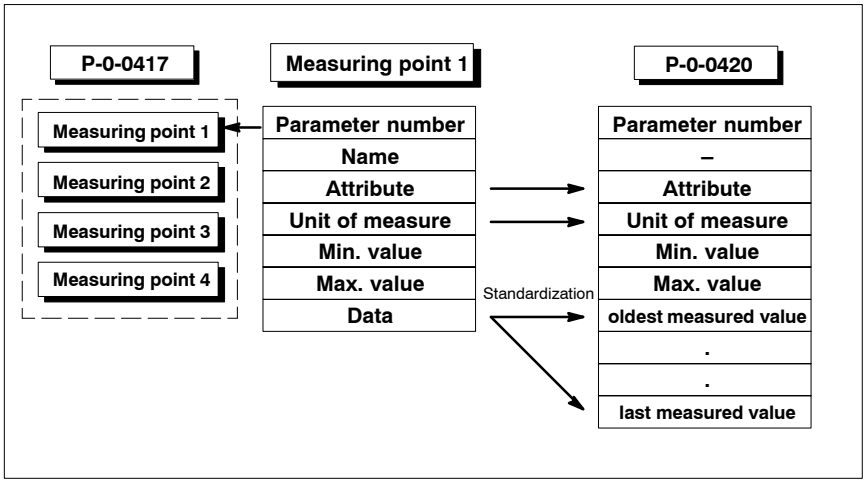
Oscilloscope: List of measuring point 1

Oscilloscope

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter contains – in addition to information on the actual measuring point – the list of data measured at measuring point 1 (for definition of the measuring points, see P-0-0417; the unit of measure, standardization and parts of the attribute of the selected measuring point will be taken over. The limit values ”min. value” and ”max. value” are automatically determined by the drive on the basis of the measured values).
Thus, parameter P-0-0420 contains all information required for subsequent display or scaling of the display.

Drive-internal structure of P-0-0420:



If, having completed the measuring procedure, you wish to continue processing the measured values externally in ASCII format, proceed as follows:

1. Load P-0-0420 exclusively into the monitor of the DSS. This parameter contains all measured values, starting with the oldest value.
2. Export the parameter into a file of your choice. During the export procedure, the DSS creates a *.scs file and a *.TAB file. Files with identical names will be overwritten!
   The *.scs file contains the name of the *.TAB file created.
   The *.TAB file itself contains all measured values from P-0-0420 in ASCII format; one line for each measured value.

P-0-0421
SER CANr ANA DP

Oscilloscope: List of measuring point 2
Oscilloscope

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the list of data measured at measuring point 2.
For structure, see P-0-0420.

P-0-0422
SER CANr ANA DP

Oscilloscope: List of measuring point 3
Oscilloscope

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the list of data measured at measuring point 3.
For structure, see P-0-0420.

P-0-0423
SER CANr ANA DP

Oscilloscope: List of measuring point 4
Oscilloscope

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the list of data measured at measuring point 4.
For structure, see P-0-0420.

P-0-0429
SER CANr ANA DP

Oscilloscope: List of scanning cycles
Oscilloscope

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter contains a list of maximally 4 possible scanning cycles (in µs) in ascending order and separated by commas.
Enter the desired cycle in parameter P-0-0418 separately for each measuring point.

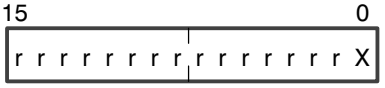
P-0-0432
SER CANr ANA MC DP

Setpoint generator: Start
Setpoint generator

3,4	2	M → D	–	FEPROM	–	SER
4	–	M → D	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

For information on the function, refer to page 3–131, section ”Start”/”Stop”.

Parameter configuration:



r = reserved

0–>1 positive edge: Start
1–>0 negative edge: Stop

☞ **Since the parameter pertains to the group of real–time control bits, it can also be entered in P-0-2000. You thus allocate one of the 10 digital inputs to the setpoint generator start. In this case, bit 0 is a logic mapping of the corresponding hardware input. A high level at this input will then initiate the setpoint generator start.**

Concerning the initialization and scanning frequency of the hardware inputs, please refer to the description of parameter P-0-2000.

P-0-0433
SER CANr ANA MC DP

Setpoint generator: Positive position limit value
Setpoint generator

4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Positive position limit value for position-monitored setpoint generator types.
For information on the function, refer to page 3–134 ff.

★ The value has to be written following the command ”start setpoint generator” (see P-0-0400).

P-0-0434
SER CANr ANA MC DP

Setpoint generator: Negative position limit value
Setpoint generator

4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Negative position limit value for position-monitored setpoint generator types.
For information on the function, refer to page 3–134 ff.

★ The value has to be written following the command ”start setpoint generator” (see P-0-0400).

P-0-0435
SER CANr ANA MC DP

Setpoint generator: Position step
Setpoint generator

4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Is used in conjunction with position-monitored setpoint generator types and single step mode.
For information on the function, refer to page 3–134 ff.

P-0-0436
SER CANr ANA MC DP

Setpoint generator: Speed
Setpoint generator

4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Is used in conjunction with the position-monitored speed generator.
For information on the function, refer to page 3–134 ff.

☞ **Positive speed values only are allowed as input values!**

P-0-0437
SER CANr ANA MC DP

Setpoint generator: Dwell time
Setpoint generator

4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Is used in conjunction with position-monitored setpoint generator types.
For information on the function, refer to page 3–134 ff.

P-0-0480

SER CANr ANA MC DP

Error memory: HW initialization error

Diagnostics, errors

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter contains all initialization statuses of the drive in encoded format. For more information, please refer to the ”Diagnostics” manual.

P-0-0481

SER

Error memory: SERCOS service channel errors

Diagnostics, errors

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter stores up to 16 errors that have occurred in the SERCOS interface communication between the master and the drive.
The error information includes the number of the parameter where the error occurred and a related error number. For this purpose, a ring-type memory was used for the memory range of the parameter.
The last occurring error is always in the first place. For more information on the error numbers, please refer to the ”Diagnostics” manual.

P-0-0482

SER CANr ANA MC DP

Error memory: DSS service channel error

Diagnostics, errors

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter stores up to 16 errors that have occurred in the communication between the DSS and the drive.
The error information includes the number of the parameter where the error occurred and a related error number. For this purpose, a ring-type memory was used for the memory range of the parameter.
The last occurring error is always in the first place. For more information on the error numbers, please refer to the ”Diagnostics” manual.

☞ **The DSS-D user interface offers a listbox for read access to the contents of this parameter in the menu items ”Diagnostics – Module configuration” (”Logbook, DSS error” group).**

P-0-0483

SER CANr ANA MC DP

Error memory: diagnostics class 1

Diagnostics, errors

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter stores up to 16 errors that have occurred in diagnostics class 1.
The error information includes the relevant error numbers for parameter S-0-0129 and parameter S-0-0011 (error message in S-0-0129 sets bit 15 in S-0-0011). For this purpose, a ring-type memory was used for the memory range of the parameter.
The last occurring error is always in the first place. For more information on the error numbers, please refer to the ”Diagnostics” manual.

☞ **The DSS-D user interface offers a listbox for read access to the contents of this parameter in the menu items ”Diagnostics – Module configuration” (”Logbook, ZSK-1 error” group).**

P-0-0484

CANr ANA MC DP

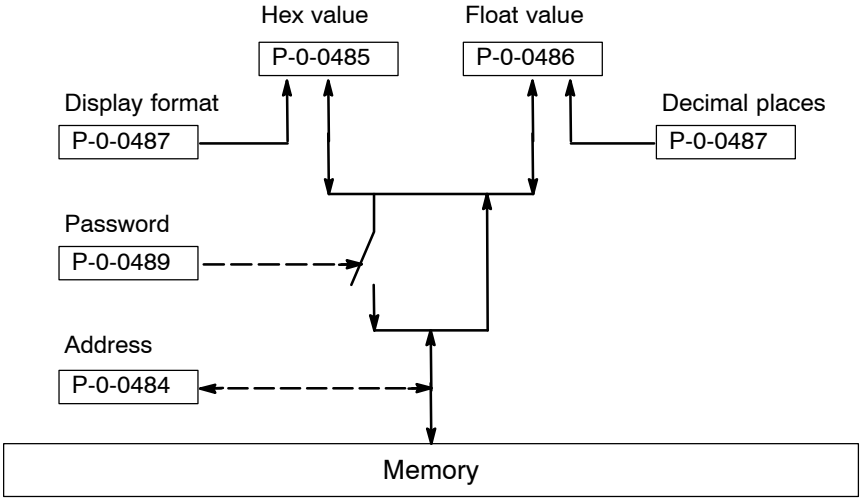
Address for target/source ident. nos. P-0-0485 and P-0-0486

Memory access

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Address of memory location to be read or overwritten.

Targeted access to a memory location and reading of data can be performed according to the following method. Write access is only possible when enabled by a password (see P-0-0489).
The data format and decimal places can be set with control word P-0-0487.



P-0-0485

CANr ANA MC DP

Value in target/source address of ident. no. P-0-0484 (hex)

Memory access

2,3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Hexadecimal or **binary** format of the value read from the addressed memory location (see P-0-0484) or to be written to this address.

P-0-0486

CANr ANA MC DP

Value in target/source address of ident. no. P-0-0484 (float)

Memory access

2,3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Decimal format of the value read from the addressed memory location (see P-0-0484) or to be written to this address.

P-0-0487

CANr ANA MC DP

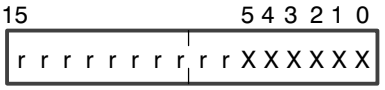
Control word for memory access

Memory access

2,3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter serves to define the display format and decimal places:

Parameter configuration:



X is assigned the 0 or 1 below it.

Number of decimal places in P-0-0486

0 0 0	max. 8 decimal places selectable
1 1 1	

Display format of P-0-0485

0 0 0	hexadecimal
0 0 1	decimal without sign
0 1 0	decimal with sign
0 1 1	binary

P-0-0488

SER

Error memory: Command runtime errors

Diagnostics, errors

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter stores up to 16 command runtime errors.
The error information includes the error numbers which also refer to certain commands.
A ring-type memory was used for the memory range of the parameter, so that the last occurring error is always in the first place.
For more information on the error numbers, please refer to the ”Diagnostics” manual.

P-0-0489

SER CANr ANA MC DP

Password

Memory access

2,3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Serves for the protection of some functions and data. The parameter can only be written. For an attempted read access the drive will always return the value “0x00000000”.

☞ **The user interface of the DSS-D offers a dialog for password entry with the menus ”Options – User”.**

☞ **The rho control does not use P-0-0489 for a password entry, but rather for controlling the ”Special function, brake” function.**

☞ **The function ”drive oscilloscope” can be enabled in the DSS via P-0-0489.**
– write character sequence OSC1 in monitor P-0-0489.
– execute DSS reset.

P-0-0490

CANr ANA MC DP

Search identification for ident. no. P-0-0491

Operating data lists

2,3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Specifies the parameters to be accounted for when generating a parameter list (see P-0-0491).
The following identifications are available:

0 Ident. numbers currently in the cyclic MDT/DT telegram
1 Ident. numbers write-protected in phase 2
2 Ident. numbers write-protected in phase 3
3 Ident. numbers write-protected in phase 4
4 Ident. numbers with parameter sets
5 Ident. numbers with individual min./max. values for every parameter set
6 Ident. numbers suitable for cyclic MDT telegram
7 Ident. numbers suitable for cyclic DT telegram
8 Automatic initialization during change between phases 2 and 3
9 Automatic initialization during change between phases 3 and 4
10 Ident. numbers suitable for real-time control bits
11 Ident. numbers suitable for real-time status bits
12 Ident. numbers must be initialized in phase 2
13 Ident. numbers must be initialized in phase 3
14 Ident. numbers belonging to ”SERCOS” group
15 Ident. numbers belonging to ”position controller” group
16 Ident. numbers belonging to ”speed controller” group
17 Ident. numbers belonging to ”current controller” group
18 Ident. numbers belonging to ”diagnostics” group
19 Ident. numbers belonging to ”oscilloscope” group
20 Ident. numbers belonging to ”setpoint generator” group
21 Ident. numbers belonging to ”controller optimization” group
22 Ident. numbers belonging to ”motor” group
23 Ident. numbers belonging to ”encoder” group
24 Ident. numbers belonging to ”amplifier” group
25 Ident. numbers belonging to ”weightings” group
26 Ident. numbers belonging to ”general control” group
27 Ident. numbers whose data are saved in the FEPROM (= S-0-0192)
28 All ident. numbers (= S-0-0017)
29 Ident. numbers belonging to ”unknown” group
30 Ident. numbers belonging to ”double for winding change-over” group
31 Ident. numbers belonging to ”motion control” group

P-0-0491

CANr ANA MC DP

Ident. no. table with search identification of ident. no. P-0-0490

Operating data lists

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Using this parameter, a preselectable parameter list can be read from the drive. After selecting one of the possible identifications in P-0-0490, the drive stores all ident. numbers that meet the respective criteria in parameter P-0-0491.

P-0-0493

CANr ANA MC DP

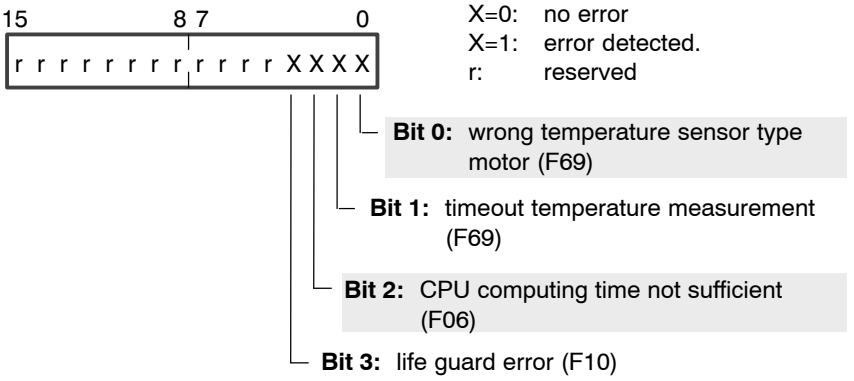
Manufacturer diagnostics class 1 (2nd group)

Diagnostics, errors

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains any **errors** which have occurred and which caused the drive to be locked (optimum drive halting with subsequent torque removal).
Each error is assigned 1 bit. If the corresponding bit is high, the related error is currently present.

Parameter configuration:



As soon as one of the errors listed above has occurred, the drive will set bit 15 of parameter S-0-0011 (diagnostics class 1) to ”1” (manufacturer-specific error).
For unlocking the drive, please refer to the description of parameter S-0-0011.

P-0-0494

CANr ANA MC DP

Manufacturer diagnostics class 1 (encoder)

Diagnostics, errors

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains any **errors** which have occurred and which caused the drive to be locked (optimum drive halting with subsequent torque removal).
Each error is assigned 1 bit. If the corresponding bit is high, the related error is currently present.

Meaning of the individual bits:

Bit 0: encoder does not respond to an absolute position request via SSI or EnDat interface.
Possible cause: defect encoder, disturbance in data transmission.

Bit 1: incorrect absolute position (parity check SSI interface).
Possible cause: defect encoder, disturbance in data transmission.

Bit 2: error in the zero point saving of the incremental system.
Possible cause: defect encoder.

Bit 3: –

Bit 4: check total test of the received data from the electrical rating plate incorrect.
Possible cause: empty rating plate, incorrect transmission.

Bits 5–6: –

Bit 7: synchronizing to I^2c bus not possible.
Possible cause: interface missing, defect rating plate.

Bit 8: reading the electr. rating plate via I^2c bus not possible.
Possible cause: defect rating plate, incorrect transmission.

Bit 9: invalid encoder parameter.
Possible cause: wrong version number, second parameter set.

Bit 10: a parameter in the electr. rating plate which is essential to controlling has value ”0”.

Bit 11: reading the electr. rating plate via EnDat interface not possible.
Possible cause: defect rating plate, incorrect transmission.

Bit 12: –

Bit 13: disturbance in the transmission of parameters from the electr. rating plate via EnDat interface (CRC check).
Possible cause: disturbance in data transmission.

Bit 14: malfunction of measuring systems with EnDat interface.
Possible cause: –failure of lighting system.
– signal amplitude too small
– position value incorrect.
– overvoltage
– undervoltage of supply
– overcurrent

Bit 15: software cannot detect valid interface.
Possible cause: – no encoder connected
– data transmission lines interrupted / wired incorrectly
– software does not support interface
– loose screwed connections

As soon as one of the errors listed above has occurred, the drive will set bit 15 of parameter S-0-00129 (manufacturer diagnostics class 1) to ”1” (manufacturer-specific error).
For unlocking the drive, please refer to the description of parameter S-0-0011.

P-0-0495

ANA

CPU utilization rate

Diagnostics

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	–	–	–	–	

Contains the computing time utilization rate of the CPU, in relation to the cycle time of the position controller (P-0-0007). If the computing time is not sufficient, the error ”CPU computing time not sufficient” (F06) is signaled.
To reduce the CPU utilization rate, any functionalities not required have to be switched off.

P-X-0496

SER CANr ANA MC DP

Error analysis of the encoder initialization error F70

Diagnostics

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	–	–	FEPROM	–	

See Diagnostics manual.

P-X-0500

SER CANr MC DP

Feedrate feed-forward control

Feed-forward control

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	2	–	–	FEPROM	–	SER
3,4	3	–	–	FEPROM	–	others

The feedrate feed-forward control is used to reduce the following distance between position setpoint and actual value at constant speed.
100 % ≙ Following distance ”0”

Range: 0 ... 110 %

P-X-0501
SER

Acceleration feed-forward control

Feed-forward control

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	2	–	–	FEPROM	–	

The acceleration feed-forward control is used to reduce the following distance when accelerating or braking.
100 % ≙ Following distance “0”, the value to be set should be determined via the following distance display of the diagnostics program DSS-D.

Range: 0 ...500

P-X-0502
SER

Lag limit value

Limit value

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	2	–	–	FEPROM	Position	

Value for maximum lag that can be accepted as standstill.
The value should be greater than the positioning window rough (S-0-0261).
Weighting and preferred weighting see S-0-0076.
See also P-0-0503.

P-0-0503
SER

Waiting time, standstill monitoring

Limit value

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	2	–	–	FEPROM	–	

The standstill monitoring monitors the lag (following distance) of the drive at standstill and without setpoint input.
If the current lag is greater than the lag limit value (P-X-0502), the error message ”Lag error” is generated in the manufacturer’s diagnostics class 1 (S-0-0129, bit 2) after a waiting period (P-0-0503).

Range: 0 ... 6553.5 ms (0 = no standstill monitoring)

P-0-0504
SER MC DP

Cam position status

Diagnostics, status

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
4	–	–	–	FEPROM	–	SER
2,3,4	–	–	–	–	–	others

The position distance between the reference point switch and the encoder mark is stored in this parameter. If the cam is changed mechanically, a re–initialization of the cam has to be requested using P-0-0504=0.
During the subsequent referencing, the drive determines a new position distance and enters the corresponding number (1, 2 or 3) in P-0-0504.

0: request initialization (subsequent referencing required)
1: cam is located between 0 and 90 degrees within one motor revolution
2: cam is located between 270 and 360 degrees within one motor revolution
3: cam is located between 90 and 270 degrees within one motor revolution

Procedure:

1. For initial commissioning or after changing the cam position, set P-0-0504 to ”0”.
2. Referencing.
3. Initiate command ”save working memory” (S-0-0264). The value is thus saved in P-0-0504.

P-0-0505

SER CANr ANA MC DP

Plug brake enable delay

Drive ON/OFF

3,4	2	–	–	FEPROM	–	SER
2,3,4	–	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

For applications with a plug braking contactor this parameter must be set to a value > 0.

The torque will not be active

- when the ”Drive enable” and ”Drive on” signals have been set (bits 14 and 15 in the control word; only for SERCOS interface)
- when the external enable has been given (FG; for all other interface types)

unless the time set in this parameter has elapsed. Afterwards, the drive will follow the setpoint input.

Range: 0: Delay time OFF
1...79: 80 ms minimum time
80 ... 1000: set value in [ms]

P-0-0506

SER

Speed threshold, friction compensation

Compensation

3,4	2	–	–	FEPROM	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

If the specified absolute value is not exceeded within 40 ms following a change of direction, the friction compensation for this change of direction is deactivated. See also S-0-0155. This function is designed to avoid overcompensation in the event of very low speeds.

P-0-0507

SER

Acceleration feed-forward control, speed controller

Feed-forward control

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Assessment of the acceleration feed-forward control of the speed controller.

P-0-0508

SER

Current speed controller gain

Measuring point

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Actual value of the current speed controller gain in [As].

P-0-0509

SER

Speed controller integral

Measuring point

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Actual value of the current speed controller integral in [A].

P-0-0510

SER

Position options

Interpolation

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	FEPROM	–	

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

8								0							
r	r	r	X	X	X	X		r	r	X	X	X	X	X	X

Bit 0: Position switching points active

0 no
1 yes (see also S-0-0059)

Bit 1: Start. value for position actual value 2

0 no
1 yes (see also S-0-0053)

Bit 2: overflow thresholds in case of abs. axis

0 do not activate
1 activate

Bit 3: electronic cam shift

0 no
1 yes

Bit 4: friction compensation with speed pulse

0 OFF
1 ON (see P-0-0536 to P-0-0540)

Bit 5: position monitoring 2 encoder

0 OFF
1 ON (see P-0-0550, P-0-0552)

Bit 8: Positioning acceleration bipolar

0 according to P-0-0511 and P-0-0512
1 according to S-0-0260

Bit 9: Target position modulo

0 no
1 yes. Modulo axes always traverse to the target position following the shortest possible path. See also S-0-0258.

Bit 10: transfer IPO with toggle

0 no
1 yes

Bit 11: activate soft cam

0 no
1 yes (see P-0-0543)

P-X-0511

SER

Positioning acceleration positive

Interpolation

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	MDT	FEPROM	Accel.	

In order to traverse to a target position (see S-0-0258), the drive accelerates to the positioning speed S-0-0259 with the value entered here. Weighting according to S-0-0160. This parameter can be changed in any operating status.

☞ **P-0-0510 may be used to specify whether the positioning acceleration in S-0-0260 (bipolar), or in P-0-0511 and P-0-0512 (pos./neg.) is to be active.**

P-X-0512
SER

Positioning acceleration negative
Interpolation

3,4	–	–	MDT	FEPROM	Accel.	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In order to traverse to a target position (see S-0-0258), the drive brakes from the positioning speed S-0-0259 with the value entered here. Weighting according to S-0-0160. This parameter can be modified in any operating status. However, it will become immediately active only if no braking process is currently taking place.

☞ **P-0-0510 may be used to specify whether the positioning acceleration in S-0-0260 (bipolar), or in P-0-0511 and P-0-0512 (pos./neg.) is to be active.**

P-0-0513
SER

Shape order preselection
Shape

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Specifies the number of position setpoint mean values. You activate the setting with P-0-0514. The currently active setting can be displayed using parameter P-0-0526.

Range: 1: no shape filter used
2, 4, 8, 16: filter constants for shape function.

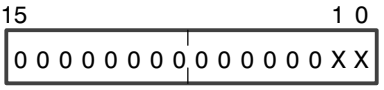
P-0-0514
SER

Shape change-over
Shape

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The position setpoints can be smoothed by the shape function (linear setpoint filter; mean value formation with uniform assessment) prior to fine interpolation.
P-0-0514 activates the shape order selected with P-0-0513.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

CAUTION
Interpolation will be influenced!
The shape change-over must not be initiated unless the axes are halted!

P-0-0515
SER

Starting point list, switching range A
Range switching points

3,4	–	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Relevant for range switching points of group A.
Contains max. 32 starting points. Starting points always have to be smaller than the corresponding end points (in P-0-0516).
For a description, refer to P-0-0523.

P-0-0516
SER

End point list, switching range A

Range switching points

3,4	–	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Relevant for range switching points of group A.
Contains max. 32 end points. End points always have to be greater than the corresponding starting points (in P-0-0515).
For a description, refer to P-0-0523.

P-0-0517
SER

Switching time list, switching range A

Range switching points

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Relevant for range switching points of group A.
Contains max. 32 switching times.
For a description, refer to P-0-0523.

Range: 0: no switching time
> 0: Switching time in ms (only integer values).

P-0-0518
SER

Signal list, switching range A

Range switching points

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Relevant for range switching points of group A.
Contains max. 32 signal numbers.
For a description, refer to P-0-0523.

Range: 0: no switching signal assigned
1,2,3: number of switching signal
(1: OUT2; 2:OUT4; 3:OUT3).

P-0-0519
SER

Starting point list, switching range B

Range switching points

3,4	–	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Relevant for range switching points of group B.
Contains max. 32 starting points. Starting points always have to be smaller than the corresponding end points (in P-0-0520).
For a description, refer to P-0-0523.

P-0-0520
SER

End point list, switching range B

Range switching points

3,4	–	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Relevant for range switching points of group B.
Contains max. 32 end points. End points always have to be greater than the corresponding starting points (in P-0-0519).
For a description, refer to P-0-0523.

P-0-0521
SER

Switching time list, switching range B

Range switching points

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Relevant for range switching points of group B.
Contains max. 32 switching times.
For a description, refer to P-0-0523.

Range: 0: no switching time
> 0: Switching time in ms (only integer values).

P-0-0522
SER

Signal list, switching range B

Range switching points

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Relevant for range switching points of group B.
Contains max. 32 signal numbers.
For a description, refer to P-0-0523.

Range: 0: no switching signal assigned
1,2,3: number of switching signal
(1: OUT2; 2:OUT4; 3:OUT3).

P-0-0523
SER

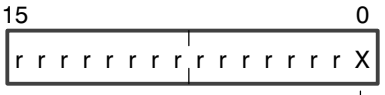
Start switching range

Range switching points

4	–	M → D	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Activates/Deactivates the ”Range switching points” function.

Parameter configuration:



r = reserved

0 ”Range switching points” function OFF
1 ”Range switching points” function ON

The ”Range switching points” function provides switching signals at outputs OUT2, OUT3 and OUT4, e.g., for controlling a PLC.

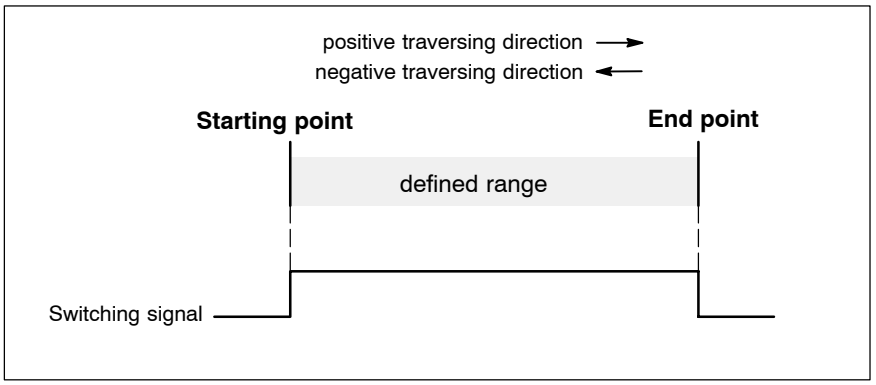
☞ **When this function is active, outputs OUT2 to 4 cannot be simultaneously used for other functions!**
This refers to: Overtemperature warning (OUT2)
Winding change-over (OUT2)
Holding brake (OUT3)
Plug-braking contactor KSB (OUT4)

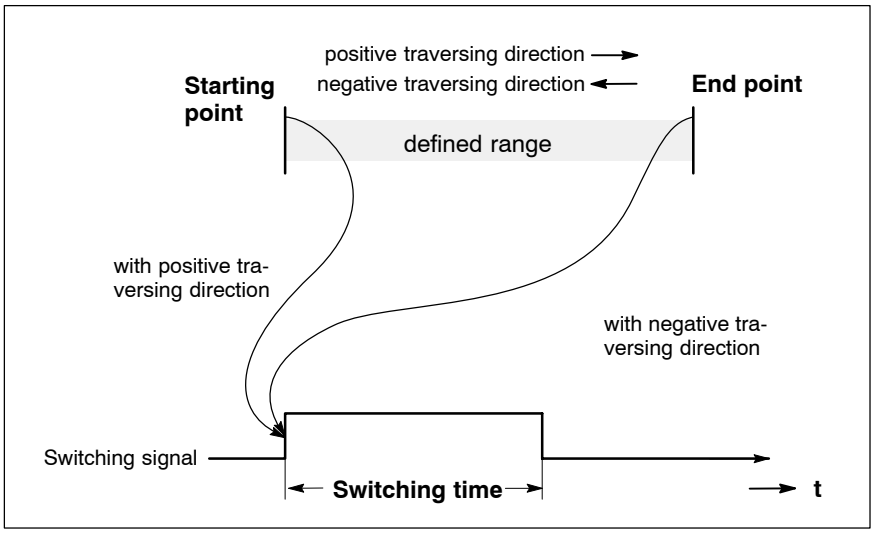
Switching signals may be output (HIGH level at OUTx) when

- the position actual value is within a defined range.

Switching signals are reset to LOW level as soon as

- the position actual value leaves the defined range, or
- a selectable time (switching time) has elapsed.





The following inputs are required for defining a range:

- Starting point
- End point
- Switching time
- Switching signal number.

The **range size** results from the **Starting and End point** entries. The position value of the end point must always be greater than the position value of the starting point.

The **switching time** starts as soon as the position actual value enters the defined range. The switching signal is reset when the switching time has elapsed, at the latest.
If this behavior is not desired, the switching time should be set to ”0”.

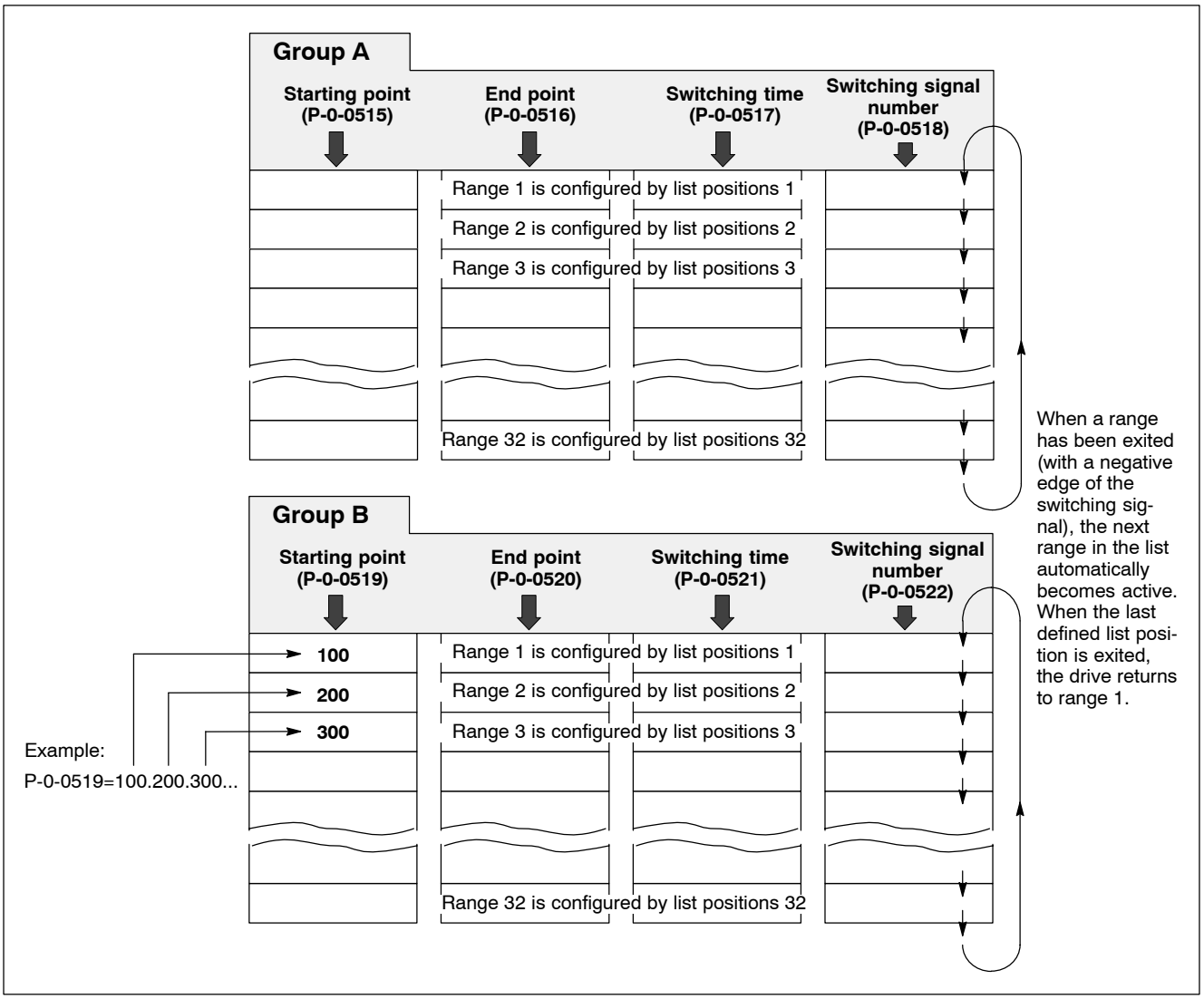
The **switching signal number** assigns a switching signal to the range. Three switching signals are available, and each switching signal is permanently linked to a hardware output at the drive.
The following applies: Switching signal 1 –> OUT2
Switching signal 2 –> OUT4
Switching signal 3 –> OUT3
If no switching signal is to be assigned to a range, you should enter ”0”.

In total, **2 groups (A and B) with 32 ranges each** can be configured. Both groups can be independently activated via P-0-0525 (bits 6 and 7). The ”Range switching points” function is activated via P-0-0523.

The parameters

- P-0-0515 ... P-0-0518 (group A) and P-0-0519 ... P-0-0522 (group B)

are used to define the ranges. Each of these parameters may contain max. 32 values in the form of a list. Each value in a list is separated from the next value by a comma. The list length must be identical for the parameters of a group.

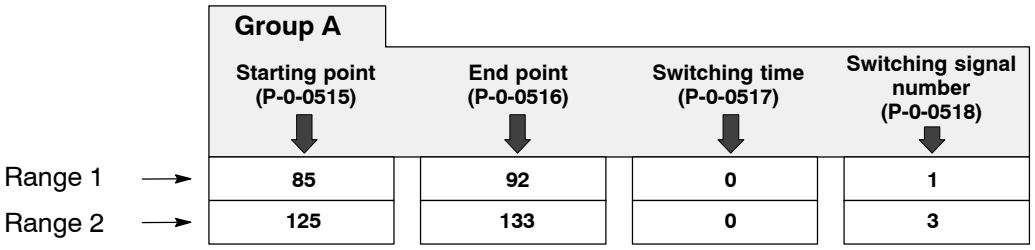


The individual list positions must be assigned values without any gaps to obtain a consecutive time schedule. If not all 32 list positions of a group are needed, the last defined position in the starting point list determines the number of ranges used by the group.

Example:

Signals are to be output at an endless rotary axis by which external actors are to be triggered when the axis is in range 1 (85 ...92 degrees) and in range 2 (125 ... 133 degrees). The axis only turns in positive traversing direction.
The switching signal for range 1 is to be output to OUT2, for range 2 to OUT3.

Required configuration if group A is used:



Required parameters:
P-0-0515 = 85,125
P-0-0516 = 92,133
P-0-0517 = 0,0
P-0-0518 = 1,3

Process:

- The Master sets a real-time bit assigned to P-0-0523 in order to activate the ”Range switching points” function.
- Bit 6 of P-0-0525 is set in order to activate group A. The drive thus first switches to range 1 for monitoring.
- When the individual ranges are reached, the related switching signal is set and output to the corresponding hardware output.

P-0-0525

SER

Switching range, control word

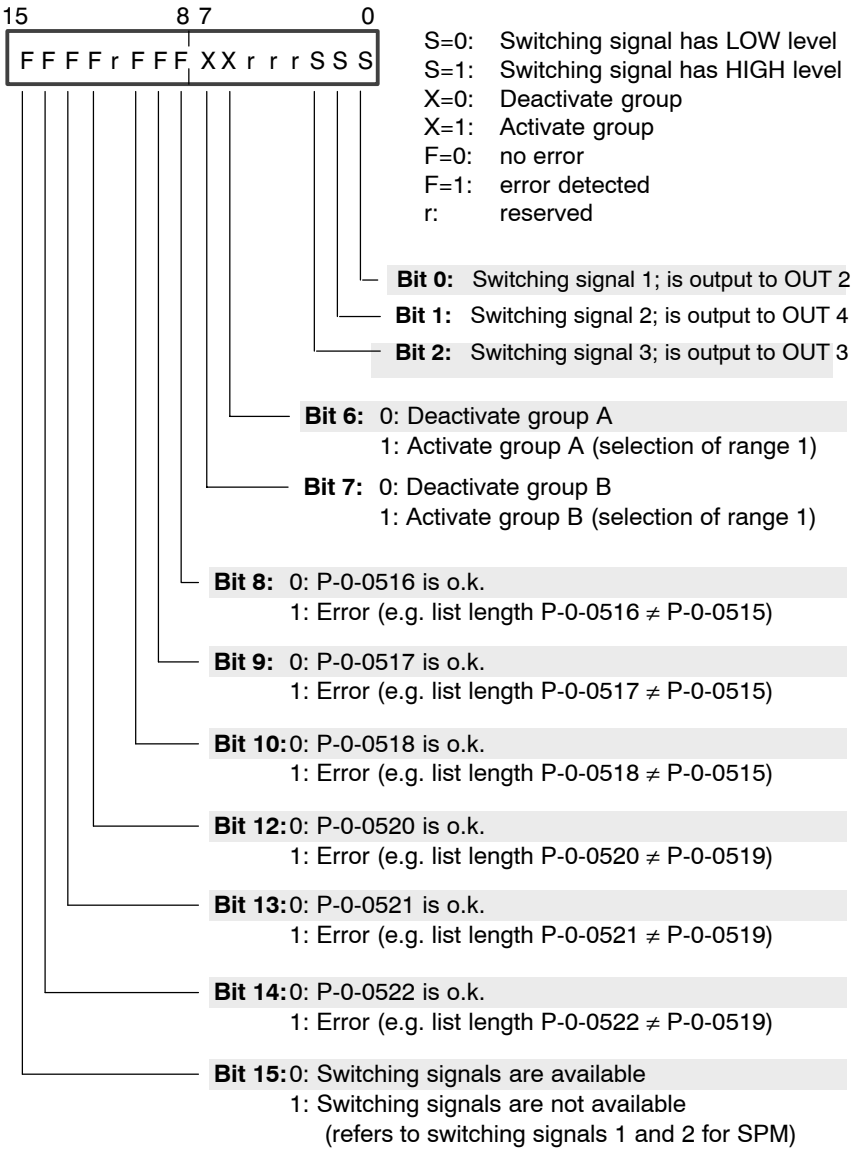
Range switching points

3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter is used to

- view the status of switching signals 1 to 3 (bits 0 to 2)
- activate / deactivate the range switching points for groups A and B (bits 6 and 7)
- query errors in the parameter settings of the ”Range switching points” function (bits 8 to 10 and 11 to 15)

Parameter configuration:



☞ **See also P-0-0523.**

P-0-0526
SER

Current shape order
Shape

2,3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the currently active shape order (see P-0-0513).

Range: 1: no shape filter active
2, 4, 8, 16: active filter constants for the shape function.

P-X-0530
SER

Lag offset
Limit value

2,3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

As opposed to servo error monitoring (see S-0-0159), ”dynamic lag monitoring” acts much faster.
The lag is monitored for a maximum value here. If it exceeds a certain limit value, the error message ”lag error” will be displayed in S-0-0129 (bit 2).

The maximum value is composed of

- a fixed component (P-X-0530) and
- a variable component (P-X-0531).

The fixed component covers the lag jump when accelerating and braking. It has to be greater than the maximum lag for e.g. 100% feedrate feed-forward control.

The variable component is formed in each position cycle from P-0-0531 (lag factor) and the setpoint feedrate. It is dependent on the loop gain (S-X-0104) and the feedrate feed-forward control (P-X-0500). At 100% feedrate feed-forward control, the factor equals 0.

P-X-0531
SER

Lag factor
Limit value

2,3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

For a description, see P-X-0530.

Input value in %. 100% corresponds to the setpoint lag.
Values >0 activate dynamic lag monitoring.

P-0-0532
SER

Absolute encoder revolutions
Encoder

2	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The revolutions of the absolute value encoder are saved in the buffered RAM (spec. personality module) and are thus maintained even after the drive has been switched off. The absolute position is determined again when the drive is switched on.
For new determination of the absolute position, P-0-0532=0 has to be set. The parameter then displays the absolute position of the encoder.

P-0-0533
SER

Modulo value switching range
Range switching points

2,3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Defines the modulo value of the position actual value in conjunction with the area monitoring. The value must be an integer division of S-0-0103.

P-0-0534
SER

Cam marker difference
Referencing

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Displays the distance between cam and marker.

P-0-0535
SER

Marker distance
Encoder

3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

It is necessary to enter the distance between two cyclical markers for translatory measuring systems.
Do not use for distance-coded scales!

P-0-0536
SER

Path speed standardized
Circle compensation

4	–	–	MDT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In case of circular movements (in particular with small feedrates), an involved axis may remain in the range of static friction for a longer period of time.
Therefore, circle compensation (activated via P-0-0510 bit 4) activates a triangular speed pulse in case of reversal of direction for this axis, which is reduced starting at a certain pulse level in a certain number of scanning steps.
Pulse level and number of scanning steps depend on the feedrate and radius of the circle.

Whereas the radius dependence is eliminated by P-0-0536 (calculated by the NC and cyclically transmitted to the drive, see also P-0-0537), the pulse area (=pulse height x scanning steps; parametrizable via P-0-0538) remains nearly constant.
Therefore, the pulse area in connection with the current pulse height can be used to calculate the required scanning steps.
The current pulse height is determined on the basis of the speed table (P-0-0539) and the pulse table (P-0-0540). For this purpose the drive compares the cyclically transmitted ”standardized path speed” (P-0-0536) with the 20 values stored in the speed table (P-0-0539) and uses the corresponding pulse height value from the pulse table (P-0-0540). If the cyclically transmitted ”standardized path speed” (P-0-0536) is located between 2 values defined in the speed table (P-0-0539), the corresponding pulse height value is interpolated accordingly.

P-0-0537
SER

Reference radius path speed

Circle compensation

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

It is required by the NC for calculation of the standardized path speed V_{stand} (=P-0-0536). Input value in unit of measure mm, without decimal places.

The calculation in the NC is performed according to:
$V_{stand} = V_{path} \times \sqrt{(P\text{-}0\text{-}0537 / R)}$ (V_{path}: current path speed
R: programmed radius)

P-0-0538
SER

Pulse area speed pulse

Circle compensation

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

P-0-0538= 1 / (pulse height x scanning steps). Max. 3 decimal places.
See description under P-0-0536.

P-0-0539
SER

Speed table speed pulse

Circle compensation

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

20 values in unit of measure mm/min, without decimal places.
See description under P-0-0536.

P-0-0540
SER

Pulse table speed pulse

Circle compensation

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

20 values in unit of measure rpm, with 3 decimal places.
See description under P-0-0536.

P-0-0542
SER

Position window position monitoring

Position monitoring 2 encoder

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

If the difference between S-0-0051 (position actual value 1) and S-0-0053 (position actual value 2) exceeds the value specified here, a servo error (F13) will be output.
See also P-0-0550, P-0-0552.

P-0-0543
SER

Soft cam position

Referencing

3,4	–	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

If cam and hardware limit switches are not used for reasons of cost, this may result in external encoders with only 1 zero marker as well as distance–coded systems exceeding the permitted traversing range during referencing. In conjunction with an absolute motor encoder, this problem can be prevented by the ”soft cam” function.

To this effect, position actual value 1 is adapted to the axis.
The type of position encoder of the motor encoder is absolute (P-0-0006=1), the ”absolute dimension, offset 1” (S-0-0177) is determined. The position actual value 1 is used as starting value for position actual value 2 (P-0-0510 bit1=1).
The soft cam position is determined during initial commissioning. The soft cam is ”low” if position actual value 2 is less than the soft cam position, otherwise it is ”high”.
The position polarity is taken into account, the soft cam is entered load–related.

The ”soft cam” function is activated via P-0-0510 bit 11. The status of the soft cam is mapped to ident. number S-0-0400.

P-0-0550
SER

Evaluation of motor encoder

Position monitoring 2 encoder

3,4	–	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The ”position monitoring 2 encoder” function is available to detect errors in the mechanical coupling between motor and axis (e.g. coupling break). In this context, it is possible to evaluate a second encoder in addition to the encoder used for position controlling (=active encoder). The drive then recognizes the error status by comparing these two actual value systems (see P-0-0542).

☞ **The function cannot be used for modulo axes.**

You activate the ”position monitoring 2 encoder” function generally using P-0-0510 bit 5.
The setting of any other parameters for the function is dependent on your application:

- in case of position controlling via external encoder, the additional evaluation of a motor encoder can be set using P-0-0550.
- in case of position controlling via motor encoder, the additional evaluation of an external encoder can be set using P-0-0552.

General information on the use of an external encoder for position controlling

The position weighting (S-0-0076) is related to the external encoder, the position data (mm or degrees) are converted into encoder pulses.
The position actual value is output in position weighting in S-0-0053 (position actual value 2). The drive determines the conversion factor between pulses of the measuring system and output unit mm or degrees on the basis of the encoder parameters motor encoder and the mechanical parameters.
In addition, the position actual value is output in pulses of the external measuring system in P-0-0553 (position actual value 2 incremental).

Additional evaluation of the motor encoder

P-0-0550=0 deactivate the additional evaluation of a motor encoder.

P-0-0550=1 activate the additional evaluation of a motor encoder.
The position actual value 1 is calculated and output in S-0-0051. P-0-0551 additionally contains the position actual value in pulses of the motor measuring system.
In case of absolute encoders, the internal reference for the motor measuring system is established using P-0-0006 and adapted using S-0-0177.
Use P-0-0065 (polarity motor encoder) to adapt the counting direction of the motor encoder to the external encoder.
P-0-0510 bit 1 (starting value for position actual value 2) can be used

to copy the absolute value of the motor encoder as starting value for the external encoder. In case of non–absolute encoders, this allows for a rough position monitoring even prior to referencing.

Referencing of the motor encoder is not possible. Modifications of the actual value system such as modulo calculations or ”set coordinates” only have an effect on the external encoder. This also applies to actual value compensations as e.g. backlash compensation and LSEC (lead–screw error compensation).
The entire actual value monitoring is related to the external encoder (limit switches, position and range switching points).
The probe function also has effect on the external encoder only.

P-0-0550=2 the same as P-0-0550=1;
during referencing, position actual value 1 (S-0-0051) is additionally set to a value identical with position actual value 2 (S-0-0053).
This does not apply to absolute motor encoders (P-0-0006=1)!

P-0-0551
SER

Position actual value 1 incremental
Position monitoring 2 encoder

–	–	–	–	FEPROM		
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the position actual value in pulses of the motor measuring system. See P-0-0550.

P-0-0552
SER

Evaluation of external encoder
Position monitoring 2 encoder

3,4	–	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The ”position monitoring 2 encoder” function is available to detect errors in the mechanical coupling between motor and axis (e.g. coupling break). In this context, it is possible to evaluate a second encoder in addition to the encoder used for position controlling (=active encoder). The drive then recognizes the error status by comparing these two actual value systems (see P-0-0542).

☞ **The function cannot be used for modulo axes.**

You activate the ”position monitoring 2 encoder” function generally using P-0-0510 bit 5.
The setting of any other parameters for the function is dependent on your application:

- in case of position controlling via external encoder, the additional evaluation of a motor encoder can be set using P-0-0550.
- in case of position controlling via motor encoder, the additional evaluation of an external encoder can be set using P-0-0552.

General information on the use of a motor encoder for position controlling

The position weighting (S-0-0076) is related to the motor encoder, the position data (mm or degrees) are converted into encoder pulses.
The position actual value is output in position weighting in S-0-0051 (position actual value 1).
In addition, the position actual value is output in pulses of the motor measuring system in P-0-0551 (position actual value 1 incremental).

Additional evaluation of the external encoder

P-0-0552=0 deactivate the additional evaluation of an external encoder.

P-0-0552=1 activate the additional evaluation of an external encoder.
The position actual value 2 is calculated and output in S-0-0053.
The drive determines the conversion factor between pulses of the measuring system and output unit mm or degrees on the basis of the encoder parameters external encoder and the mechanical parameters. P-0-0553 additionally contains the position actual value in pulses of the external measuring system.

In case of absolute encoders, the internal reference for the external measuring system is established using P-0-0066 and adapted using S-0-0178.

Referencing of the external encoder is not possible. Modifications of the actual value system such as modulo calculations or ”set coordinates” only have an effect on the motor encoder. This also applies to actual value compensations as e.g. backlash compensation and LSEC (lead–screw error compensation).
The entire actual value monitoring is related to the motor encoder (limit switches, position and range switching points).
The probe function also has effect on the motor encoder only.

P-0-0552=2 the same as P-0-0552=1;
during referencing, position actual value 2 (S-0-0053) is additionally set to a value identical with position actual value 1 (S-0-0051).
This does not apply to absolute external encoders (P-0-0066=1)!

P-0-0553
SER

Position actual value 2 incremental
Position monitoring 2 encoder

–	–	–	–	FEPROM		
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the position actual value in pulses of the external encoder. See P-0-0552.

P-0-0590
SER CANr ANA MC DP

Protection wait time drive OFF
Drive ON/OFF

2,3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Specifies the maximum period of time it is necessary to wait to switch off the output stage following ”drive OFF”.

Possible entries.

- 0:
  ”Protection wait time drive OFF” is deactivated (default). In this case, the output stage is only switched off when n=0.
- S-0-0207 < P-0-0590:
  ”Protection wait time drive off” is activated.
  The output stage is switched off even though n=0 has not been reached (e.g. in case of incorrect encoder displacement and overspeeding motor).
- P-0-0590 < S-0-0207:
  The output stage is switched off when the wait time S-0-0207 has elapsed.

P-0-0600
SER

RSU password
RSU

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

☞ **For setting and handling the RSU function, you need the ”RSU Redundant Safety Monitoring” manual.**

Password protection for changing the parameters P-0-0012, P-0-0022, P-0-0023, P-0-0024 and “save RSU memory” command (P-0-0601).
The factory settings can be returned to at any time by entering “ RSUCLEAR” .

Range: Word comprising max. 10 letters/digits
Default setting “BOSCH”
(upper/lower case letters not supported)

P-0-0601
SER

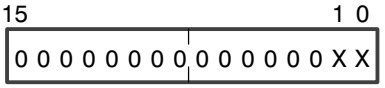
Command ”save RSU memory”
RSU

Phase 3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

☞ **For setting and handling the RSU function, you need the ”RSU Redundant Safety Monitoring” manual.**

This command saves the current (RSU) data modified in the main memory (RAM) to the internal RSU memory (EEPROM) of the drive and the RSU data range of the RAM.
Whenever this command is executed, the alteration index (P-0-0603) will be incremented.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

P-0-0602
SER

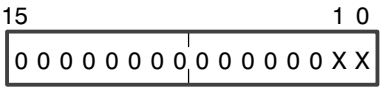
Command ”load RSU memory”
RSU

Phase 3,4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

☞ **For setting and handling the RSU function, you need the ”RSU Redundant Safety Monitoring” manual.**

This command loads the RSU data stored in the internal EEPROM of the drive to the main memory (RAM) of the drive.
The command is automatically executed when the drive is started up.

Parameter configuration:



X is assigned the 0 or 1 below it.

0 0 No command
1 1 Execution of command

P-0-0603
SER

RSU alteration counter
RSU

Phase 3,4	Phase 2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

☞ **For setting and handling the RSU function, you need the ”RSU Redundant Safety Monitoring” manual.**

Counter for the number of completed “save RSU memory” commands.

P-0-0604

SER

RSU status word

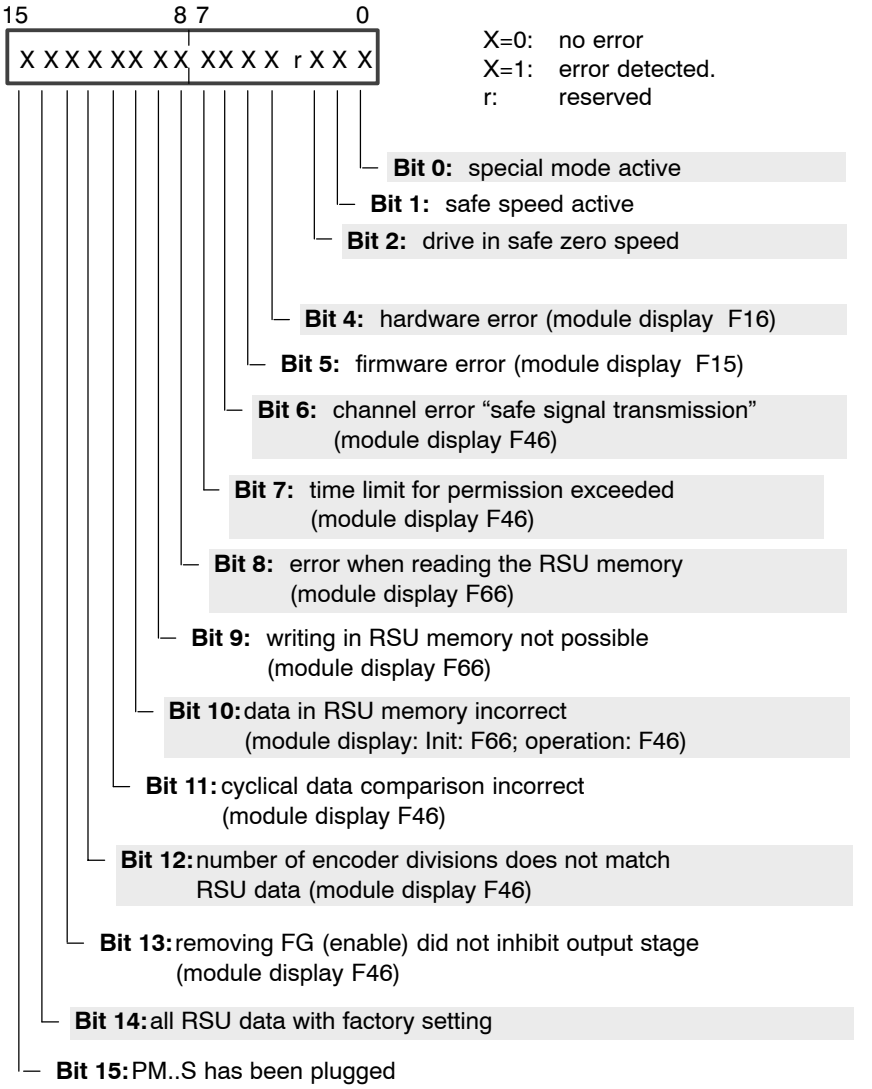
RSU

Phase 3,4	Phase 2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

☞ **For setting and handling the RSU function, you need the "RSU Redundant Safety Monitoring" manual.**

In the event of an error, this status message provides for a more detailed diagnostics of the cause of the error.

Parameter configuration:



Incorrect data in the RSU memory (bit 10) set bit 11 in the manufacturer diagnostics class 1 (P-0-0129), thus causing an error in diagnostics class 1 by which the drive is halted in the shortest possible time with subsequent torque removal.

Error message F66 occurs during start-up of the drive and can only be deleted by RSUCLEAR (return to the factory setting of the RSU data) and subsequent RESET.

P-0-0605
SER

RSU special mode active
RSU

–	–	D → M	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

☞ **For setting and handling the RSU function, you need the "RSU Redundant Safety Monitoring" manual.**

The drive sets this message when operated in special mode without any errors.
Precondition:

- A Personality Module PM..S is used
- The drive has been switched to special operating mode SO.

P-0-0606
SER

Manual protective door release
RSU

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

☞ **For setting and handling the RSU function, you need the "RSU Redundant Safety Monitoring" manual.**

When an encoder error occurs, the protective door is locked for safety reasons because it is no longer possible to ascertain whether the spindle is rotating or standing still.
In these cases, the protective door can be unlocked using the P-0-0606 command.

P-0-1000
SER

Position polarities, spindle
Polarity

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

When reading position actual values, this parameter determines the polarity at the interface. The encoder polarity remains unchanged.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

15										3	2	1	0
r	r	r	r	r	r	r	r	r	r	X	X	X	X

Bit 0: position setpoint
0 Positive polarity
1 Negative polarity

Bit 1: position setpoint additive
0 Positive polarity
1 Negative polarity

Bit 2: position actual value 1
0 Positive polarity
1 Negative polarity

Bit 3: position actual value 2
0 Positive polarity
1 Negative polarity

P-X-1001
SER

Positioning window, spindle
Spindle

3,4	2	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The ”positioning window, spindle” is used to determine the maximum permissible following distance, for which the drive outputs the message ”in position” (see S-0-0336). The message takes place if the amount of the difference between the position setpoint and the position actual value (= following distance) is smaller than the ”positioning window, spindle”.

For weighting and preferred weighting, see S-0-0076.

P-X-1002
SER

Loop gain factor of position controller, spindle
Spindle

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This factor specifies the loop gain of the position control circuit over the entire speed range. You thus determine the rigidity of the spindle (see also S-0-0104).

Range: 0 ... 655.35
Weighting 0.01 (1000/min)

P-0-1003
SER

Closing speed of the position controller
Spindle

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Speed limit below which the drive closes the internal position control loop and decelerates to the selected position with the command ”position spindle”.

Range: 0 ... $+2^{31}-1$, weighting 10^{-4} min^{-1}

P-X-1004
SER

Reference dimension offset 1, spindle
Spindle

3,4	2	–	–	FEPROM	Motor position encoder	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Distance between the machine zero point and the reference mark of the motor encoder.
For weighting and preferred weighting, see S-0-0076.

P-X-1005
SER

Reference dimension offset 2, spindle
Spindle

3,4	2	–	–	FEPROM	Ext. position encoder	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Distance between the machine zero point and the reference mark of an external encoder.
For weighting and preferred weighting, see S-0-0076.

P-X-1006
SER

Monitoring window, spindle
Spindle

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Monitoring of speed setpoint by evaluating the deviation between the position actual value and the position setpoint. When the monitoring window (% of maximum speed) is exceeded, the drive sets the error message 'excessive controller deviation' in diagnostics class 1 (see S-0-0011).
100 % ≙ maximum speed in accordance with S-0-0091.

Range: 0 ... 500 %
Default setting: 120 %

P-0-1007
SER

Following distance, spindle
Measuring point

–	–	–	DT	–	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Current difference between the position setpoint and the position actual value relevant for control. The value can only be read.

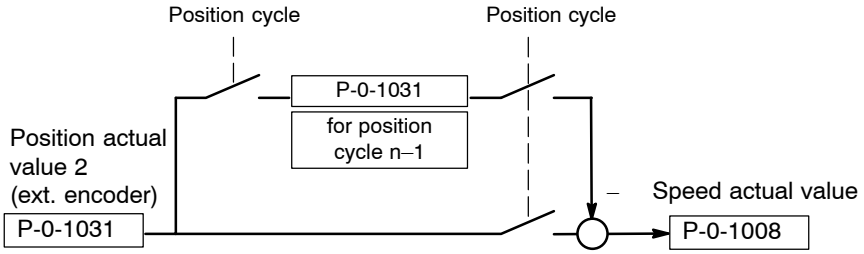
P-0-1008
SER

External speed actual value of spindle
Spindle

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Current spindle speed, calculated from the position difference of an external encoder.

This value is the setpoint for speed synchronization and can only be read.



P-X-1009
SER

Feedrate feed-forward control, spindle
Spindle

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The feedrate feed-forward control is used to reduce the following distance with constant speed.
100 % ≙ Following distance "0"

Range: 0 ... 110 %

P-X-1010

SER

Acceleration feed-forward control, spindle

Spindle

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The acceleration feed-forward control is used to reduce the following distance when accelerating or braking.
100 % ≙ Following distance ”0”. The value to be set should be determined via the following distance display of the diagnostics program DSS–D.

Range: 0 ...500

P-X-1011

SER

P-component of speed controller, spindle

Spindle

3,4	–	–	–	FEPROM	–	SER
2,3,4	–	–	MDT	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You influence the P–action (P–component; proportional gain) of the speed controller. In the case of many applications, the default setting is adequate. If an adaptation is necessary, the P–component is adjusted to the transient response of the speed actual value.

Range: 0 ... 400.0

P-X-1012

SER

Integral-action component of speed controller, spindle

Spindle

3,4	2	–	–	FEPROM	Controller	SER
2,3,4	–	–	MDT	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

You influence the integral action (integral-action component; correction time) of the speed controller.
In the case of many applications, the default setting is adequate. If an adaptation is necessary, the integral-action component is adjusted to the transient response of the speed actual value.

Range: 10 ... 2^{15} ms
Entering the maximum value 2^{15} deactivates the correction time.

P-0-1013

SER

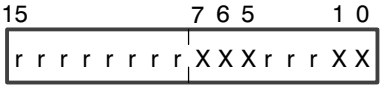
Referencing parameter, spindle

Spindle

2,3	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter controls the sequences for spindle referencing.
Bit 5 = 1 starts spindle referencing.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

Bit 0: referencing direction

0 positive (clockwise rotation from the point of view of the shaft)
1 negative(counter-clockwise rotation)

Bit 1: position encoder reference mark

0 first zero mark after positive edge of the reference point switch
1 first zero mark after negative edge of the reference point switch

Bit 5: evaluation of reference point switch

0 reference point switch not active
1 reference point switch active (= function ON)

Bit 6: evaluation of position encoder reference mark

0 is evaluated
1 is not evaluated. Referencing is performed for the cam edge.

Bit 7: clear reference point prior to orientation

0 do not clear reference point
1 clear reference point. Spindle is always referenced prior to orientation.

P-X-1014

SER

Referencing speed, spindle

Spindle

3,4	2	–	–	FEPROM	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Speed for searching the reference point switch.

Range: 0 ... 90% n_{max}
For weighting and preferred weighting, see S-0-0044.

P-X-1015
SER

Cam position status, spindle

Spindle

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
4	–	–	–	FEPROM	–	

The position distance between the reference cam and the encoder mark is stored in this parameter. If the cam is changed mechanically, a re–initialization of the cam has to be requested using P-X-1015=0.
During the subsequent referencing, the drive determines a new position distance and enters the corresponding number (1, 2 or 3) in P-X-1015.

0: request initialization (subsequent referencing required)

1: cam is located between 0 and 90 degrees within one motor revolution

2: cam is located between 270 and 360 degrees within one motor revolution

3: cam is located between 90 and 270 degrees within one motor revolution

Procedure:

1. For initial commissioning or after changing the cam position, set P-X-1015 to ”0”.
2. Referencing.
3. Initiate command ”save working memory” (S-0-0264). The value is thus saved in P-X-1015.

P-0-1016
SER

Cam position, spindle

Spindle

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	–	–	–	–	

Contains the position of the reference mark for diagnostics purposes.

P-X-1023
SER

Positioning window rough, spindle

Spindle

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	2	–	–	FEPROM	Position	

Determines the maximum permissible following distance, for which the drive outputs the message ”in position rough” (S-0-0341). The message takes place if the amount of the difference between the position setpoint and the position actual value (= following distance) is smaller than the ”positioning window rough, spindle”.

For weighting and preferred weighting, see S-0-0076.

P-X-1024
SER

Loop gain increase, spindle

Spindle

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	2	–	–	FEPROM	–	

The loop gain factor of the spindle (P-0-1002) is multiplied by this value if the current spindle speed is lower than the value in P-0-1025.

Range: 0 ... 100.0
1 ≙ no change

P-X-1025
SER

Speed loop gain increase, spindle
Spindle

3,4	2	–	–	FEPROM	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The loop gain increase (P-0-1024) is active up to this spindle speed.

Range: 0.0000 ... n_{max}

P-0-1026
SER

Multiplication of spindle motor encoder
Spindle

2	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Factor by which the signals of the spindle motor encoder can be multiplied in the drive.
Divisions/rev. x Multiplication = Impulses per motor revolution

Range: 2 ... 512

Default setting: 4

P-X-1027
SER

Orientation acceleration
Spindle

3,4	2	–	–	FEPROM	Accel.	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Adjustable acceleration ramp for spindle orientation. Valid for both directions of rotation.

For translatory or rotary preferred weighting, see S-0-0160.

P-X-1028
SER

Modulo value spindle
Spindle

3,4	2	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Specifies the spindle position from which a modulo calculation must be performed, if the position weighting was set to modulo format.

Weighting and preferred weighting in accordance with S-0-0076.

P-0-1029
SER

Internal position setpoint, spindle
Spindle

3,4	–	–	MDT	–	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Internal position setpoint spindle.

P-0-1030
SER

Position actual value 1 (motor encoder), spindle
Measuring point

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	–	DT	–	Motor position encoder	

Position actual value of the spindle motor encoder. The polarity can be adjusted in P-0-1000.

For weighting, see S-0-0076.

P-0-1031
SER

Position actual value 2 (external encoder), spindle
Measuring point

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
–	–	–	DT	–	Ext. position encoder	

Position actual value of an external spindle encoder. The polarity can be adjusted in P-0-1000.

For weighting, see S-0-0076.

P-0-1050
SER

Command ”winding change-over”
Winding change-over

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	–	–	–	–	–	

Starts the winding change-over. For sequence and parameters used, see fig. on page 3–179.

Parameter configuration:

15 1 0

0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X

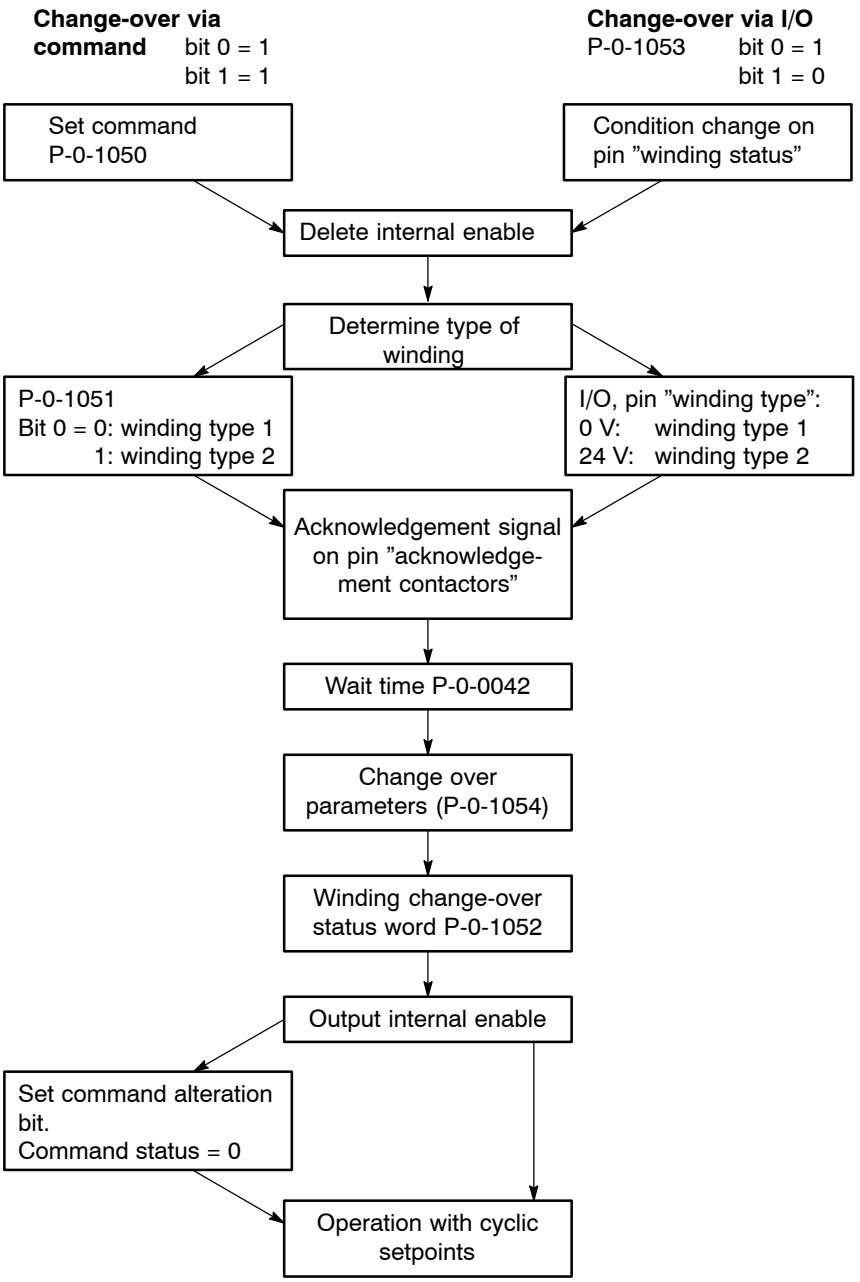
X is assigned the 0 or 1 below it.

0 Delete command in drive
1 Set command in drive

0 Interrupt execution of command
1 Enable execution of command

Using the winding change-over feature, an asynchronous motor can be operated with variable winding circuits, and hence different characteristics.
For this purpose, the inverter changes over between the corresponding parameter sets. For each parameter set, different gear levels can be additionally selected.
Change-over is performed alternatively by a command or a programmable input.

☞ **If the ”winding change-over” function is used, the OUT2 output cannot be simultaneously used by other functions!**
This refers to: overtemperature warning



Winding change-over

P-0-1051

SER

Winding change-over preselection

Winding change-over

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Preselects the winding type for the next winding change-over.

Parameter configuration:

15 1 0

r r r r r r r r r r r r r r X

X is assigned the 0 or 1 below it.
r = reserved

0 Winding type 1
1 Winding type 2

P-0-1052
SER

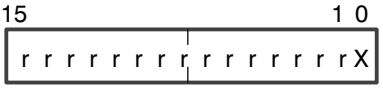
Winding change-over status word

Winding change-over

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the currently active winding type. The ”winding change-over preselection” can already be programmed for another winding type.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

0 Winding type 1
1 Winding type 2

P-0-1053
SER

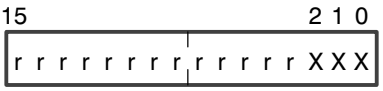
Winding change-over control word

Winding change-over

3,4	–	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Determines how a winding change-over is performed.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

0 0 No winding change-over
0 1 Change-over via command (P-01050 and P-0-1051)
1 0 No winding change-over
1 1 Change-over via programmed input

1 Evaluate acknowledgement signal of contactors
0 No evaluation of acknowledgement signal

P-0-1054

SER

Winding change-over addressing mode

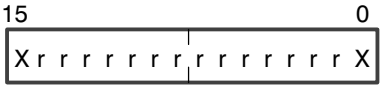
Winding change-over

2, 3, 4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In automatic operation, the parameters will always be processed which belong to the current winding change-over.

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved



0 Winding type 1
1 Winding type 2

0 Parameter processing acc. to bit 0
1 Automatic parameter processing

The following parameters to be changed for winding change-over are available once for each winding type:

Ident. no.	Parameter
S-x-0091	Bipolar speed limit value
S-x-0100	P–component of speed controller
S-x-0101	Integral-action component of speed controller
S-x-0102	D–component of speed controller
S-x-0106	P–component 1 of current controller
S-x-0107	Integral-action component 1 of current controller
S-x-0109	Motor peak current
S-x-0111	Motor zero–speed current
S-0-0113	Maximum motor speed (n_{max})
S-0-0119	P–component 2 of current controller
S-0-0120	Integral-action component 2 of current controller
S-x-0126	Torque threshold Md_x
S-0-0158	Output threshold P_x
P-x-0013	Actual value smoothing interval
P-0-0027	Braking current limitation
P-0-0040	Setpoint filter ON
P-0-0041	Time constant for current setpoint
P-x-1002	Loop gain factor of position controller, spindle
P-x-1011	P–component of speed controller, spindle
P-x-1012	Integral-action component of speed controller, spindle
P-x-1024	Loop gain increase, spindle
P-x-1025	Speed loop gain increase, spindle
P-x-1027	Orientation acceleration

P-0-1536
SER

Control word cyc. Service channel

Telegram configuration

2	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

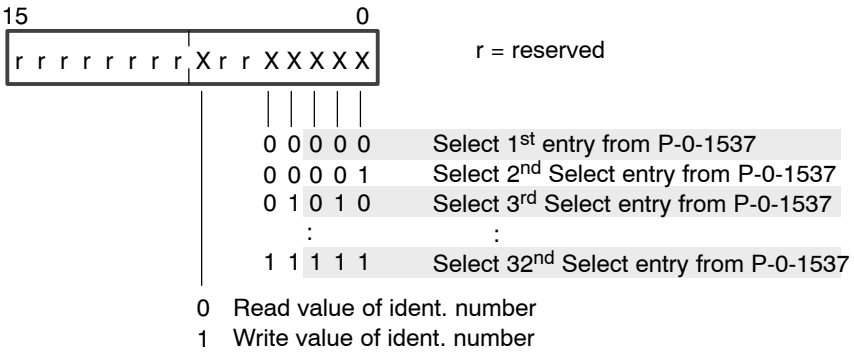
Information can be exchanged between master and drive in special containers (P-0-1538, P-0-1539) via the cyclical service channel. The ident. numbers P-0-1536 to P-0-1539 are used for parametrization.

The basic precondition is that

- ”freely configurable telegram” has been set in the telegram type parameter (S-0-0015)
- ident. number P-0-1536 has been input in the MDT telegram via S-0-0024
- data container P-0-1538 has been input in the MDT telegram via S-0-0024 (required if data are to be written in the drive cyclically)
- the data container P-0-1539 has been transferred into the DT telegram via S-0-0016
- a list has been parametrized in P-0-1537 which contains all ident. numbers to be transmitted.

It is possible to select via P-0-1536 which ident. numbers contained in P-0-1537 are finally read/written cyclically:

Parameter configuration:



P-0-1537
SER

IDN list for cyc. service channel

Telegram configuration

2	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains a list of all ident. numbers (max. 32) which can be selected in P-0-1536 for transmission.
Configuration: P-0-1537=*<ID no.0>*,*<ID no.1>*,*<ID no.2>*,*<ID no.3>* ...*<ID no.31>*
See P-0-1536.

P-0-1538
SER

MDT–IDN for cyc. service channel

Telegram configuration

2	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Data container for cyclical writing of an ident. number in the drive.
See P-0-1536

P-0-1539

SER

DT-IDN for cyc. service channel

Telegram configuration

2	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Data container for cyclical reading of an ident. number from the drive. Having read an ident. number, the container holds its data.
If an ident. number has previously been written in the drive, the container holds the data status of the written parameter.
See P-0-1536

P-0-2000

CANr ANA MC DP

Inport: configuration list

I/O port assignment

2	3	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In conjunction with P-0-2000, drive functions can be initiated via external control signals (e.g. ”encoder simulation: start absolute value transmission”, P-0-0116).

☞ **You can recognize such ”control” parameters by the entry ”M → D” in the ”real–time bit” column of the attributes bar.**

For this purpose, the drive has the digital inputs IN1 to INx (number depends on the type of drive used) and always maps their logic status to individual bits in parameter P-0-2001. A voltage level between +15 VDC and +30 VDC at the inputs will be interpreted as ”logic 1” by the drive, and the corresponding bit in P-0-2001 will be set to ”1”.

Using parameter P-0-2000, the individual bits in parameter P-0-2001 can be linked to ”control” parameters: if the logic status of a bit in P-0-2001 changes due to a corresponding input signal, the drive will automatically map its status to the related ”control” parameter, thus initiating the respective function.

☞ **The drive will update the bits in ”control” parameters in the respective controller cycles required, and not immediately after a change of the bits in P-0-2001. Therefore, commands may not be initiated right away.**

Enter the ident. numbers of all required ”control” parameters in P-0-2000, separated by commas. Please note:

- All ”control” parameters in P-0-2000 are linked to the individual bits in P-0-2001 in a sequence (starting with bit 0).
- If gaps are necessary (e.g. individual bits in P-0-2001 are not supposed to be linked), parametrize the relevant list positions in P-0-2000 with the value ”S-0-0000”.

Internal structure of parameter P-0-2000:

	P-0-2000	P-0-2001	Digital input
Bytes 0 and 1	n * 2 bytes		
Bytes 2 and 3	20		
Bytes 4 and 5	”Control” parameter 1	Bit 0	IN 1 (X06, terminal 5)
Bytes 6 and 7	”Control” parameter 2	Bit 1	IN 2 (X06, terminal 6)
Bytes 8 and 9	”Control” parameter 3	Bit 2	IN 3 (X06, terminal 7)
Bytes 10 and 11	”Control” parameter 4	Bit 3	IN 4 (X06, terminal 8)
Bytes 12 and 13	”Control” parameter 5	Bit 4	IN 5 (X22, terminal 1)
Bytes 14 and 15	”Control” parameter 6	Bit 5	IN 6 (X22, terminal 2)
Bytes 16 and 17	”Control” parameter 7	Bit 6	IN 7 (X22, terminal 3)
Bytes 18 and 19	”Control” parameter 8	Bit 7	IN 8 (X22, terminal 4)
Bytes 20 and 21	”Control” parameter 9	Bit 8	IN 9 (X22, terminal 5)
Bytes 22 and 23	”Control” parameter 10	Bit 9	IN 10 (X22, terminal 6)

Bytes 0 and 1: contain the real list length; n=number of ”control” parameters
Bytes 2 and 3: contain the maximum possible number of ”control” parameters * 2

Example:
Absolute value transmission of the encoder simulation is to be started by an external voltage signal to IN2.
P-0-2000 = S-0-0000,P-0-0116,S-0-0000,S-0-0000,S-0-0000,...

Example: Default settings of P-0-2000 for ”Motion Control” (MC)

	P-0-2000	
Bytes 0 and 1	**20**	
Bytes 2 and 3	**20**	
Bytes 4 and 5	**P-0-2203**	MC block select bit 0
Bytes 6 and 7	**P-0-2203**	MC block select bit 1
Bytes 8 and 9	**P-0-2203**	MC block select bit 2
Bytes 10 and 11	**P-0-2203**	MC block select bit 3
Bytes 12 and 13	**P-0-2203**	MC block select bit 4
Bytes 14 and 15	**P-0-2200**	Start/stop signal
Bytes 16 and 17	**P-0-2201**	MC control word bit 0
Bytes 18 and 19	**P-0-2201**	MC control word bit 1
Bytes 20 and 21	**P-0-2201**	MC control word bit 2
Bytes 22 and 23	**P-0-2201**	MC control word bit 3

P-0-2001

CANr ANA MC DP

Inport: signal control word
I/O port assignment

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

See P-0-2000.

P-0-2002

CANr ANA MC DP

Outport: configuration list

I/O port assignment

2	3	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In conjunction with P-0-2002, the status of drive functions can be reported to an external I/O peripheral (e.g. ”encoder simulation: absolute value transmission finished”, P-0-0117).

☞ **You can recognize such ”status” parameters by the entry ”D → M” in the ”real–time bit” column of the attributes bar.**

For this purpose, the drive has the digital outputs OUT1 to OUTx (number depends on the type of drive used) and always maps their logic status to individual bits in parameter P-0-2003 at the hardware outputs. A high bit in P-0-2003 has the effect that $+24V_{DC}$ is output at the corresponding output or that a relay contact is switched for OUT1 or OUT10 (1 x Um).

Using parameter P-0-2002, the individual bits in parameter P-0-2003 can be linked to ”status” parameters: if the status of a ”status parameter” changes, the drive will automatically change the linked bit in P-0-2003 and thus influence the corresponding hardware output.

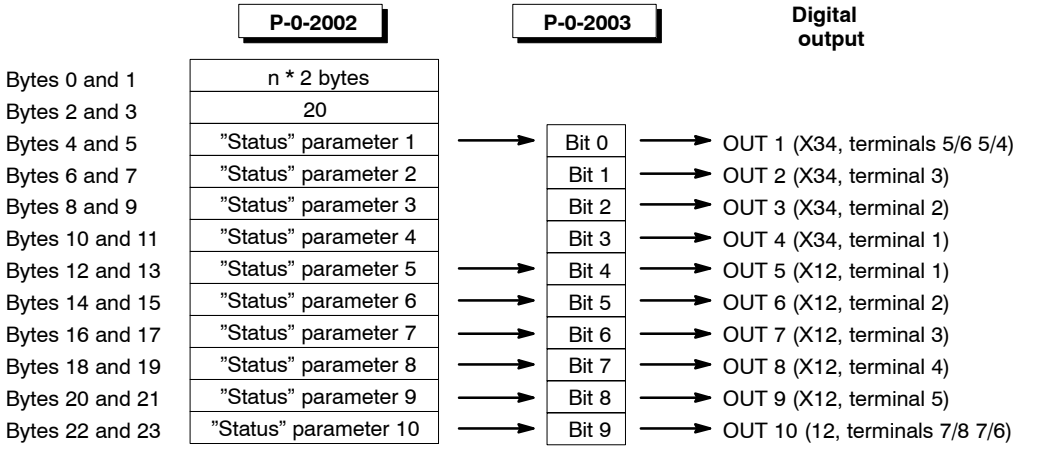
☞ **The drive will update the bits in P-0-2003 in the controller cycles generated, and not immediately after a change of the related ”status” parameter.**

Enter the ident. numbers of all required ”status” parameters in P-0-2002, separated by commas. Please note:

- All ”status” parameters in P-0-2002 are linked to the individual bits in P-0-2003 in a sequence: bits 0, 4, 5, 6, 7, 8, 9.
- If gaps are necessary (e.g. individual bits in P-0-2003 are not supposed to be linked), parametrize the relevant list positions in P-0-2002 with the value ”S-0-0000”.

☞ **Bits 1, 2 and 3 are always used for specific functions and can therefore not be linked using P-0-2002.**

Internal structure of parameter P-0-2002:



Bit 1: is always used for overtemperature warning (S-0-0311)
Bit 2: is always used for controlling the holding brake
Bit 3: is always used for controlling the plug braking contactor

Bytes 0 and 1: contain the real list length; n=number of ”status” parameters
Bytes 2 and 3: contain the maximum possible number of ”status” parameters * 2

Example:
The status of parameter P-0-0117 (encoder simulation: absolute value transmission finished) is to be output to OUT1:
P-0-2002 = P-0-0117,...

Example: default settings of P-0-2002 for ”Motion Control” (MC)

P-0-2002 = P-0-2202,S-0-0403,P-0-2202,P-0-2202,P-0-2202

	P-0-2002	
Bytes 0 and 1	**10**	
Bytes 2 and 3	**20**	
Bytes 4 and 5	**P-0-2202**	MC status word bit 0
Bytes 6 and 7	**S-0-0403**	Position actual value status
Bytes 8 and 9	**P-0-2202**	MC status word bit 1
Bytes 10 and 11	**P-0-2202**	MC status word bit 2
Bytes 12 and 13	**P-0-2202**	MC status word bit 3

P-0-2003

CANr ANA MC DP

Outport: signal status word

I/O port assignment

4	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

See P-0-2002.

P-0-2010

SER CANr ANA MC DP

DAC channels: configuration list

I/O port assignment

2,3,4	–	–	–	FEPROM	–	SER
2,3,4	2	–	–	FEPROM	–	others
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Analog output of the internal signals of the drive is possible through the digital-to-analog converters (DACs) integrated on the ”OM04” circuit board (voltage range: +/–10V; resolution: 12 bits; output resistor: approx. 100 ohms).
Only those signals can be output which have their own parameter number (e.g. speed actual value (S-0-0040), speed setpoint (S-0-0036) etc.).

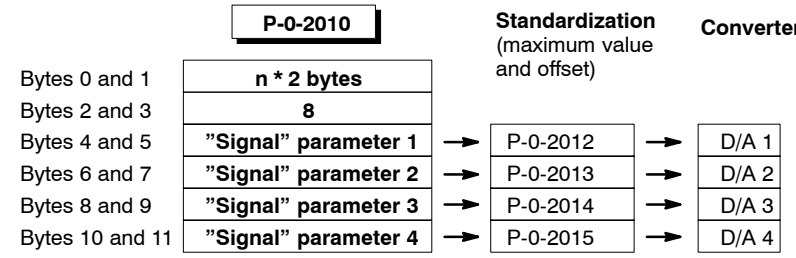
You simply have to enter the parameter numbers of the required signals in P-0-2010, separated by commas:

- The first parameter in P-0-2010 defines the signal output to DAC 1.
  The last parameter defines the signal output to DAC 4.

★ **For SERCOS interface:**
List positions may be assigned actually existing parameter numbers in ascending order only! Gaps are not permitted.
For all other interface types:
All list positions must be assigned parameter numbers! If no signal is to be assigned to a DAC, the parameter ”S-0-0000” should be assigned to the corresponding list position.

The standardization is defined separately for each DAC using parameters P-0-2012 to P-0-2015.

Internal structure of the parameter:



Bytes 0 and 1: contain the real list length; n=number of ”signal” parameters
Bytes 2 and 3: contain the maximum possible number of ”signal” parameters * 2

☞ **The drive updates the digital input data of the DACs with every cycle of the respective controller rather than immediately after a change in the digital source signal.**

Default settings of P-0-2010 are only available for the analog interface:

”Signal” parameter 1:speed setpoint (S-0-0036)
”Signal” parameter 2:speed actual value (S-0-0040)
”Signal” parameter 3:torque setpoint (S-0-0080)
”Signal” parameter 4:torque actual value (S-0-0084)
–> P-0-2010 = S-0-0036,S-0-0040,S-0-0080,S-0-0084

P-0-2012
SER CANr ANA MC DP

DAC channel 1: maximum value, offset
I/O port assignment

2,3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

★ **Before entering the maximum value and offset, the corresponding ”signal” parameter must have been defined in P-0-2010!**

Defines the following for ”signal” parameter 1 in P-0-2010:

- the value for which the DAC outputs its maximum analog value of +10V,
- the value for which the DAC outputs 0V (offset).

☞ **An incorrect standardization of the signals can produce a DAC overflow!**

P-0-2013
SER CANr ANA MC DP

DAC channel 2: maximum value, offset
I/O port assignment

2,3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

As P-0-2012, but for ”signal” parameter 2 of P-0-2010.

P-0-2014
SER CANr ANA MC DP

DAC channel 3: maximum value, offset
I/O port assignment

2,3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

As P-0-2012, but for ”signal” parameter 3 of P-0-2010.

P-0-2015
SER CANr ANA MC DP

DAC channel 4: maximum value, offset
I/O port assignment

2,3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

As P-0-2012, but for ”signal” parameter 4 of P-0-2010.

P-0-2016
ANA MC

ADC channels: configuration list
I/O port assignment

3	3	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Using two analog–to–digital converters (ADCs) (12-bit resolution) external analog control variables (+/–10V) can be specified as setpoints for the drive. For this purpose, the active voltage values at the converter inputs (see P-0-2017 and P-0-2018) are first converted into digital values, and then entered as values into the existing parameter numbers.
P-0-2016 determines **which** parameter numbers are to contain the converted data. All parameters which have a separate ident. number and contain setpoints may be entered in P-0-2016 separated by commas (e.g. speed setpoint S-0-0036, speed setpoint additive S-0-0037 etc.).

- The 1st parameter in P-0-2016 defines the parameter number to which the converted value is written by ADC 1.
- The 2nd parameter in P-0-2016 defines the parameter number to which the converted value is written by ADC 2.

☞ **The drive updates the setpoints in the controller cycles generated individually, not in the scanning cycle of the analog–to–digital converter.**

★ All list positions must be assigned parameter numbers! If an ADC input is not used, the corresponding list position in P-0-2016 should be assigned parameter ”S-0-0000”.

For each ADC used, you have to specify which maximum value corresponds to an active control variable of +10V. Furthermore, all offset voltages, if any, can be accounted for. Please also refer to parameters P-0-2017 and P-0-2018.
A possibly necessary low–pass filter can be configured individually for each channel using P-0-2020 and P-0-2021.

☞ **If the ”speed setpoint additive” (S-0-0037) is influenced via an analog–to–digital converter, it can be additionally manipulated using P-0-2019. See P-0-2019.**

Example:
The input signal of ADC2 is to be used as an additive speed setpoint:
P-0-2016 = S-0-0000,S-0-0037

P-0-2017
ANA MC

ADC channel 1: maximum value, offset
I/O port assignment

3,4	3	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Parameterizes the analog input at input X21 between terminals A_IN2+ and A_IN2– (ADC 1).
The entries in P-0-2017 determine:

- the value of the control variable applied if +10V are active at the input of the ADC
- the offset voltage (in mV) for which the active control variable is interpreted as ”0”.

★ Information as e.g. unit of measure, decimal places, min. and max. values are taken over from the ident. numbers entered in P-0-2016. That is why P-0-2016 must be parametrized before P-0-2017!

Example:
Only the input signal of ADC 1 is to be used as an additive speed setpoint.
An input voltage of +10V corresponds to an additive setpoint of 100 rpm. The offset voltage is +10mV if an additive speed setpoint of 0 rpm is specified for ADC 1:

P-0-2016 = S-0-0037,S-0-0000
P-0-2017 = 100.10

P-0-2018
ANA MC

ADC channel 2: maximum value, offset
I/O port assignment

3,4	3	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Parameterizes the analog input at input X21 between terminals A_IN3+ and A_IN3– (ADC 2). See P-0-2017.

P-0-2019

ANA MC

Limitation of additive speed setpoint

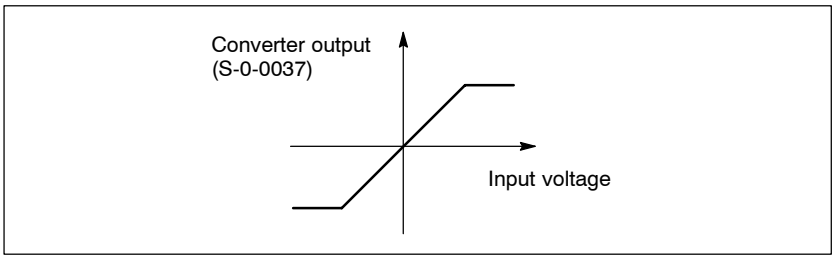
I/O port assignment

3,4	3	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

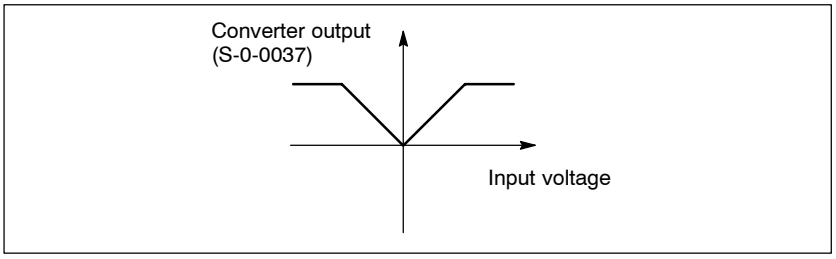
If the ”speed setpoint additive” (S-0-0037) is influenced via an analog–to–digital converter (S-0-0037 is entered in the list of P-0-2016), it can be additionally manipulated.

Possible input values:

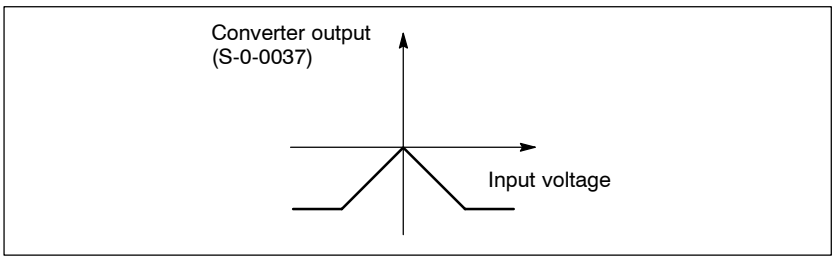
- 0
  The ”speed setpoint additive” output by the converter is limited by the maximum value both in positive and negative direction (determined in P-0-2017 or P-0-2018).



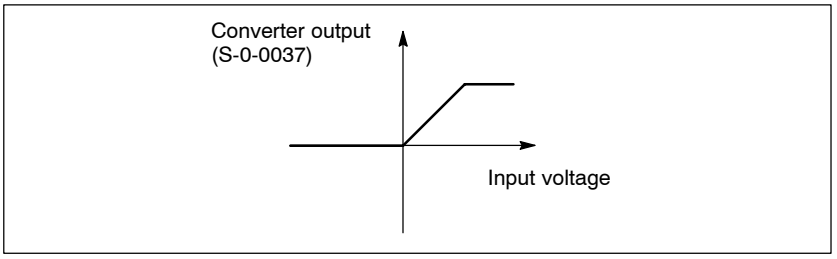
- 1
  Both positive and negative analog setpoint inputs result in positive speed setpoints at the converter output.
  Negative analog setpoint inputs are internally always multiplied by –1 here. Even in case of negative offset (determined in P-0-2017 or P-0-2018), a negative speed setpoint will never be output at the converter output.



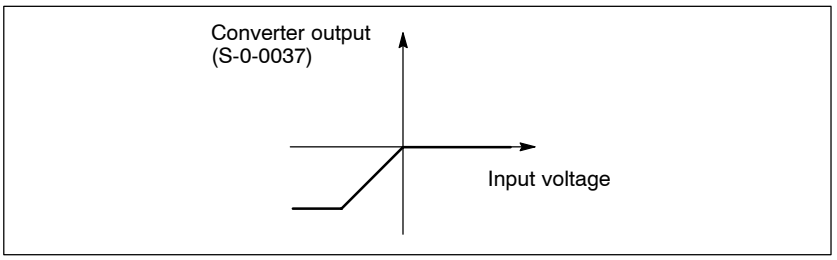
- 2
  Both positive and negative analog setpoint inputs result in negative speed setpoints at the converter output.
  Positive analog setpoint inputs are internally always multiplied by –1 here. Even in case of positive offset (determined in P-0-2017 or P-0-2018), a positive speed setpoint will never be output at the converter output.



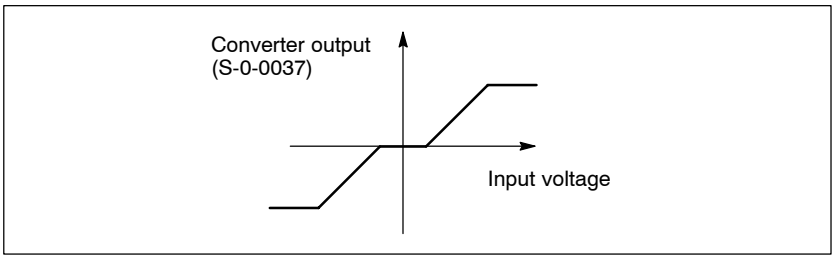
- 3
  Positive analog setpoint inputs result in positive speed setpoints and negative analog setpoint inputs result in speed setpoint 0 at the converter output. Even in case of negative offset (determined in P-0-2017 or P-0-2018), a negative speed setpoint will never be output at the converter output.



- 4
  Negative analog setpoint inputs result in negative speed setpoints and positive analog setpoint inputs result in speed setpoint 0 at the converter output. Even in case of positive offset (determined in P-0-2017 or P-0-2018), a positive speed setpoint will never be output at the converter output.



- 5
  The ”speed setpoint additive” output by the converter is limited by the maximum value both in positive and negative direction (determined in P-0-2017 or P-0-2018).
  Positive and negative analog input voltages the amount of which is less than the parametrized offset (determined in P-0-2017 or P-0-2018) result in speed setpoint 0 at the converter output.
  This behavior corresponds to a bipolar setpoint limitation with dead band.



P-0-2020

ANA MC

ADC channel 1: filter time

I/O port assignment

3,4	3	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Determines the limit frequency (1/filter time) for ADC channel 1.

Range: 0 ... 32000 (unit: ms)
0 means: filter off.

P-0-2021

ANA MC

ADC channel 2: filter time

I/O port assignment

3,4	3	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Determines the limit frequency (1/filter time) for ADC channel 2.

Range: 0 ... 32000 (unit: ms)
0 means: filter off.

P-0-2200

MC

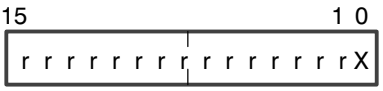
Start/stop signal

Interface Motion Control

–	–	M → D	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Starts/stops the traversing movement.
Change from 0 to 1: start
Change from 1 to 0: stop
This parameter can be influenced by a digital input (default setting: IN6). See P-0-2000.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

0 Stop
1 Start

P-0-2201
MC DP

SGB control word
PROFIBUS-DP

–	–	–	MDT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

☞ **Except for bit 4, the individual bits are also used for drives with Motion Control interface. For information on how to start/stop a traversing movement in connection with Motion Control, see P-0-2200.**

Block-controlled operation with PROFIBUS-DP:

In ”block-controlled operation” (SGB, see S-0-0032 ”position control with motor encoder”), the drive can

- be used as positioning control, and
- be controlled by a PROFIBUS-DP master via PROFIBUS-DP interface.

The shortest cycle time of the position setpoint generator is 2 ms.

A maximum of 32 traversing blocks can be stored in the drive (e.g. via DSS) for this purpose.
The data of all traversing blocks must be stored in the following parameters:

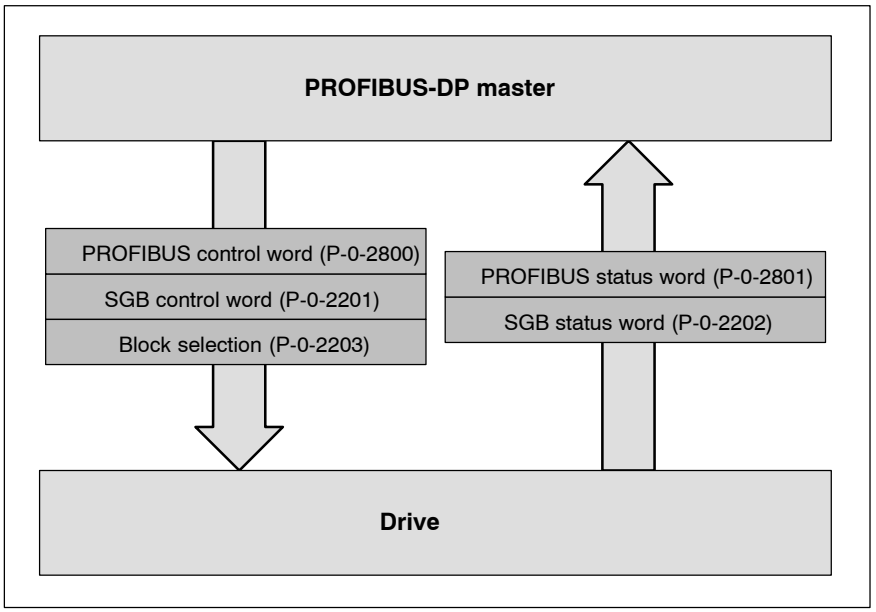
- P-0-2820 (SGB: target positions)
- P-0-2830 (SGB: positioning speed)
- P-0-2840 (SGB: positioning acceleration)
- P-0-2850 (SGB: positioning deceleration)
- P-0-2860 (SGB: positioning control value)
- P-0-2870 (SGB: positioning wait time)

For controlling the drive, cyclical transmission of the following information from master to drive is required:

- PROFIBUS control word (P-0-2800)
- SGB control word (P-0-2201) and
- which block is to be traversed next in automatic mode (P-0-2203).

In return, the following cyclical transmission from drive to master takes place:

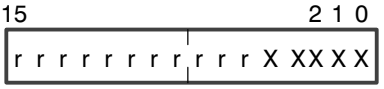
- PROFIBUS status word (P-0-2801) and
- the SGB status word (P-0-2202).



Warnings or errors which occur in the course of block-controlled operation are reported by the drive via bit 6 in P-0-2202. The cause of the error can then be read via the ident. number P-0-2206.

Using the SGB control word (P-0-2201), the master can trigger the following functions in the drive:

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

Bits 0 and 1: operating mode selection

0 0	Automatic mode (positioning)
0 1	Referencing
1 0	Jogging in negative direction of rotation
1 1	Jogging in positive direction of rotation

Bit 2: reference cam reached

0	Reference cam not reached
1	Reference cam reached

Bit 3: initiate control reset

X Positive edge (0→1) deletes an active or interrupted traversing movement and activates the ”in position” signal (bit 3 in P-0-2202).

Bit 4: Start/stop (only for PROFIBUS-DP!)

X Positive edge (0→1) starts a new or interrupted traversing movement.
A negative edge (1–>0) prior to the end of the block interrupts an active traversing movement.

☞ **“Reference cam reached”: input signal for the reference cam. If the switching signal of the reference cam is reported via P-0-2000 through a digital input, bit 2 remains without effect.**

☞ **”Initiate control reset” is effective both in automatic and in jog mode.**

P-0-2202

MC DP

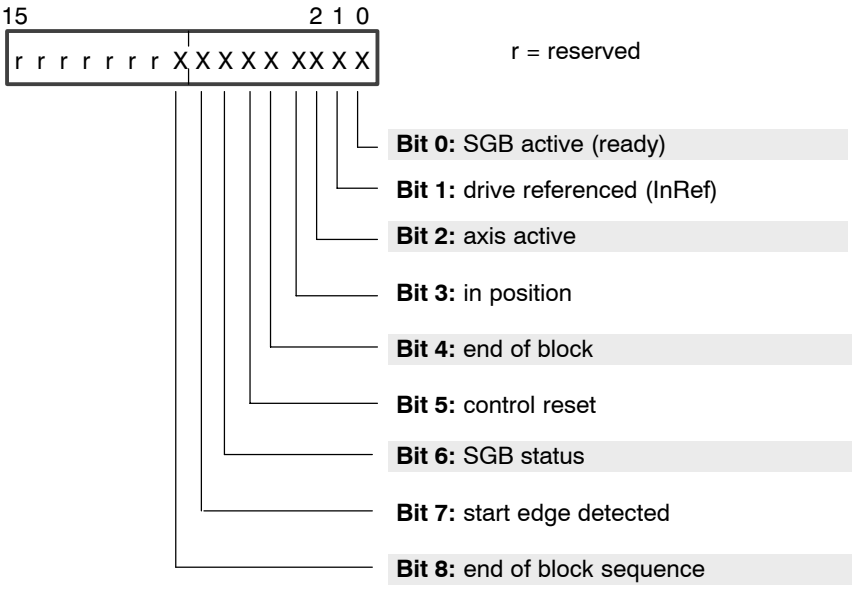
SGB status word

PROFIBUS-DP

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In conjunction with ”block-controlled operation” (see P-0-2201), the drive transmits its status to the master.

Parameter configuration:



Description of the SGB status word bits:

Bit 0: SGB active

This bit is set when the SGB function is ready.

Bit 1: drive referenced.

For positioning procedures, incremental encoders induce a referencing of the axis after power–on. The blocks can be traversed in automatic mode only when traversing to reference point has been performed.
In case of an activated absolute encoder system (P-0-0006=1), bit 1 is always set parallel to bit 0.

☞ **Traversing the axis in jog mode is also possible without referenced drive!**

Bit 2: axis active

This bit is set as soon as the axis executes a traversing movement.
It is reset when

- traversing to the reference mark has been performed in the referencing operating mode
- the axis has come to a stop in jog mode
- the end of the block (bit 4=1) has been reached in automatic mode
- control reset has been initiated.

Bit 3: in position

This bit is set as soon as the current position is located within the positioning window (S-0-0057) at active controller release and no encoder error has occurred. If the distance to go is larger than the positioning window or after interruption of the traversing movement (P-0-2201 bit 4:1–> 0), ”in position”=0 and ”axis active”=1 remain in order to signalize the interruption. ”Control reset” at this point in time cancels the active distance to go and sets ”in position” (bit 3) to ”1”.

☞ **Without controller release, bit 3 is always high.**

Bit 4: end of block.

This bit is set as soon as the traversing block started in automatic mode has been completely executed.
Bit 4 is reset by a positive edge of bit 4 in P-0-2201.

Bit 5: control reset.

This bit is set as soon as control reset (see bit 3 in P-0-2201) has been correctly executed internally and new inputs can be made.

Bit 6: SGB status.

This bit is set when an SGB error is detected by the drive. The cause of the error can be determined via P-0-2206.
Bit 6 can be reset by control reset (bit 3 in P-0-2201).

Bit 7: start edge detected.

This bit is set as soon as a positive edge of the ”start/stop” signal (bit 4 in P-0-2201) has been detected.
A further writing process to P-0-2201 resets ”start edge detected”.

Bit 8: end of block sequence.

This bit is set as soon as the table set sequence started in positioning operation has been completely executed.
A negative edge of the ”start/stop” signal (bit 4 in P-0-2201) resets ”end of block sequence”.

P-0-2203

MC DP

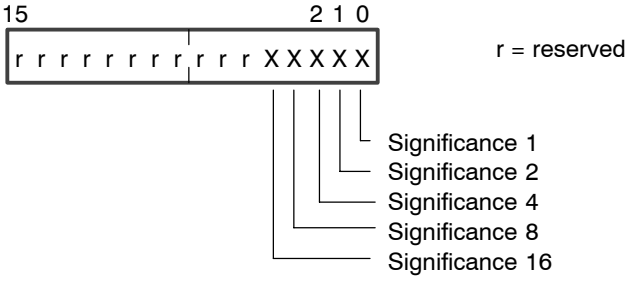
SGB: block selection

PROFIBUS-DP

–	–	–	MDT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

This parameter is used for block selection of a traversing block (0 to 31) stored in the drive.
The selected traversing block can be started with the next positive edge of bit 4 in P-0-2201 (in case of drive with Motion Control interface via P-0-2200), if the ”automatic operation” mode is active (see bits 0 and 1 in P-0-2201).

Parameter configuration:



P-0-2205

MC

Error memory: MC diagnostics class 1

Diagnostics, error

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the numbers of conditions (in this case: errors) which cause a defined shut-down of the axes in connection with Motion Control.

The drive can only be **unlocked** by:

- a restart (RESET) or phase start-up of the drive, **or**
- if the ”reset diagnostics class 1” (S-0-0099) command has been given.

For a description of the possible error numbers, please refer to the online help function of the DSS (menu sequence: HELP ▶ ID NUMBERS).
There, please look up parameter P-0-2205 in the ”ident. numbers” subject area.

P-0-2206

MC DP

Error memory: MC diagnostics class 2/SGB error

Diagnostics, warning

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the numbers of conditions (in this case: switch-off prewarnings, warnings or errors) which are currently present in connection with Motion Control or SGB (block-controlled operation, see P-0-2201), however, without requiring the immediate shut-down of the axes.
In any case, drive operation is disturbed.

All numbers in P-0-2206 are deleted

- by phase start-up of the drive **or**
- by initiating the ”reset diagnostics class 1” (S-0-0099) **or**
- when the corresponding condition has been corrected.

For a description of the possible error numbers, please refer to the online help function of the DSS (menu sequence: HELP ▶ ID NUMBERS).
There, please look up parameter P-0-2206 in the ”ident. numbers” subject area.

P-0-2207

MC

Error memory: MC diagnostics class 3

Diagnostics, status

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains the numbers of conditions which are currently present in connection with Motion Control, however, without causing other reactions of the drive MC.

For a description of the possible error numbers, please refer to the online help function of the DSS (menu sequence: HELP ▶ ID NUMBERS).
There, please look up parameter P-0-2207 in the ”ident. numbers” subject area.

P-0-2210

MC DP

Parameter rotary axis

Interpolation

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
3,4	2	–	–	FEPROM	–	

For endless axes (rotary axes with activated modulo calculation; see S-0-0076 bit 7 and S-X-0103) you can determine whether the target position

- is to be approached in ”uniform sense of rotation” or
- on the ”optimum path”.

In case of **”uniform sense of rotation”** all positions are always approached in a certain direction. The required direction is specified via bit 0 in P-0-2210.

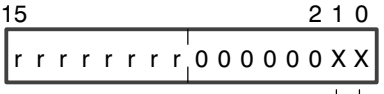
Preconditions:
– active modulo calculation
– an absolute position has been programmed
– limit switches are not active

In case of **”approach on the optimum path”** the target position is approached on the shortest path.

Preconditions:
– active modulo calculation
– an absolute position has been programmed
– limit switches are not active
– operating mode ”referencing” is not active
– the programmed position is located within the modulo value

☞ **Position inputs located outside of the current modulo value (see S-X-0103) are first transformed into a corresponding position within the modulo range. The transformed position is then principally approached in a uniform sense of rotation and not on the optimum path.**

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

0 uniform sense of rotation: negative direction
1 uniform sense of rotation: positive direction

0 traversing in the ”uniform sense of rotation”
1 approach on the optimum path

P-0-2211

MC

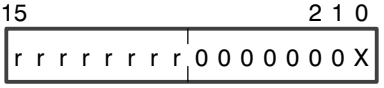
MC: Interface selection

Interface Motion Control

Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for
2	2	–	–	FEPROM	–	

Selection of the Motion Control interface variant.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

0 Standard MC interface
1 Special interface, customer-specific

P-0-2215
MC

MC: Division factor modulo range

Diagnostics, status

–	–	–	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Using the parameter you determine into how many ranges (1..15) the current modulo range of an endless axis is to be subdivided.
Via the 4 digital outputs of the OM 04 circuit board, the binary coded information, in which of these ranges the endless axis is currently located, is available.

Precondition: OM 04 circuit board, firmware: from MC V0.008 on

Parameter configuration:

15 2 1 0
r r r r r r r r 0 0 0 0 X X X X

X is assigned the 0 or 1 below it.
r = reserved

Number of ranges, binary coded
Bit 0: significance 1
Bit 1: significance 2
Bit 2: significance 4
Bit 3: significance 8

P-0-2550
CANr

CANrho: Control word

CAN:rho

–	–	M → D	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The control word with a length of 8 bits contains commands which are cyclically transmitted from the rho to the drive via the CAN bus.
Each command is assigned 1 bit.

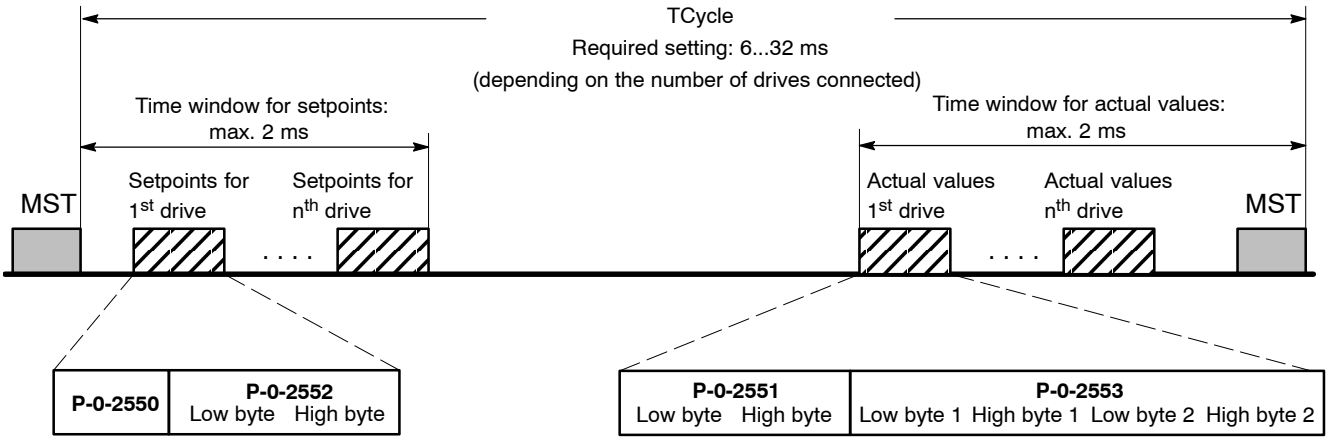
Parameter configuration:

7 0
X X X X X X X X

X: 0 or 1

Bit 0: status digital output OUT1
Bit 1: not used
Bit 2: not used
Bit 3: not used
Bit 4: 1: S-0-0092 (R-109)
0: S-1-0092 (R-110)
Bit 5: not used
Bit 6: 0: Power output stage OFF
1: Power output stage ON
Bit 7: 0: Brake ON
1: Brake OFF

Telegram sequence for communication between rho3 and drive



P-0-2551

CANr

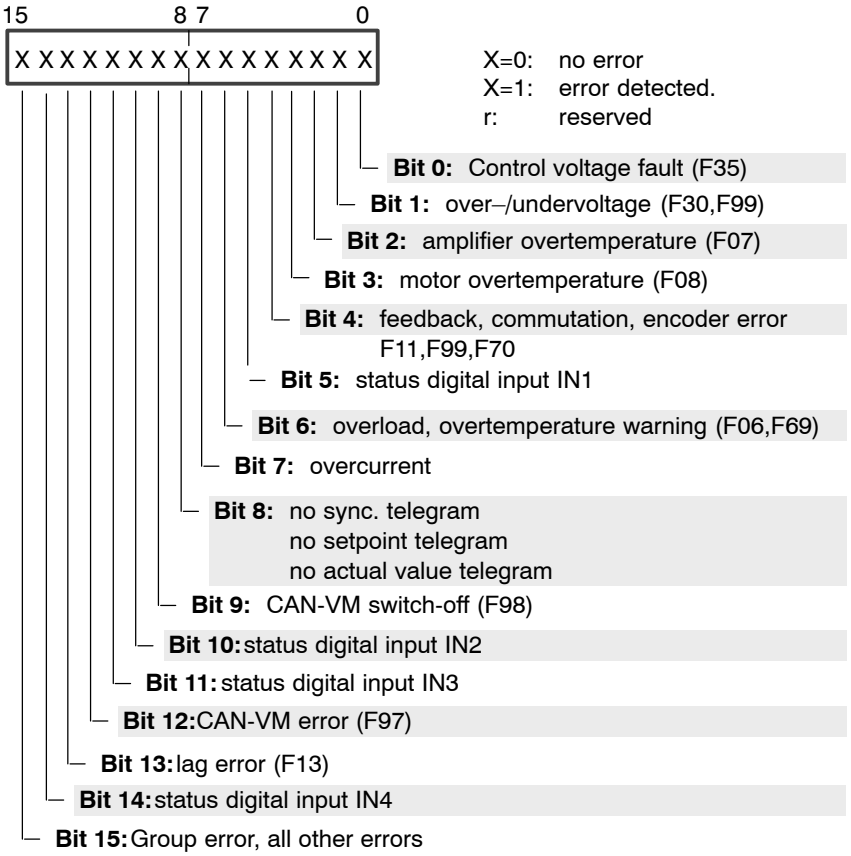
CANrho: Diagnostics class (status word)

CAN:rho

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Contains information transmitted cyclically to rho via the CAN bus. This information may consist of errors, but also of other conditions.
Every piece of information is assigned 1 bit. If the corresponding bit is high, the related piece of information is currently logically true.

Parameter configuration:



See also fig. on page 3–200

P-0-2552

CANr

CANrho: Position setpoint

CAN:rho

2,3,4	–	M → D	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Incremental position setpoint change since the last setpoint input (16-bit, integer; resolution: 8192 incr. per motor revolution).

See also fig. on page 3–200

P-0-2553

CANr

CANrho: Position actual value 1 (motor encoder)

CAN:rho

–	–	D → M	–	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Absolute motor position (32-bit, integer; resolution: 8192 incr. per motor revolution).

See also fig. on page 3–200

P-0-2800

DP

PROFIBUS control word

PROFIBUS-DP

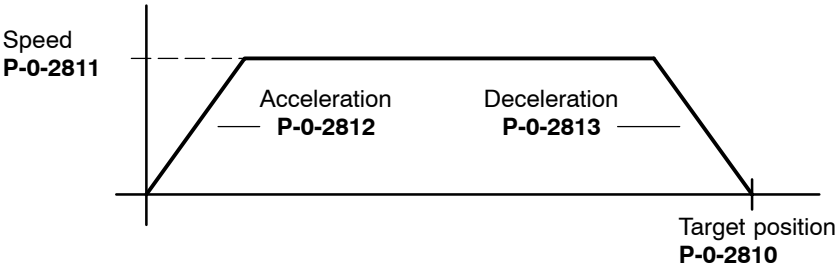
–	–	–	MDT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

In conjunction with ”interpolation in the drive” (see S-0-0032 to S-0-0035), the information required by the drive is cyclically transmitted from the PROFIBUS-DP master to the drive and automatically entered in different parameters (ident. numbers). This information consists of the traversing block data

- target position (see P-0-2810)
- positioning speed (see P-0-2811)
- positioning acceleration (see P-0-2812)
- positioning deceleration (see P-0-2813)

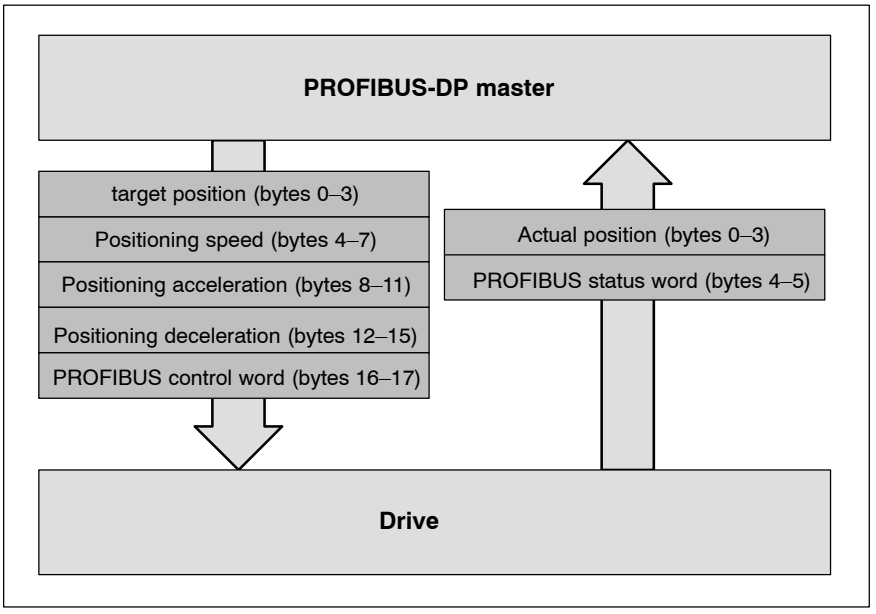
and the

- PROFIBUS control word.



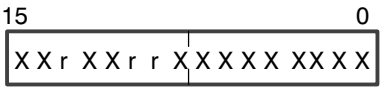
In return, the drive cyclically transmits the following information to the PROFIBUS-DP master:

- PROFIBUS status word (see P-0-2801)
- actual position (see S-0-0051).



Via the PROFIBUS control word (P-0-2800), the master is able to control the processing of a block and the drive status.

Parameter configuration:



X is assigned the 0 or 1 below it.
r = reserved

Bit 0: drive halt
0 Drive halt, setpoints are inhibited
1 Setpoints are active

Bit 1: drive enable
0 No drive enable
1 Drive enabled

Bit 2: drive ON
0 Drive OFF
1 Drive ON.

Bit 3: diagnostics class 1 reset
0 No effect
1 Perform diagnostics class 1 reset

Bit 4: new setpoint
X Positive edge (0→1) transfers the traversing block data into the interpolator and starts the traversing movement.

Bit 5: executes subsequent block without stop
0 Deceleration to n=0 is always performed at the end of the block.
1 Deceleration to a stop at the end of the block does not take place if further block data are available.
Please observe the note on bit 5 below!

Bit 6: absolute/relative
0 Target position is input in absolute dimension
1 Target position is input in relative dimension

Bit 7: start/stop referencing / absolute encoder init.
X Edge 0→1: starts referencing / start init. (working-memory is saved)
Edge 1→0: interrupt referencing

Bit 8: IPO halt
0 Traversing movement is continued
1 Traversing movement is interrupted (IPO halt)

Bit 11: IPO reset
0 New block can be started with bit 4 (new setpoint).
1 Current traversing movement is interrupted (IPO reset). In this case, bits 10 and 14 in P-0-2801 are set.

Bit 12: reference switch
X Via bit 12, the status of the reference cam can be transmitted to the drive.

Bits 14 and 15: operating mode
0 0 Automatic
1 0 Jogging in positive direction
1 1 Jogging in negative direction
Movements can be started with the positive edge of bit 4 (new setpoint).
Stop as soon as bit 4=0.

Bits 4 to 15 are only relevant in the “interpolation in the drive” mode!

☞ **Bits 1 and 2 are set to ”1”:**
The drive is brought into circuit. The torque is active, the motor is under control.

☞ **If bit 5 is high, the subsequent block must not initiate a reversal of direction! Otherwise, the end point of the subsequent block will not be reached.**

P-0-2801

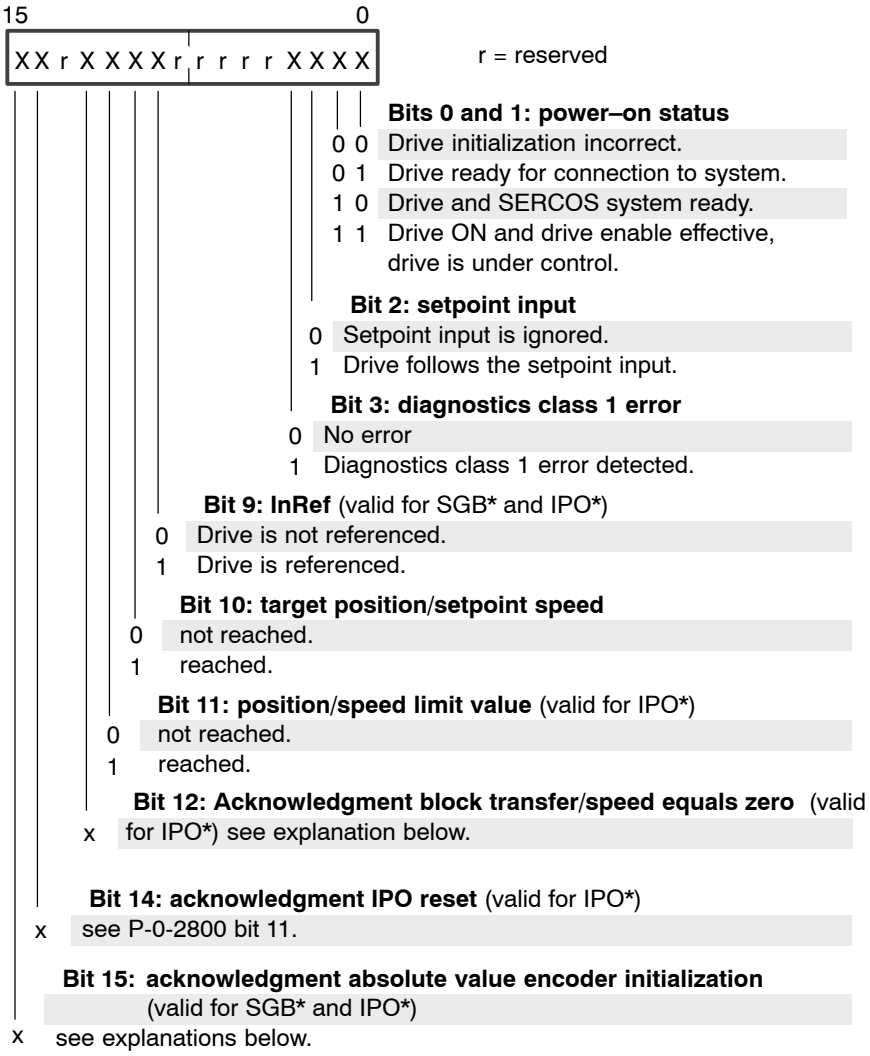
DP

PROFIBUS status word

PROFIBUS-DP

–	–	–	DT	–	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Via the PROFIBUS status word, the drive informs the master about the current status of the drive and the interpolator.



* SGB = block-controlled operation
IPO = interpolation in the drive

Explanations on the bits:

Bits 0,1: power–on condition.

Shows the different power–on conditions of the drive, depending on external and internal releases.

Bit 2 setpoint input.

This bit is set when the drive follows the setpoint values.

Bit 3: error has occurred.

This bit is set when the drive detects a diagnostics class 1 error situation. The drive is halted within the best time possible; then the torque is removed.

Bit 9: drive referenced.

For positioning procedures , incremental encoders induce referencing of the axis after power–on.
In case of an activated absolute encoder system (P-0-0006=1), bit 9 is always set.

Bit 10: target position reached (in case of SGB and IPO),
Setpoint speed has been reached (in case of ”speed control”).

SGB and IPO:
Bit 10 is set as soon as the current position is located within the positioning window (S-0-0057) or when bit 11 in P-0-2800 is set (cancel distance to go). If the distance to go is larger than the positioning window or after interruption of the traversing movement (P-0-2800 bit 8=1), bit 10 remains low.
”Speed control”:
This bit is set as soon as the specified speed has been reached in accordance with speed window P-0-0157.

Bit 11: position limit value exceeded (in case of IPO),
Speed limitation active (in case of ”speed control”).

IPO:
If the drive is referenced (P-0-2801 bit 9=1), the setting of bit 11 in P-0-2801 indicates that the position limit values (S-0-0049, S-0-0050) have been exceeded.
The position limit values can be deactivated via S-0-0055 (position polarities parameter).
”Speed control”:
This bit is set when the setpoint input is too high and therefore limited to n_{limit} .

Bit 12: acknowledgment block transfer (in case of IPO),
Speed equals zero (in case of ”speed control”).

IPO:
This bit is set as soon as new block data has been taken over by the interpolator (see also P-0-2800, bit 4; new setpoint: initiates block takeover by positive edge).
This bit is reset in P-0-2800 bit 4, and when the interpolator is ready to accept new block data the drive resets bit 12 in P-0-2801 as well.
”Speed control”:
This bit is set as soon as speed 0 has been reached in accordance with speed window P-0-0157.

Bit 15: absolute value encoder initialized.

This bit is set when the absolute value encoder has been initialized (initialization triggered via P-0-2800 bit 7).

☞ **Bits 0 to 3 are not only relevant for drives with PROFIBUS-DP interface (for all operating modes) but also for drives with Motion Control interface.**

☞ **In case of ”interpolation in the drive”, all bits are relevant.**

☞ **In case of ”speed control”, bits 0 to 3 and bits 10 to 12 are relevant.**

☞ **In case of ”block-controlled operation (SGB)”, bits 0 to 10 and bit 15 are relevant.**

P-0-2810

DP

Target position
PROFIBUS-DP

3,4	2	–	MDT	–	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Specifies the desired target position to the drive (see also P-0-2800).
The drive traverses to the target position taking into account the positioning speed P-0-2811, the positioning acceleration P-0-2812 and the positioning deceleration P-0-2813. Weighting according to S-0-0076.

If the drive is referenced (P-0-2801 bit 9=1), the setting of bit 11 in P-0-2801 indicates that the position limit values (S-0-0049, S-0-0050) have been exceeded.

☞ **The position limit values can be deactivated via S-0-0055 (position polarities parameter).**
For rotary axes, see also P-0-2210.

P-0-2811
DP

Positioning speed
PROFIBUS-DP

3,4	3	–	–	FEPROM	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

The drive will approach the target position with the speed entered in this parameter (see P-0-2810).
If the speed limit value in S-0-0091 is exceeded, the warning ”positioning speed > n_{limit}” is output (see S-0-0315).
Weighting according to S-0-0044.

P-0-2812
DP

Positioning acceleration
PROFIBUS-DP

3,4	2	–	–	FEPROM	Accel.	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Using the value entered here the drive accelerates to the positioning speed P-0-2811 (see also P-0-2800).
Weighting in accordance with S-0-0160.

P-0-2813
DP

Positioning deceleration
PROFIBUS-DP

3,4	2	–	–	FEPROM	Accel.	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

Using the value entered here the drive decelerates at the end of the block (see also P-0-2800).
Weighting in accordance with S-0-0160.

P-0-2820

DP

SGB: Target positions

PROFIBUS-DP

3,4	2	–	–	FEPROM	Position	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

List containing 32 target positions which are separated by commas and allocated to blocks 0 to 31. This list is used in ”block-controlled operation” (SGB; for a description see P-0-2201).
Weighting according to S-0-0076.

☞ **Whether the entered target position is interpreted as absolute or incremental position input, depends on P-0-2860 bit 0.**

The required block and the corresponding target position is selected in parameter P-0-2203.
The individual target positions are approached taking into account the positioning speed (see P-0-2830), the positioning acceleration (see P-0-2840) and the positioning deceleration (see P-0-2850).

☞ **The individual target positions can only be approached when the drive has been referenced (P-0-2202 bit 1=1). Otherwise, the axis can only be moved in jog mode.**

☞ **The position limit values can be deactivated via S-0-0055 (position polarities parameter).**
For rotary axes, see also P-0-2210.

Internal structure of parameter P-0-2820:

P-0-2820

Bytes 0 and 1	**n*4**
Bytes 2 and 3	**128**
Bytes 4 to 7	**Target position 1**
Bytes 8 to 11	**Target position 2**
	..
	Target position n

Bytes 0 and 1: contain the real list length; n=number of list entries
Bytes 2 and 3: contain the maximum possible list length in bytes.

P-0-2830

DP

SGB: Positioning speed

PROFIBUS-DP

3,4	2	–	–	FEPROM	Speed	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

List containing 32 speed values which are separated by commas and allocated to blocks 0 to 31.
This list is used in ”block-controlled operation” (SGB; for description, see P-0-2201) in connection with the input target position (see P-0-2820).
Weighting according to S-0-0044.

The drive approaches the target position with the positioning speed. If the speed value for a target position is missing, the drive uses the value from S-0-0259.

Internal structure of parameter P-0-2830:

	P-0-2830
Bytes 0 and 1	**n*4**
Bytes 2 and 3	**128**
Bytes 4 to 7	**Speed 1**
Bytes 8 to 11	**Speed 2**
	..
	Speed n

Bytes 0 and 1: contain the real list length; n=number of list entries
Bytes 2 and 3: contain the maximum possible list length in bytes.

P-0-2840

DP

SGB: Positioning acceleration

PROFIBUS-DP

3,4	2	–	–	FEPROM	Accel.	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

List containing 32 acceleration values which are separated by commas and allocated to blocks 0 to 31.
This list is used in ”block-controlled operation” (SGB; for description, see P-0-2201) in connection with the input target position (see P-0-2820).
Weighting in accordance with S-0-0160.

The drive accelerates to the positioning speed with the positioning acceleration. If the acceleration value for a target position is missing, the drive uses the value from S-0-0260.

Internal structure of parameter P-0-2840:

	P-0-2840
Bytes 0 and 1	**n*4**
Bytes 2 and 3	**128**
Bytes 4 to 7	**Acceleration 1**
Bytes 8 to 11	**Acceleration 2**
	..
	Acceleration n

Bytes 0 and 1: contain the real list length; n=number of list entries
Bytes 2 and 3: contain the maximum possible list length in bytes.

P-0-2850

DP

SGB: Positioning deceleration

PROFIBUS-DP

3,4	2	–	–	FEPROM	Accel.	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

List containing 32 deceleration values which are separated by commas and allocated to blocks 0 to 31.
This list is used in ”block-controlled operation” (SGB; for description, see P-0-2201) in connection with the input target position (see P-0-2820).
Weighting in accordance with S-0-0160.

The drive decelerates to n=0 at the end of the block with the positioning deceleration. If the deceleration value for a target position is missing, the drive uses the value from S-0-0260.

Internal structure of parameter P-0-2850:

P-0-2850

Bytes 0 and 1	**n*4**
Bytes 2 and 3	**128**
Bytes 4 to 7	**Deceleration 1**
Bytes 8 to 11	**Deceleration 2**
	..
	Deceleration n

Bytes 0 and 1: contain the real list length; n=number of list entries
Bytes 2 and 3: contain the maximum possible list length in bytes.

P-0-2860

DP

SGB: Positioning control values

PROFIBUS-DP

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

List containing 32 control words which are separated by commas and allocated to blocks 0 to 31. Each control word contains information for the processing of an individual block. This list is used in ”block-controlled operation” (SGB; for description, see P-0-2201) in connection with the input target position (see P-0-2820).

Parameter configuration:

X is assigned the 0 or 1 below it.
r = reserved

15								2	1	0
r	r	r	r	r	r	r	r	r	X	X

0 Target position is absolute
1 Target position is incremental

0 Single-block operation: start of the next table set using P-0-2201 bit 4.
1 Automatic operation: automatic start of the next table set.

In case of automatic operation:
0 deceleration to n=0 at the end of each block.
1 at the end of each block, direct acceleration/ deceleration to the speed of the next block.

☞ **If bit 2 is high, the subsequent block must not initiate a reversal of direction! Otherwise, the end point of the subsequent block will not be reached.**

Internal structure of parameter P-0-2860:

	P-0-2860
Bytes 0 and 1	**n*2**
Bytes 2 and 3	**64**
Bytes 4 to 7	**Control word 1**
Bytes 8 to 11	**Control word 2**
	..
	Control word n

Bytes 0 and 1: contain the real list length; n=number of list entries
Bytes 2 and 3: contain the maximum possible list length in bytes.

P-0-2870

DP

SGB: Positioning wait time

PROFIBUS-DP

3,4	2	–	–	FEPROM	–	
Changeable	Init	Real-time bit	Cyclic	Recovery	Weighting	Valid for

List containing 32 wait times (in ms) which are separated by commas and allocated to blocks 0 to 31.
Specifies the time span between the end of the traversing movement and the setting of the end of block signal. A subsequent block can only start after this.

Internal structure of parameter P-0-2870:

	P-0-2870
Bytes 0 and 1	**n*4**
Bytes 2 and 3	**128**
Bytes 4 to 7	**Wait time 1**
Bytes 8 to 11	**Wait time 2**
	..
	Wait time n

Bytes 0 and 1: contain the real list length; n=number of list entries
Bytes 2 and 3: contain the maximum possible list length in bytes.

A Annex

A.1 Index

D

E

F

H

I

L

M

N

O

P

Q

R

S

T

U

V

W

A.2 Register: Ident. nos. sorted by numbers

A.3 Register: Ident. nos. sorted by function groups

Rexroth
Bosch Group

Bosch Rexroth AG
Electric Drives and Controls
Postfach 11 62
64701 Erbach
Berliner Straße 25
64711 Erbach
Deutschland
Tel.: +49 (0) 60 62/78-0
Fax: +49 (0) 60 62/78-4 28
www.boschrexroth.com

Australia

Bosch Rexroth Pty. Ltd.
3 Valediction Road
Kings Park NSW 2148
Phone:+61 (0) 2 98 31 77 88
Fax: +61 (0) 2 98 31 55 53

USA

Bosch Rexroth Corporation
5150 Prairie Stone Parkway
Hoffmann Estates, Illinois 60192
Phone:+1 (0) 847 6 45-36 00
Fax: +1 (0) 847 6 45-08 04

United Kingdom

Bosch Rexroth Ltd.
Broadway Lane, South Cerney
Cirencester GL7 5UH
Phone:+44 (0) 1285-86 30 00
Fax: +44 (0) 1285-86 30 03

Canada

Bosch Rexroth Canada Corp.
490 Prince Charles Drive South
Welland, Ontario L3B 5X7
Phone:+1 (0) 905 7 35-05 10
Fax: +1 (0) 905 7 35-56 46

1070 066 038-102 (02.06) GB · HB AN · BRC/ESM11 · Printed in Germany