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# ECODRIVE03

## Drive for General Automation

## With SERCOS-, Analog- and Parallelinterface

Parameter Description: SGP 01VRS

DOK-ECODR3-SGP-01VRS**-PAR1-EN-P

283218

Indramat

**Title** ECODRIVE03 Drive for General Automation With SERCOS-, Analog- and Parallelinterface

**Type of Documentation** Parameter Description

**Dokumentation Type** DOK-ECODR3-SGP-01VRS**-PAR1-EN-P

**Internal Filing Notation**

- Mappe 72-01V-EN
- Based on: SGP 01VRS
- 209-0088-4323-01

**What is the purpose of this documentation?** The following documentation describes the parameters of the firmware FWA-ECODR3-SGP-01VRS.

This documentation serves:

- for parameterization of the drive controller

**Cource of modification**

| Document identification of previous and presend output | Release Date | Remarks |
|---|---|---|
| DOK-ECODR3-SGP-01VRS**-PAR1-EN-P | 01.99 | First edition |
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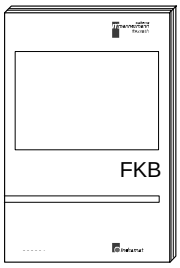
**Note** This document is printed on chlorine-free bleached paper.

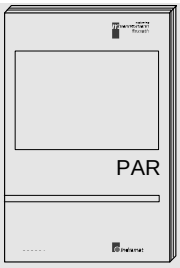
# Summary of Documentation - Overview




Functional Description:

Description of all implemented Function
based on SERCOS SERCOS-Parameters

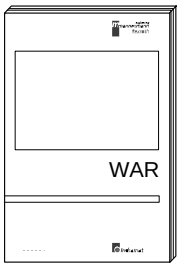
Order designation:
DOK-ECODR3-SGP-01VRS**-FKB1-EN-P




Parameter Description:

A description of all parameters
used in the firmware

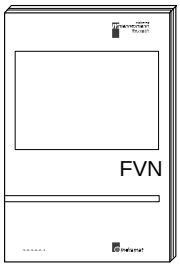
Order designation:
DOK-ECODR3-SGP-01VRS**-PAR1-EN-P




Troubleshooting Guide:

-Explanation of the diagnostic states
-How to proceed when eliminating faults

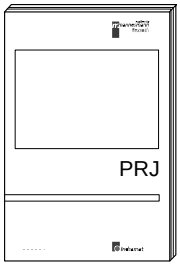
Order designation:
DOK-ECODR3-SGP-01VRS**-WAR1-EN-P




Firmware Version Notes:

Description of new and changed functions
in terms of the derivatives:
-FWA-ECODR3-SMT01VRS-MS
-FWA-DIAX04-ELS05VRS-MS
-FWA-ECODRV-ASE04VRS-MS

Order designation:
DOK-ECODR3-SGP-01VRS**-FVN1-EN-P




Project Planning Manual:

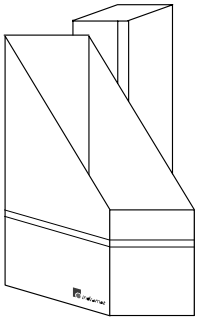
-Planning conbtrol cabinet construction
-Planning the electric layout in the control cabinet

Order designation:
DOK-ECODR3-DKC**.3****-PRJ1-EN-P

CD: DRIVEHELP

Collection of Windows help systems which
contain documents on firmware derivatives

Order designation:
DOK-GENERL-DRIVEHELP**-GEN1-MS-D0600



Order designation
DOK-ECODR3-SGP-01VRS**-7201-EN-P

# Contents

# 1 General Information

## Using This Manual

All standard and product specific parameters are listed in this chapter in a numerically ascending order.

This chapter supplements the feature description and represents a complete description of all parameters used in the software.
The description of the individual parameters is divided into two subsections.

**1) General description**
This section contains the feature or meaning of the parameter and tips for setting parameters.

**2) Description of attributes**

The characteristic values or features listed here help to classify the parameter. They are necessary for a complete description of the parameter. However, they are not required to get a general idea of the meaning of the parameter.

# Definitions

The following abbreviations are used:

**Data length:**

**2-byte** - the data length for the operating data is 2 bytes.

**4-byte** - the data length for the operating data is 4 bytes.

**1-byte variable** - this is a piece of operating data of variable length (list). The length of a data unit is 1 byte.

**2-byte variable** - this is a piece of operating data of variable length (list). The length of a data unit is 2 bytes.

**4-byte variable** - this is a piece of operating data of variable length (list). The length of a data unit is 4 bytes.

**Format:**

**BIN** - the display format for the operating data should be binary.

**HEX** - the display format for the operating data should be hexadecimal.

**DEC_OV** - The display format for the operating data should be decimal without a sign.

**DEC_MV** - The display format for the operating data should be decimal with a sign.

**ASCII** - the operating data is an ASCII string.

**IDN** - the operating data is an ID number (IDN).

**Editability:**

**No** - the operating data cannot be edited.

**P2** - The operating data can only be edited in communications phase 2.

**P23** - The operating data can only be edited in communications phases 2 and 3.

**P234** - The operating data can be edited in any communications phase.

**P3** - The operating data can only be edited in communications phase 3.

**P4** - The operating data can only be edited in communications phase 4.

**Memory:**

**fixed** - the operating data is programmed in the drive (fixed value).

**no** - The operating data is not buffered in the drive; the value is undefined after the drive controller is switched on.

**Param. EE** - The operating data is buffered in E²prom of the programming module (DSM).

**Ampl. EE** - The operating data is buffered in E²prom of the drive controller.

**Feedb. EE** - The operating data is buffered in the E²prom of the motor feedback data memory (only in MHD- and MKD motors).

**Validity check:**

**no** - the operating data is not checked for validity.

**Phase2** - the operating data is checked in the "Communications phase 3 transition check" command.

**Phase3** - the operating data is checked in the "Communications phase 4 transition check" command.

**Extreme value check:**

**no** - the operating data is not checked for its extreme values when it is written to.

**yes** - the operating data is checked for its extreme values when it is written to.

**Combination check:**

**no** - the operating data is not checked (bitwise) for a valid combination with other parameter values when it is written to.

**yes** - The operating data is checked (bitwise) for a valid combination with other parameter values when it is written to.

**Cyc. transmittable:**

**no** - The operating data cannot be configured as cyclical data in the master data telegram or in the drive telegram.

**AT** - The operating data can be configured as cyclical data in the drive telegram.

**MDT** - The operating data can be configured as cyclical data in the master data telegram.

**Default Value:**

The default value indicates the value of the parameter loaded into fixed memory with the current version of firmware installed on the drive following the PL program load command and prior to user edits or loading saved parameter files.

# Notes

# 2 Standard Parameters

## S-0-0001, NC Cycle time (TNcyc)

The NC cycle time indicates the time intervals between new command values being made available by the numerical control.

For the Sercos interface, the NC cycle time must be transmitted in communications phase 2 from the master to the slave; from communications phase 3 on it must be considered in the slave.

The NC cycle time must be an integral multiple of **S-0-0002, SERCOS Cycle time (Tscyc)**.

$$T_{Ncyc} = T_{Scyc} \bullet j, \quad \text{where } j = 1, 2, 3 \ldots$$

## S-0-0002, SERCOS Cycle time (Tscyc)

The interface cycle time indicates the time intervals for the cyclical data transfer. The interface cycle times are set to

2 ms, ... to 65 ms in increments of 1ms.

For the Sercos interface, the SERCOS cycle time must be transmitted from the master to the slave in communications phase 2; and from communications phase 3 on it must be activated in both.

See also the functional description: "Configuration of the Telegram Send and Receive Times".

## S-0-0003, Minimum AT transmit starting time (T1min)

The slave uses this parameter value to indicate the minimum time requirement between the end of the received master synchronization telegram and the transmission of the drive telegram.

The time $T1_{min}$ is read in communications phase 2 by the master to calculate the time to send the drive telegram T1 **S-0-0006, AT Transmission starting time (T1)**.

See also the functional description: "Configuration of the Telegram Send and Receive Times".

## S-0-0004, Transmit/receive transition time (TATMT)

This parameter indicates the time required for the slave to switch to reception of the master data telegram after sending its drive telegram.

The transmission/reception transition time is read in communications phase 2 by the master to calculate the time to send the master data telegram T2 **S-0-0089, MDT Transmit starting time (T2)**.

See also the functional description: "Configuration of the Telegram Send and Receive Times".

## S-0-0005, Minimum feedback acquisition time(T4min)

This is the minimum time requirement between feedback-value acquisition and the end of the master synchronization telegram. This value is indicated by the drive in such a manner that the current feedback values can be transmitted to the numerical control in the next drive telegram.

For the Sercos interface, the master reads this value in communications phase 2 to set the acquisition starting time of the feedback values T4 **S-0-0007, Feedback acquisition starting time (T4)** for all drives.

See also the functional description: "Configuration of the Telegram Send and Receive Times".

## S-0-0006, AT Transmission starting time (T1)

The transmission starting time determines when the slave must send its drive telegram in communications phases 3 and 4, after the end of the master synchronization telegram.

This parameter is transmitted from the master to the slave in communications phase 2 and is active from communications phase 3 on.

The transmission time drive telegram must be set equal to or greater than the transmission reaction time **S-0-0003, Minimum AT transmit starting time (T1min)**.

The following must apply: **T1min** $\leq$ **T1**

See also the functional description: "Configuration of the Telegram Send and Receive Times".

## S-0-0007, Feedback acquisition starting time (T4)

This is the feedback acquisition starting time set by the master after the end of the master synchronization telegram. Thus, the master can set the same feedback acquisition starting time for all drives that work together. This guarantees synchronized feedback-value acquisition among the affected drives. Also, the cyclically transferred command values are processed at time T4.

For the Sercos interface, the master must set the feedback acquisition starting time equal to or less than the difference between the **S-0-0002, SERCOS Cycle time (Tscyc)** and the polled **S-0-0005, Minimum feedback acquisition time (T4min)**.

The following must apply: **T4** $\leq$ **$T_{Scyc}$ - T4min**

See also the functional description: "Configuration of the Telegram Send and Receive Times"

## S-0-0008, Command valid time (T3)

The "command valid time" indicates the time after which the drive may access new command values.

Thus, the master can set the same "command valid time" for all drives that work together. The drive activates the "command valid time" beginning with communications phase 3.

See also the functional description: "Configuration of the Telegram Send and Receive Times".

## S-0-0009, Beginning address in master data telegram

This parameter displays the start address of a drive's data record in the Master Data Telegram, expressed as a byte position. It begins with 1 for the first data byte after the address field in the MDT.

The start address of the drive's data record in the MDT is transmitted to each drive by the master in communications phase 2. The address is activated beginning with communications phase 3.

See also the functional description: "Configuration of the Telegram Send and Receive Times".

## S-0-0010, Length of master data telegram

The length of the Master Data Telegram, expressed in bytes, contains the data records of all the drives. The MDT length is transmitted by the master to all drives in communications phase 2. It is activated by the master and slave beginning with communications phase 3.

See also the functional description: "Configuration of the Telegram Send and Receive Times".

## S-0-0011, Class 1 diagnostics

**Function: Drive lock**

A Class 1 diagnostic error situation discovered by the drive leads to

- the drive's error response, as described in the functional description under "Error".
- setting the static error bits to 1 for Class 1 (**S-0-0135, Drive status word**)

The drive resets the error bit back to 0 only if

- there are no errors pending in C1D
- and command **S-0-0099, C500 Reset C1D** has been started.

**Parameter structure:**

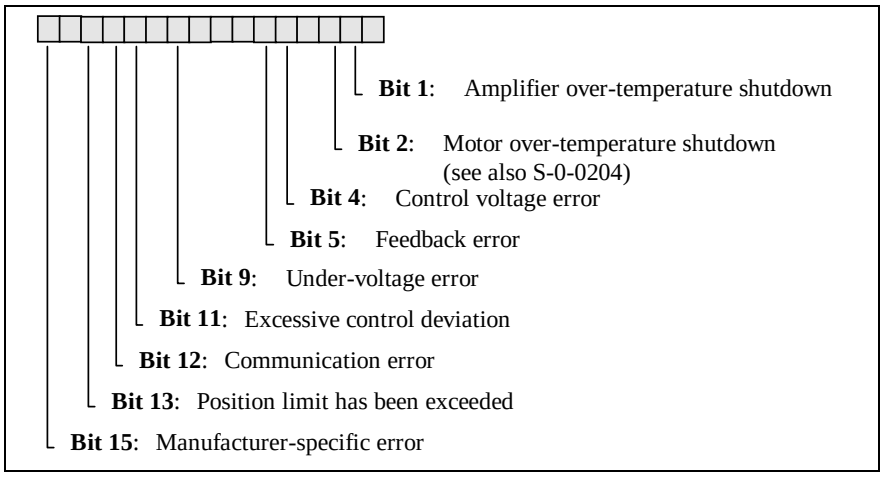



Fig. 2-1: S-0-0011, Class 1 diagnostics

See also the functional description: "S-0-0011, Class 1 diagnostics".

## S-0-0012, Class 2 diagnostics

Function: Shutdown warning.

If a C2D warning is pending in the drive, i.e., is active or inactive, then the change bit (S-0-0135, **Drive status word** Bit 12 ) for the C2D is set.

The change bit (S-0-0135, **Drive status word** Bit 12 ) is not cleared by the drive until parameter S-0-0012, **Class 2 diagnostics** has been read.

**Parameter structure:**

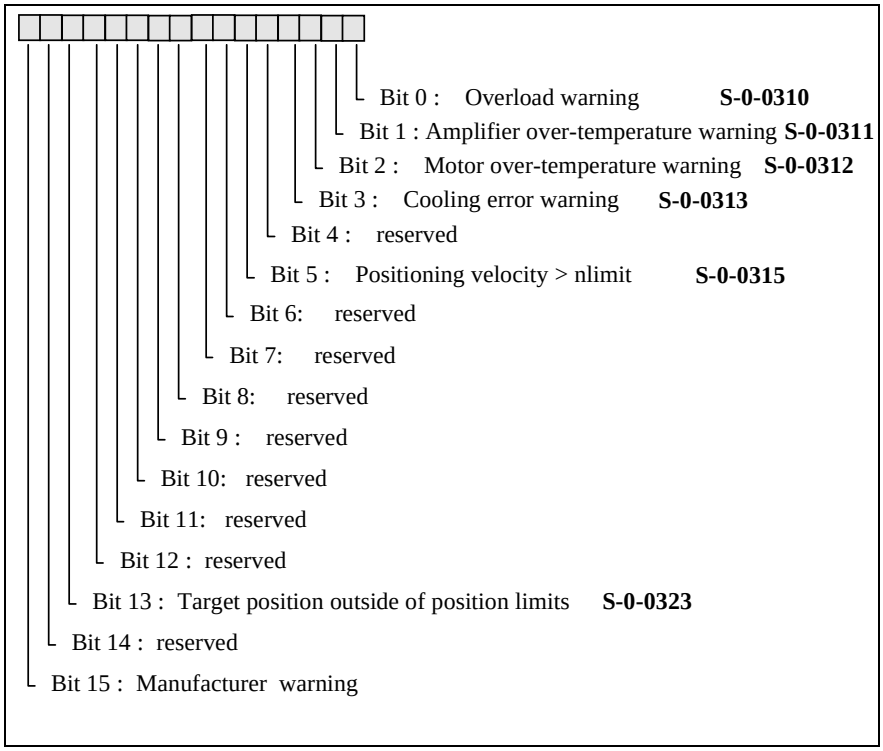



Fig. 2-2: S-0-0012, Class 2 diagnostics

See also the functional description: "S-0-0012, Class 2 diagnostics".

# S-0-0013, Class 3 diagnostics

Function: **Operating status messages**.

If a C3D message is active or inactive in the drive, then the change bit (S-0-0135, **Drive status word** Bit 11 ) is set in the drive.

The change bit (S-0-0135, **Drive status word** Bit 11 ) is not reset by the drive until parameter S-0-0013, **Class 3 diagnostics** is read.

**Parameter structure:**

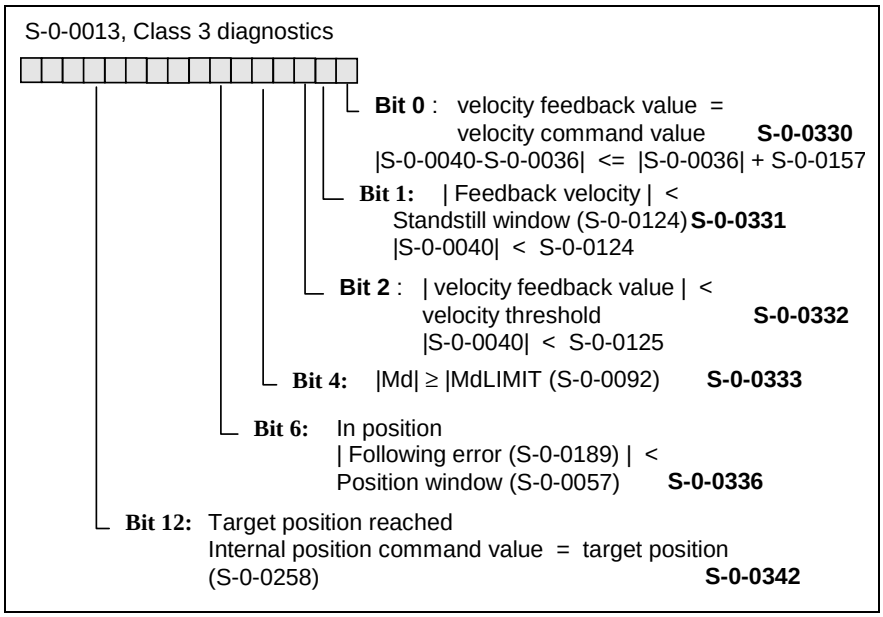



Fig. 2-3: S-0-0013, Class 3 Diagnostics

See also the functional description: "S-0-0013, Class 3 diagnostics".

# S-0-0014, Interface status

In the least significant three bits ( 0, 1, 2 ), the current communication phase can be requested:

0010b: the drive is in **parametrization mode**

0100b: the drive is in **operation mode**

If an interface error is pending, then

- one of the **bits 4-15** in **S-0-0014, Interface status** is set (Bit in 4 .. 15 = 1 => error pending)
- and **Bit 12** is set in **S-0-0011, Class 1 diagnostics**.

The communications error bits are not cleared by the drive until

- the relevant interface error is no longer pending
- and command **S-0-0099, C500 Reset class 1 diagnostic** is started.

**Parameter structure:**

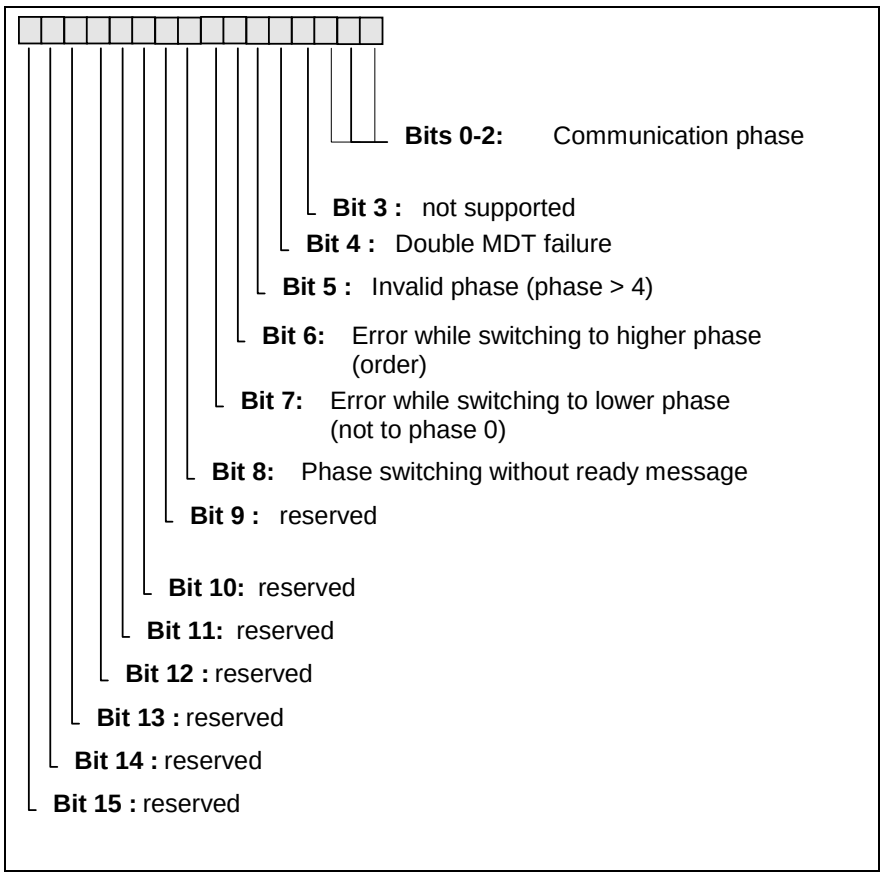



Fig. 2-4: S-0-0014, Interface status

See also the functional description: "Diagnostic of the interface Status".

# S-0-0015, Telegram type parameter

In this parameter, you can choose between priority telegrams and the configured telegram.

The telegram type that is selected will be activated in the master and slave only from communications phase 3 on.

**Parameter structure:**

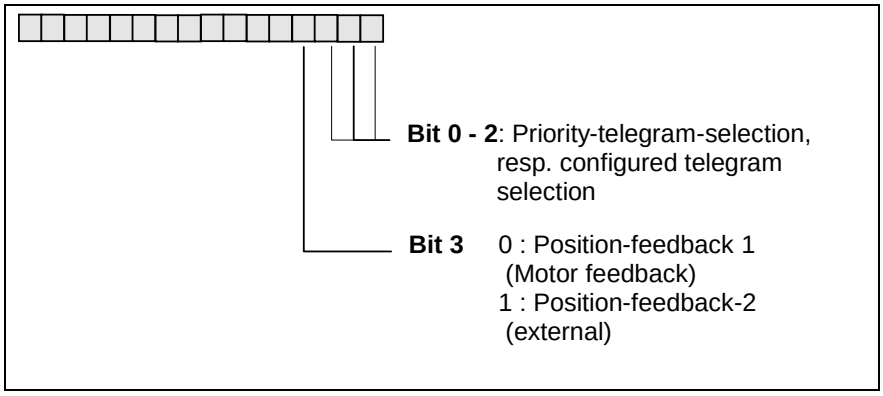



Fig. 2-5: S-0-0015, Telegram type parameter

**Note:** Only the bits indicated here are supported by the software.

**Telegrams:**

| Bit 0-2: | | MDT: | AT: |
|---|---|---|---|
| 0 | PT 0 | No cyclical data | No cyclical data |
| 1 | PT 1 | **DF1**: S-0-0080 Torque command | No cyclical data |
| 2 | PT 2 | **DF1**: S-0-0036, Velocity command value | **DF1**: S-0-0040 Velocity feedback value |
| 3 | PT 3 | **DF1**: S-0-0036, Velocity command value | **DF1**: S-0-0051/S-0-0053 Position feedback value 1 |
| 4 | PT 4 | **DF1**: S-0-0047, Position command value | **DF1**: S-0-0051/S-0-0053 Position feedback value 1 |
| 5 | PT 5 | **DF1**: S-0-0047, Position command value<br>**DF2**: S-0-0036, Velocity command value | **DF1**: S-0-0051/S-0-0053 Position feedback value 1<br>**DF2**: S-0-0040 Velocity feedback value |
| 6 | PT 6 | **DF1**: S-0-0036, Velocity command value | No cyclical data |
| 7 | Configurable telegram | | |

Fig. 2-6: Supported bits

where PT : Priority telegram
DF1/2: Data field 1/2

See also the functional description: "Configuration of Telegram Contents"

## S-0-0016, Custom amplifier telegram configuration list

If a configured telegram is set in **S-0-0015, Telegram type parameter**, then this list will be used for application-specific configuration of the data record in the AT.

The list can contain only operating data that are listed in the parameter **S-0-0187, List of configurable data in the AT**.

See also the functional description: "Configuration of Telegram Contents"

## S-0-0017, IDN-list of all operation data

The ID numbers for all parameters with operation data available in the drive are accessible in this IDN list.

See also the functional description: "Parameter"

## S-0-0018, IDN-list of operation data for CP2

The the IDN-list contains the ident-numbers of all parameters that the drive checks in the transition command for phase 3. Only when the data of the listed ident-numbers are correct, the transition command can be acquitted positive, and the transition to communications phase 3 can be allowed.

See also the functional description: "IDN List of Parameters"

## S-0-0019, IDN-list of operation data for CP3

The the IDN-list contains the ident-numbers of all parameters that the drive checks in the transition command for phase 4. Only when the data of the listed ident-numbers are correct, the transition command can be acquitted positive, and the transition to communications phase 4 can be allowed.

## S-0-0021, IDN-list of invalid op. data for comm. Ph. 2

The drive checks whether all communications parameters are complete and correct before executing a delayed phase switch from 2 to **S-0-0127, C100 Communication phase 3 transition check** with the control system-driven transition check command.

If the drive identifies one or more IDNs as invalid, it will write the operating data that is still needed or is invalid to this ID No. list. This will be displayed to the drive by command error diagnostic message **C101 Invalid communication parameter (S-0-0021)**.

See also the functional description: "IDN List of Parameters"

## S-0-0022, IDN-list of invalid op. data for comm. Ph. 3

Before the drive executes a delayed phase switch from 3 to **S-0-0128, C200 Communication phase 4 transition check** with the control system-driven transition check command, the drive will check parameters for the following conditions:

- Validity of the parameter
- The parameter value is found within the valid input range.
- Compatibility with other parameters.

If the result of a parameter check is negative, this operating data will be entered in the ID No. (IDN) list.

The drive then responds to the transition command with the communications error diagnostic messages

- **C201 Invalid Parameter(s) (->S-0-0022) or**
- **C202 Parameter limit error (->S-0-0022) or**
- **C203 Parameter calculation error (->S-0-0022)**

See also the functional description: "IDN List of Parameters"

## S-0-0024, Config. list of the master data telegram

If the configured telegram is set in **S-0-0015, Telegram type parameter**, then the configurable data record in the MDT will be configured application-specifically using this list.

The list can contain only operating data that are listed in the parameter **S-0-0188, List of configurable data in the MDT**.

See also the functional description: "Configuration of Telegram Contents"

## S-0-0025, IDN-list of all procedure commands

The data of the IDN-list contains the ident-numbers of all commands in the drive controller.

See also the functional description: "Commands"

## S-0-0026, Configuration list signal status word

The data of the parameters stores the ident-numbers of the signals or bits which the signal status word (S-0-0144) contains.

The order of the ident-numbers in the configuration list determines the bit enumeration, beginning with the LSB in the signal status word.

That means, the first ident-number in S-0-0026 defines the bit 0, the second ident-number in S-0-0026 defines bit 1 in the parameter **S-0-0144, Signal status word**, and so on.

**Note:** The signal status word is used in fieldbus drives for the internal communications betwen the two microcontrollers (exception: P-0-4048 = FFFFh).

See also the functional description: "Configurable Signal Status Word"

## S-0-0027, Configuration list signal control word

This parameter keeps the ident numbers of the signals or bits contained in the signal control word (S-0-0145).

The order of the ident numbers in the configuration list determines the bit numbering, starting with the LSB in the signal control word. So, the first ident number in S-0-0027 defines the bit 0, the second ident number defines bit 1 in the parameter **S-0-0145, Signal control word**, and so on.

See also the functional description: "Configurable Signal Control Word".

## S-0-0028, MST error counter

The MST error count counts all invalid Master Synchronization Telegrams in communications phases 3 and 4.

If two MSTs fail in direct succession, then error **F401 Double MST error shutdown** will be generated and the operation will return to phase 0.

The MST error count has a limit stop at (2^16) - 1. This means that during a highly distorted transfer the MST Error count will show the value 65535 after a long time.

See also the functional description: "Error Count for Telegram Interrupts".

## S-0-0029, MDT error counter

This parameter counts all invalid Master Data Telegrams in communications phases 3 and 4.

If two MDTs fail in direct succession, then error **F402 Double MST error shutdown** will be generated.

The MDT error counter has a limit stop at (2^16) - 1. This means that during a highly distorted transfer the MDT error count will show a value of 65535 after a long time.

See also the functional description: "Error Count for Telegram Interrupts".

## S-0-0030, Manufacturer version

The **version of the drive firmware** can be read from this parameter as plain text. The **structure** of the manufacturer version is defined as follows:

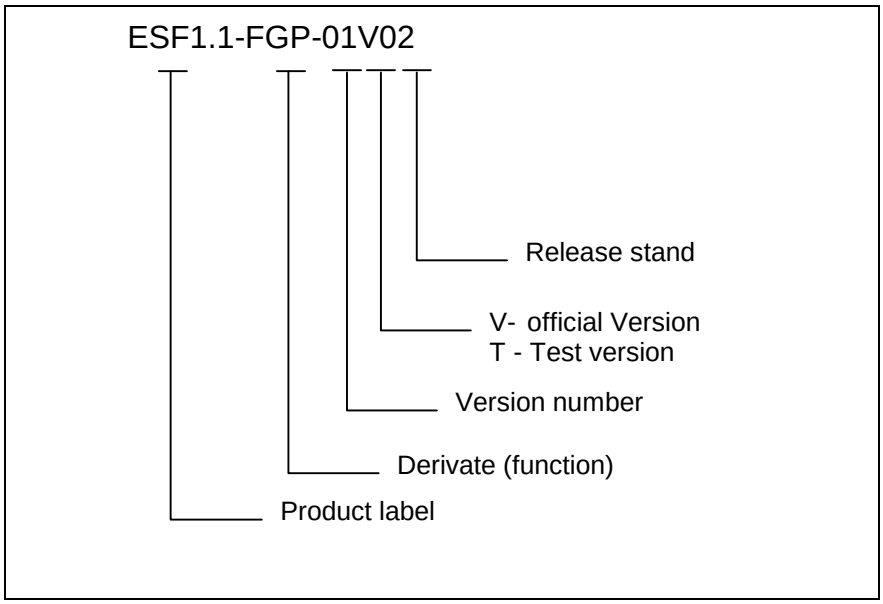



Fig. 2-7: Manufacturer Version

**Examples:**

HSM1.1-SSE-01V02

ESF1.1-FGP-01V02

See also the functional description: "Systemoverview"

## S-0-0032, Primary mode of operation

The drive follows one of four possible modes if "AF" is in the display. These four modes must be defined in parameters:

- **S-0-0032, Primary mode of operation**
- **S-0-0033, Secondary operation mode 1**
- **S-0-0034, Secondary operation mode 2**
- **S-0-0035, Secondary operation mode 3**

The control in units with bus interface specifies in the master control word which of the four operating modes (S-0-0032 to 35) should be active.

The choice of operating modes is entered into the bit list within which specific positions are permanently defined.

This means it is necessary to make the selection in bit 3 as to whether position control is to operate with or without lag.

**It applies:**

Bit 3 = 0 position control with lag

Bit 3 = 1 position control without lag

| Bit list: | Definition: |
|---|---|
| 0000,0000,0000,0001 | torque control |
| 0000,0000,0000,0010 | velocity control |
| 0000,0000,0000,x011 | position control with encoder 1 |
| 0000,0000,0000,x100 | position control with encoder 2 |
| 0000,0000,0001,x011 | drive-internal interpolation, encoder 1 |
| 0000,0000,0001,x100 | drive-internal interpolation, encoder 2 |
| 0000,0010,0001,x011 | relative drive-internal interpolation, encoder 1 |
| 0000,0010,0001,x100 | relative drive-internal interpolation, encoder 2 |
| 1100,0000,0000,x011 | step-motor mode |
| 1100,0000,0001,0011 | jog mode |
| 0000,0000,0011,x011 | position control/position block mode, encoder 1 |
| 0000,0000,0011,x100 | position control/position block mode, encoder 2 |
| 1010,0000,0000,0010 | velocity synchronization, virtual master axis |
| 1001,0000,0000,x011 | angle synchronization, encoder 1, virtual master axis |
| 1001,0000,0000,x100 | angle synchronization, encoder 2, virtual master axis |
| 1000,1000,0000,x011 | cam, encoder 1, virtual master axis |
| 1000,1000,0000,x100 | cam, encoder 2, virtual master axis |
| 1001,0000,0001,x011 | angle synchronization, encoder 1, real master axis |
| 1010,0000,0001,0010 | velocity synchronization, real master axis |
| 1000,1000,0001,x011 | cam, encoder 1, real master axis |

Only torque and velocity control are allowed with DKC11.3s.

| Bit list: | Definition: |
|---|---|
| 0000,0000,0000,0001 | torque control |
| 0000,0000,0000,0010 | velocity control |

Fig. 2-8: Bit list S-0-0032

**Note:** Units without bus interface (SERCOS interface, Profibus-DP and so on) can only be operated in main mode (S-0-0032). Auxiliary mode 1 is permanently set there to jog mode and activated via the jog inputs.

See function description: "Setting the Operating Mode Parameters".

# S-0-0033, Secondary operation mode 1

The operating mode set in these parameters is activated in the drive if:

- auxiliary mode 1 is selected in the master control word (bits 8 and 9 = "01"),
- control and power sections are ready to operate and
- the drive enable RF has been set.

The operating mode is selected by inputting a bit list in which specific positions are permanently defined.

Thus, it must be set in bit 3 whether position control operates with or without lag.

**It applies:**

Bit 3 = 0 position control with lag

Bit 3 = 1 position control without lag

| Bit list: | Definition: |
|---|---|
| 0000,0000,0000,0001 | torque control |
| 0000,0000,0000,0010 | velocity control |
| 0000,0000,0000,x011 | position control with encoder 1 |
| 0000,0000,0000,x100 | position control with encoder 2 |
| 0000,0000,0001,x011 | drive-internal interpolation, encoder 1 |
| 0000,0000,0001,x100 | drive-internal interpolation, encoder 2 |
| 0000,0010,0001,x011 | relative drive-internal interpolation, encoder 1 |
| 0000,0010,0001,x100 | relative drive-internal interpolation, encoder 2 |
| 1100,0000,0000,x011 | step motor operation |
| 1100,0000,0001,0011 | jog mode |
| 0000,0000,0011,x011 | pos. control/pos. block mode, encoder 1 |
| 0000,0000,0011,x100 | pos. control/pos. block mode, encoder 2 |

Fig. 2-9: Bit list S-0-0033

**Note:** Units without bus interface (Sercos interface, Profibus-DP, etc.) can only be operted in main mode (S-0-0032). Auxiliary mode 1 is permanently set there to jog mode and activated via the jog inputs.

See function description: "Setting the Operating Mode Parameters".

## S-0-0034, Secondary operation mode 2

The operating mode set in these parameters is activated in the drive if:

- auxiliary mode 2 is selected in the master control word (bits 8 and 9 = "10"),
- control and power sections are ready to operate and
- the drive enable RF has been set.

The operating mode is selected by inputting a bit list in which specific positions are permanently defined.

Thus, it must be set in bit 3 whether position control operates with or without lag.

**It applies:**

Bit 3 = 0 position control with lag

Bit 3 = 1 position control without lag

| Bit list: | Definition: |
|---|---|
| 0000,0000,0000,0001 | torque control |
| 0000,0000,0000,0010 | velocity control |
| 0000,0000,0000,x011 | position control with encoder 1 |
| 0000,0000,0000,x100 | position control with encoder 2 |
| 0000,0000,0001,x011 | drive-internal interpolation, encoder 1 |
| 0000,0000,0001,x100 | drive-internal interpolation, encoder 2 |
| 0000,0010,0001,x011 | relative drive-internal interpolation, encoder 1 |
| 0000,0010,0001,x100 | relative drive-internal interpolation, encoder 2 |
| 1100,0000,0000,x011 | step motor operation |
| 1100,0000,0001,0011 | jog mode |
| 0000,0000,0011,x011 | pos. control/pos. block mode, encoder 1 |
| 0000,0000,0011,x100 | pos. control/pos. block mode, encoder 2 |

Fig. 2-10: Bit list S-0-0034

**Note:** Units without bus interface (Sercos interface, Profibus-DP, etc.) can only be operted in main mode (S-0-0032). Auxiliary mode 1 is permanently set there to jog mode and activated via the jog inputs.

See function description: "Setting the Operating Mode ParametersSetting ".

## S-0-0035, Secondary operation mode 3

The operating mode set in these parameters is activated in the drive if:

- auxiliary mode 3 is selected in the master control word (bits 8 and 9 = "11"),
- control and power sections are ready to operate and
- the drive enable RF has been set.

The operating mode is selected by inputting a bit list in which specific positions are permanently defined.

Thus, it must be set in bit 3 whether position control operates with or without lag.

**It applies:**

Bit 3 = 0 position control with lag

Bit 3 = 1 position control without lag

| Bit list: | Definition: |
|---|---|
| 0000,0000,0000,0001 | torque control |
| 0000,0000,0000,0010 | velocity control |
| 0000,0000,0000,x011 | position control with encoder 1 |
| 0000,0000,0000,x100 | position control with encoder 2 |
| 0000,0000,0001,x011 | drive-internal interpolation, encoder 1 |
| 0000,0000,0001,x100 | drive-internal interpolation, encoder 2 |
| 0000,0010,0001,x011 | relative drive-internal interpolation, encoder 1 |
| 0000,0010,0001,x100 | relative drive-internal interpolation, encoder 2 |
| 1100,0000,0000,x011 | step motor operation |
| 1100,0000,0001,0011 | jog mode |
| 0000,0000,0011,x011 | pos. control/pos. block mode, encoder 1 |
| 0000,0000,0011,x100 | pos. control/pos. block mode, encoder 2 |

Fig. 2-11: Bit list S-0-0035

**Note:** Units without bus interface (Sercos interface, Profibus-DP, etc.) can only be operted in main mode (S-0-0032). Auxiliary mode 1 is permanently set there to jog mode and activated via the jog inputs.

See function description: "Setting the Operating Mode Parameters".

## S-0-0036, Velocity command value

This parameter is used to set the velocity command value. This together with **S-0-0037, Additive velocity command value** determines the effective Velocity Command Value for the drive.

**Note:** In the position control operating modes, this parameter displays the output signal of the position controller.

See also the functional description: "Operating Mode: Velocity Control"

## S-0-0037, Additive velocity command value

The additional velocity command value is added to the **S-0-0036, Velocity command value** in the drive.

See also the functional description: "Operating Mode: Velocity Control"

## S-0-0040, Velocity feedback value

The velocity feedback value can be transferred from the drive control device to the control system either cyclically or via the service channel.

see also functional description "Preparations for Setting the Velocity Controller"

## S-0-0041, Homing velocity

The product of **S-0-0041, Homing velocity** and **S-0-0108, Feedrate override** determines the velocity for the **S-0-0148, Drive controlled homing procedure** command.

If, in the case of an absolute encoder, the **S-0-0148, Drive controlled homing** procedure is initiated, then the drive will proceed with this velocity to the reference point (home position) that was determined with the **P-0-0012; set absolute measurement**, command.

See also the functional description: "Drive-Controlled Homing".

## S-0-0042, Homing acceleration

This parameter indicates the acceleration value at which the drive executes the command **S-0-0148, C600 Drive controlled homing procedure command**.

See also the functional description: "Drive-Controlled Homing".

## S-0-0043, Velocity polarity parameter

This parameter is used to switch the polarity of the velocity data in relation to the application.

Polarities are switched externally, at the input and output of a control system rather than inside the system.

**The following applies to rotary motors:**

**Clockwise** rotation when facing the motor shaft is the rule for a **positive** velocity command value and a positive polarity.

The following applies to linear motors:

The **positive direction** is used when the primary is moving **toward** the linear motor power **cable side**.

**Parameter structure:**

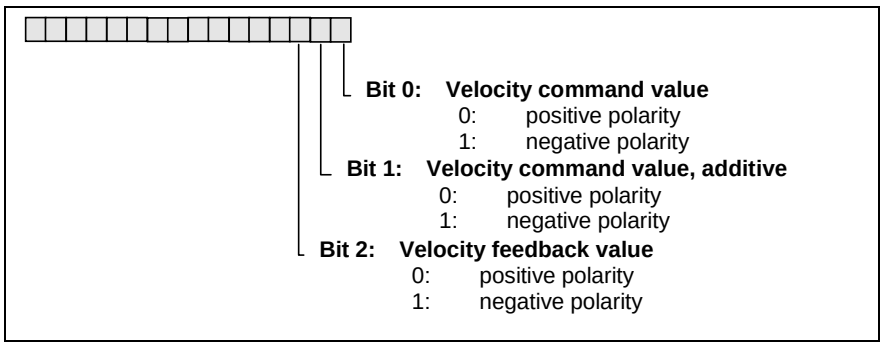



Fig. 2-12: S-0-0043, Velocity polarity parameter

**Note:** The bits 1 and 2 are copies of bit 0. Only changes of bit 0 have an effect. Different settings of the single bits are not possible!

See also the functional description: "Command Polarities and Actual Value Polarities".

## S-0-0044, Velocity data scaling type

Various scaling types can be defined for the velocity data in the drive.

Examples: RPM → rotary

mm/min → linear

**Structure of the parameter:**

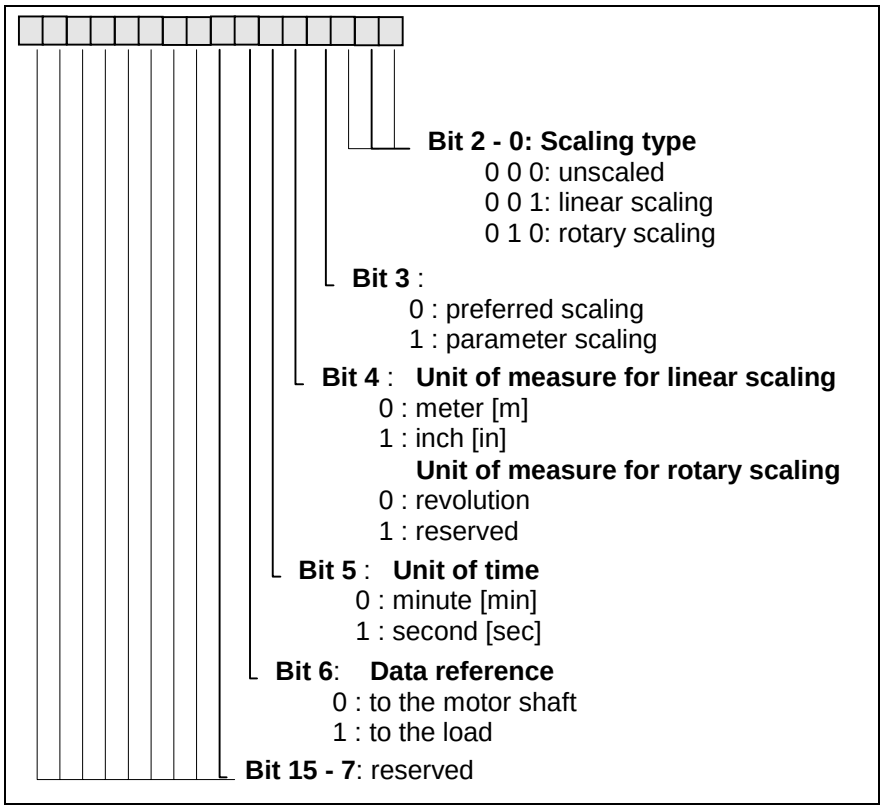



Fig. 2-13: S-0-0044, Velocity Data Scaling Type

In bit 3 it is possible to select between preferred and parameter scaling.

**Preferred scaling:**

The following parametrs are predefined in this case and cannot be changed:

- **S-0-0045, scaling factor for velocity data**
- **S-0-0046, scaling exponents for velocity data**

Scaling with parameter scaling means that this parameter must be specified.

see section: "Preferred Scaling - Parameter Scaling".

See also example under **S-0-0045, Velocity Data Scaling Factor**

and functional description: "Velocity Data Display Format"

## S-0-0045, Velocity data scaling factor

This parameter defines the scaling factor for all velocity data in the drive.

If preferred scaling is set with **S-0-0044, Velocity data scaling type**, this parameter will be set to 1.

See also the functional description: "Velocity Data Display Format"

## S-0-0046, Velocity data scaling exponent

The scaling exponent for all velocity data in the drive is determined in this parameter.

See also functional description: "Velocity Data Display Format".

## S-0-0047, Position command value

The position command value for the step motor interface will be determined through the evaluation of the step-pulse signals present at this interface. The position command value that is determined in this fashion can be read here.

The position command value for the positioning interface will be generated by the internal position command value interpolator. The active position command value can be read here.

Parameter S-0-0047 must be configured in the real time channel (master -> slave) in "cyclical position control" mode.

## S-0-0048, Position command value additional

If a synchronization operating mode with position control is selected, then the additional position command value is added to the **S-0-0047, Position Command Value** in the drive. This is used to establish a position offset between the master axis encoder and the following axis.

## S-0-0049, Positive position limit value

The positive position limit value describes the maximum extent of travel in the positive direction.

**Activation**

The position limit value is active only when all position data refers to the homing point, i.e., the drive is **homed** (bit 0 is set to 1 in parameter **S-0-0403, Position feedback value status**).

The position limit values can be switched off using bit 4 in **S-0-0055, Position polarity parameter**.

**Warning**

If a **Target position, S-0-0258** beyond the positive position limit value is set for the drive, then the drive sets warning bit 13 in **S-0-0012, Class 2 diagnostic** and generates the warning **E253 Target position out of travel range**.

If the positive position limit value is exceeded, the drive sets error bit 13 in **S-0-0011, Class 1 diagnostic**.

See also the functional description: "Axis Limit Values".

## S-0-0050, Negative position limit value

The negative position limit value describes the maximum extent of travel in the negative direction.

**Activation** The position limit value is active only when all position data refers to the homing point, i.e. the drive is **homed** (bit 0 is set to 1 in parameter **S-0-0403, Position feedback value status**). The position limit values can be switched off using bit 4 in **S-0-0055, Position polarity parameter**.

**Warning** If a target position beyond the negative position limit value is set for the drive, then the drive sets warning bit 13 in **S-0-0012, Class 2 diagnostic** and generates the warning **E253 Target position out of travel range**.

If the negative position limit value is exceeded, the drive will set error bit 13 in **S-0-0011, Class 1 diagnostics**.

See also the functional description: "Axis Limit Values".

## S-0-0051, Position feedback 1 value

Position feedback value 1 represents the current position of the motor encoder. The initialization of the position feedback happens during the execution of **S-0-0128, C200 Communication phase 4 transition check**; that means, the feedback positions are only initialized after successful execution of the command.

If an absolute encoder is present, the value in **S-0-0051, Position Feedback 1 Value** then shows the absolute position referred to the machine's zero-point, provided that during the first setup the command **P-0-0012, C300 Command 'Set absolute measurement'** has been executed once.

In the other case, the initialization value depends on whether the parameter **P-0-0019, Position start value** has been written to during the phase progression or whether the motor feedback is an absolute encoder.

See also the functional description: "Setting the Measurement System".

## S-0-0052, Reference distance 1

The parameter displays the distance between the machine zero-point and the homing point for the motor measurement system (Position feedback value 1). The parameter is used for the execution of the commands
**S-0-0148, C600 Drive controlled homing procedure command** and **P-0-0012, C300 Command 'Set absolute measurement'**.

During the command **S-0-0148, C600 Drive controlled homing procedure command**, the distance between the homing point and the machine zero-point is written there. If homing is done with run to the homing point, the drive goes to the homing point, and **S-0-0051, Position feedback 1 value** contains the value of **S-0-0052, Reference distance 1**.

For the command **P-0-0012, C300 Command 'Set absolute measurement'**, the desired value for **S-0-0051, Position feedback 1 value** is written there. After successful execution of 'Setting absolute measurement', **S-0-0051, Position feedback 1 value** shows the value of **S-0-0052, Reference distance 1**.

See also the functional description: "Drive-Controlled Homing".

## S-0-0053, Position feedback 2 value

Position feedback value 1 represents the current position of the **optional external encoder**. The initialization of the position feedback happens during the execution of **S-0-0128, C200 Communication phase 4 transition check**; that means, the feedback positions are only initialized after successful execution of the command.

If an absolute optional encoder is present, the value in **S-0-0053, Position Feedback Value 2** then shows the absolute position referred to the machine's zero-point, provided that during the first setup the command **P-0-0012, C300 Command 'Set absolute measurement'** has been executed once.

In the other case, the initialization value depends on whether the parameter **P-0-0019, Position start value** has been written to during the phase progression or whether an existing optional feedback is an absolute encoder.

See also the functional description: "Setting the Measurement System".

## S-0-0054, Reference distance 2

The parameter displays the distance between the machine zero-point and the homing point for the external measuring system (Position feedback value 2). The parameter is used for the execution of the commands
**S-0-0148, C600 Drive controlled homing procedure command** and **P-0-0012, C300 Command 'Set absolute measurement'**.

During the command **S-0-0148, C600 Drive controlled homing procedure command**, the distance between the homing point and the machine zero-point is written there. If homing is done with run to the homing point, the drive goes to the homing point, and **S-0-0053, Position feedback 2 value** contains the value of **S-0-0054, Reference distance 2**.

For the command **P-0-0012, C300 Command 'Set absolute measurement'**, the desired value for **S-0-0053, Position feedback 2 value** is written there. After successful execution of 'Setting absolute measurement'**, S-0-0053, Position feedback 2 value** shows the value of **S-0-0054, Reference distance 2**.

See also the functional description: "Drive-Controlled Homing".

## S-0-0055, Position polarities

This parameter can be used to invert the polarities of the given position data. These polarities are switched outside of the control system (i.e., at the input and output of the control system).

**Note:** The polarity of the position must be determined during the first setup of an axis *before* establishing a zero reference for the measurement systems, because changing the polarity results in different position values.

Note the following in reference to rotary motors:

"**Motor-clockwise rotation**" means the motor shaft turns in a clockwise direction (facing the motor shaft) if the position command value difference and the polarity are both positive.

The following applies to linear motors:

The positive direction is used when the primary is moving toward the linear motor power cable side

Bit 4 is used to activate or deactivate software position limits.

**Parameter structure:**

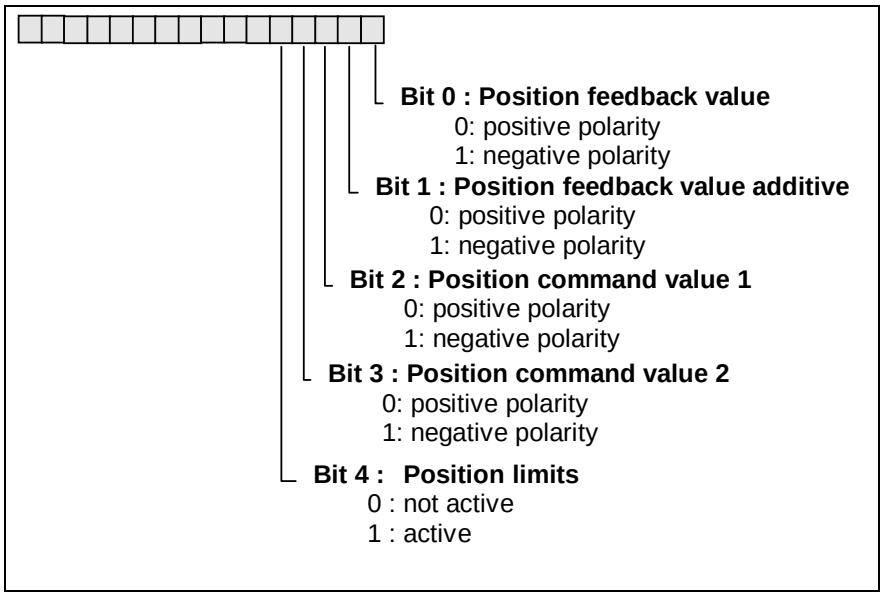



Fig. 2-14: S-0-0055, Position polarity parameter

**Note:** - Only the bits indicated here are supported by the software.
- If bit 0 is changed by the control system, bits 1 - 3 will also be set to the value of bit 0 by the drive!

See also the functional description: "Command Polarities and Actual Value Polarities".

## S-0-0057, Position window

The parameter S-0-0057, Position window, is used for following functions:

- Status **In Position**, |Following error (S-0-0189)| < Position window (S-0-0057) sets bit 6 in **S-0-0013, Class 3 Diagnostics**
- Status **ITP**, |Target - act.pos.|< Position window (S-0-0057) && |following error| < Position window && |act. speed| < Standstill window (S-0-0124) → bit 6 in **S-0-0182,** Manufacturer class 3 diagnostics
- Status **In_Target_Position**, |Target - act.pos.| < Position window (S-0-0057) → Bit 10 in **S-0-0182,** Manufacturer class 3 diagnostics
- Status **Final position reached,** (|Target - act.pos-1/2| < S-0-0057, Position window) && **Last process block** done

- During the execution of the command **S-0-0148,** C600 Drive controlled homing procedure command, the drive reports completion of the command, when the internal command generator has reached its target value and the difference between this value and the actual position is smaller than the position window.
- As a **hysteresis** window for the position limits. I.e., when the drive has gone beyond the limit, the travel range is additionally limited by the position window.
- As hysteresis window for dynamic cam groups.
- If position limit value is active, then there is a positioning to the position limit value positioning window when **jogging**.
- Target positions within the window are run to over the shortest path regardles of what is set in S-0-0393.
- For spindle positioning command, to show that the spindle is standing in position.

See also the functional description: "S-0-0182, Manufacturer class 3 diagnostics".

## S-0-0076, Position data scaling type

The position data scaling type determines, in which format position data are communicated between drive and control or display surface. When position parameters (e.g. **S-0-0051, Position feedback 1 value**) are read, the drive displays them with the selected scaling. The scaling selection is usually preset by the PLC.

The following settings can be made:

**Structure of the parameter:**

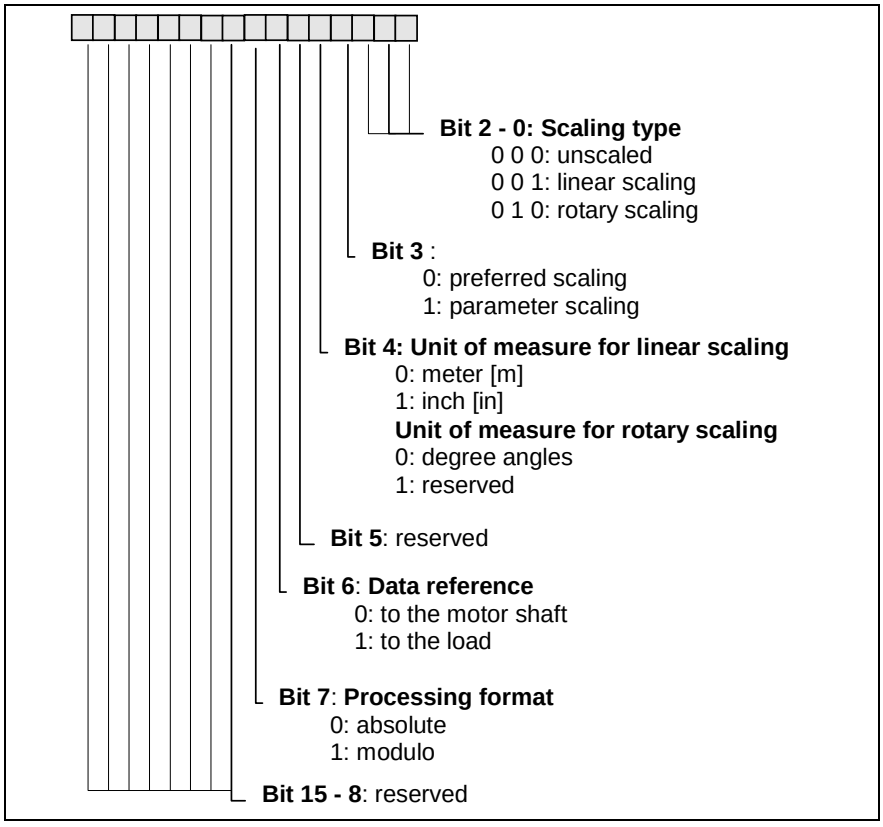



Fig. 2-15: S-0-0076, Position data scaling type

In bit 3 the selection between preferred and parameter scaling can be set.

**Preferred scaling:**

The followng parameters are predefined and cannot be changed:

- **S-0-0077, Linear position data scaling factor,**
- **S-0-0078, Linear position data scaling exponent**
- **S-0-0079, Rotational position resolution**

Parameter scaling means that this parameter must be set for scaling (see section: Preferred Scaling - Parameter Scaling").

**Note:** Only the bits mentioned here are supported by the firmware.
1) See also S-0-0045, Scaling factor for velocity data.
2) See also the example S-0-0077, Scaling of position data.

See also the functional description: "Display Format of Position Data".

## S-0-0077, Linear position data scaling factor

The parameter **S-0-0077, Linear position data scaling factor** determines together with **S-0-0078, Linear position data scaling exponent** and the selection of the physical unit m (meters) or inch in S-0-0076, in which unit the present position parameters in the drive are displayed, when linear scaling is selected.

If "preferred scaling“ is chosen in **S-0-0076, Position data scaling type** (bit 3 = 0), the values in S-0-0077 and S-0-0078 are set by the drive.

If "**parameter scaling**“ is chosen in **S-0-0076, Position data scaling type** (bit 3 = 1), the settings in S-0-0077 and S-0-0078 are taken.

Example for the display of position data for linear scaling:

- Physical position of the motor feedback equals 0.12 m (meter).

A) Selected scaling = linear preferred scaling (S-0-0077 = 1, S-0-0078 = -7). This gives for **S-0-0051, Position feedback 1 value** a value of 1200000 with unit meters and 7 places after the decimal.

B) Selected scaling = linear parameter scaling (S-0-0077 = 3, S-0-0078 = -7). This gives for **S-0-0051, Position feedback 1 value** a value of 400000 with unit meters and 7 places after the decimal.

See also the functional description: "Display Format of Position Data".

## S-0-0078, Linear position data scaling exponent

The parameter S-0-0078, Linear position data scaling exponent determines together with **S-0-0077, Linear position data scaling factor** and the selection of the physical unit m (meters) or inch in S-0-0076, in which unit the present position parameters in the drive are displayed, when linear scaling is selected.

If "**preferred scaling**“ is chosen in **S-0-0076, Position data scaling type** (bit 3 = 0), the values in S-0-0077 and S-0-0078 are set by the drive.

If "**parameter scaling**“ is chosen in **S-0-0076, Position data scaling type** (bit 3 = 1), the settings in S-0-0077 and S-0-0078 are taken.

**Example** for the display of position data for linear scaling:

- Physical position of the motor feedback equals 0.12 m (meter).

A) Selected scaling = linear preferred scaling (S-0-0077 = 1, S-0-0078 = -7). This gives for **S-0-0051, Position feedback 1 value** a value of 1200000,0 with unit meters and 7 places after the decimal.

B) Selected scaling = linear parameter scaling (S-0-0077 = 1, S-0-0078 = -6). This gives for **S-0-0051, Position feedback 1 value** a value of 120000 with unit meters and 6 places after the decimal.

See also the functional description: "Display Format of Position Data".

## S-0-0079, Rotational position resolution

If rotary position scaling is selected, the LSB valence for all position data will be set in this parameter. The valence of the LSB in the drive's position data results in

$$\text{LSB valence} = \frac{1 \text{ Revolution}}{\text{Rotational position resolution}}$$

where bit 6 of **S-0-0076, Position data scaling type** selects whether the LSb valence refers to one motor revolution or one load revolution.

If you work with preferred rotary scaling, the value in S-0-0079, Rotational position resolution is fixed at 3 600 000. Thus, the LSB bit of all rotary position data is fixed at 0.0001 degrees of angle.

See also the functional description: "Display Format of Position Data".

## S-0-0080, Torque/Force command

In the torque control operating mode, the torque command values are transferred by the control system to the drive.

If the velocity controller is active, the torque required for the corresponding velocity can be derived from this parameter.

The evaluation depends upon the scaling of the torque and force data. At present, only the **percentage-based scaling** is supported.

The date value corresponds to the current command value in respect to the motor current at standstill (S-0-0111).

**100 % = Motor continous standstill torque**, Mdn

The value can be converted to a torque or force value by multiplying the command current by the torque/force constant (P-0-0051).

See also the functional description: "Operating Mode: Torque Control".

## S-0-0084, Torque/Force feedback value

The current torque/force feedback value can be derived from this parameter.

The shown values depend from the torque/force scaling. At present, only the percentage-based scaling is supported.

The data value corresponds to the measured feedback current; 100% are equal to the motor current at standstill, S-0-0111.

The value can be converted to a torque or force value by multiplying the command current by the torque/force constant P-0-0051.

## S-0-0085, Torque/Force polarity parameter

The polarities for the given torque data as related to the application can be switched in this parameter.

Polarities are switched externally, at the input and output of a control system rather than inside the system.

The following applies to rotary (turning) motors:

The motor will turn in a clockwise direction (facing the motor shaft) with a positive torque command value and positive polarity.

The following applies to linear motors:

The positive direction is used when the primary is moving toward the linear motor power cable side

**Structure of the parameter:**

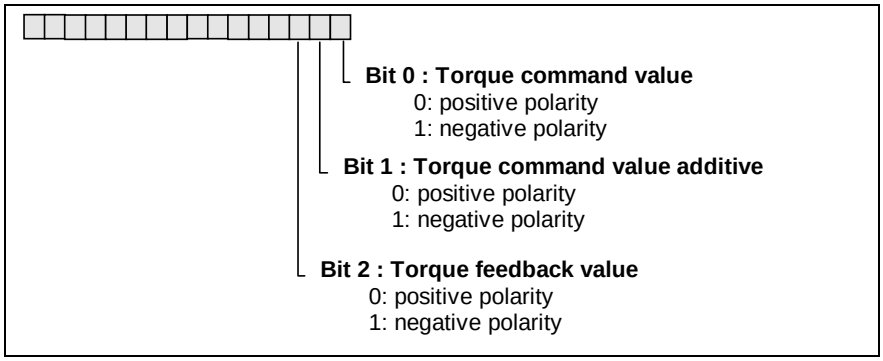



Fig. 2-16: S-0-0085, Torque/force polarity parameter

**Note:** If bit 0 of the control system is changed, then bits 1 - 2 of the drive will also be set to the value in bit 0.

See also the functional description: "Command Polarities and Actual Value Polarities".

## S-0-0086, Torque/Force data scaling type

At present, only the percentage scaling for torque/force data is supported.

**The following applies:**

**100 % = S-0-0111, Motor current at standstill**

See also the functional description: "Adjustable Scaling for Position, Velocity, and Acceleration Data".

## S-0-0088, Receive to receive recovery time (TMTSG)

This parameter defines the time needed for the slave to switch to readiness for the next master synchronization telegram after receiving a master data telegram.

The parameter is read by the control system in phase 2 to calculate the time slot parameters.

See also the functional description: "Configuration of the Telegram Send and Receive Times"

## S-0-0089, MDT Transmit starting time (T2)

This is the transmit starting time for the master data telegram after the end of a master synchronization telegram. The value is transferred from the master to the slave in communications phase 2 and is activated in phase 3.

See also the functional description: "Configuration of the Telegram Send and Receive Times"

## S-0-0090, Command value transmit time (TMTSG)

This is the time required by the slave to prepare the command values for the drive after reception of the master data telegram.

See also the functional description: "Configuration of the Telegram Send and Receive Times"

## S-0-0091, Bipolar velocity limit value

The "bipolar velocity limit value" describes the maximum permissible velocity, symmetrical in both directions. The max. input value is determined by the **S-0-0113, Maximum motor speed (nmax)**.

The entered value generates the maximum value for all other speed parameters.

See also the functional description: "Limiting Velocity"

## S-0-0092, Bipolar torque/force limit value

This parameter describes the maximum allowable torque symmetrical in both directions ( accelerating, braking ).

The evaluation refers to the percentage of the motor current at standstill:

100 % = Motor current at standstill

**Note:** The maximum torque is also influenced by
- P-0-0006, Overload factor
- P-0-4011, Switching frequency

See also the functional description: "Torque/Force Limiting".

## S-0-0093, Torque/force data scaling factor

The scaling factor for all torque/force data in the drive is set in this parameter.

The parameter has no meaning at the present time, because only percentage scaling can be set for torque and force data. Therefore, only the value 1 is suitable.

See also the functional description: "Adjustable Scaling for Position, Velocity, and Acceleration Data".

## S-0-0094, Torque/force data scaling exponent

The scaling exponent for all torque/force data in the drive is set in this parameter.

The parameter has no meaning at the present time, because only percentage scaling can be set for torque and force data.

See also the functional description: "Adjustable Scaling for Position, Velocity, and Acceleration Data".

## S-0-0095, Diagnostic message

The operating status for the drive that is relevant at the moment can be read in **text** form in this parameter.

The respective diagnostic message number from **S-0-0390, Diagnostic Message Nummer** will appear in front of this parameter.

**Example:** **"A010 Drive Halt"**

See also the functional description: "Diagnostic Message"

## S-0-0096, Slave arrangement (SLKN)

For Sercos: During initialization, the master must know which drives are available under which slave numbers in order to execute an optimal automatic time slot calculation.

The master uses this information to detect the address of the connected slave.

**Example for address 3:**

| **Contents S-0-0096** | 03 | 03 |
|---|---|---|

See also the functional description: "Setting the Drive Address of the SERCOS Interface"

## S-0-0097, Mask class 2 diagnostic

This parameter can be used to mask pre-warnings in the **S-0-0012, Class 2 diagnostics** concerning their effect on the change bit in the drive status. When the masked early warnings change, the Class 2 diagnostic change bit will be set in the drive status.

The mask has no effect on the operating data of the Class 2 diagnostics.

Moreover, this parameter can mask pre-warnings in the **S-0-0012, Class 2 diagnostics** concerning their effect on the warning output.

**Note:** A warning masked out by this mask will only be displayed in the data of the Class 2 diagnostics, but woll not lead to setting the warning output.

See also the functional description: "Change bit of class 2 and 3 diagnostics in the drive status word".

## S-0-0098, Mask class 3 diagnostic

This parameter can be used to mask pre-warnings in the **S-0-0013, Class 3 diagnostics** in the drive status according to their effect on the change bit. When the masked early warnings change, the Class 3 diagnostics change bit will be set in the drive status.

The mask has no effect on the operating data of the Class 3 diagnostics.

Moreover, this parameter can mask pre-warnings in the **S-0-0013, Class 3 diagnostics** concerning their effect on the warning output.

**Note:** A warning masked out by this mask will only be displayed in the data of the Class 3 diagnostics, but woll not lead to setting the warning output.

See also the functional description: "Change bit of class 2 and 3 diagnostics in the drive status word".

## S-0-0099, C500 Reset class 1 diagnostic

Command to **reset errors**, after the cause has been cleared.

This command can be started with

- the S1 key on the drive controller or
- by writing to the parameter **S-0-0099, C5 Reset class 1 diagnostic**

When starting the command via the parameter S-0-0099, all errors in the drive are cleared, and the drive will switch to the "ready for operation" status if no further error remains.

If the command is started with the S1 key, only one error is deleted at a time. If the drive has stored several errors (up to 4 errors), the diagnostic message that corresponds to each error will appear sequentially every time the S1 key is pressed again.

See also the function description: "Clearing Errors".

## S-0-0100, Velocity loop proportional gain

This parameter contains the value for the velocity loop proportional gain.

The proportional gain **unit** depends on the contacted motor type.

| **Motor type:** | **Unit:** |
|---|---|
| Rotary motor: | A•sec/rad |
| Linear motor: | A•min/m |

Fig. 2-17: Units for the vel. loop prop. gain depending on the motor type

It is possible to load a default value for the parameter using the command "Basic load", as long as there is a motor with feedback memory (**P-0-4014, Motor type:** 1 or 5).

See also the functional description: "Setting the Velocity Controller".

## S-0-0101, Velocity loop integral action time

The velocity controller forms a current command value from the difference between the velocity command value and the velocity feedback value

(= speed regulation deviation).

This current command value consists of a proportional component and an integral component. The Velocity Loop Integral Action Time corresponds to the time in which the integral component of the current command value is growing on the value of the proportional component.

**Definition of the Integral Action Time**

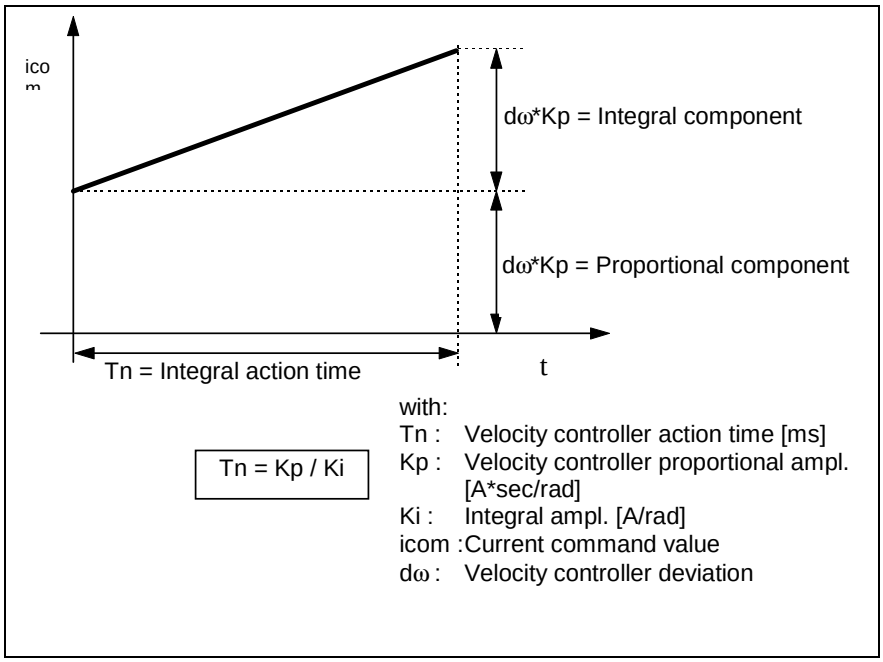



Fig. 2-18: Integral Action Time

The value of the time axis for which the integral component is equal to the proportional component is described as integral action time. This represents the time that a pure I-controller would need until the controller output variable is equal to the output variable of a P-controller at time t=0.

The integral gain component is disabled with an input value of 0.

See also the functional description: "Setting the Velocity Controller".

## S-0-0103, Modulo value

When the modulo format is set (parameter **S-0-0076, Position data scaling type** bit 7), the modulo value determines at which numeric value the position data roll over (overflow) to 0.

See also parameter "**S-0-0393, Command value mode**"

See also the functional description: "Modulo Feature".

and "Modulo Processing-Limiting Conditions"

## S-0-0104, Position loop Kv-factor

This parameter contains the value for the proportional gain of the position controller.

It is possible to load a default value for the controller parameters using the command "Basic load".

Motors with feedback memory e.g. MKD, have appropriate values for all controller settings in their feedback. These are loaded after the initial connection (display UL) or with the command "Basic load“.

See also the functional description: "Setting the position controller".

## S-0-0106, Current loop proportional gain 1

The current controller proportional gain is determined for every motor-drive combination. It depends on the type of the motor and may not be changed. It is loaded from the motor feedback after the initial connection (display UL) or using the command "Basic load".

**Note:** The values of the current controller set at the factory should not be altered!

See also function description: "Setting the Current Controller".

## S-0-0107, Current loop integral action time 1

The current loop integral action time is fixed for every motor-drive combination. It depends on the type of the motor. The factory setting may not be changed.

The basic setup for all controllers is loaded after the initial connection (display UL) or with the command "Basic load“. For motors without feedback memory, you can take the value from the motor’s data sheet.

See also function description: "Setting the Current Controller".

## S-0-0108, Feedrate override

The feedrate override acts on drive controlled operation modes and motion commands, like

- **S-0-0148, C600 Drive controlled homing procedure command**
- operating modes **Drive internal interpolation** and **Relative drive internal interpolation**
- Programmed **positioning block** operating mode
- **Jogging** operation
- automatic control loop setting

**Note:** The versions have not implemented all operating modes and commands at the same time.

The feedrate override has a **multiplying** effect on the parameters

- **S-0-0041, Homing velocity**
- **S-0-0259, Positioning velocity**
- Positioning block velocities
- Jog velocity

**Note:** In devices with analog interface, an analog input can be configured for the feedrate override, see also the project manual.

See also the functional description: "Drive-Controlled Homing".

## S-0-0109, Motor peak current

Specifies the maximum current which may flow through the motor for a short period without damaging it.

**Note:** If the motor's peak current is less than the amplifier's peak current, the maximum output current will be automatically limited to the motor's peak current.

This value is stored in the motor feedback for MHD, MKD and MKE motors and will be uploaded from there when the amplifier is turned on for the first time. For other motor types, the value must be taken from the data sheet.

See also the functional description: "Setting the Active Peak Current".

## S-0-0110, Amplifier peak current

Peak current available from the drive controller. The value will be set by the drive itself. This current is only available for short durations.

See also the functional description: "Current Limit".

## S-0-0111, Motor current at standstill

The motor current at standstill is the current from which the motor continuously generates the standstill torque according to the motor data sheet.

This value is stored in motor feedback for MHD, MKD and MKE motors and will be loaded from there when the drive controller is turned on for the first time. For other types of motors, this value must be taken from the data sheet.

**Note:** All torque/force data refer to this motor current at standstill = 100 % .

See also the functional description: "Motor Feedback-Data Memory"

## S-0-0112, Amplifier nominal current

Allowable continuous current output for the drive controller. The value will be set by the drive itself.

See also the functional description: "Setting the Active Continuous Current"

## S-0-0113, Maximum motor speed (nmax)

The maximum velocity for the motor cannot be exceeded. It also limits the **S-0-0091, Bipolar velocity limit** parameter.

This value is stored in the motor feedback of MHD, MKD and MKE motors and will be loaded from there when the drive controller is turned on for the first time. For other motor types, the value must be taken from the data sheet.

In torque regulation, if the maximum motor speed is exceeded by more than 12.5%, the drive will be switched into a torque free state and the error message **F879 Velocity limit S-0-0091 exceeded** will result.

See also the functional description: "Limiting Velocity".

## S-0-0115, Position feedback 2 type

Essential characteristics of the optional encoder (position encoder 2) are established is this parameter.

**Parameter structure:**

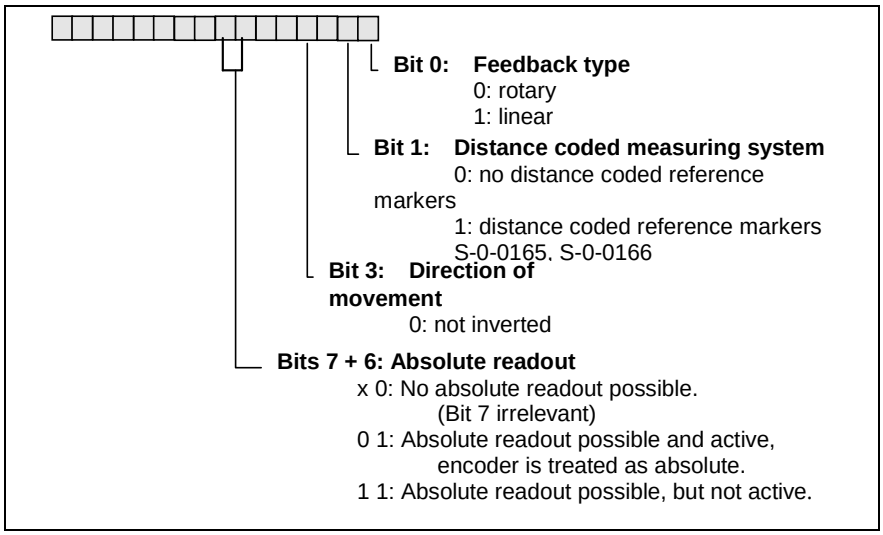



Fig. 2-19: S-0-0115, Position feedback 2 type parameter

**Remark:**

For absolute measurement systems with data memory, bit 6 is set automatically.

See also the functional description: "Other Optional Encoder Characteristics".

## S-0-0116, Feedback 1 Resolution

Depending on parameter **P-0-4014, Motor type** (rotary or linear motors), the resolution of the motor encoder is indicated by **S-0-0116, Resolution of motor feedback**.

This value contains the number of lines or cycles per motor revolution for rotary motors, or the segment spacing per mm for linear motors. For motors with resolver feedback, the number of the resolver pole pairs is stored here.

See also the functional description: "Motor Encoder Resolution".

## S-0-0117, Feedback 2 Resolution

The resolution of the optional encoder contains the cycles per external encoder revolution for rotational encoders. For linear optional encoders, the segment spacing is given, in mm.

See also the functional description: "Optional Encoder Resolution".

## S-0-0121, Input revolutions of load gear

A mechanical gear is often employed between the motor and the load.

The **gear ratio** is defined by:

$$\frac{\textbf{S-0-0122, Output Revolutions of load Gear}}{\textbf{S-0-0121, Input Revolutions of load Gear}}$$

Fig. 2-20: Gear Ratio

See also function description: "Transmission Ratio" and "Modulo Processing-Limiting Conditions".

**Example:**

5 motor rotations result in 2 output gear rotations.

⇒ S-0-0121 : 5

S-0-0122 : 2

## S-0-0122, Output revolutions of load gear

A mechanical gear is often employed between the motor and the load.

The gear ratio is defined by:

$$\frac{\text{S-0-0122, Output Revolutions of load Gear}}{\text{S-0-0121, Input Revolutions of load Gear}}$$

Fig. 2-21: Gear Ratio

See also function description: "Transmission Ratio" and "Modulo Processing-Limiting Conditions".

**Example:**

5 motor rotations result in 2 output gear rotations.

⇒ S-0-0121 : 5

S-0-0122 : 2

## S-0-0123, Feed constant

This parameter describes the conversion from rotary to linear motion. It is defined as the linear displacement of the load during one revolution of the gear drive shaft.

**Characteristic value:**

| **Ball screw spindle:** | **Rack and pinion:** |
|---|---|
| Feed constant = pitch of screw (typical value 10.00 mm) | Feed constant = effective pitch diameter of the pinion • π = effective circumference of the pinion |

Fig. 2-22: Characteristic values of the feed constant

**Note:** The unit is dependent on bit 4 in S-0-0076, Position data scaling type.

Note that: S-0-0076 bit 4 = 0 → mm/rev

S-0-0076 bit 4 = 1 → inch/rev

See also the functional description: "Feed Constant".

## S-0-0124, Standstill window

The motors standstill is an indication that the **velocity feedback value, (S-0-0040)** has reached below the pre-define threshold level in S-0-0125.

Bit 1 of the **S-0-0013, Class 3 diagnostics** is set during standstill.

The standstill window also works:

- if termination or interruption of a drive control command is acknowledged when the drive is standing
- with drive-controlled homing, the actual and command values are not switched until the drive is standing
- command value processing is initilized upon operating mode switch to velocity = 0 if actual velocity is smaller than standstill window

See also the functional description: "S-0-0182, Manufacturer class 3 diagnostics"

## S-0-0125, Velocity threshold nx

If the **S-0-0040, Velocity feedback value** falls below the value of the parameter **S-0-0125, Velocity threshold nx**, the drive sets the message n_actual < nx (Bit 2 in **S-0-0013, Class 3 Diagnostics**).

See also the functional description: "S-0-0013, Class 3 diagnostics".

## S-0-0127, C100 Communication phase 3 transition check

The command "**S-0-0127, C100 Communication phase 3 transition check** is used to switch form the parameteri mode to the operating mode.

If invalid parameters are pending, then

- the drive completes the command with an error message
- and the invalid parameters are entered in parameter S-0-0021, IDN list of invalid operating data phase 2!

---

**Note:** The execution of the command also causes the switch into phase 3 but only if ( P-0-4086 = xx1b ) command communications (SERCOS or fieldbus) is inactive.

---

This makes it possible, using commands

- **S-0-0127, C100 communications phase 3 transition check**
- **S-0-0128, C200 communications phase 4 transition check**

to switch (with inactive command communications ( P-0-4086 = xx**1**b )) from **Parametrization** into **operating** mode.

See also Function description: "Position Command Value Monitoring".

## S-0-0128, C200 Communication phase 4 transition check

When the **S-0-0128, C200 Communication phase 4 transition check** command is executed , all parameters will be checked for validity and limit value encroachments.

- If any invalid parameters or any limit values have been encroached upon, the drive would end the command with an error message
- and the invalid parameter entered in parameter S-0-0022, IDN list of invalid operating data phase 3!

The execution of the command, however, with an **inactive** ( P-0-4086 = xx**1**b ) **command communication** (SERCOS or fieldbus) also causes **a transition to phase4**.

this means it possible, using commands

- **S-0-0127, C100 Communication phase 3 transition check**
- **S-0-0128, C200 Communication phase 4 transition check**

to switch from **parametrization into operating mode** with an active command communications ( P-0-4086 = xx**1**b ).

See also Function description: "Position Command Value Monitoring".

## S-0-0130, Probe value 1 positive edge

The drive uses the positive edge of the input signal from **S-0-0130, Probe value 1 positive edge**, to store the instantaneous value of the selected signal in this parameter.

The signal to be measured is determined by parameters **P-0-0200, Signal select probe 1** and **S-0-0169, Probe control parameter**.

See also the functional description: "Probe Input Feature".

## S-0-0131, Probe value 1 negative edge

The drive uses the negative edge of the input signal from **S-0-0401, Probe 1**, to store the instantaneous value of the selected signal in this parameter.

The signal to be measured is determined by parameters **P-0-0200, Signal select probe 1** and **S-0-0169, Probe control parameter**.

See also the functional description: "Probe Input Feature".

## S-0-0132, Probe value 2 positive edge

The drive uses the positive edge of the input signal from **S-0-0402, Probe 2**, to store the instantaneous value of the selected signal in this parameter.

The signal to be measured is determined by parameters **P-0-0201, Signal select probe 2** and **S-0-0169, Probe control parameter**.

See also the functional description: "Probe Input Feature".

## S-0-0133, Probe value 2 negative edge

The drive uses the negative edge of the input signal from **S-0-0402, Probe 2**, to store the instantaneous value of the selected signal in this parameter.

The signal to be measured is determined by parameters **P-0-0201, Signal select probe 2** and **S-0-0169, Probe control parameter**.

See also the functional description: "Probe Input Feature".

## S-0-0134, Master control word

If a **bus interface** is present (SERCOS-Interface, Profibus-DP, Interbus, CAN, ...), the master control word is transmitted cyclically from the master (control) to the drive. It defines important control informations, like

- drive enable
- /drive halt
- Selection of the operation mode

The exact composition is explained in the functional description of the respective bus interface.

If there is no bus interface, the information of the master control word is given by **digital inputs**. In any case, the parameter **S-0-0134, Master control word** is only for diagnostic purposes.

See also the functional description: "Master Control Word".

## S-0-0135, Drive status word

If a **bus interface** is present (SERCOS-Interface, Profibus-DP, Interbus, CAN, ...), the drive status word is transmitted cyclically from the slave (drive) to the control. It defines important status informations, like

- class 1 errors, drive lock
- operation readiness
- active actual operation mode

The exact composition is described in the functional description of the respective bus interface. In any case, the parameter S-0-0135, Drive status word is only for diagnostic purposes.

See also the functional description: "Drive Status Word".

## S-0-0138, Bipolar acceleration limit value

The Bipolar acceleration limit value describes the maximum permissible acceleration, symmetrical in both directions (acceleration and deceleration).

The drive decelerates at this deceleration to the velocity = 0 when the function "Drive stop" is executed, if the previously active operation mode was without drive internal command generation. Operation modes without drive internal command generation are

- Position control
- Angular synchronization
- Stepper motor operation

and others.

See also the functional description: "Drive Halt/Start".

## S-0-0139, D700 Command Parking axis

Setting and enabling the command Parking Axis switches off all the monitoring functions related to the measurement system.

This affects position control, feedback monitoring and the monitoring of the position window (S-0-0057).

When the command is active, the drive does not report any errors of class 1 diagnostics.

The Position feedback value status (S-0-0403) is cleared by the drive.

The command is acknowledged positive, when the mentionend surveillances are switched off.

Clearing the command switches all the mentioned surveillances on again. To refer the position feedback values to the reference point again, the drive must go to the reference again.

**Structure of the parameter:**

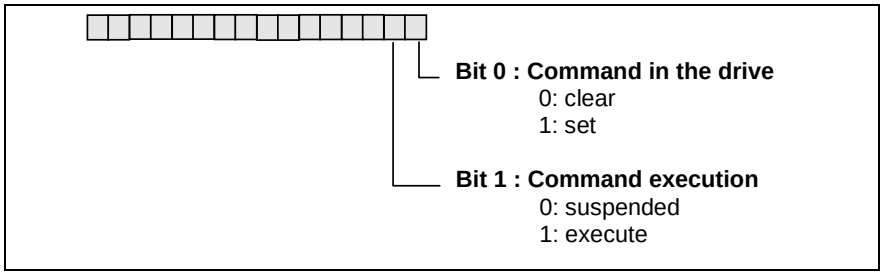



Fig. 2-23: S-0-0139, D700 Command Parking axis

See also the functional description: "Command Parking Axis".

## S-0-0140, Controller type

The device type of the manufacturer can be found in **text** form in the operating data for the controller type.

**Examples:**

HDS02.1-W100-D

DKC01.1-040-7

See also the functional description: "Drive Controllers and Motors".

## S-0-0141, Motor type

Here is the motor type of the connected motor in text form.

The contents of the parametrer are overwritten when „Loading base values“ (possible with MHD, MKD and MKE motors ) with parameter S-7-0141.

The diagnoses „F208 UL motor type has changed“ is based on a comparison between S-0-0141 and S-7-0141.

With motors without feedback data memory it is necessary to enter the motor type.

**Example:**

MKD 071B-061-KP1-BN

MKE 096B-047-GG0-KN

See also the functional description: "Systemoverview".

## S-0-0142, Application type

A descriptive name text for the drive can be stored in this parameter (e.g., swivel axis ). It has no functional significance.

See also the functional description: "Systemoverview"

## S-0-0143, System interface version

The version of the SERCOS interface specifications is found in the operating data.

**Current valid settings:**

| **V** | **V 01.01:** | **V 01.02:** |
|---|---|---|
| SERCOS specification German 01.00: | SERCOS English specification | SERCOS update German/English |
| Version 5/90 | Version 4/91 | Version 9/91 |

Fig. 2-24: S-0-0143, Version of the SERCOS interface specification

See also the functional description: "Overview of SERCOS Communication".

## Notes

## S-0-0144, Signal status word

With the help of the signal status word, real time signals can be transferred from the drive to the PLC.

To do so, the signal status word must be configured as cyclic data in the Drive Telegram.

The bits in the signal status word can be defined freely with the parameters **S-0-0026, Configuration list signal status word** and **S-0-0328, Config. list for signal status word, bit number.**

With a parallel interface, bits 0 to 9 are illustrated directly on the digital outputs. Thus various parameters can be allocated to the digital outputs.

See also the functional description: "Configurable Signal Status Word"

## S-0-0145, Signal control word

With the help of the signal control word, signals can be transmitted in real time from control to drive.

The signal control word must, in this case, be built in as cyclical data into the drive telegram.

The bits in signal control word can be freely defined via parameter **S-0-0027, Configuration list signal control word** and **S-0-0329, Assign list signal control word.**

With parallel interface, bits 0 to 9 are directly write accessed at the digital inputs. This means that the digital inputs can be allocated to different parameters.

Also see function description: "Configurable Signal Control Word"

## S-0-0147, Homing parameter

The processes for the **S-0-0148, Drive controlled homing procedure,** in relation to the machine layout, NC and drive installation are set in this parameter.

**Structure of the parameter:**

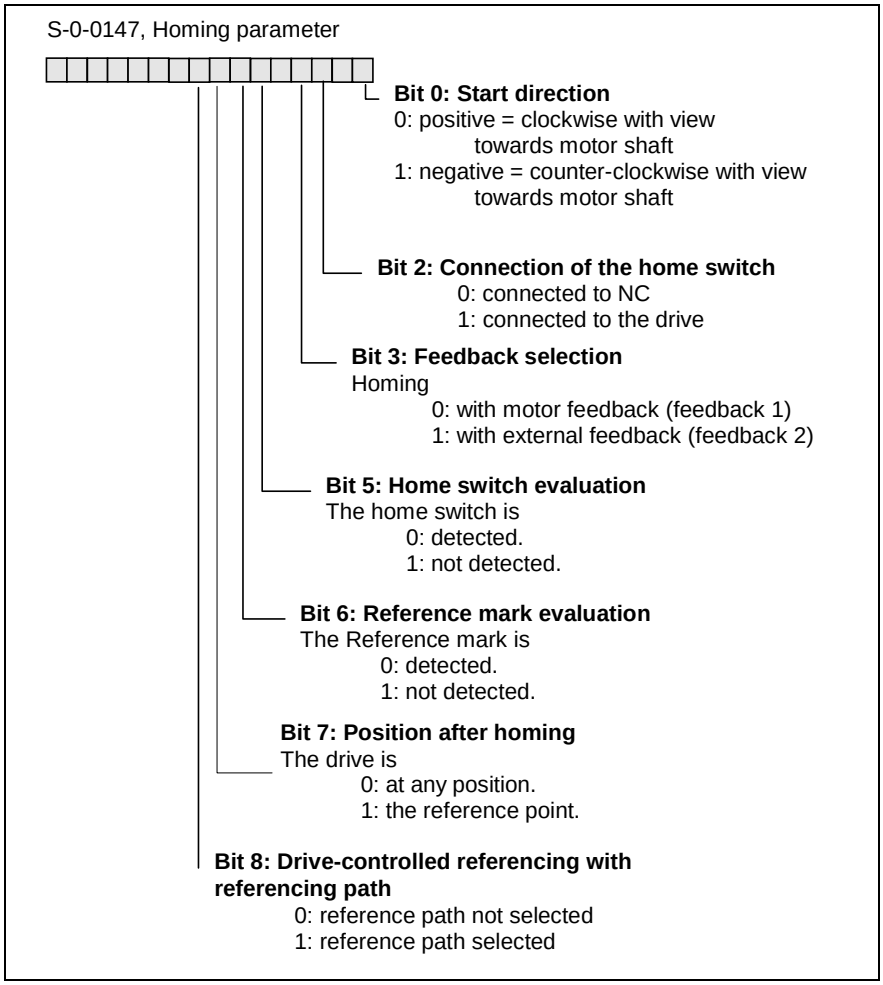



Fig. 2-25: S-0-0147, Homing Parameter

**Note:** In addition, for DIAX drives, bit 5 activates the monitoring of the external 24V.

See also the functional description: "Drive-Controlled Homing".

## S-0-0148, C600 Drive controlled homing procedure command

When this command is set and enabled, the drive switches automatically into internal position control and accelerates using the **S-0-0042, Homing acceleration** to the **S-0-0042, Homing velocity** as long as it is in operating status AF. Bit 0 in **S-0-0403, Position feedback value status** will be deleted at first. As long as the command is active, changes in the cyclic position command values will be ignored.

The process for the homing procedure can be specified with **S-0-0147, Homing parameter**. After the command has been properly executed (drive is at standstill and position feedback value is related to the homing position), the drive sets bit 0 in parameter **S-0-0403, Position feedback value status**.

The parameter "Position feedback value status“ reflects the signal "In_Reference“.

See also the functional description: "Drive-Controlled Homing"

## S-0-0150, Reference offset 1

This parameter describes the distance between the position encoder home reference marker 1 and **S-0-0052, Reference distance 1**.

The parameter makes it possible to shift the reference point in relation to the reference marker to be detected. If bit 7 in **S-0-0147, Homing parameter** is set to 1, then, during execution of the command **S-0-0148, C600 Drive controlled homing procedure command**, the drive goes to the reference point shifted from the reference mark by the value **S-0-0150, Reference Offset 1**.

See also the functional description: "Drive-Controlled Homing".

## S-0-0151, Reference offset 2

This parameter describes the distance between the position encoder home reference marker 2 and **S-0-0054, Reference distance 2**.

The parameter makes it possible to shift the reference point in relation to the reference marker to be detected. If bit 7 in **S-0-0147, Homing parameter** is set to 1, then, during execution of the command **S-0-0148, C600 Drive controlled homing procedure command**, the drive goes to the reference point shifted from the reference mark by the value **S-0-0151, Reference offset 2**.

See also the functional description: "Drive-Controlled Homing"

## S-0-0157, Velocity window

The Velocity window refers to the absolute value of the **S-0-0036, Velocity Command Value**.

If the velocity command value is whithin the calculated velocity window, then the drive sets the bit 0 in **S-0-0013, Class 3 diagnostics** (Message 'n_actual = n_command').

See also the functional description: "S-0-0013, Class 3 diagnostics"

## S-0-0159, Monitoring window

When an operating mode with internal position control is activated in the drive, the position loop is monitored. Therefore, a model value for the actual position is calculated and compared with the real actual position.

The maximum tolerated deviation between the measured and calculated actual feedback value is set with the help of the parameter **S-0-0159, Monitoring window**. If the position deviation exceeds the monitoring window, then the drive sets the error **F228 Excessive deviation** in the class 1 diagnostics.

The greatest deviation that occurs will always be stored in parameter **P-0-0098, Max. model deviation**.

See also the functional description: "Position Control Loop Monitoring"

## S-0-0160, Acceleration data scaling type

Various scaling types can be set as described below for the acceleration data in the drive as defined by the bit values of this parameter.

**Structure of the parameter:**

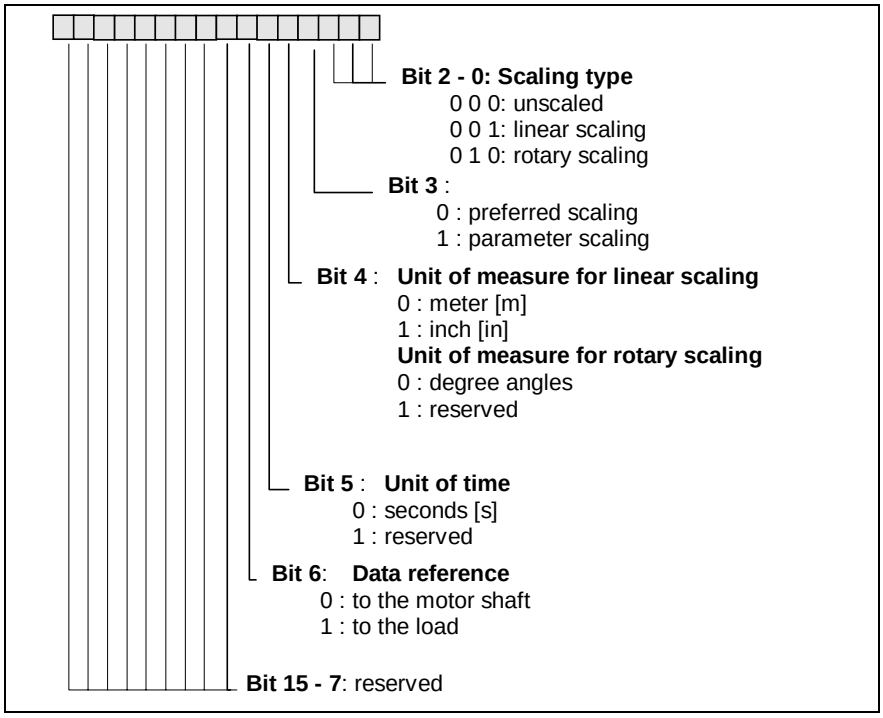



Fig. 2-26: S-0-0160, Acceleration Data Scaling Type

In bit 3 it is possible to select between preferred and parameter scaling.

**Preferred scaling:**

With preferred scaling, the following parameters are predefined and cannot be changed:

- **S-0-0161, Scaling factor for accel data**
- **S-0-0162, Scaling exponent for accel data**

Scaling with parameter scaling means that this parameter must be set.

(See section: "Preferred Scaling - Parameter Scaling").

**Note:** Only the bits named here are supported by the product.

See also: **S-0-0044, Velocity data scaling type**

**Example:** (Acceleration data scaling)

Suppose that loadside, linear scaling as desired with acceleration units in M/s². The scaling on the drive will result as follows:

| Parameter | Value |
|---|---|
| S-0-0159, Acceleration data scaling type | 1001001 |
| Bit 2-0 001 linear scaling | |
| Bit 3: 1 (Preferred) parameter scaling | |
| Bit 4: 0 Dimensional unit in meters (m) | |
| Bit 5: 0 Time unit in seconds (s) | |
| Bit 6: 1 Data referenced at load | |

**S-0-0161, Acceleration data scaling factor** 1

**S-0-0162, Acceleration data scaling exponent** -6

Now suppose that the decimal value +1234567 is stored in the relevant acceleration data register. The datum value will be interpreted and displayed as:

or $+1234{,}567X10^{-3}$ $mm/s^2$

or, as the value would be displayed in the IDN lists, +1234,567 mm/s² with respect to the load.

Note that the least significant decimal value is determined by the scaling exponent, in this exaple, as $10^{-6}$ $m/s^2$ or $10^{-3}$ $mm/s^2$.

see also functional description: "Velocity Data Display Format"

## S-0-0161, Acceleration data scaling factor

When parameter scaling is set in **S-0-0160, Acceleration data scaling type**, the scaling factor for all of the acceleration data in the drive is determined by this parameter.

See also the functional description: "Velocity Data Display Format".

## S-0-0162, Acceleration data scaling exponent

If parameter scaling is set in **S-0-0160, Acceleration data scaling type** the scaling exponent with sign for all acceleration data in the drive is determined in this parameter.

See also the functional description: "Velocity Data Display Format".

## S-0-0165, Distance coded reference offset 1

With the help of this parameter, the greater distance between two reference markers is programmed, if a measurement system with distance coded reference markers is used.

See also the functional description: "Drive-Controlled Homing"

## S-0-0166, Distance coded reference offset 2

With the help of this parameter, the smaller distance between two reference markers is programmed, if a measurement system with distance coded reference markers is used.

See also the functional description: "Drive-Controlled Homing"

## S-0-0169, Probe control parameter

This parameter is used to specify whether one or both of the probe inputs "probe 1" (DSS: X12-E4) and "probe 2" (DSS: X12-E5) are activated, and which edge (positive/negative) should trigger the probe data acquisition.

**Parameter structure:**

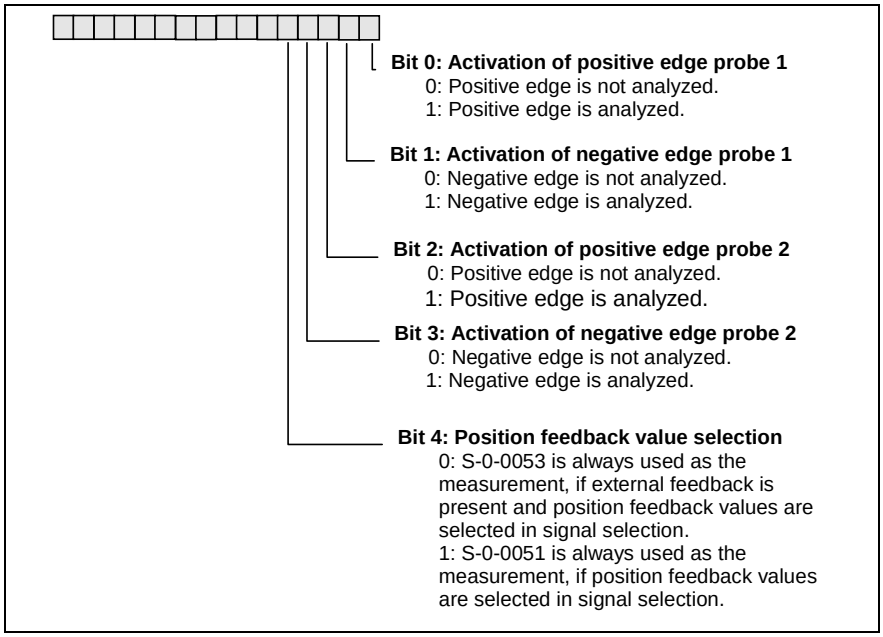



Fig. 2-27: S-0-0169, Probe control parameter

**Note:** Only the bits indicated here are supported by the software.

See also the functional description: "Probe Input Feature".

## S-0-0170, Probing cycle procedure command

By setting and enabling the command "probing cycle procedure," the drive reacts to the following:

- **S-0-0405, Probe 1 enable / S-0-0406, Probe 2 enable** and
- **S-0-0401, Probe 1, / S-0-0402, Probe 2.**

as is programmed in **S-0-0169, Probe control parameter**.

The NC can perform multiple measurements while this command is active. If the NC no longer wants new measurements, it clears the command.

**Parameter structure:**

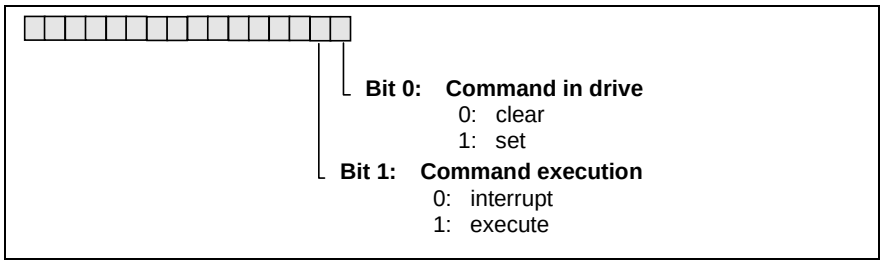



Fig. 2-28: S-0-0170, Probing cycle procedure command

**Note:** With bit 0, moreover, the monitoring of the external 24V is activated.

See also the functional description: "Probe Input Feature".

## S-0-0173, Marker position A

During the drive controlled homing with an incremental measuring system, the position of the reference marker (zero pulse) is stored in this parameter. This position feedback value still refers to the "old“ coordinate system (before switching the coordinate system with the homing procedure).

Furthermore, the recognition of the reference mark can be activated by the command **P-0-0014, D500 Command determine marker position**. Then, as soon as the next reference pulse comes from the feedback, the appropriate position value is stored in this parameter, and the command gets a positive acknowledge.

See also the functional description: "Command - detect marker position"

## S-0-0177, Absolute distance 1

The parameter is used for the homing procedure of a distance coded motor feedback. It describes the offset between the zero point of the motor feedback (position of the 1st reference marker of the motor encoder) and the machine's zero-point.

Determining the right value for this parameter can be done in 2 steps. First, write the value 0 into S-0-0177 and proceed the command **S-0-0148, C600 Drive controlled homing procedure command**. The position feedback value 1 in S-0-0051 then shows the actual position refered to the machine’s zero point.

Then, when you jog the axis to the machine’s zero point, input the value of S-0-0051 indicated there into S-0-0177 with inverted sign (+ ↔ -). After another homing, the value in S-0-0051 displays the position in reference to the machine’s zero point.

See also the functional description: "Drive-Controlled Homing"

## S-0-0178, Absolute distance 2

The parameter is used for the homing procedure of a distance coded external feedback. It describes the offset between the zero point of the optional feedback (position of the 1st reference marker) and the machine's zero-point.

Determining the right value for this parameter can be done in 2 steps. First, write the value 0 into S-0-0178 and proceed the command **S-0-0148, C600 Drive controlled homing procedure command**. The position feedback value 2 in S-0-0053 then shows the actual position refered to the machine's zero point.

Then, when you jog the axis to the machine's zero point, input the value of S-0-0053 indicated there into S-0-0178 with inverted sign (+ ↔ -). After another homing, the value in S-0-0053 displays the position in reference to the machine's zero point.

See also the functional description: "Drive-Controlled Homing"

## S-0-0179, Measurement value status

If the drive stores one or more measured values during the active **Command probe cycle** (**IDN 00170**) then it simultaneously sets the relevant bit in the measured value cycle.

If **Probe 1 enable** (**IDN 00405**) is cleared by the control, then the drive clears bits 0 and 1 in the probe status.

If **Probe 2 enable**(**IDN 00406**) is cleared by the control, then the drive clears bits 2 and 3 in the probe status.

The drive clears all bits if the command probe cycle (**IDN 00170**) is cleared by the control.

**Parameter structure:**

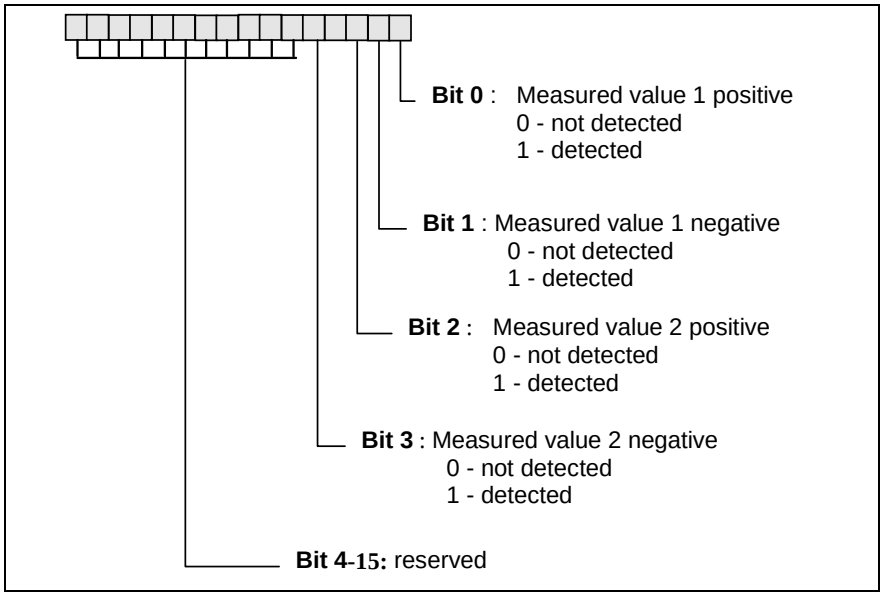



Fig. 2-29: Probe status structure

# S-0-0182, Manufacturer class 3 diagnostics

Different messages regarding operating status will be stored here every 8ms. If the status of a message were to change, this would not be signalled by an editing bit.

**Structure of the parameter:**

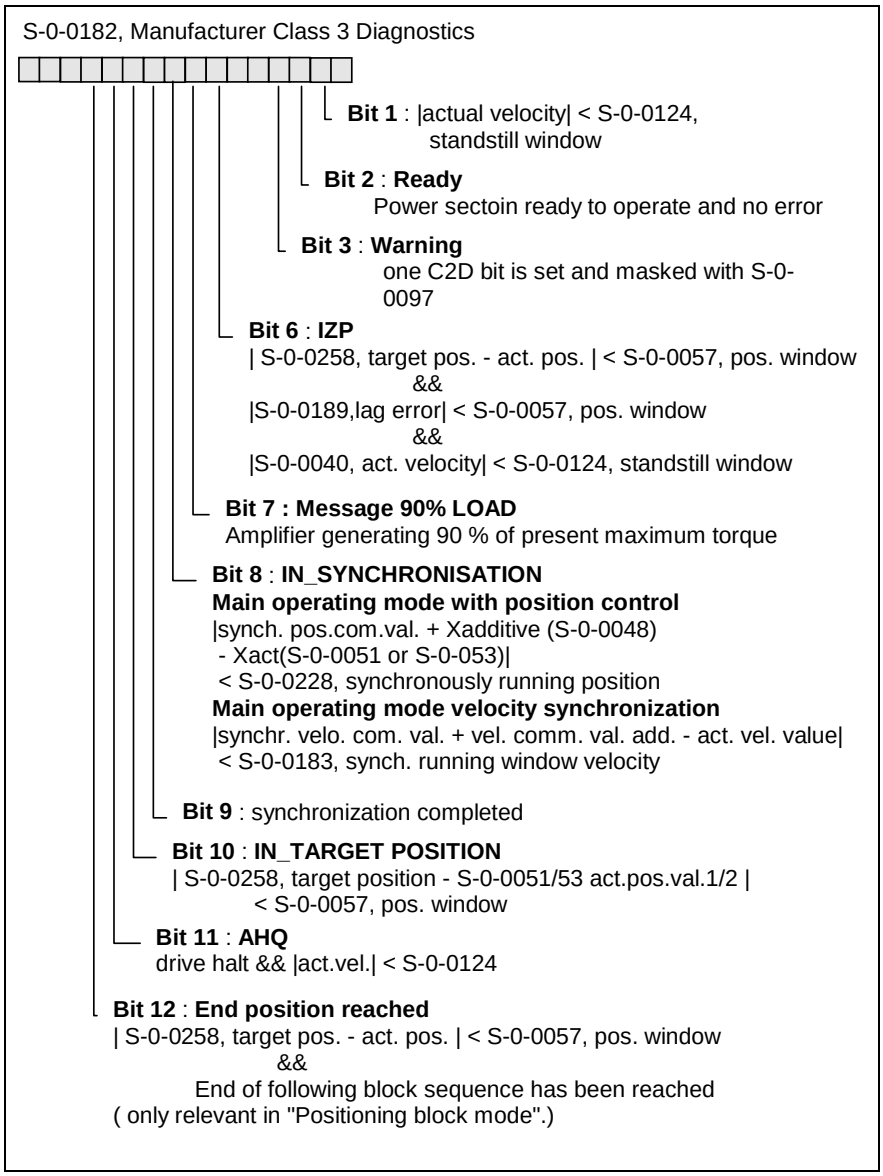



Fig. 2-30: Structure of S-0-0182, Manufacturer Class 3 Diagnostics

See also the functional description: "S-0-0182, Manufacturer class 3 diagnostics".

## S-0-0183, Velocity synchronization window

If during the operating mode "velocity synchronization" the difference between velocity command value and feedback value is smaller than the synchronization window, then bit 8 in the **S-0-0182, Manufacturer Class 3 Diagnostics** will be set.

**The following applies:**

Bit 8 = 1, if $| dX_{Synch} + dX_{Additive} - dX_{Feedback} | < S\text{-}0\text{-}0183$

with $dX_{Feedback}$: Velocity feedback value

$dX_{Synch}$: Synchronized velocity command value, produced from actual master axis velocity

$dX_{Additive}$: Additive velocity command value, S-0-0037

See also the functional description: "Dynamic synchronization in the velocity synchronization operating mode"

## S-0-0185, Length of the configurable data record in the AT

In the operating data of the parameter with this ID number, the drive indicates the maximum length in bytes which it can process in the configurable Data block of drive telegram (S-0-0016)..

**Note:** In the actual version of the firmware, the number of data in the AT equals 16 bytes.

See also the functional description: "Configuration of Telegram Contents".

## S-0-0186, Length of the configurable data record in the MDT

In the operating data of the parameter with this ID number, the drive indicates the maximum length in bytes which it can process in the configurable master data telegram (S-0-0024)

**Note:** In the actual version of the firmware, the number of data in the AT equals 16 bytes.

See also the functional description: "Configuration of Telegram Contents".

## S-0-0187, List of configurable data in the AT

This list contains the ID numbers of the operating data which can be configured in the drive telegram (AT).

- **S-0-0040, Velocity feedback value**
- **S-0-0051, Position feedback value 1 (motor feedback)**
- **S-0-0053, Position feedback value 2 (ext. feedback)**
- **S-0-0084, Torque/Force feedback value**
- **S-0-0130, Probe value 1 positive edge**
- **S-0-0131, Probe value 1 negative edge**

- **S-0-0132, Probe value 2 positive edge**
- **S-0-0133, Probe value 2 negative edge**
- **S-0-0182, Manufacturer class 3 diagnostics**
- **S-0-0189, Following error**
- **P-0-0082, Parallel I/O input 1**
- **P-0-0111, Parallel I/O input 2**
- **P-0-0113, Parallel I/O input 3**
- **P-0-0171, Parallel I/O input 4**
- **P-0-0173, Parallel I/O input 5**
- **P-0-0175, Parallel I/O input 6**
- **P-0-0202, Difference probe values 1**
- **P-0-0203, Difference probe values 2**
- **P-0-0210, Analog input 1**
- **P-0-0211, Analog input 2**

See also the functional description: "Configuration of Telegram Contents".

## S-0-0188, List of configurable data in the MDT

This list contains the ID numbers of the operating data which can be configured in the Master Data Telegram.

- **S-0-0036, Velocity command value**
- **S-0-0037, Additive velocity command value**
- **S-0-0047, Position command value**
- **S-0-0080, Torque/force command**
- **S-0-0091, Bipolar velocity limit value**
- **S-0-0092, Bipolar torque/force limit value**
- **S-0-0138, Bipolar acceleration limit value**
- **S-0-0193, Positioning Jerk**
- **S-0-0258, Target position**
- **S-0-0259, Positioning Velocity**
- **S-0-0260, Positioning Acceleration**
- **S-0-0349, Jerk limit bipolar**
- **P-0-0081, Parallel I/O output 1**
- **P-0-0110, Parallel I/O output 2**
- **P-0-0112, Parallel I/O output 3**
- **P-0-0170, Parallel I/O output 4**
- **P-0-0172, Parallel I/O output 5**
- **P-0-0174, Parallel I/O output 6**
- **P-0-0400, Pos. corr., external correction value**
- **P-0-0405, Pos. corr., actual temperature, position independent**

See also the functional description: "Configuration of Telegram Contents".

## S-0-0189, Following error

To this parameter, the drive writes the current **difference between the position command and the feedback position** value (**S-0-0051, Position feedback 1 value** or **S-0-0053, Position feedback 2 value** ).

See also the functional description: "Determining the Position Controller Setting".

## S-0-0191, D600 Cancel reference point procedure command

Setting and enabling the command Cancel reference point clears the bit **S-0-0403, Position feedback value status** in the drive.

The command correctly completed in the drive, when the bit "Position feedback value status“ has been set to 0 and the position value of the active feedback does not refer any more to the machine’s zero point (= no longer referenced).

**Parameter structure:**

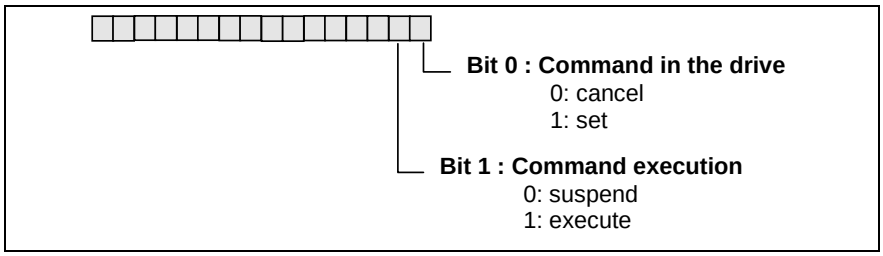



Fig. 2-31: S-0-0191, D600 Cancel reference point procedure command

See also the functional description: "Drive-Controlled Homing"

## S-0-0192, IDN-list of backup operation data

The ID numbers for all operating data that must be loaded in the drive for proper operation are kept in this IDN list. Generally these are the parameters which are stored in the programming module.

The control system should use this IDN list to create a **backup** copy of the drive parameters.

If a customer password has been activated with the parameter **S-0-0267, Password**, all parameters contained in **S-0-0192, IDN List of backup operation data** are write protected.

See also the functional description: "IDN List of Parameters".

## S-0-0193, Positioning Jerk

The positioning jerk limits the acceleration change per time in the operating modes with

- Drive internal interpolation and
- Relative drive internal interpolation.
- type

**Note:** With the value 0, the jerk filter is off.

See also the functional description: "Functional principle Drive Internal Interpolation"

## S-0-0201, Motor warning temperature

If the motor temperature exceeds the motor warning temperature, then the motor warning high temperature bit will be set by the drive in **S-0-0012, Class 2 diagnostics**.

This parameter will be set by the drive at **145°** for MHD, MKD and MKE motors.

See also the functional description: "Temperature Monitoring".

## S-0-0204, Motor shutdown temperature

If the motor temperature exceeds the motor shutdown temperature, then the motor overtemperature bit in **S-0-0011, Class 1 diagnostics** will be set by the drive and the error **F219 Motor overtemp. shutdown** will be generated.

In MHD, MKD and MKE motors, the drive sets this parameter at **155°.**

See also the functional description: "Temperature Monitoring".

## S-0-0208, Temperature data scaling type

In this scaling mode, temperature can be set to either **°C (Celsius) or F (Fahrenheit)**.

**Scaling** of temperature equals 0.1°C or 0.1 F.

**Data length** for temperature data is set to **2 bytes**.

**Parameter structure:**

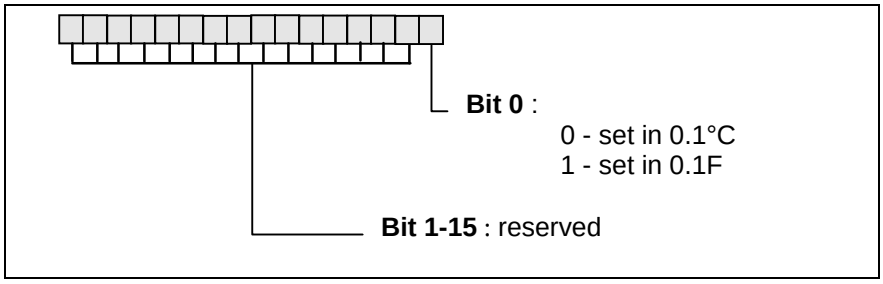



Fig. 2-32: Scaling mode structure for temperature data

## S-0-0228, Position synchronization window

If the difference between the position command value and the feedback value is smaller than the synchronization window during the parameterized synchronization operating mode with underlying position control, then bit 8 in the **S-0-0182, Manufacturer Class 3 Status** will be set.

**The following applies:**

Bit 8 = 1, if $| X_{Synch} + X_{Additive} - X_{Feedback} | < S\text{-}0\text{-}0228$

with $X_{Feedback}$: Position feedback value S-0-0051 or S-0-0053

$X_{Synch}$: Synchronized position command value, compiled from the actual master axis position

$X_{Additive}$: Additive position command value, S-0-0048

See also the functional description: "Dynamic synchronization in the phase synchronization operating mode"

## S-0-0236, Master drive 1 revs.

The **gear ratio** between the master drive 1 and the slave drive is calculated as follows:

$$\text{Transmission ratio} = \frac{\textbf{Slave drive revolutions-1 S-0-0237}}{\textbf{Master drive 1 revolutions S-0-0236}}$$

Fig. 2-33: S-0-0236, Gear Ratio

The Master Drive 1 Revolutions, S-0-0236 need **integer** input.

See also the functional description: "Operating mode: Velocity synchronization with virtual master axis"

## S-0-0237, Slave drive 1 revs.

The **gear ratio** between the master drive 1 and the slave drive is calculated as follows:

$$\text{Transmission ratio} = \frac{\textbf{Slave drive revolutions-1 S-0-0237}}{\textbf{Master drive 1 revolutions S-0-0236}}$$

Fig. 2-34: S-0-0237, Gear Ratio

The Slave Drive Revolutions, S-0-0237 need **integer** input.

See also the functional description: "Operating mode: Velocity synchronization with virtual master axis"

## S-0-0256, Multiplication 1

The parameter S-0-0256, Multiplication 1 determines, with which factor the signals of the motor feedback are multiplied in the drive.

The internal **resolution** for the motor encoder in the drive is calculated as follows:

**S-0-0116 Resolution of motor feedback • S-0-0256 Multiplication 1**

The multiplication 1 depends at first from the parameters **S-0-0278, Maximum travel range** and **S-0-0116, Resolution of motor feedback**. If there is an optional encoder, the **S-0-0257, Multiplication 2** is taken into account as well.

See also the functional description: "Setting the drive-internal position data format"

## S-0-0257, Multiplication 2

The parameter **S-0-0257, Multiplication 2** determines, with which factor the signals of the optional feedback are multiplied in the drive.

The internal resolution for the optional encoder in the drive is calculated as follows:

**S-0-0117 Resolution of optional feedback • S-0-0257 Multiplication 2**

The multiplication 2 depends on the parameters **S-0-0278, Maximum travel range** and **S-0-0117, Resolution of optional feedback**.

See also the functional description: "Setting the drive-internal position data format"

## S-0-0258, Target position

The target position is assigned to the drive as a command value by the controller in the operating modes with drive-controlled interpolation. The drive moves to the target position taking into account **S-0-0259, Positioning Velocity**, **S-0-0260, Positioning Acceleration** and **S-0-0193, Positioning Jerk**

**Note:** In the operating mode "Position control with positioning interface" (process blocks), the target position of the current position block will be copied to parameter S-0-0258, target position.

See also the functional description: "Functional principle Drive Internal Interpolation"

## S-0-0259, Positioning Velocity

Using the positioning velocity

- it is possible in operating mode with drive-internal interpolation to run to S-0-0258, target position
- and to limit velocity if "run with limited speed" is switched on in positioning block mode
- or to set the effective speed with an automatic control loop setting.

See also the functional description: "Functional principle Drive Internal Interpolation".

## S-0-0260, Positioning Acceleration

Positioning acceleration is used in the "Drive internal interpolation" operating mode to accelerate up to the **S-0-0259, Positioning velocity**.

The acceleration active in control loop settings is also set with this parameter.

See also the functional description: "Functional principle Drive Internal Interpolation".

## S-0-0262, C700 Command basic load

When this command is set and enabled, the default parameters in the motor feedback for current, velocity and position control loop settings will be loaded and activated. These default parameters are not optimized for the specific application. They establish a stable control loop status.

**ATTENTION**

⇒ When this command is executed, parameters that have already been optimized may be overwritten.

See also Function description: "Load Default Feature"

## S-0-0265, Language selection

All parameter names, units and diagnostic warning messages within the drive controller are stored in several languages. This parameter determines the output language for the text.

- 0: German
- 1: English
- 2: French
- 3: Spanish
- 4: Italian

See also the functional description: "Language Selection".

## S-0-0267, Password

With this parameter, a customer password can be activated. This is used to lock the writability of all important parameters specific for the axis. The parameters which are locked by activating the customer password, can be seen in the parameter **S-0-0192, IDN-List of backup operation data**.

The password "007" is set at the factory. This password permits write access to the parameters.

Moreover, the parameter can unlock service capabilities.

See also the functional description: "Password".

## S-0-0269, Parameter buffer mode

**Note:** Parameter S-0-0269 is not significant as all parameters are stored in a non-volatile memory (NOVRAM)!

## S-0-0277, Position feedback 1 type

This parameter is used to determine the significant properties of the encoder 1.

**Parameter structure:**

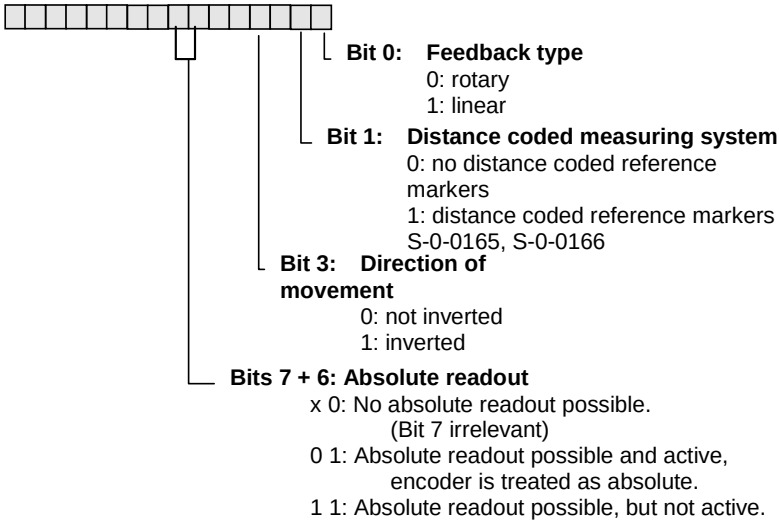



Fig. 2-35: S-0-0277, Position feedback 1 type parameter

**Remark:**

- If the motor has a motor feedback memory (MHD, MKD or MKE) then bits 0,1 and 3 are deleted.
- If the motor is a linear motor, then bit 0 is set to "1“.
- Depending on the absolute encoder range and the maximum travel range or modulo value, bit 6 is either set or deleted.

**Note:** Only the bits indicated here are supported by the software.

See also the functional description: "Other Motor Encoder Characteristics"

## S-0-0278, Maximum travel range

The parameter **S-0-0278, Maximum travel range** defines the maximum possible mechanical move of the machine. Depending on the selected scaling, modulo or absolute format (see also **S-0-0076, Position data scaling type**), the input is unipolar (positive only) or bipolar (with sign).

The parameter **S-0-0278, Maximum travel range** affects the parameters **S-0-0256, Multiplication 1** and **S-0-0257, Multiplication 2** and therefore the internal position resolution in the drive.

Moreover, the limits for velocity and acceleration of the drive internal position command generator are influenced by the maximum travel range. Among others, the max. input values for **S-0-0259, Positioning Velocity** and **S-0-0260, Positioning Acceleration** depend from the value in S-0-0278 !

**Note:** The greater the parametrized maximum travel range, the smaller is the multiplication and the drive internal position resolution and the higher are the limits of the acceleration and velocity data.

Additionally, the parameter **S-0-0278, Maximum travel range** affects the bit 6 "Absolute readout possible“ in the respective parameter **S-0-0277, Position feedback 1 type** or **S-0-0115, Position feedback 2 type**. If the parametrized maximum travel range is greater than the absolute numerical range of the used encoder, then the bit 6 for "Absolute readout possible“ is reset to 0. Vice versa, the bit 6 is set as soon as a travel range less than the absolute numerical range of the encoder is recognized.

See also the functional description: "Setting the drive-internal position data format"

## S-0-0279, IDN-list of password-protected operation data

The parameters in the IDN list are write protected with a user password (**S-0-0267, Password)**.

The user can select those parameters to be protected by editing the parameters.

The state of the parameters at delivery corresponds to the contents of parameter **S-0-0279, IDN-list of password-protected operation data**.

See also functional description: "Password"

## S-0-0282, Travel distance

The control gives to the drive the travel distance in the operating mode **Relative internal Interpolation** as a **relative command value**.

When the parameter **S-0-0346, Setup flag for relative command values** is toggled (= changed), the drive adds the travel distance to the target position. The resulting absolute target position is displayed in in the parameter **S-0-0258, Target position**. Then, the drive performs the travel distance, with regard to

- **S-0-0259, Positioning Velocity**
- **S-0-0260, Positioning Acceleration**
- **S-0-0193, Positioning Jerk**

See also the functional description: "Operating Mode: Relative drive-internal interpolation"

# S-0-0292, List of all operating modes

In this list, all operation modes are named, which the drive supports. The operation modes are listed by their codings, as they are input in the parameters **S-0-0032..35** (primary and secondary operation modes).

**Contents S-0-0292:**

| Bit list: | Meaning: |
|---|---|
| 0000,0000,0000,0001 | Torque control |
| 0000,0000,0000,0010 | Velocity control |
| 0000,0000,0000,x011 | Position control with encoder 1 |
| 0000,0000,0000,x100 | Position control with encoder 2 |
| 0000,0000,0001,x011 | Drive-controlled interpolation, encoder 1 |
| 0000,0000,0001,x100 | Drive-controlled interpolation, encoder 2 |
| 0000,0010,0001,x011 | Relative drive-controlled Interpolation, encoder 1 |
| 0000,0010,0001,x100 | Relative drive-controlled Interpolation, encoder 2 |
| 1100,0000,0000,x011 | Stepper motor Operations |
| 1010,0000,0000,0010 | Velocity synchronization with virtual master axis |
| 1100,0000,0001,0011 | Jog-Mode |
| 0000,0010,0011,x011 | Position control with process blocks, encoder 1 |
| 0000,0010,0011,x100 | Position control with process blocks, encoder 2 |
| 1001,0000,0000,x011 | Phase synchronization with virtual master axis, using feedback 1 |
| 1001,0000,0000,x100 | Phase synchronization with virtual master axis, using feedback 2 |
| 1000,1000,0000,x011 | Cam follower with virtual master axis, feedback 1 |
| 1000,1000,0000,x100 | Cam follower with virtual master axis, feedback 2 |
| 1001,0000,0001,x011 | Phase synchronization with real master, using feedback 1 |
| 1010,0000,0001,0010 | Velocity synchronization with real master axis |
| 1000,1000,0001,x011 | Cam follower with real master axis, feedback 1 |

With DKC11.3 it is only possible to use the modes Torque control and Velocity control.

| Bit list: | Meaning: |
|---|---|
| 0000,0000,0000,0001 | Torque control |
| 0000,0000,0000,0010 | Velocity control |

**The following applies for bit 3:**

Bit 3 = 0 position control with following error

Bit 3 = 1 position control without following error

See also the functional description: "Possible Operating Modes".

## S-0-0298, Reference cam shift

For the drive controlled homing, if there is more than one reference marker in the travel range of the axis during homing, it is necessary to evaluate a reference switch. In this case, the 0->1 rising edge of the zero switch specifies the relevant reference marker.

To do this, the distance between zero switch and reference marker may not be below a certain value, because otherwise the reference marker is ambiguous. Therefore, the drive monitors the distance. If the distance is outside the allowed range, the command **S-0-0148, C600 Drive controlled homing procedure command** ends up with the error **C602 Distance zero switch - reference marker wrong**.

In this case, this parameter shows the distance, by which the zero switch must be shifted, to get the optimal distance.

You can either

- input the value in the parameter **S-0-0299, Home switch offset** to shift the active zero switch (virtually) referred to the real one, or
- shift the zero switch mechanically by the value displayed in S-0-0298.

If the distance between zero switch and reference marker is good, then **S-0-0298, Reference cam shift by**.. displays a 0.

See also the functional description: "Drive-Controlled Homing"

## S-0-0299, Home switch offset

For the drive controlled homing, if there is more than one reference marker in the travel range of the axis during homing, it is necessary to evaluate a reference switch. In this case, the 0->1 rising edge of the zero switch specifies the relevant reference marker.

To do this, the distance between zero switch and reference marker may not be below a certain value, because otherwise the reference marker is ambiguous. Therefore, the drive monitors the distance. If the distance is outside the allowed range, the command **S-0-0148, C600 Drive controlled homing procedure command** ends up with the error **C602 Distance zero switch - reference marker wrong**.

In this case, the parameter **S-0-0298, Reference cam shift** shows the distance, by which the zero switch must be shifted, to get the optimal distance.

You can either

- input the value in the parameter **S-0-0299, Home switch offset** to shift the active zero switch (virtually) referred to the real one, or
- shift the zero switch mechanically by the value displayed in S-0-0298.

If the distance between zero switch and reference marker is good, then S-0-0298, Reference cam shift by.. displays a 0.

See also the functional description: "Drive-Controlled Homing"

## S-0-0301, Allocation of real-time control Bit 1

In order to assign a signal to the real-time control bit 1, the ID number of the signal is written to the operating data of the assignment for the real-time control bit 1.

If such an assignment is made, the assigned signal (bit 0) will be controlled by the real-time control bit 1 ( = component of the master control word).

If the selected IDN is not available, the drive responds with the service channel error message "IDN not available"

If the programmed IDN is available but is not editable in phase 4, then the drive responds with the error message "Data not correct"

See also the functional description: "Real-Time Control and Status Bits".

## S-0-0303, Allocation of real-time control Bit 2

In order to assign a signal the real-time control bit 2, the ID number of the signal is written to the operating data of the assignment for the real-time control bit 2.

If such an assignment is made, the assigned signal (bit 0) will be controlled by the real-time control bit 2 ( = component of the master control word).

See also the functional description: "Real-Time Control and Status Bits".

## S-0-0305, Allocation of real-time status Bit 1

In order to assign a signal to the real-time status bit 1, the ID number of the signal is written to the operating data of the assignment for the real-time status bit 1.

If such an assignment is made, the assigned signal (bit 0) thereafter appears in the real-time status bit 1 ( = component of the drive status word).

If the programmed IDN is not available, the drive responds with the service channel error message "IDN not available".

see also the functional description: "Real-Time Control and Status Bits".

## S-0-0307, Allocation of real-time status Bit 2

In order to assign a signal to the real-time status bit 2, the ID number of the signal is written to the operating data of the assignment for the real-time status bit 2.

If such an assignment is made, the assigned signal (bit 0) thereafter appears in the real-time status bit 2 (component of the drive status word).

See also the functional description: "Real-Time Control and Status Bits".

## S-0-0310, Overload warning

This parameter defines an ident number for the overload warning. The purpose is to be able to assign the overload warning to a real time status bit. The overload warning is defined as a bit in the Class 2 diagnostics and is set dependent from the load integral limit. Only the bit 0 is defined.

**Structure of the parameter:**

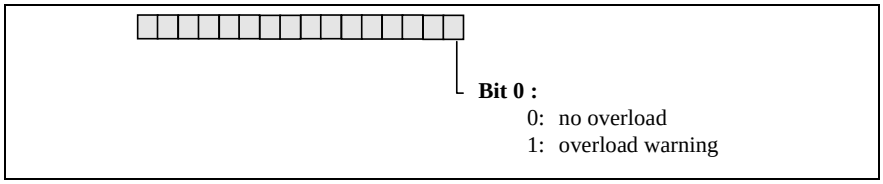



Fig. 2-36: S-0-0310, Overload Warning

## S-0-0311, Amplifier overtemperature warning

This parameter defines an ident number for the amplifier overtemperature warning. The purpose is to be able to assign the amplifier overtemperature warning to a real time status bit. The amplifier overtemperature warning is defined as a bit in the Class 2 diagnostics and is set dependent from the amplifier temperature warning threshold. Only the bit 0 is defined.

**Structure of the parameter:**

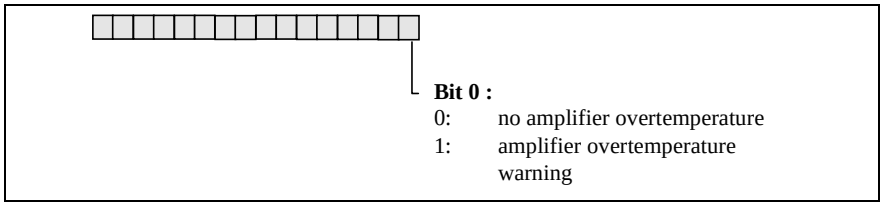



Fig. 2-37: S-0-0311 Amplifier overtemperature warning

## S-0-0312, Motor overtemperature warning

This parameter defines an ident number for the motor overtemperature warning. The purpose is to be able to assign the motor overtemperature warning to a real time status bit. The motor overtemperature warning is defined as a bit in the Class 2 diagnostics and is set dependent from the motor temperature warning threshold. Only the bit 0 is defined.

**Structure of the parameter:**

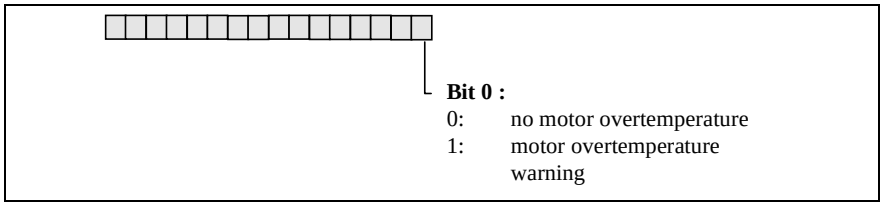



Fig. 2-38: S-0-0312 Motor overtemperature warning

## S-0-0315, Positioning speed > n_limit

This parameter defines an ident number for the warning "Positioning speed > n_limit". The purpose is to be able to assign the warning to a real time status bit. The warning "Positioning speed > n_limit" is defined as a bit in the Class 2 diagnostics and is set, when the positioning velocity is outside the velocity limits. Only the bit 0 is defined.

**Structure of the parameter:**

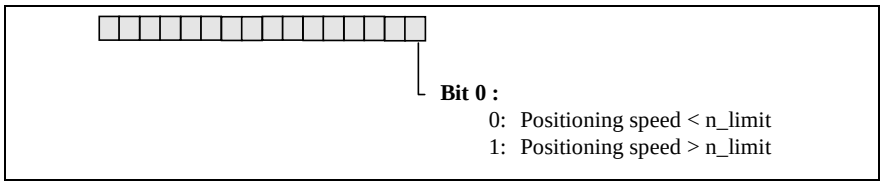



Fig. 2-39: S-0-0315 Positioning speed > n_limit

## S-0-0323, Target position beyond position limits

This parameter defines an ident number for the warning "Target position beyond position limits". The purpose is to be able to assign the warning to a real time status bit. The warning "Target position beyond position limits" is defined as a bit in the Class 2 diagnostics and is set, when the given target position is outside the position limits, positive or negative.

**Note:** If the actual position value exceeds a position limit, the bit for "Position limit exceeded" in the Class 1 diagnostics is set.

**Structure of the parameter:**

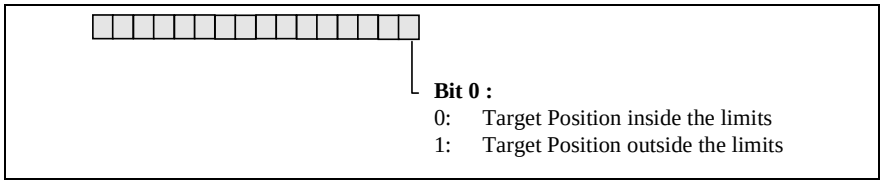



Fig. 2-40: S-0-0323 Target position beyond position limits

## S-0-0328, Assign list signal status word

The signal status word (S-0-0144) is configured with the parameters **S-0-0026, Configuration list signal status word** and **S-0-0328, Assign list signal status word**. These parameters have variable length with data elements of 16 bits. In the parameter **S-0-0026, Configuration list signal status word**, the **ident number** of the parameters is set, which contains the original bit (source). The parameter **S-0-0026, Configuration list signal status** determines, which **bit** in the data is copied into the signal status word.

The position in the respective configuration list determines, to which position in the signal status word the chosen bit is copied.

See also the functional description: "Configurable Signal Status Word".

## S-0-0329, Assign list signal control word

The signal control word (S-0-0145) is configured with the parameters **S-0-0027, Configuration list signal control word** and **S-0-0329, Assign list signal control word**. These parameters have variable length with data elements of 16 bits.

In the Parameter **S-0-0027, Configuration list signal control word**, the **ident number** of the parameter is set which contains the bit to manupulate (target). In the Parameter **S-0-0329, Assign list signal control word**, it is set which **bit** in the data of that ident number is manipulated by the signal control word.

The position in the respective configuration list determines the bit assignment in the signal control word.

See also the functional description: "Configurable Signal Control Word".

## S-0-0330, Message ’n_actual = n_command’

This parameter defines an ident number for the message ’n_actual = n_command’. This message is defined as a bit in the class 3 diagnostics. It is set when the actual velocity S-0-0040 is within the velocity window S-0-0157 around the velocity command value S-0-0036.

Only the bit 0 is defined in the operation data.

See also the functional description: "S-0-0182, Manufacturer class 3 diagnostics".

## S-0-0331, Status ’n_feedback = 0’

This parameter sets an ident number for the status ‘n_feedback = 0’. The status ‘feedback = 0’ is defined as a bit in the class 3 diagnostics and is set when the velocity feedback value is found **within the standstill window** (S-0-0124).

Only bit 0 is defined in the operating data.

The output signal "Standstill" corresponds to this bit.

See also the functional description "S-0-0182, Manufacturer class 3 diagnostics".

## S-0-0332, Message ’nactual < nx’

This parameter defines an ident number for the message 'nactual < nx'. This message is defined as a bit in the Manufacturer class 3 diagnostics. It is set when the actual velocity S-0-0040 is below the velocity threshold nx S-0-0125.

Only bit 0 is defined in the operating data.

## S-0-0334, Message ’T >= Tlimit’

This parameter defines an ident number for the message 'T >= Tlimit'. This message is defined as a bit in the class 3 diagnostics. It is set when the torque S-0-0084 is greater than the bipolar torque limit S-0-0092.

Only bit 0 is defined in the operating data.

## S-0-0336, Message In position

This parameter defines an ident number for the message ‘In position’. The message ‘In Position’ (S-0-0336 bit 0=1) is defined as a bit in the class 3 diagnostics(S-0013 bit 6), if:

Following error (S-0-0189) <Position window (S-0-0057)

During the spindle positioning command, the message is set as soon as the spindle is in position.

See also the functional description: "S-0-0182, Manufacturer class 3 diagnostics".

## S-0-0342, Target position reached

This parameter defines an ident number for the message ‘target position reached’. The message ‘target position reached’ is defined as a bit in the class 3 diagnostics. It is set when the position command value S-0-0047 given by the drive internal interpolator is equal to the target position S-0-0258.

Only bit 0 is defined in the operating data.

See also the functional description: "S-0-0182, Manufacturer class 3 diagnostics".

## S-0-0346, Setup flag for relative command values

In "Positioning block mode" any toggling of bit 0 of S-0-0346 causes the selected travel block to be assumed.

When the operation mode **Relative drive-internal interpolation** is active, the drive performs the distance parametrized in **S-0-0282, Travel distance**, as soon as the bit 0 in **S-0-0346, Setup flag for relative command values** toggles (changes).

See also the functional description: "Operating Mode: Relative drive-internal interpolation"

## S-0-0347, Speed deviation

Parameter S-0-0347 indicates the difference between the velocity command value and the velocity feedback value in the velocity controller.

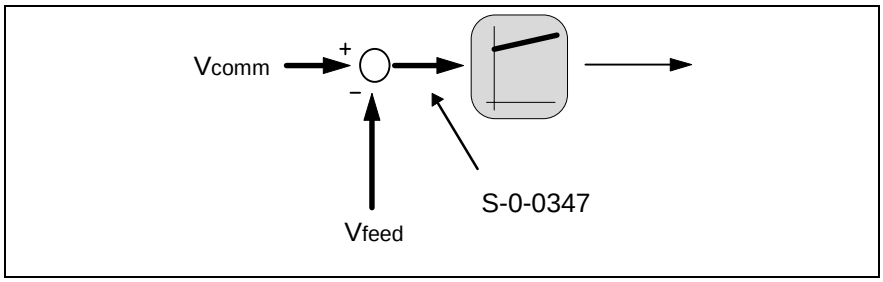



Fig. 2-41: S-0-0347, Speed deviation

See also the functional description: "Velocity Controller".

# S-0-0348, Acceleration feedforward gain

The acceleration feedforward helps to reduce the following error during the acceleration in operation modes without following error. To do this, the current acceleration command value is multiplied by the "acceleration feedforward gain" and added to the current command value of the velocity controller.

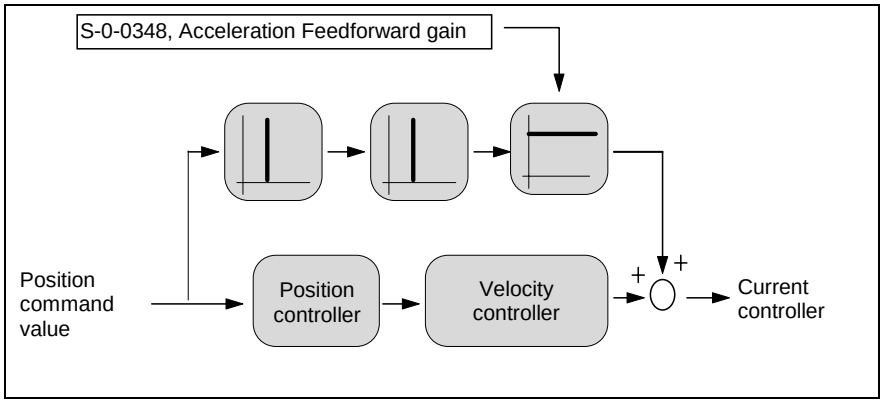



Fig. 2-42: Acceleration feedforward

**Activation:**

Writing a value greater than 0 to the parameter activates the acceleration feedforward.

**Note:** The controller functions as well without feedforward! (The standard value equals 0.) Acceleration feedforward is only possible in lagless modes (without following error).

**Comparison between the different types of feedforward**

The **velocity feedforward** is activated by selecting an operating mode without **lag** (following error). This creates (from the point of view of the position controller) a **feedforward of 1st order** (prop. to velocity). This means that at constant speed, the position deviation is 0. A lag results, nevertheless, during acceleration and deceleration.

The **acceleration feedforward** is activated by entering more than 0 for this parameter. It creates (from the point of view of the position controller), a **feedforward of 2nd order** (prop. to acceleration). The position deviation is 0 as long as the correct gain is set and the acceleration is constant.

**Correct input value:**

$$S\text{-}0\text{-}0348 = \frac{\text{moment of inertia } \left(\text{kgm}^2\right)}{\text{torque constant } (\text{Nm/A})} * 1000$$

The moment of inertia is the total sum of the rotor and the reflected load inertia.

The factor 1000 is needed for unit mA.

Fig. 2-43: Acceleration feedforward prop. gain

See also the functional description: "Setting the Acceleration Feed Forward"

## S-0-0349, Jerk limit bipolar

The Jerk limit bipolar limits the **acceleration change per time** during "Drive Halt"

See also the functional description: "Drive Halt/Start"

## S-0-0360, MDT Data container A

In the parameter **S-0-0360, MDT Data container A**, the master transfers the data that is written on the target parameter in the drive. The target is addressed with the "Addressing for data container A" (S-0-0368 with S-0-0371).

If a target parameter with 2 byte data is addressed, only the low word of **S-0-0360, MDT Data container A** is used.

To be able to use the data container, you must enter the parameter S-0-0360 in the list of cyclical data S-0-0024 during phase 2.

**Note:** The parameter S-0-0360 ist not writable via the asynchronous data channel.

See also the functional description: "Multiplex Channel".

## S-0-0362, List index, MDT data container A

The parameter **S-0-0362, List index, MDT data container A** contains the list index, which gives access to singular list elements configured in **S-0-0370, Configuration list MDT data container**.

This gives the possibility in the multiplex channel to write single elements in a list with the index as a pointer.

The parameter **S-0-0362, List index, MDT data container A** can, as required, be configured in the Master data telegram (**MDT**) or written to via the **asynchronous data channel** or another interface.

**Note:** The parameter becomes only active when a list parameter is addressed in S-0-0368, Addressing Data container A.

See also the functional description: "Multiplex Channel".

## S-0-0364, AT Data container A

In the parameter **S-0-0364, AT Data container A**, the drive copies the data of the source parameter which has been addressed via the "Addressing for data container A" (S-0-0368 with S-0-0371).

If a source parameter with 2 byte data is addressed, only the low word is copied into **S-0-0360, AT Data container A**.

To be able to use the data container, you must enter the parameter S-0-0364 in the list of cyclical data S-0-0016 during phase 2.

**Note:** The parameter S-0-0364 ist not writable via the asynchronous data channel.

See also the functional description: "Multiplex Channel".

## S-0-0366, List index, AT data container A

The parameter **S-0-0366, List index, AT data container A** contains the list index, which gives access to singular list elements configured in **S-0-0371, Configuration list AT data container**.

This gives the possibility in the multiplex channel to write single elements in a list with the index as a pointer.

The parameter **S-0-0366, List index, AT data container A** can, as required, be configured in the Master data telegram (**MDT**) or written to via the **asynchronous data channel** or another interface.

**Note:** The parameter becomes only active when a list parameter is addressed in S-0-0368, Addressing Data container A.

See also the functional description: "Multiplex channel".

## S-0-0368, Addressing for data container A

The parameter **S-0-0368, Addressing for data container A** contains the indices for the access to the two parameter lists **S-0-0370, Configuration list MDT data container** and **S-0-0371, Configuration list AT-data container**. Herewith, the content of the two data containers **S-0-0360** and **S-0-0364** is defined.

Only the **bits 0..7** (for **MDT**) and **8..15** (for **AT**) are used for the addressing; the other bits are truncated.

**Note:** If an index greater than the number of elements in the respective list is set, the warning E4/08 Invalid Addressing MDT-data container A or, respectively, E4/09, Invalid Addressing AT-data container A is generated.

**Note:** The parameter S-0-0368, Addressing data container A can be configured in the Master data telegram (MDT), or written to via the asynchronous data channel or another interface, as needed.

See also the functional description: "Multiplex Channel".

## S-0-0370, Configuration list for MDT data container

In the parameter **S-0-0370, Configuration list MDT-data container**, those ident numbers (IDN) are entered, which are transferred, depending from the index in **S-0-0368, Addressing for data container A**, low byte, in the **S-0-0360, MDT Data container A**.

In this procedure, the following **checks** are done :

- Check, whether the input IDN exists; if not, the async. channel error message "0x1001, Ident number inexistant“ is generated.
- Check, whether the input IDN is present in the parameter **S-0-0188, IDN list of configurable data in the MDT**; if not, the async. channel error message "0x7008, data not correct“ is generated.

**Note:** A maximum of 32 ident numbers is configurable in S-0-0370.

See also the functional description: "Multiplex Channel"

## S-0-0371, Configuration list for the AT data container

In the parameter **S-0-0371, Configuration list AT-data container**, those ident numbers (IDN) are entered, which are transferred, depending from the index in **S-0-0368, Addressing for data container A**, high byte, in the **S-0-0364, AT Data container A**. Writing to S-0-0371 is only possible in communication phase 2.

In this procedure, the following **checks** are done :

- Check, whether the input IDN exists; if not, the async. channel error message "0x1001, Ident number inexistant“ is generated.
- Check, whether the input IDN is present in the parameter **S-0-0187, IDN list of configurable data in the AT**; if not, the async. channel error message "0x7008, data not correct“ is generated.

**Note:** A maximum of 32 ident numbers is configurable in S-0-0371.

See also the functional description: "Multiplex Channel"

## S-0-0375, List of diagnostic numbers

The drive enters every change of the parameter **S-0-0390 Diagnostic number** in this list. The list is organized as a circular buffer; there is place for 50 numbers. When the list is read, the 1st element of the parameter shows the last displayed diagnostic number.

See also the functional description: "List of diagnostic numbers"

## S-0-0378, Encoder 1, absolute range

Parameter **S-0-0378 Absolute encoder 1, range** defines the range in which the encoder selected in **P-0-0074, Feedback type 1** can generate the position information absolutely.

Also see Function Description: "Absolute encoder range and absolute encoder evaluation"

## S-0-0379, Encoder 2, absolute range

**Description:**

Parameter **S-0-0379, Absolute encoder 2, range**defines the range in which the encoder selected in **P-0-0075, Feedback type 2**can generate the position information absolutely.

Also see function description: "Absolute encoder range and absolute encoder evaluation".

## S-0-0382, Intermediate bus power

Display of the DC-bus power in kw.

## S-0-0383, Motor temperature

This parameter contains the measured motor temperature.

**Remark:**

For all motors except 2AD motors, a PTC resistor is used as the temperature sensor .

As the temperature curve in this case shows a considerable tolerance and in higher temperature ranges a considerable progression, the value in
**S-0-0383, Motor temperature** is not usable for these motor types.

See also the functional description: "Temperature Monitoring".

## S-0-0390, Diagnostic message number

In the parameter Diagnostic message number, the same number is stored as it can be seen in the seven segment display. This makes it possible for the control to generate its own diagnostics according to the diagnostic message number (for example in languages which are not stored as diagnostics in the drive).

**Example:**

Diagnostic Message: "F822 Motor encoder failure: signal too small" in parameter S-0-0095

Seven Segment Display: changing "F8" <=> "22"

Diagnostic message number: "F822(hex)" in parameter S-0-0390

See also the functional description: "Diagnostic Message Number"

## S-0-0391, Monitoring window feedback 2

**Description:**

This parameter defines the maximum allowable deviation of the **S-0-0051, Actual feedback 1 value** and **S-0-0053, Actual feedback 2 value** .

If this value is exceeded for longer than 20ms, then the error **F236, Excessive position feedback difference** will be generated.

The monitoring can be turned off by writing 0 to this parameter.

See also the functional description: "Actual Feedback Value Monitoring".

## S-0-0393, Command value mode

**Structure of the parameter:**

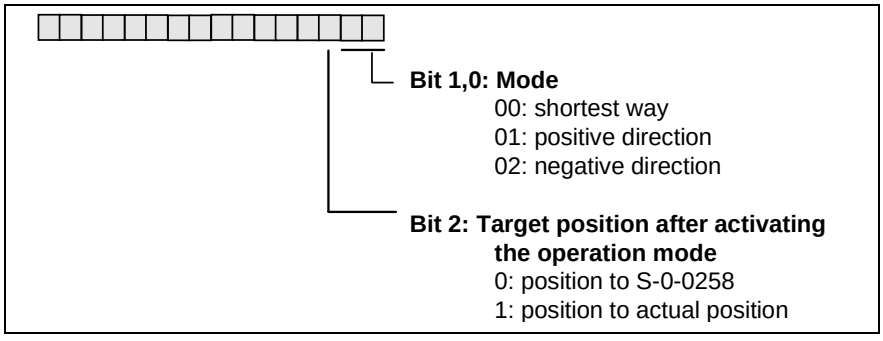



Fig. 2-44: Structure of the parameter S-0-0393

**Description of Bit 1:**

The interpretation of position command values such as **S-0-0047, Position command value** and **S-0-0258, Target position** with activated modulo function is dependent on the selected mode. To adjust the mode, there is the parameter S-0-0393.

This parameter has an effect only if **S-0-0076, Position data scaling type** has been activated in the modulo format.

**Description of Bit 2:**

**Parameter S-0-0393, Command value mode, Bit 2 = 0**

After activation, the drive positions to the value in the parameter S-0-0258 Target position. So, after an interruption of the operation mode (e.g. on error), the drive can go to the same target position as it should have done before the error. That means, the **remaining path** is performed. **Reference dimension** is retained.

**Parameter S-0-0393, Command value mode, Bit 2 = 1**

After activating the operation mode, the drive refers the distance to move always to the actual position. To do this, the parameter S-0-0258, Target position is set to the actual position. That means, after an accidental interruption, the drive stays at the actual position at first.

In the operation mode Relative drive internal interpolation, the distance to move refers to the actual position after toggling the parameter S-0-0346 Setup flag for relative command values. In other words, after a possible interrupt, the drive remains standing on the actual position value.

See also the functional description: "Processing Command Values in Modulo Format, Shortest Path - Direction Selection".

## S-0-0399, IDN list of configurable data in the signal control word

To configure the signal control word, you must enter the ident numbers of the parameters in the "Assign list signal control word". In the parameter S-0-0399 IDN list of configurable data in the signal control word, you can read which parameters can be entered there.

**Contents P-0-0399:**

- S-0-0000, Zero-Parameter to switch off
- S-0-0148, C600 Drive controlled homing procedure command
- S-0-0169, Probe control parameter
- S-0-0170, Probing cycle procedure command
- S-0-0191, D600 Cancel reference point procedure command
- S-0-0346, Setup flag for relative command values
- S-0-0405, Probe 1 enable
- S-0-0406, Probe 2 enable
- P-0-0012, C300 Command ’Set absolute measurement’
- P-0-0014, D500 Command determine marker position
- P-0-0036, Trigger control word
- P-0-0088, Cam shaft control
- P-0-4026, Process block selection
- P-0-4056, Jog inputs
- P-0-4060, Process block control word

See also the functional description: "Configuring the Signal Control Word"

## S-0-0400, Home switch

This parameter is used to assign an ID number to the home switch (external signal).

**Application:**

The IDN (and thus the feedback status of the home switch) can be assigned to a real-time status bit.

**Structure of the parameter:**

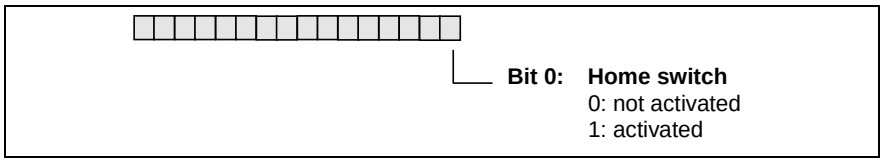



Fig. 2-45: S-0-0400, Home switch

See also the functional description: "Evaluation of the Home Switch"

## S-0-0401, Probe 1

This parameter is used to assign an ID number to Probe 1 (external signal). This makes it possible to assign Probe 1 to a real-time status bit, for example.

The signal Probe 1 is only polled by the drive and considered valid if the **S-0-0170, Probing cycle procedure command** is active and **S-0-0405, Probe 1 enable** is present.

**Parameter structure:**

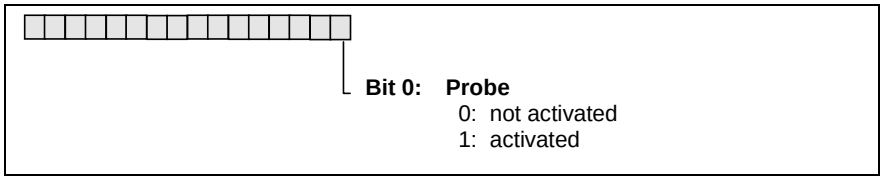



Fig. 2-46: S-0-0401, Probe 1

See also the functional description: "Probe Input Feature".

## S-0-0402, Probe 2

This parameter is used to assign an ID number to Probe 2 (external signal). This makes it possible to assign Probe 2 to a real-time status bit, for example.

The signal Probe 2 is only polled by the drive and considered valid if the **S-0-0170, Probing cycle procedure command** is active and **S-0-0406, Probe 2 enable** is present.

**Parameter structure:**

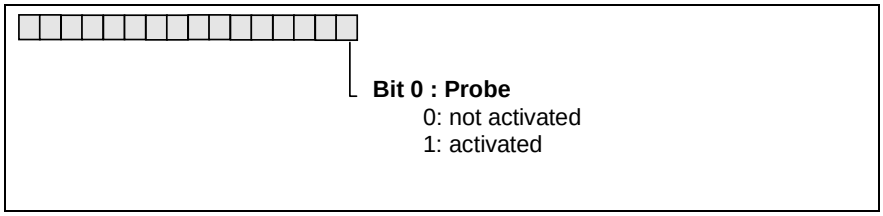



Fig. 2-47: S-0-0402, Probe 2

See also the functional description: "Probe Input Feature".

## S-0-0403, Position feedback value status

When the bit 3 of **S-0-0147, Homing parameter** is set high, bit 0 of this parameter will be set high when the position feedback value is fixed in feference to the machine's zero point.

When the drive performs the commands **S-0-0148, C600 Drive controlled homing** procedure or **P-0-0012, C300 Command 'Set absolute measurement'**, the bit will be reset when they are started and then set 1 again once the command has been successfully completed.

The bit position feedback value status corresponds to the output signal "In reference".

In drives with Sercos interface, the position feedback value status can be assigned to a real-time status bit and thus be continuously communicated to the NC in the drive status word (see **S-0-0305, Allocation of real-time status bit 1**).

**Structure of the parameter:**

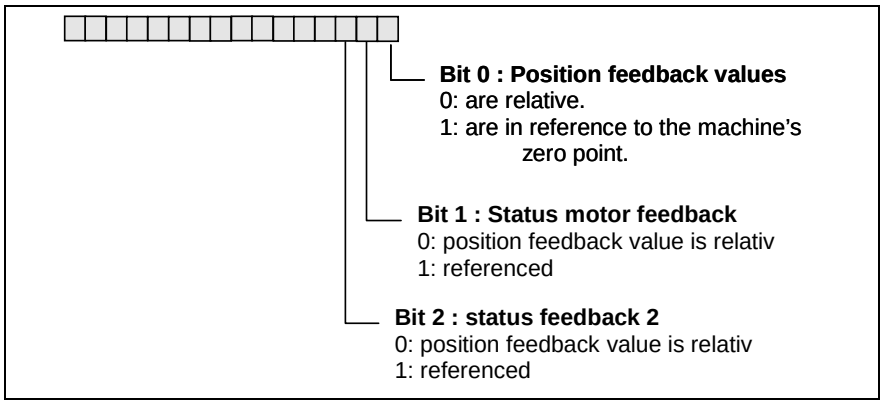



Fig. 2-48: S-0-0403, Position feedback value status

See also the functional description: "Drive-Controlled Homing".

## S-0-0405, Probe 1 enable

This parameter is used to enable a probe input.

Changing this signal from 0 to 1 activates the trigger mechanism for evaluating the positive and/or negative slope of the probe signal.

The probe 1 enable can be assigned to a real-time control bit and thus be communicated to the master control word in the drive.

**Parameter structure:**

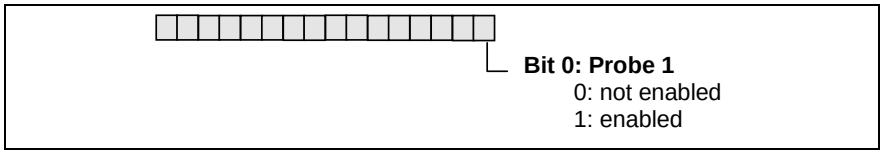



Fig. 2-49: S-0-0405, Probe 1 enable

See also the functional description: "Probe Input Feature".

## S-0-0406, Probe 2 enable

This parameter is used to enable a probe input.

Changing this signal from 0 to 1 activates the trigger mechanism for evaluating the positive and/or negative slope of the probe signal.

The probe 2 enable can be assigned to a real-time control bit and thus be communicated to the drive in the master control word.

**Parameter structure:**

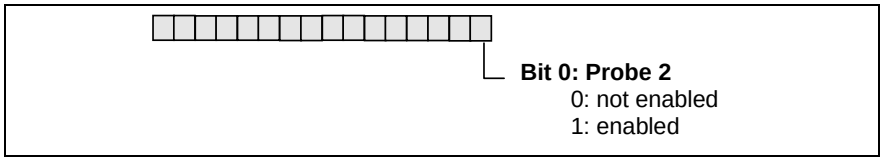



Fig. 2-50: S-0-0406, Probe 2 enable

See also the functional description: "Probe Input Feature".

## S-0-0409, Probe 1 positive latched

Bit 0 in this parameter will be set by the drive if

- the **S-0-0170, Probing cycle procedure command** is active,
- bit 0 in **S-0-0169, Probe control parameter** is set,
- **S-0-0405, Probe 1 enable** is present and
- the positive edge of **S-0-0401, Probe 1** is recognized.

The drive simultaneously stores the value of the selected signal in **S-0-0130, Probe value 1 positive edge**.

The drive clears the bit if the NC clears the **S-0-0170, Probing cycle procedure command** or if **S-0-0405, Probe 1 enable** has been set from 1 to 0.

The parameter "Probe 1 positive latched" can be assigned to a real-time status bit and thus be continuously communicated to the NC in the drive status word (see **S-0-0305, Allocation of real-time status bit 1**).

**Parameter structure:**

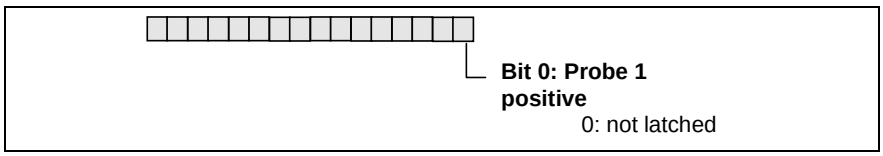



Fig. 2-51: S-0-0409, Probe 1 positive latched

See also the functional description: "Probe Input Feature".

## S-0-0410, Probe 1 negative latched

Bit 0 in this parameter will be set by the drive if

- the **S-0-0170, Probing cycle procedure command** is active,
- bit 1 in **S-0-0169, Probe control parameter** is set,
- **S-0-0405, Probe 1 enable** is present and
- the negative edge of **S-0-0401, Probe 1** is recognized.

The drive simultaneously stores the value of the selected signal in **S-0-0131, Probe value 1 negative edge**.

The drive clears the bit if the NC clears the **S-0-0170, Probing cycle procedure command** or if **S-0-0405, Probe 1 enable** has been set from 1 to 0.

The parameter "probe 1 negative latched" can be assigned to a real-time status bit and thus be continuously communicated to the NC in the drive status word (see **S-0-0305, Allocation of real-time status bit 1**).

**Parameter structure:**

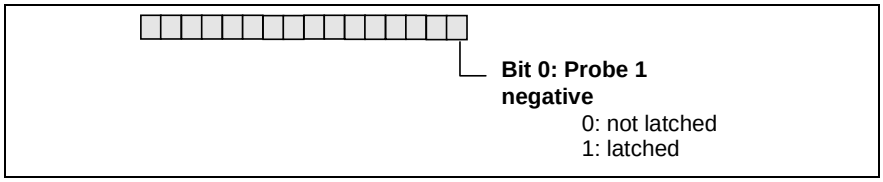



Fig. 2-52: S-0-0410, Probe 1 negative latched

See also the functional description: "Probe Input Feature".

## S-0-0411, Probe 2 positive latched

Bit 0 in this parameter will be set by the drive if

- the **S-0-0170, Probing cycle procedure command** is active,
- bit 3 in **S-0-0169, Probe control parameter** is set,
- **S-0-0406, Probe 2 enable** is present, and
- the positive edge of **S-0-0402, Probe 2** is recognized.

The drive simultaneously stores the value of the selected signal in **S-0-0132, Probe value 2 positive edge**.

The drive clears the bit if the NC clears the **S-0-0170, Probing cycle procedure command** or if **S-0-0406, Probe 2 enable** has been set from 1 to 0.

The parameter "Probe 2 positive latched" can be assigned to a real-time status bit and thus be continuously communicated to the NC in the drive status word (see **S-0-0305, Allocation of real-time status bit 1**).

**Parameter structure:**

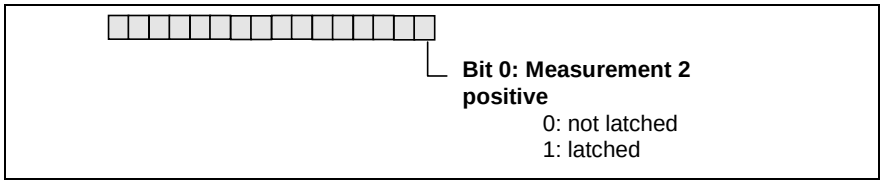



Fig. 2-53: S-0-0411, Probe 2 positive latched

See also the functional description: "Probe Input Feature".

## S-0-0412, Probe 2 negative latched

**Description:**

Bit 0 in this parameter will be set by the drive if

- the **S-0-0170, Probing cycle procedure command** is active,
- bit 3 in **S-0-0169, Probe control parameter** is set,
- **S-0-0406, Probe 2 enable** is present, and
- the negative edge of **S-0-0402, Probe 2** is recognized.

The drive simultaneously stores the value of the selected signal in **S-0-0133, Probe value 2 negative edge**.

The drive clears the bit if the NC clears the **S-0-0170, Probing cycle procedure command** or if **S-0-0406, Probe 2 enable** is set from 1 to 0.

The parameter "probe 2 negative latched" can be assigned to a real-time status bit and thus be continuously communicated to the NC in the drive status word (see **S-0-0305, Allocation of real-time status bit 1**).

**Parameter structure:**

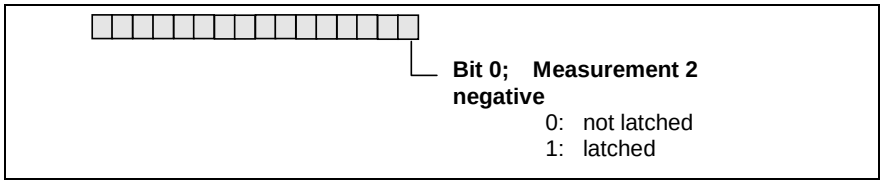



Fig. 2-54: S-0-0412, Probe 2 negative latched

See also the functional description: "Probe Input Feature".

## S-7-0100, Velocity loop proportional gain

This parameter contains the default value for the velocity loop proportional gain.

This value comes from the feedback data memory. With the Basic Load procedure, the S-7-xxxx parameters are copied into the S-0-xxxx parameters.

**Note:** S-0-0100 and S-7-0100 have different units/dimensions, e.g. for rotatory action As/rad vs. mAs/rad. The number of places after the decimal also differs.

See also the functional description: "Setting the Velocity Controller" and the parameter description for S-0-0100.

## S-7-0101, Velocity loop integral action time

This parameter contains the default value for the integral action time of the integrator in the velocity loop controller.

This value comes from the feedback data memory. With the Basic Load procedure, the S-7-xxxx parameters are copied into the S-0-xxxx parameters.

See also the functional description: "Setting the Velocity Controller" and the parameter description for S-0-0101.

## S-7-0104, Position loop Kv-factor

This parameter contains the default value for the proportional gain of the position controller.

This value comes from the feedback data memory. With the Basic Load procedure, the S-7-xxxx parameters are copied into the S-0-xxxx parameters.

See also the functional description: "Setting the position controller" and the parameter description for S-0-0104.

## S-7-0106, Current loop proportional gain 1

This parameter contains the appropriate value for the proportional gain of the current controller with the connected motor.

This value comes from the feedback data memory. With the Basic Load procedure, the S-7-xxxx parameters are copied into the S-0-xxxx parameters.

**Note:** Do not alter the values for the current controller set at the factory.

See also function description: "Setting the Current Controller" and the parameter description for S-0-0106.

## S-7-0107, Current loop integral action time 1

This parameter contains the appropriate value for the integral action time of the integrator in the current controller with the connected motor.

This value comes from the feedback data memory. With the Basic Load procedure, the S-7-xxxx parameters are copied into the S-0-xxxx parameters.

**Note:** Do not alter the values for the current controller set at the factory.

See also function description: "Setting the Current Controller" and the parameter description for S-0-0107.

## S-7-0109, Motor peak current

Value in the feedback memory which specifies the maximum current which may flow in the motor for a short period without damaging it.

For MHD, MKD and MKE motors, the value will be copied into the active parameter **S-0-0109, Motor peak current** when the amplifier is turned on.

See also the functional description: "Setting the Active Peak Current"

## S-7-0111, Motor current at standstill

Value in the feedback memory for the current which can continuously flow in the motor without damaging it.

For MHD, MKD and MKE motors, the value will be copied into the active parameter **S-0-0111, Motor current** at standstill when the amplifier is turned on.

See also the functional description: "Motor Feedback-Data Memory"

## S-7-0113, Maximum motor speed (nmax)

Value in the feedback memory for the maximum possible motor speed.

For MHD, MKD and MKE motors, the value will be copied into the active parameter **S-0-0113, Maximum motor speed (nmax)** when the amplifier is turned on.

See also the functional description: "Limiting Velocity".

## S-7-0116, Feedback 1 Resolution

Value in the feedback memory for resolution of the motor encoder.

For MHD, MKD and MKE motors, the value will be copied into the active parameter **S-0-0116, Feedback 1 Resolution** when the amplifier is turned on.

See also the functional description: "Motor Encoder Resolution".

## S-7-0117, Feedback 2 Resolution

Value in the feedback memory for resolution of the motor encoder.

The value will be copied into the active parameter **S-0-0117, Feedback 2 Resolution** when the amplifier is turned on.

See also the functional description: "Motor Encoder Resolution".

## S-7-0141, Motor type

Text in the feedback memory for the motor type.

For MHD, MKD and MKE motors, the value will be copied into the active parameter S-0-0141, Motor type when the amplifier is turned on.

The diagnostic message „F208 UL motor type has changed“ is based on a comparison between S-0-0141 and S-7-0141.

**Examples:**

MKD 071B-061-KP1-BN

MKE 096B-047-GG0-KN

See also the functional description: "Drive Controllers and Motors"

## Notes

# 3 Product-specific parameters

## P-0-0004, Velocity loop smoothing time constant

The time constant that can be activated in this parameter affects the output of the velocity loop controller. It can be used to suppress quantization effects and limit the bandwidth of the velocity loop controller.The limit frequency is derived from smoothing time constant T resulting from the relationship

$$f_g = \frac{1}{2 \cdot \pi \cdot \mathrm{T}}$$

Inputting the minimum input value turns the filter off.

See also the functional description: "Setting the Velocity Controller".

## P-0-0008, Activation E-Stop function

Parameter P-0-0008 can be used to activate the E-Stop input and to select a response for bringing the drive to standstill.

**Parameter structure:**

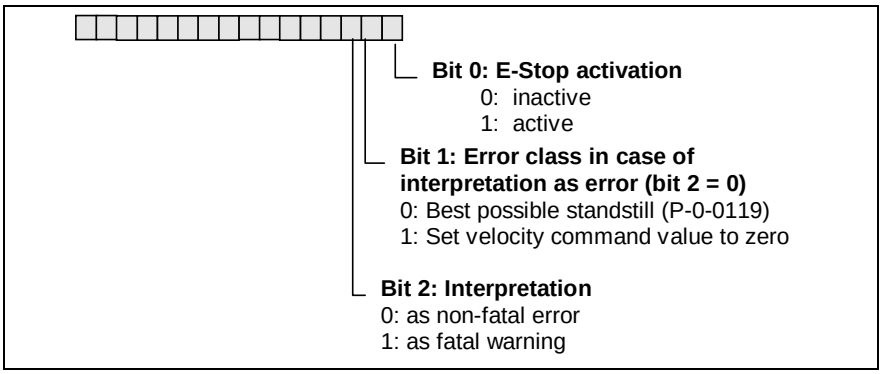



Fig. 3-1: P-0-0008, Activation of E-Stop function

**Note:** The input polarity is always 0-active.

See also the functional description: "Activation and Polarity of the E-Stop Input".

## P-0-0009, Error message number

If the drive diagnosis a class 1 diagnostic error, then a bit gets in parameter **S-0-0011, Class 1 diagnostics**. Bit 13 is set in the operation status word for ''Error in class 1 diagnostic''.

Additionally, for a precise diagnosis,

- the diagnosis number is displayed in the 7-segment display and stored in parameter **S-0-0390, Diagnostic message number,**
- the plain text diagnosis is stored in parameter **S-0-0095, Diagnostic message**
- and the relevant error number is stored in **paramter P-0-0009, Error message number**.

If no error is pending, then the value of parameter **P-0-0009 Error message number** is 0.

**Example** for a diagnostic:

S-0-0390 F822 (hex)

P-0-0009: 822 (decimal)

S-0-0095: F822 Motor encoder failure: signal too small

7-segment display: Changing between F8 and 22

See also the functional description: "Error Number".

## P-0-0010, Excessive position command value

In position control mode (S-0-0032..35 = 0x0003, 0x0004, 0x000B or 0x000C), the NC sets position commands at constant intervals (all **S-0-0001, NC Cycle time (TNcyc)**). Within the drive, the difference of two sequential position commands are monitored for excessive values, i.e., the position commands must satisfy:

$$\frac{X_{Soll}(k) - X_{Soll}(k-1)}{S-0-0001} \leq S-0-0091$$

whereby:
Xsoll(k) = NC position command in current cycle
Xsoll(k-1) = NC position command in previous cycle
S-0-0091, Bipolar velocity limit value
S-0-0001, NC Cycle time (TNcyc)

Fig. 3-2: Monitoring of the position command for excessive values for in the position control mode

If the above condition is violated, then error **F237, Excessive position command difference** is triggered and the drive decelerantes as set in parameter **P-0-0119, Best possible decleration**.

The error triggering excessive position command value ($X_{soll}(k)$)is stored in parameter **P-0-0010, Excessive position command value**, the last valid position command ($X_{soll}(k-1)$) in parameter **P-0-0011, Last valid position command value**.

See also the functional description: "Position Command Value Monitoring".

## P-0-0011, Last valid position command value

In position control mode (S-0-0032..35 = 0x0003, 0x0004, 0x000B or 0x000C), the NC sets position commands at constant intervals (every **S-0-0001, NC Cycle time TNcyc**). The difference of two sequential position commands is monitored for excessive value. The position command values must satisfy the following relation:

$$\frac{X_{Com}(k) - X_{Com}(k-1)}{S-0-0001} \leq S-0-0091$$

whereby:
Xcom(k) = NC-position command in current cycle
Xcom(k-1) = NC-position command in previous cycle
S-0-0091, Bipolar velocity limit value
S-0-0001, NC Cycle time (TNcyc)

Fig. 3-3: Monitoring of the position command for excessive values in the position control mode

If the above condition is violated, then error **F237, Excessive position command difference** is triggered, and the drive decelerates as set in parameter **P-0-0119, Best possible decleration**.

The error triggering excessive position command value $X_{Com}(k)$ is stored in parameter **P-0-0010, Excessive position command value**, the last valid position command $X_{Com}(k-1)$ in parameter **P-0-0011, Last valid position command value**.

See also the functional description: "Position Command Value Monitoring".

## P-0-0012, C300 Command 'Set absolute measurement'

When an absolute measuring system is started for the first time, the drive will indicate a random feedback value that is not referenced to the machine zero-point.

The position feedback of this measuring system can be set to the desired value with the command "Set absolute measurement". After the "Set absolute measurement" command is executed, the position feedback value of the measurement-supplied encoder will contain a defined reference to the machine zero-point. Thereafter, the value of parameter **S-0-0403, Position feedback value status** is 1.

All information will be available after reset because all necessary data from the absolute measurement system is buffered in feedback data memory or in parameter data memory. The position feedback value permanently retains its reference to the machine zero-point.

Parameter P-0-0012 can be used to execute this function.

See also the functional description: "Set Absolute Measuring".

## P-0-0014, D500 Command determine marker position

The command **P-0-0014, D500 Command determine marker position** is used to check the detection of the reference marker of an incremental measuring system. If there is an incremental measuring system and the command has been activated, then the actual position of the measuring system, once detected is stored in parameter **S-0-0173, Marker position A**. It is then signalled that the command is completed. Given 2 measuring

systems,the bit 3 in **S-0-0147, Homing parameter** determines which measuring system is used.

See also the functional description: "Command - detect marker position"

## P-0-0015, Memory address

This parameter can be used to select a memory address in the drive for operation-internal test purposes. The contents will be displayed in the parameter **P-0-0016, Content of memory address**.

## P-0-0016, Content of memory address

This parameter displays the contents of the memory address set in parameter **P-0-0015, Memory address** (only for test purposes).

## P-0-0018, Number of pole pairs/pole pair distance

This indicates the **number of pole pairs** per motor revolution **for rotating motors**.

For **linear motors**, the **length of a pole pair** must be indicated here.

This value does not need to be indicated here for motors with **motor feedback data memory**, like MKD.

See also the functional description: "Motor Feedback-Data Memory".

## P-0-0019, Position start value

The position start value sets a defined initialization value for position feedback values 1 and 2 in non-absolute measurement systems.

During initialization of the position feedback value with command **S-0-0128, C200 Communication phase 4 transition check**, the drive checks whether the position start value has been written in communications phase 2 or 3. Only then will position feedback values 1 and 2 be set to that value. The position start value is used only for non-absolute encoders.

To preset the actual position value of the drive, the parameter P-0-0019, Position start value is used.

See also the functional description: "Actual Feedback Values of Non-Absolute Measurement Systems After Initialization".

## P-0-0021, List of scope data 1

The measured values of channel 1 of the oscilloscope function are stored in chronological sequence in parameter **P-0-0022, List of scope data 2**. (The oldest scope value is the first element of the list.)

See also the functional description: "Oscilloscope Feature".

## P-0-0022, List of scope data 2

The measured values of channel 2 of the oscilloscope function are stored in chronological sequence in parameter **P-0-0022, List of scope data 2**. (The oldest scope value is the first element of the list.)

See also the functional description: "Oscilloscope Feature".

## P-0-0023, Signal select scope channel 1

Parameter P-0-0023 determines the signal that will be recorded. The following fixed predefined signals are available:

| Number | Signal selection | Unit of the scope data list |
|---|---|---|
| 0 x 00 | Channel not activated | -- |
| 0 x 01 | Actual feedback value dependent on operating mode S-0-0051 or S-0-0053 | Dependent on position scaling |
| 0 x 02 | Velocity value parameter (S-0-0040) | Dependent on velocity scaling |
| 0 x 03 | Velocity control deviation (-S-0-0347) | Dependent on velocity scaling |
| 0 x 04 | Following error parameter (S-0-0189) | Dependent on position scaling |
| 0 x 05 | Torque/force command value parameter S-0-0080 | Percent |
| 0 x 06 | Position feedback 1, S-0-0051 | Dependent on position scaling |
| 0 x 07 | Position feedback 2, S-0-0053 | Dependent on position scaling |
| 0 x 08 | Position command value | Dependent on position scaling |

Fig. 3-4: P-0-0023, Signal select scope channel 1

**Expanded oscilloscope recording feature:**

In addition to the fixed predefined signal selection, it is also possible to record any memory address of the drive. To do this, bit 12 = 1 must be set. Bit 13 defines the data length of the memory signal in question.

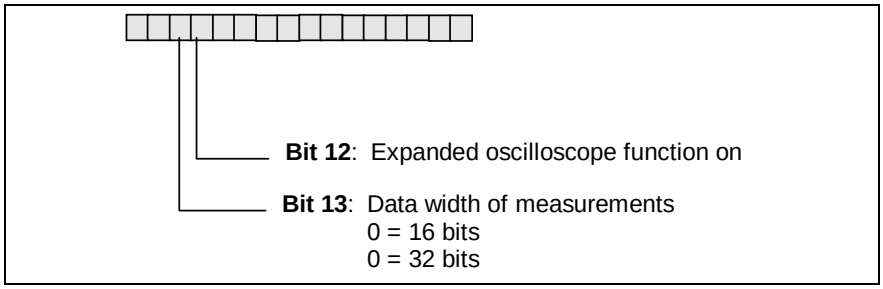



Fig. 3-5: P-0-0023 & P-0-0024, Oscilloscope function signal selection

See also the functional description: "Oscilloscope Feature".

## P-0-0024, Signal select scope channel 2

Parameter P-0-0024 determines the signal that will be recorded. The following fixed predefined signals are available:

| Number | Signal selection | Unit of the scope data list |
|---|---|---|
| 0 x 00 | Channel not activated | -- |
| 0 x 01 | Actual feedback value dependent on operating mode S-0-0051 or S-0-0053 | Dependent on position scaling |
| 0 x 02 | Velocity value parameter (S-0-0040) | Dependent on velocity scaling |
| 0 x 03 | Velocity control deviation (-S-0-0347) | Dependent on velocity scaling |
| 0 x 04 | Following error parameter (S-0-0189) | Dependent on position scaling |
| 0 x 05 | Torque/force command value parameter S-0-0080 | Percent |
| 0 x 06 | Position feedback 1, S-0-0051 | Dependent on position scaling |
| 0 x 07 | Position feedback 2, S-0-0053 | Dependent on position scaling |
| 0 x 08 | Position command value | Dependent on position scaling |

Fig. 3-6: P-0-0024, Signal select scope channel 2

**Expanded oscilloscope recording feature:**

In addition to the fixed predefined signal selection, it is also possible to record any memory address of the drive. To do this, bit 12 = 1 must be set. Bit 13 defines the data length of the memory signal in question.

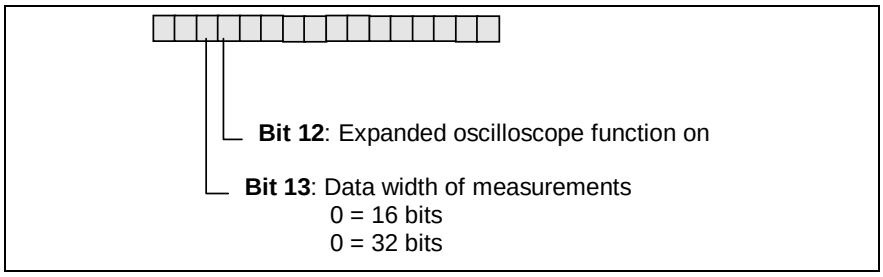



Fig. 3-7: P-0-0023, and P-0-0024, Oscilloscope function signal selection

See also the functional description: "Oscilloscope Feature".

## P-0-0025, Trigger source

Parameter P-0-0025 defines the source that initiates the trigger signal. There is a choice between

- External trigger
- Internal trigger

**External trigger (P-0-0025 = 0x01)**

If the external trigger is chosen, then the trigger will be initiated by bit 0 of the trigger command word.

**Internal trigger (P-0-0025 = 0x02)**

If the internal trigger is selected, then the trigger signal set by parameter will be monitored for the trigger condition, and the trigger will be initiated as soon as the condition is met.

See also the functional description: "Oscilloscope Feature".

## P-0-0026, Trigger signal selection

For internal trigger sources, the parameter P-0-0026, Trigger signal selection defines the signal that is monitored for the parametrized trigger condition. The following fixed predefined signals are available:

| Trigger signal numbers | Trigger signal | Corresponding trigger threshold |
|---|---|---|
| 0 x 00 | Not defined | Not defined |
| 0 x 01 | Actual feedback value based on mode of operation | Position data P-0-0027 |
| 0 x 02 | Velocity feedback value Parameter S-0-0040 | Velocity data P-0-0028 |
| 0 x 03 | Velocity deviation parameter -- | Velocity data P-0-0028 |
| 0 x 04 | Following error, parameter S-0-0189 | Position data P-0-0027 |
| 0 x 05 | Torque command value, parameter S-0-0080 | Torque data P-0-0029 |
| 0 x 06 | Position feedback 1, S-0-0051 | Depending on position scaling |
| 0 x 07 | Position feedback 2, S-0-0053 | Depending on position scaling |
| 0 x 08 | Position command value | Depending on position scaling |

Fig. 3-8: P-0-0026, Trigger signal selection

Additional trigger signals can also be defined by setting bit 12.

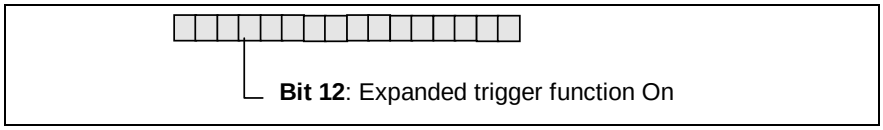



Fig. 3-9: P-0-0026, Trigger signal selection

See also the functional description: "Oscilloscope Feature".

## P-0-0027, Trigger level for position data

Parameter P-0-0027 determines with given **P-0-0026, Trigger signal selection** oscilloscope function = “1“or “4“, the position value at which the trigger will be released as long as the correct edge has been recognized.

See also the functional description: "Oscilloscope Feature".

## P-0-0028, Trigger level for velocity data

Parameter P-0-0028 determines with given **P-0-0026, Trigger signal selection** oscilloscope function = “2“ or “3“, the actual speed value at which the trigger will be released as long as the correct edge has been recognized.

See also the functional description: "Oscilloscope Feature".

## P-0-0029, Trigger level for torque/force data

Parameter P-0-0029 determines with given **P-0-0026, Trigger signal selection** oscilloscope function = “5“, the torque force value at which the trigger will be released as long as the correct edge has been recognized.

See also the functional description: "Oscilloscope Feature".

## P-0-0030, Trigger edge

Parameter P-0-0030 Trigger edge defines the signal change at which a trigger event can be initiated.

| Number: | Trigger edge: |
|---|---|
| 1 | Triggering on the positive edge of the trigger signal |
| 2 | Triggering on the negative edge of the trigger signal |
| 3 | Triggering on both the positive edge and negative edge of the trigger signal |
| 4 | Triggering if the trigger signal equals the trigger level |

Fig. 3-10: Selection of trigger edges

See also the functional description: "Oscilloscope Feature".

## P-0-0031, Timebase

The Timebase defines the time intervals in which the probe values of the selected signals are sampled. Possible time intervals range from 250 µs (resp. 500 µs) to 100 ms.

**Note that in general:**

Recording duration = Time resolution • Size of memory [µs]

See also the functional description: "Oscilloscope Feature".

## P-0-0032, Size of memory

The size of memory determines the number of recorded probe values per measurement. A maximum of 512 probe values can be recorded per channel.

The memory size and time resolution together determine the recording duration. The minimum recording duration is 128 ms, and the maximum duration is 51.2 s.

**Note that in general:**

Recording duration = Time resolution • Size of memory [us]

See also the functional description: "Oscilloscope Feature".

## P-0-0033, Number of samples after trigger

Parameter P-0-0033 defines the number of probe values, or samples, that will be entered in the probe value list after the trigger event. In this way it is possible to set a parameter to define a trigger delay. Parameter P-0-0033 is used for this.

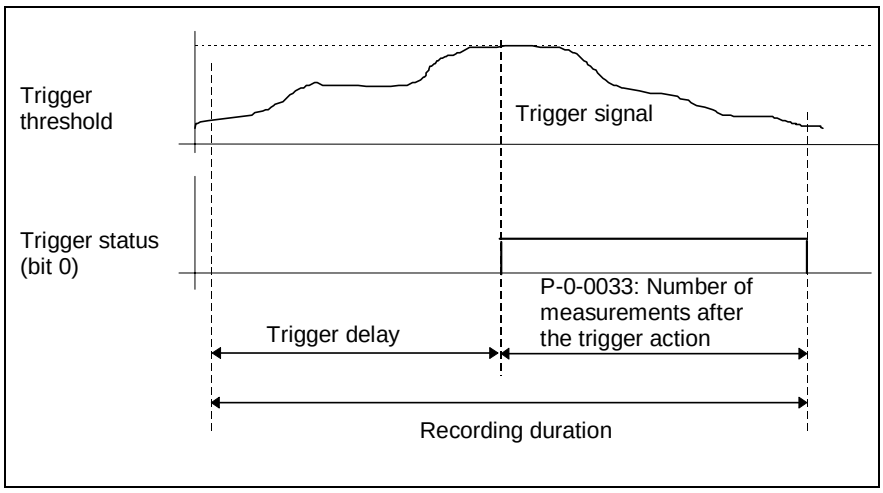



Fig. 3-11: Triggering

See also the functional description: "Oscilloscope Feature".

## P-0-0034, Position command additional actual value

This parameter is used as the starting value for synchronization in a synchronization operating mode with underlying position control.

It contains the difference between the position feedback (actual) value and the synchronous position command value derived from the master drive position. (The phase offset command is stored here.)

## P-0-0035, Delay from trigger to start

Parameter P-0-0035 indicates the number of cycles between the trigger event (internal) and the release of the trigger (bit 0 trigger control word) in external triggering.

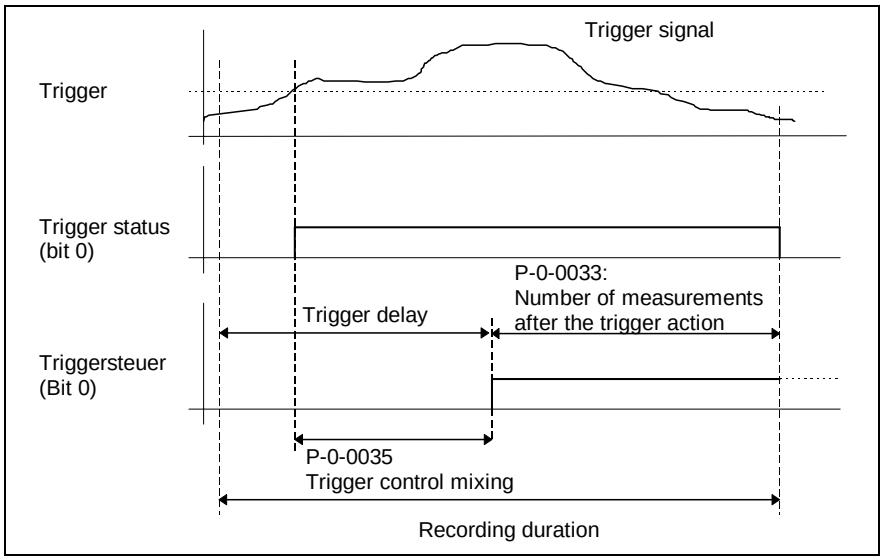



Fig. 3-12: Triggering

Since there is a delay between the transmission of the trigger event by the control system and the release of the trigger, the delay is measured by the drive controller and stored in parameter **P-0-0035, Delay from trigger to start**. A time-correct display of signals is ensured by using this parameter for visualizing the probe values.

See also the functional description: "Oscilloscope Feature".

## P-0-0036, Trigger control word

Parameter P-0-0036 controls the oscilloscope function.

- Bit 2 activates the function, i.e., the lists of scope data are filled with the selected data.
- Bit 1 activates trigger monitoring.
- Bit 0 can initiate a trigger event. If a valid edge is recognized, the probe-value memory will be completed as specified by parameter **P-0-0033, Number of samples after the trigger**, and the oscilloscope function will be deactivated by resetting bits 1 and 2 in the trigger control word.

**Parameter structure:**

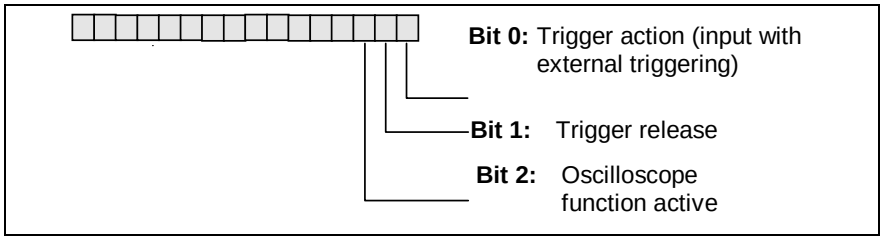



Fig. 3-13: P-0-0036, Trigger control word

See also the functional description: "Oscilloscope Feature".

# P-0-0037, Trigger status word

**Status messages for the oscilloscope function.**

The parameter P-0-0037 offers various pieces of information about the current status of the oscilloscope function.

**Parameter structure:**

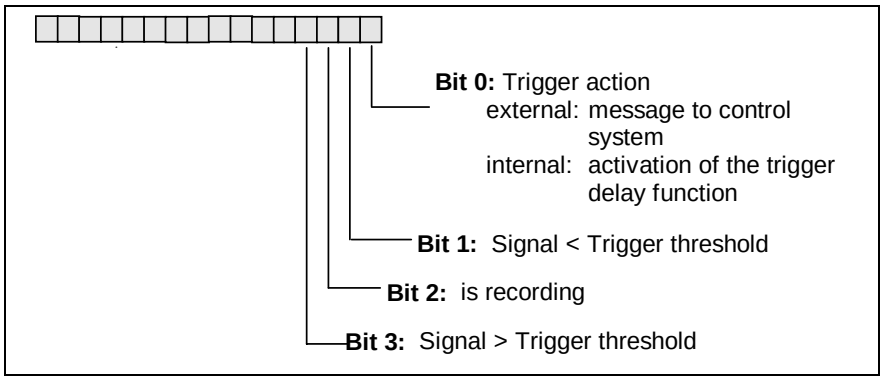



Fig. 3-14: P-0-0037, Trigger status word

See also the functional description: "Oscilloscope Feature".

# P-0-0051, Torque/force constant

The torque/force constant determines what drive torque or force the motor will deliver at a specific effective current.

For **synchronous motors**, this value depends entirely on the design of the motor.

In **asynchronous motors**, this value is valid as long as the motor is not operated in the field-weakening range.

For MHD, MKD and MKE motors, this parameter is stored in the **feedback data memory** and cannot be changed.

**MA [Nm, N] = (P-0-0051)•(S-0-0111)•(S-0-0080)**

where:

| | | |
|---|---|---|
| MA | = | Drive torque |
| P-0-0051 | = | Torque/force constant, [Nm/A] or [N/A] |
| S-0-0111 | = | Motor current at standstill [A] |
| S-0-0080 | = | Torque/force command [%] |

Fig. 3-15: Drive torque

See also the functional description: "Motor Feedback-Data Memory".

## P-0-0052, Position feedback value 3

If the control drive is operated with a master drive, the parameter P-0-0052 displays the current position of the master drive and sends it to the control system.

The position feedback value format amounts to 2^20 increments per rotation and cannot be set.

See also the functional description: "Parameterizing the Master Axis Feedback".

## P-0-0053, Master drive position

The Master drive position is either

- determined in the drive by evaluating the master drive encoder (operation with real master axis), or
- given cyclically from the NC in equidistant time intervals (virtual master axis).

This parameter serves as the command value default for the control drive in the following operating modes:

- Velocity synchronization
- Phase synchronization
- Electronic curve pattern disk
- Electronic pattern transmission

See also the functional description: "Electronic Pattern Control".

## P-0-0060, Filter time constant additional pos. command

If the **P-0-0155, Synchronization Mode 1** is set, then the dynamic synchronization will be switched off after the absolute synchronization is reached for the first time.

Changes to the **S-0-0048, additional position command value** will be smoothed with a filter of the first order. The time constant of the filter can be set with this parameter.

See also the functional description: "Dynamic synchronization in the phase synchronization operating mode"

## P-0-0061, Angle offset begin of profile

The profile (table) will be shifted by this angle in relation to the Master drive position.

The offset is used in the cam shaft or pattern transmission operating modes.(Master Phase Adjust)

## P-0-0072, Cam shaft profile 1

This parameter contains a table with 1024 elements with tab( φ ) data points for the cam shaft profile.

The distance between the data points dφ is derived from the number of elements:

$$d\varphi = 360° / 1024 = 0.35°$$

The first element in the table is the data point for φ = 0°. The last element of the table is the data point for φ = 360° - dφ.

See also the functional description: "Operating mode: Electronic cam shaft with virtual master axis"

## P-0-0074, Feedback 1 type

This parameter determines the encoder interface to which the motor encoder is connected. The number of the corresponding interface module should be entered in this parameter.

| P-0-0074 | Interface: | Measurement system: |
|---|---|---|
| 1 | X4 | digital servo feedback or resolver |
| 2 | X8 | Incremental encoder with sine signals from the Heidenhain company, 1V signals |
| 5 | X8 | Incremental encoder with square-wave signals from the Heidenhain company |
| 8 | X8 | Encoder with EnDat interface |
| 9 | X8 | gearwheel encoder with 1Vss signals |
| 10 | X4 | Resolver without feedback data memory |
| 11 | X4+X8 | Resolver without feedback data memory + incremental encoder with sine signals |
| 12 | X4+X8 | Hall-Feedback + Square-wave signals |
| 13 | X4 | ECI Feedback |
| 14 | X4+X8 | Hall-Feedback + sine Feedback |

Fig. 3-16: Measurement system:

See also the functional description: "Determining the Feedback Interface of the Motor Feedback".

## P-0-0075, Feedback 2 type

This parameter determines the encoder interface to which the optional encoder is connected. The number of the corresponding interface module should be entered in this parameter.

| P-0-0075: | Interface: | Measurement system: |
|---|---|---|
| 1 | X4 | digital servo feedback or resolver |
| 2 | X8 | Incremental encoder with sine-wave signals from the Heidenhain company, 1Vpp signals |
| 5 | X8 | Incremental encoder with square-wave signals from the Heidenhain company |
| 8 | X8 | Encoder with EnDat interface |
| 9 | X8 | Gearwheel with 1Vpp signals |

Fig. 3-17: Measurement system:

See also the functional description: "Determining the Feedback Interface of the Motor Feedback"

## P-0-0083, Gear ratio fine adjust

The transmission ratio of the electronic gearbox is changed by this percent value.

This parameter is only active in the **velocity synchronization** mode. After power-up, the value is 0, and the transmission ratio is not affected.

See also the functional description: "Operating mode: Velocity synchronization with virtual master axis".

## P-0-0085, Dynamical angle offset

With this parameter, the operative Master-drive position can be offset dynamically as shown in the following equation:

$$\varphi_{\text{Master drive, active}} = \varphi_{\text{Master}} + \frac{n_{\text{Master}}}{\text{Position control KV}} \cdot \text{dynamic angle displacement}$$

Fig. 3-18: Offset of an operative Master-Drive Position

This function is available in the cam plate and pattern transmission operating modes.

The following graph show the offset position command value and feedback value when P-0-0085 = 100 %.

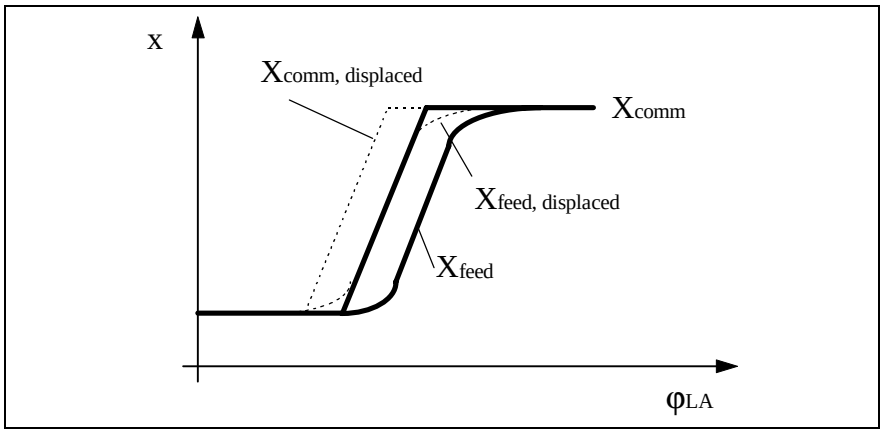



Fig. 3-19: Offset Position Command value and Feedback value when P-0-0085 = 100%.

## P-0-0087, Offset position feedback value 3

The evaluation of a Master-drive encoder occurs in absolute terms over one encoder revolution. If this parameter is set to 0, then this absolute position will be displayed in **P-0-0052, Position Feedback Value 3**.

With the P-0-0087, Offset Position Feedback Value 3 parameter, the raw position can be acted upon by an offset.

The following applies:

2^20 = 1048575 ⇒ 360° (real master drive)

See also the functional description: "Parameterizing the Master Axis Feedback".

## P-0-0088, Cam shaft control

An active cam profile of a drive can be selected in this parameter.

**Parameter structure:**

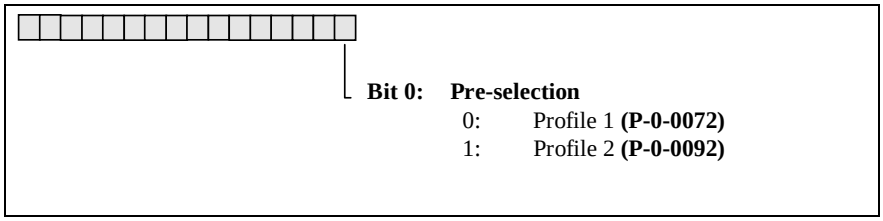



Fig. 3-20: P-0-0088, Cam Shaft Control

The drive will make a preselection if the master drive position goes beyond the **P-0-0094, cam shaft switch angle**.

See also the functional description: "Operating mode: Electronic cam shaft with virtual master axis"

## P-0-0089, Cam shaft status

The drive indicates the active cam profile with this parameter.

**Parameter structure:**

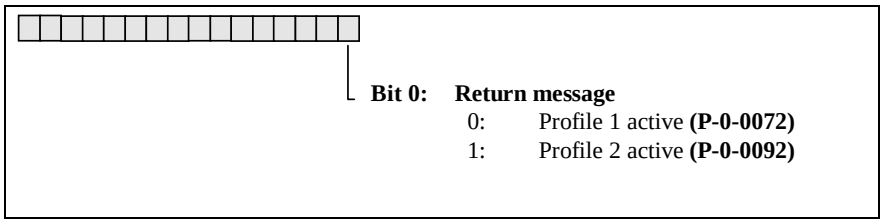



Fig. 3-21: P-0-0089, Cam Shaft Status

See also the functional description: "Operating mode: Electronic cam shaft with virtual master axis"

## P-0-0090, Travel limit parameter

Parameter P-0-0090 activates the travel limit switches. In addition, the inputs can be inverted ( 0V on input Limit+/- ⇨ Travel limit exceeded ).

**Parameter structure:**

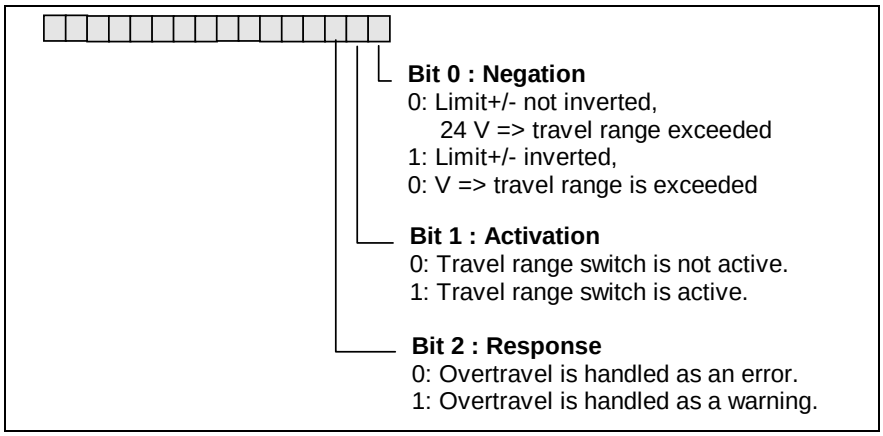



Fig. 3-22: P-0-0090, Travel limit parameter

See also the functional description: "Travel Range Limits".

## P-0-0092, Cam shaft profile 2

This parameter contains a table with 1024 elements with tab( φ ) data points for the cam shaft profile.

The distance between the data points dφ is derived from the number of elements:

$$d\varphi = 360° / 1024 = 0.35°$$

The first element in the table is the data point for φ = 0°. The last element of the table is the data point for φ = 360° - dφ.

See also the functional description: "Operating mode: Electronic cam shaft with virtual master axis"

## P-0-0093, Cam shaft distance

This parameter determines the factor with which the cam profile will be multiplied.

See also the functional description: "Operating mode: Electronic cam shaft with virtual master axis"

## P-0-0094, Cam shaft switch angle

If the Master-drive position passes this angle in a positive or negative direction, then a switch will be made to the cam-profile table that was preselected by the parameter **P-0-0088, Cam Shaft Control**.

Parameter **P-0-0089, Cam Shaft Status** will be set to the activated cam-profile table.

When the control drive is first initialized, the cam profile set in **P-0-0088** will be activated. Parameter **P-0-0089** also will be set.

See also the functional description: "Operating mode: Electronic cam shaft with virtual master axis"

## P-0-0096, Distance to move in error situation

By inputting a 3 in parameter **P-0-0119, Best possible declaration**, the reaction "return motion“ can be set.

A switch into best possible standstill takes place and the path parametrized here starting with the current feedback position value is traversed (the qualifying sign is noted). The **S-0-0091, Bipolar velocity limit value**, **S-0-0138, Bipolar acceleration limit value** and **S-0-0349, Jerk limit bipolar** hereby not exceeded.

It is necessary to parametrize a sufficiently sized value in **P-0-0126, Maximum braking time** to give the drive enough time to traverse the spezified path.

If the position limit values are active, then the drive keeps the return motion from traversing them. The drive then stops at the **S-0-0057, Position window** at the respective position limit value.

See also the functional description: "Return motion".

## P-0-0097, Absolute encoder monitoring window

The absolute encoder monitoring compares during **S-0-0128, C200 Communication phase 4 transition check** the position saved during the last powering down with the current absolute feedback.

If the difference is greater than what is set in parameter P-0-0097, Absolute encoder monotoring window, the error message **F276 Absolute encoder out of allowed window** will be generated. This can happen, when the axis has been **moved with the power off**, or after changing the motor.

**Note:** If a 0 is parametrized in P-0-0097, Absolute encoder monitoring window, the absolute encoder monitor is deactivated.

As a standard value, 0.1 motor revolution ( = 36 degrees in reference to the motor shaft ) can be programmed if the axis has an electrically released brake or a self braking mechanic.

See also the functional description: "Absolute Encoder Monitoring".

## P-0-0098, Max. model deviation

The maximum model deviation is the maximum deviation between the real position feedback value and the model position feedback value calculated by the drive.

This parameter can be read out by the user to help set the parameter for **S-0-0159, Monitoring window**.

Two cases must be distinguished for determining the model position feedback value:

**1) Position control with following (lag) error**

In this operating mode, the controlled system is simulated by a model.

The maximum deviation between the calculated position feedback module value and the real position feedback value is stored in the parameter P-0-0098.

**2) Position control without following (lag) error**

In this operating mode, the position command value is compared to the position feedback value. The maximum deviation encountered is stored in P-0-0098.

**Note:** This parameter can be write accessed so that it can be set back to 0, for example.

See also the functional description: "Position Control Loop Monitoring".

## P-0-0099, Position command smoothing time constant

The position command smoothing time constant determines the maximum jerk possible in operation modes with closed loop position control.

The maximum jerk is determined by:

$$\text{max. jerk} = \frac{\text{2nd derivative of the position command values}}{\textbf{P-0-0099 Position command value smoothing filter time constant}}$$

Fig. 3-23: Max. jerk

If you don’t want to activate a filter, set P-0-0099 >= S-0-0001, NC Cycle time (TNcyc) (greater or equal).

See also the functional description: "Command value processing: Position Control".

## P-0-0108, Master drive polarity

This parameter can invert master drive position polarity. This means that an inverted, electronic gearbox can be implemented.

**Parameter structure:**

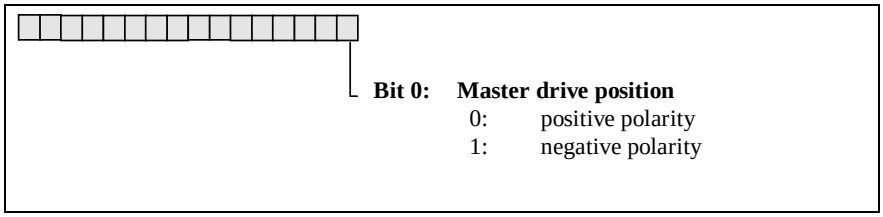



Fig.: 3-24: P-0.0108, Master Drive Polarity

See also the functional description:

- "Operating mode: Velocity synchronization with virtual master axis"
- "Operating mode: Phase synchronization with virtual master axis"

## P-0-0109, Torque/force peak limit

The maximum peak torque of a drive can be limited in a manner suitable to an application with the use of parameter P-0-0109, Torque/ force peak limit. In other words, the parameter ensures that the max. torque specific to the application is not exceeded even if **S-0-0092, Bipolar torque/force limit value** is set exceedingly high.

See function description: "Torque/Force Limiting"".

## P-0-0117, NC reaction on error

This parameter allows the NC 30 seconds to bring the drive controller to a coordinated deceleration in an error situation if the parameter is set with a "1". The drive follows the command for this period. The drive reacts with the preset **P-0-0119, Best possible deceleration**.

This feature works for non-fatal errors.

**Parameter structure:**

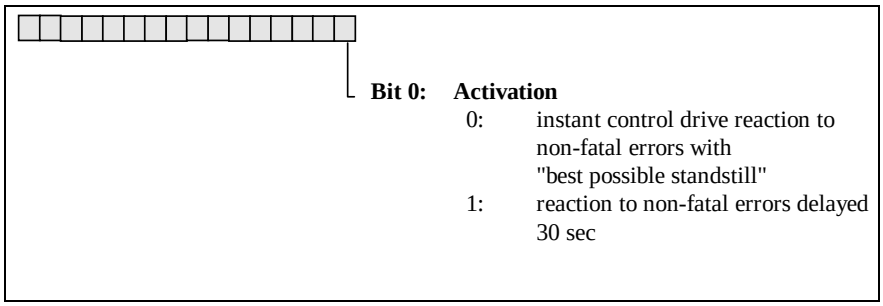



Fig. 3-25: P-0-0117, NC reaction on error

See also the functional description: "NC Response in Error Situation"

# P-0-0118, Power off on error

How a drive error is signalled to the drive pack or to the supply module, can be activated in the parameter P-0-0118, Power off on error.

Moreover, there are following possibilities to set the reaction upon error:

- Power off / packet reaction in case of error (bit 0)
- Condition for power up (bit 1)
- Time for switching the power off (bit 2)
- Reaction upon undervoltage (bit 3)
- Undervoltage as fatal warning (bit 4)
- Automatic clearance of undervoltage (bit 5)

**Parameter structure:**

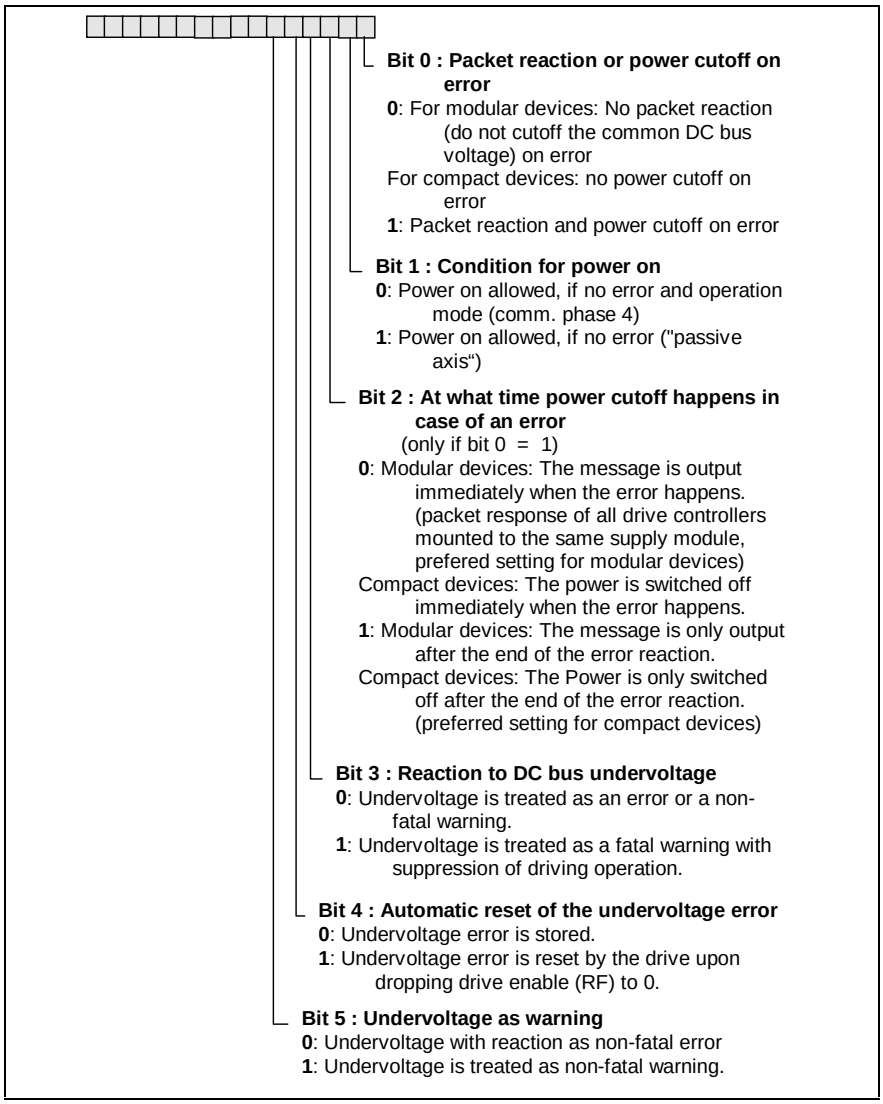



Fig. 3-26: P-0-0118, Power off on error

See also the functional description: "Power off on error".

## P-0-0119, Best possible deceleration

This parameter specifies the type of braking to standstill for the drive in the event of

- a non-fatal error
- an interface error
- a phase regression
- switching off the drive enable signal

| P-0-0119: | Reaction type: |
|---|---|
| 0 | **Velocity command value set to zero**<br>The motor brakes in regard to the torque limit value. The **Braking time** is set in parameter **P-0-0126**. 100 milliseconds before the brake time elapses, the blocking brake is activated. If the velocity has previously fallen below 10 rpm (rotational motors) or below 10 mm/min (linear motors), then the blocking brake will be engaged immediately. 100 milliseconds after the mechanical brake is set, the motor is torque free. |
| 1 | **Switch to torque-free state** |
| 2 | **Velocity command to zero** with command ramp and filter.<br>The ramp, i.e. the maximum acceleration, is set via **P-0-1201, Ramp 1 pitch**, the jerk filter via **P-0-1222, Velocity command filter**. |
| 3 | **Return motion**<br>The drive generates a position command profile for traversing the set "path on error“ in which case a relative path is activated which is defined with **P-0-0096, Distance to move in error situation**, **S-0-0091, Bipolar Velocity Limit Value**, **S-0-0138, Bipolar acceleration limit value** and **S-0-0349, Jerk Limit bipolar**. |

Fig. 3-27: Deceleration mode for the drive

The drive enable can be set again, at the earliest, after the operation of the error reaction.

See also the functional description: "Best Possible Deceleration".

## P-0-0121, Velocity mix factor feedback 1 & 2

The Velocity mix factor parameter determines the relation of the velocity feedback values between the motor encoder and the optional encoder.

The input is percentage-based. Note the following:

**0 % :** The velocity controller works solely with the velocity of the motor encoder ( = encoder 1).

**100 % :** The velocity controller works solely with the velocity of the opt. encoder ( = encoder 2).

If no optional encoder is available, then the parameter is set to 0 % .

See also the functional description: "Setting the Velocity Mix Factor".

## P-0-0123, Absolute encoder buffer

All the data that the absolute encoder needs for position initialization is stored in this parameter.

See also the functional description: "Other Settings for Absolute Measurement Systems".

## P-0-0126, Maximum braking time

The maximum braking time for the drive is set in this parameter.

The value should always be set higher then the time needed, considering the maximum possible velocity, to decelerate the shaft using velocity command value zero-switching.

The velocity command value is switched to zero if **P-0-0119, Best possible deceleration** is set to 0 and either

- The drive enable (RF) is removed
- The drive is switched to Set parameter mode with RF switched on
- A drive error is recognized that still allows a reaction from the drive (all non-fatal errors)
- In the case of separately supplied devices (HDS), a drive connected to the same supply module reports an error to that module, so that the intermediate voltage is switched off.

## P-0-0127, Overload warning

To protect the power stage, the temperature is calculated with a temperature model for the transistor final stage. If the temperature exceeds 125°C, then the torque-producing command current will be limited.

To avoid an unexpected disruption of the torque from the drive, a warning threshold can be set in this parameter.

If the thermal load rises above the set value, warning **E261 Continuous current limiting prewarning** will be generated.

If 100% is entered, this warning will be deactivated, because then the message **E257 Continuous current limit active** will be generated instead.

See also the functional description: "Monitoring the Thermal Load of the drive controller".

## P-0-0131, Signal select position switch

This parameter can be used to activate and to select the signal for the programmable position switch.

The following values can be entered:

| P-0-0131: | Function: |
|---|---|
| **0** | The programable limit switch is not activated. |
| **1** | The programable limit switch is activated; the reference signal is **S-0-0051, Position feedback value 1** |
| **2** | The programable limit switch is activated; the reference signal is **S-0-0053, Position feedback value 2** |

Fig. 3-28: Activation and signal selection for the programmable position switch

See also the functional description: "Programmable Limit Switch".

## P-0-0132, Switch on threshold position switch

This parameter list can be used to set the switch-on positions for the programmable limit switch.

It consists of **16 elements**, where element 1 is allocated for the position switch bit 1, element 2 is allocated for bit 2, and so forth.

See also the functional description: "Programmable Limit Switch"

## P-0-0133, Switch off threshold position switch

This parameter list can be used to set the switch-off positions for the programmable limit switch.

It consists of **16 elements**, where element 1 is allocated for the position switch bit 1, element 2 is allocated for bit 2, and so forth.

See also the functional description: "Programmable Limit Switch".

## P-0-0134, Position switch lead times

By parameterizing a rate time, a time delay can be compensated for an external, position-driven switch element. In that way, a theoretical adjustment value can be calculated from the rate time and the current drive velocity for the on- and off-switch Positions.

The programmable limit switch switches by the rate time before reaching the trigger position.

**Note:** The velocity must remain constant in the range between the theoretical and actual on-switch or off-switch threshold.

.

See also the functional description: "Programmable Limit Switch"

## P-0-0135, Status position switch

The state of the programmable position switch bits is displayed in this parameter.

**Parameter structure** with 16 switches:

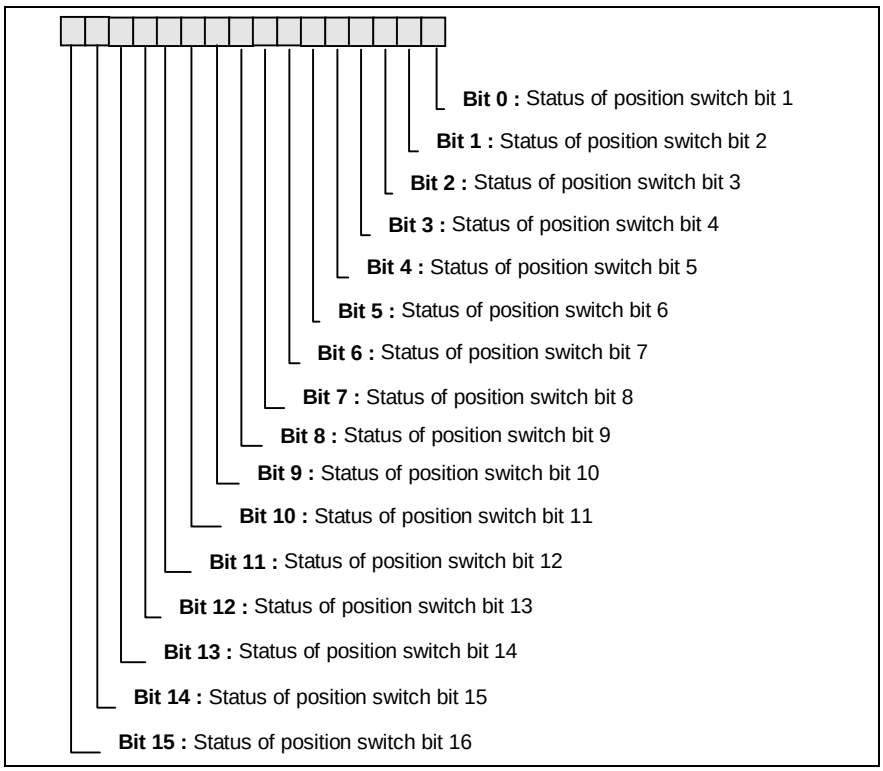



Fig. 3-29: P-0-0135, Position switches' status word

See also the functional description: "Programmable Limit Switch".

## P-0-0139, Analog output 1

The parameter **P-0-0139, Analog output 1** sets the voltage value for the analog output 1 of the drive controller.

See also the functional description: "Analog Output".

## P-0-0140, Analog output 2

The parameter **P-0-0140, Analog output 2** sets the voltage value for the analog output 2 of the drive controller.

See also the functional description: "Analog Output".

## P-0-0141, Thermal drive load

The parameter P-0-0141, Thermal drive load is for diagnostic purposes. In this parameter, 0% corresponds to a chip over-temperature of 0 Kelvin, 100% corresponds to the maximum chip over-temperature. The thermal load should not exceed a value of 80% for the applied operating cycles if the drive is set up correctly.

It typically takes about 10 minutes to warm up a drive controller end stage to its final temperature. To check the thermal load of a drive during installation without having to run operating cycles during this period of time, the drive controller load can be preset with 80%. This can happen by writing an arbitrary value to the parameter **P-0-0141, Thermal drive load**.

See also the functional description: "Checking the Thermal Load of the drive controller".

## P-0-0142, Synchronization acceleration

Acceleration or deceleration with which the synchronous velocity is reached in dynamic synchronization (ramp up and lock on).

Acceleration and delay is performed with the synchronization acceleration in the second step of dynamic synchronization (ramp up and lock on). This affects device operating modes with underlying position control. When running an angle offset, the slave drive is accelerated or decelerated with the synchronization acceleration.

This is only operational in the operating modes with electronic gear:

- velocity synchronization
- phase synchronization
- curve pattern disk (cam plate)
- pattern transmission

See also the functional description:

- "Operating mode: Velocity synchronization with virtual master axis"
- "Operating mode: Phase synchronization with virtual master axis"

## P-0-0143, Synchronization velocity

The velocity with which the distance (angle difference) to absolute synchronization is done in dynamic synchronization (ramp up and lock on).

This is only operative in the operating modes with **electronic gear**:

- phase synchronization
- curve pattern disk (cam plate)
- pattern transmission

See also the functional description: "Operating mode: Phase synchronization with virtual master axis"

## P-0-0144, Cam shaft distance switch angle

A new value for the **P-0-0093, Cam Shaft Distance** will become active only when the table access angle passes the cam shaft switch angle. The angle for the table access is formed out of the following parameters:

- **P-0-0053, Master drive position**
- **P-0-0061, Angle offset begin of profile**
- **P-0-0085, Dynamical angle offset**
- **P-0-0108, Master drive polarity**
- **P-0-0156, Master drive gear input revolutions**
- **P-0-0157, Master drive gear output revolutions**
- **P-0-0158, Angle offset change rate**

This works only in the curve pattern disk (Cam profile) operating mode.

See also the functional description: "Operating mode: Electronic cam shaft with virtual master axis".

## P-0-0145, Expanded trigger level

This parameter is for service purposes only.

If bit 12, Expanded trigger level is selected using parameter **P-0-0026, Trigger signal selection**, then an address can be selected with parameter P-0-0145 that is monitored for the threshold parameter value.

**Parameter structure:**

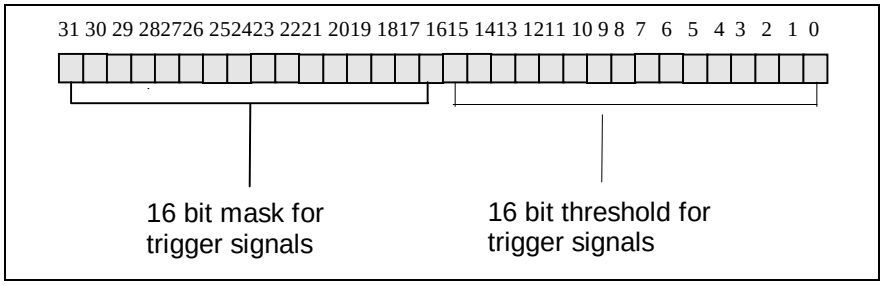



Fig. 3-30: P-0-0145, Expanded trigger level (oscilloscope function)

See also the functional description: "Oscilloscope Feature".

## P-0-0146, Expanded trigger address

This parameter is for service purposes only.

If bit 12 Expanded trigger level is selected in using parameter **P-0-0026, Trigger signal selection**, then an address can be selected with parameter P-0-0146 that is monitored for the threshold parameter value.

**Parameter structure:**

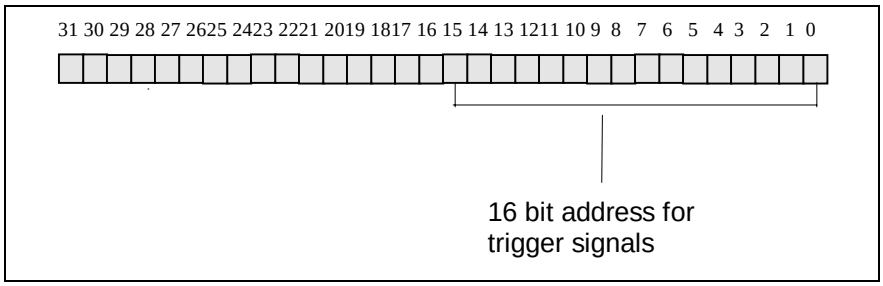



Fig. 3-31: P-0-0146, Expanded trigger address

The 16-bit value of the trigger edge is monitored. Before, the trigger signal is ANDed with the mask for trigger signals.

See also the functional description: "Oscilloscope Feature".

## P-0-0147, Expanded signal K1 address

If an expanded signal selection is made with parameters **P-0-0023, Signal select scope channel 1** and **P-0-0024, Signal select scope channel 2**, then an address to be recorded can be chosen in the drive with parameter P-0-0147.

See also the functional description: "Oscilloscope Feature".

## P-0-0148, Expanded signal K2 address

If an expanded signal selection is chosen with parameters **P-0-0023, Signal select scope channel 1** and **P-0-0024, Signal select scope channel 2**, then an address to be recorded can be chosen in the drive with parameter P-0-0148.

See also the functional description: "Oscilloscope Feature".

## P-0-0149, List of selectable signals for oscilloscope function

The control system can read drive-supported, predefined signals with parameter P-0-0149. This permits a user interface to prepare a signal select menu using the information in the listed parameters in the drive.

| List entries: | ID number of: |
|---|---|
| 1 | S-0-0051 or S-0-0053 |
| 2 | S-0-0040 |
| 3 | S-0-0347 |
| 4 | S-0-0189 |
| 5 | S-0-0080 |
| 6 | S-0-0051 |
| 7 | S-0-0053 |
| 8 | S-0-0047 |
| 9 | P-0-0147 |
| 10 | P-0-0148 |

Fig. 3-32: P-0-0149, List of selectable signals for oscilloscope function

See also the functional description: "Oscilloscope Feature".

## P-0-0150, Number of valid samples for oscilloscope function

If the oscilloscope function is activated then the signal to be recorded is continously fed to a value memory. If triggering occurs, then the recording procedure is stored and the value list can be read out. The oldest measured value is the first element of this list, the newest value the last.

If triggering occurs before the memory is completely filled, then a number of values at the start of the list are invalid.The number of valid values before triggering is available in parameter **P-0-0150, Number of valid samples for oscilloscope function**.

See also the functional description: "Oscilloscope Feature".

## P-0-0151, Synchronization init window for modulo format

The second step of dynamic synchronization (ramp up and lock on) establishes a path that must be crossed to reach absolute synchronization.

If positioning difference exceeds "synchronization window in modulo format P-0-0151“, then the synchronization direction is determined by parameter „command value in modulo format“ (S-0-0393). If the position difference is smaller than the the value in „seynchronization window in modulo format“, then synchronization may take place in a direction counter to the oneset in parameter S-0-0393.

In synchronization window parameter, the position difference as it releates to the following drive is entered, within which the rotational direction may deviate from the one set for synchronization.

See also the functional description: "Operating mode: Phase synchronization with virtual master axis"

## P-0-0153, Optimal distance home switch - reference mark

During command "**Drive-controlled homing**" when the zero-switch and homing mark evaluation are activated, the distance between the zero-switch edge and the homing mark is monitored. For reference marks (home reference) with equal intervals, the optimal distance is half the home-reference interval. The optimal distance can be entered in parameter P-0-0153, Optimal distance home switch - reference mark as per the following table:

| Encoder type | P-0-0153 | Function |
|---|---|---|
| Rotational | 0 | The zero-switch - reference mark interval is monitored. The optimal distance will be calculated internally, and is equal to 1/2 of an encoder revolution for DSF or incr. rotary encoders, or 1/2 of an encoder revolution / **S-0-0116, Rotary encoder resolution - 1** for resolvers. |
| Rotational | x | The zero-switch - reference mark interval is monitored. Half the reference mark distance must be entered in **P-0-0153, Optimal distance home switch - reference mark**. |
| Linear | 0 | The zero-switch - reference mark interval is not monitored. The linear encoder does not affect reference marks with constant intervals. The real distance between the zero-switch and the reference mark must be large enough to ensure recognition of the zero-switch edge, taking into account the maximum homing velocity and the cycle time for the zero-switch input request. |
| Linear | x | The zero-switch - reference mark interval is monitored. Half the reference mark distance must be entered in **P-0-0153, Optimal distance home switch - reference mark**. |

Fig. 3-33: Interval monitoring, home switch - reference mark

See also the functional description: "Drive-Controlled Homing".

## P-0-0154, Synchronization direction

The second step of dynamic synchronization (ramp up and lock on) establishes a path that must be crossed to reach absolute synchronization.

With rotary axes, the drive can move in a positive or negative direction.

The synchronization direction determines the direction for the drive.

If the shortest path to absolute synchronization is smaller than the **P-0-0151, Synchronization Init Window for Modulo Format**, then the shortest path will be taken and the preset synchronization direction will be ignored.

This parameter is only operative in the operating modes

- phase synchronization
- cam shaft (curve pattern disk)
- pattern transmission

See also the functional description: "Dynamic synchronization in the phase synchronization operating mode"

## P-0-0155, Synchronization mode

The drive will start the dynamic synchronization automatically after one of the following operating modes is activated: phase synchronization, cam shaft or pattern transmission. The **S-0-0047, Position Command Values** will be generated by the drive until the absolute synchronization (**S-0-0047**= XSynch + **S-0-0048**) is reached. The **P-0-0142, Synchronization Acceleration** and **P-0-0143, Synchronization Velocity** will be taken into consideration.

The synchronization mode then will be examined.

If synchronization mode 1 is set, then parameters **P-0-0142** and **P-0-0143** will be inoperative after absolute synchronization is reached.

The following changes of the **S-0-0048, Position Command Value Additional** will then be smoothed through a filter of the first order. The time constant for the filter will be set with the parameter **P-0-0060, Filter Time Constant** Additional Position Command Value.

In synchronization mode 0 is selected, a path will be created after every change of the position command value based on the equation (phase adjusting)

Path = XSynch + **S-0-0048** - **S-0-0047**,

and the path will be taken with regard to the synchronization acceleration and velocity.

See also the functional description: "Dynamic synchronization in the phase synchronization operating mode"

## P-0-0156, Master drive gear input revolutions

This parameter determines together with the parameter P-0-0157 Master drive gear output revolutions the master drive gear.

A master axis position (P-0-0053) sent to the drive will be multiplied with the master drive gear transmission ratio before the processing, and will then be limited to the standardized range of 2^20.

The master axis position and therefore also this parameter are only active in the **operation modes**

- speed synchronization
- angular synchronization
- cam shaft
- pattern control

## P-0-0157, Master drive gear output revolutions

This parameter determines together with the parameter P-0-0156 Master drive gear input revolutions the master drive gear.

A master axis position (P-0-0053) sent to the drive will be multiplied with the master drive gear transmission ratio before the processing, and will then be limited to the standardized range of 2^20.

The master axis position and therefore also this parameter are only active in the **operation modes**

- speed synchronization
- angular synchronization
- cam shaft
- pattern control

## P-0-0158, Angle offset change rate

In the operation modes Cam shaft and Pattern control, **P-0-0061, Angle Offset Begin of Profile** affects the access angle to the table. If this angular shift should be changed in a greater range, with the given increment in the active table, then a slow approach towards the new value must be done, because every change means a jump in the position command.

A new value for the parameter P-0-0061, Angle Offset Begin of Profile does not become active immediately. Outgoing from the actualn value, a ramp shaped approach to the new value is done.

The approach is made on the shortest way.

The slope of the ramp is determined with the parameter P-0-0158, Phase offset velocity.

## P-0-0159, Slave drive feed travel

During the **linear angle synchronization**, the slave axis performs **one feed per revolution of the master axis**. The parameter P-0-0159, Slave drive feed travel together with the parameter **S-0-0236, Master drive 1 revs.** determines the distance to go per revolution of the master axis.

It will then automatically be taken instead of S-0-0237, Slave drive 1 revs. to calculate the electronic gear factor and the modulo value, as far as the position scaling is parametrized as linear and modulo.

When the position data refer to the load, the S-0-0103, Modulo value calculated by the drive is the quotient of P-0-0159, Slave drive feed travel and S-0-0236, Master drive 1 revs.

## P-0-0162, D900 Command Automatic control loop adjust

Starting this command executes an automatic control loop setting in the drive as soon as the drive is in the loop with command start.

**WARNING**

⇒ This can effect an immediate motion if **drive enable** and **drive start** are applied to the drive.

⇒ The drive now conducts autonomous motions within the travel range defined by both limits.

All pre-settings affecting the command, such as **P-0-0163, damping factor for automatic control loop settings, P-0-0164, application for autom. control loop setting, S-0-0092, bipolar torque/force limit value** and **S-0-0259, positioning speed** must also first be set.

**Note:** Errors can occur during the execution of a command. These are signalled with messages.

**D901 Start requires drive enable**

**D902 Motor feedback data not valid**

**D903 Inertia detection failed**

**D904 Gain adjustment failed**

**D905 Travel range invalid, P-0-0166 & P-0-0167**

**D906 Travel range exceeded**

See also the functional description: "Automatic Control Loop Settings".

## P-0-0163, Damping factor for autom. control loop adjust

By varying P-0-0163, the user has the option to influence control loop dynamics set by the automatic control loop setting.

**Note:** P-0-0163 = 20 ⇒ least dynamic

**P-0-0163 = 0.5 ⇒ max. dynamic**

See also the functional description: "Automatic Control Loop Settings".

## P-0-0164, Application for autom. control loop adjust

In order to take control strategies related to an application into consideration with the automatic control loop settings, the user receives a **selection list** from which the desired application can be selected.

This offers, e.g., the option to completely switch the I-gain off, for example.

The information below relates to the velocity loop.

| P-0-0164 | Application | I-gain | P-gain |
|---|---|---|---|
| 0 | tool machine<br>⇨ good load rigidity | with | normal |
| 1 | nipple machine<br>⇨ short settling times | without,<br>Tn = 0ms | high |

| | | | |
|---|---|---|---|
| 2 | simultaneously running separation device<br>⇨ rel. undynam. control loop setting | without,<br>Tn = 0ms | normal |
| 3 | Drum feeder<br>⇨ very high load inertia | with | high |
| 4 | Handling axis<br>⇨ possible oscillation | with | small |

Fig. 3-34: Application-dependent velocity loop setting

**Note:** Indramat will expand this table according to the needs.

The **default value** is set for a **machine tool**.

See also the functional description: "Automatic Control Loop Settings".

## P-0-0165, Selection for autom. control loop adjust

By selecting the corresponding bit, you can **select** (bit = 1) or **deselect** (bit = 0) any partial functionality of the automatic control loop setting.

The following table describes the possibilities for selection.

**Parameter structure:**

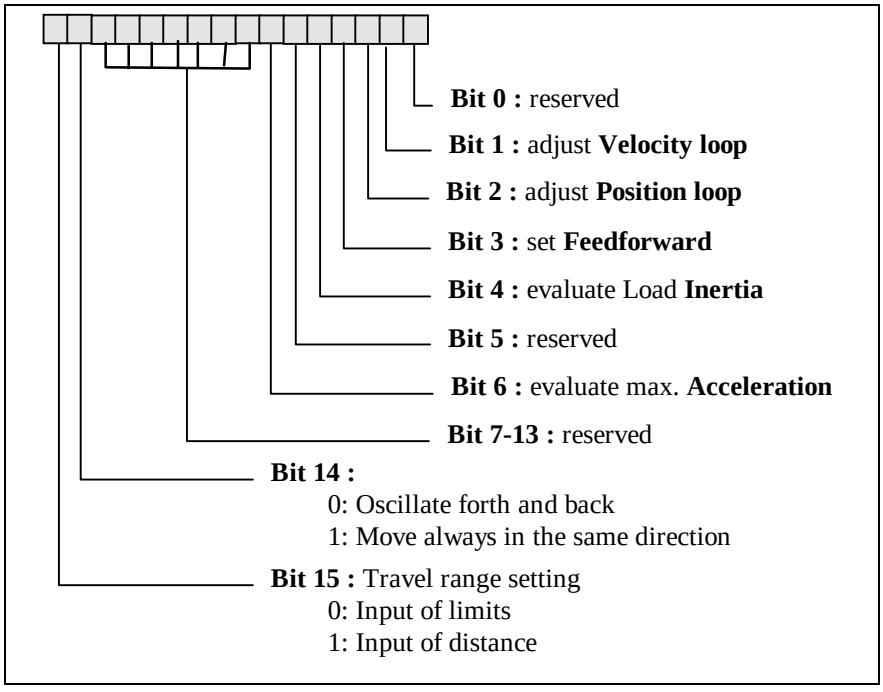



Fig. 3-35: Selection parameter for autom. control loop setting

**Example:**

The default setting ( P-0-0165 = 0000 0000 0001 0110 ) means:

- Load inertia is evaluated.
- Velocity loop is adjusted.
- Position loop is adjusted.

See also the functional description: "Automatic Control Loop Settings".

## P-0-0166, Lower position limit for autom. control loop adjust

The allowed range, within which the axis may move during the automatic control loop adjust with the command P-0-0162, is defined by

- a lower position limit **P-0-0166** and
- an upper position limit **P-0-0167**.

These two limits can either be

- input directly
- or they are calculated internally, based on a defined travel distance P-0-0169, taking into account the actual position at the start of the command D9 (P-0-0165, bit 12 = 1).

**Note:** At the start of the command D9, a check is run of the travel range defined by both parameters P-0-0166 and P-0-0167.

See also the functional description: "Automatic Control Loop Settings".

See also **D905 wrong position range**

See also **D906 position range exceeded**

## P-0-0167, Upper position limit for autom. control loop adjust

The allowed range, within which the axis may move during the automatic control loop adjust with the command P-0-0162, is defined by

- a lower position limit **P-0-0166** and
- an upper position limit **P-0-0167**.

These two limits can either be

- input directly
- or they are calculated internally, based on a defined travel distance P-0-0169, taking into account the actual position at the start of the command D9 (P-0-0165, bit 12 = 1).

**Note:** At the start of the command D9, a check is run of the travel range defined by both parameters P-0-0166 and P-0-0167.

See also the functional description: "Automatic Control Loop Settings".

See also **D905 wrong position range**

See also **D906 position range exceeded**

## P-0-0168, Maximum acceleration

This parameter holds the maximum possible acceleration found during the automatic control loop setting, if the function is selected in the P-0-0165, Selection for autom. control loop adjust ( P-0-0165, Bit 6 = 1 ).

The value is, in a first approximation, inversely proportional to the total inertia (motor + load) of the drive and directly proportional to the peak torque or force of the drive.

**Note:** P-0-0168 serves as initial value for a later setting of the positioning block accelerations.

See also the functional description: "Automatic Control Loop Settings".

## P-0-0169, Travel distance for autom. control loop adjust

The allowed range, within which the axis may move during the automatic control loop adjust with the command P-0-0162, is defined by

- a lower position limit **P-0-0166** and
- an upper position limit **P-0-0167**.

These two limits can either be

- input directly (P-0-0165, Bit12 = 0)
- or they are calculated internally, based on a defined travel distance P-0-0169, taking into account the actual position at the start of the command D9 (P-0-0165, bit 12 = 1).
- P-0-0166 = Start position - P-0-0169 / 2
- P-0-0167 = Start position + P-0-0169 / 2

**Note:**

At the start of the command D9, a check is run of the travel range defined by both parameters P-0-0166 and P-0-0167.

## P-0-0176, Torque/Force command smoothing time constant

The parameter P-0-0176, Torque/force command smoothing time constant is only active during the operation mode Torque control.

The time constant input here filters during torque control the command value given by S-0-0080, Torque/Force command via a low pass filter. This can smoothen acceleration jumps in successive command values.

See also the functional description: "Operating Mode: Torque Control".

## P-0-0180, Rejection frequency velocity loop

To supress the mechanical resonance frequency, a band filter can be activated at the output of the velocity controller .It is parametrized with parameters **P-0-0180, Rejection frequency velocity loop** and **P-0-0181, Rejection bandwidth velocity loop**.

**P-0-0180, Rejection frequency velocity loop** indicates the most attenuated frequency.

See also the functional description: "Filtering oscillations from mechanical resonance".

## P-0-0181, Rejection bandwidth velocity loop

To supress the mechanical resonance frequency, a band filter can be activated at the output of the velocity controller. It is parametrized with parameters **P-0-0180, Rejection frequency velocity loop** and **P-0-0181, Rejection bandwidth velocity loop**.

**P-0-0181, Rejection bandwidth velocity loop** sets the frequency range for the locking frequency with an attenuation smaller than -3dB.

**Example:**

P-0-0180 = 500 Hz,

P-0-0181 = 200 Hz;

then: attenuation < -3dB in range of 400..600 Hz.

| Parameter content | Effect of P-0-0181 |
|---|---|
| -1 | low pass filter with time constant P-0-0004 |
| 0 | filter is off |
| >0 | bandwidth of suppression (notch) filter |

Fig. 3-36: P-0-0181, Rejection bandwidth velocity loop

See also the functional description: "Filtering oscillations from mechanical resonance".

## P-0-0185, Function of encoder 2

Parameter P-0-0185 can be used to allocate a specific function to an optional encoder. The following functions are defined:

| Value in P-0-0185, Function of encoder 2 | Meaning |
|---|---|
| 0 | Optional encoder as additional loadside control feedback for position and/or velocity loop. The signal frequency is monitored whether it exceeds the max. possible frequency for the interface. In case of excess, the error **F246 Max. signal frequency for encoder 2 exceeded** is generated, and the position status S-0-0403 is cleared. |
| 1 | Optional encoder as master axis encoder. Only measuring systems with binary encoder resolutions are allowed. |
| 2 | Optional encoder as singular loadside control feedback (only with rotary asynchronous motor). In this case, there is no motor encoder (P-0-0074 = 0). The parameter **P-0-0121, Velocity mix factor encoder 1 & 2** must be set to 100 % . |
| 4 | Optional encoder as spindle encoder. Usage like "optional encoder as additional loadside control feedback for position and/or velocity loop". But if the max. signal frequency is exceeded, no error is generated, but the position status is cleared. |

Fig. 3-37: Function of optional encoder

**Explanation:**

- If the optional encoder is used as a **control encoder**, it can be used to close the control loop. All modes are possible with ext. enc. The position value is set in **S-0-0053, Position feedback value 2 (opt. feedback)**
- If the optional encoder is used as a **motor encoder**, the control loop and commutation are generated from this encoder. Only **S-0-0053, Position feedback value 2 (opt. feedback)** is supported.

See also the functional description: "Optional encoder".

## P-0-0186, Actual Position value 3, smoothing time

Determines the time constant of the low pass filter to smoothen the actual position value 3. After input of 0, no smoothening is done.

The delay of the low pass filter will automatically be compensated.

## P-0-0190, Operating hours control section

The operating hours of the control section are displayed here. With this parameter, the entire on time of control electronics since installation of the unit can be displayed. If a class 1 error occurs, the contents of this parameter at that time is first stored in **P-0-0193, Error recorder, operating hours control section**.

See also the functional description: "Error memory and operating hour counter".

## P-0-0191, Operating hours power section

With this parameter, the entire on time of control electronics since installation of the unit can be displayed. This is the time over which the drive was operated with drive enable on.

See also the functional description: "Error memory and operating hour counter".

## P-0-0192, Error recorder, diagnosis number

If the drive reports a class 1 error (C1D), a bit is set in **S-0-0011, Class 1 diagnostics** C1D. In the drive status word Bit 13 for "Error C1D“ is set.

Additionally, for a precise diagnosis,

- the diagnosis number is shown in the 7- segment display and stored in **S-0-0390, Diagnostic message number**,
- the plain text diagnosis is stored in **S-0-0095, Diagnostic message**,
- and the relevant error number in **P-0-0009, Error message number**.

When the error is cleared, then the diagnosis number of the error displayed **in S-0-0390, Diagnostic message number** is stored in **P-0-0192, Error recorder diagnosis number**. This parameter shows the diagnosis numbers of the last 19 errors in chronological order in the form of a stack memory. The last cleared error is on top.

The status of **P-0-0190, Operating hours control section** at the time the error was deleted is stored in **P-0-0193, Error recorder, operating hours control section**.

See also the functional description: "Error memory and operating hour counter".

## P-0-0193, Error recorder, operating hours control section

If the drive reports a class 1 error (C1D), then a bit is set in **S-0-0011, Class 1 diagnostics** C1D. Bit 13 for "Error C1D“ is set in the drive status word.

Additionally, for a precise diagnosis,

- the diagnosis number is shown in the 7-segment display and stored in **S-0-0390, Diagnostic message number**,
- the clear text diagnosis is stored in **S-0-0095, Diagnostic message**,
- and the relevant error number in **P-0-0009, Error message number**.

When the error is reset, then the status of **P-0-0190, Operating hours control section** at the time the error was detected is stored in **P-0-0193, Error recorder, operating hours control section**. This parameter shows the diagnosis numbers of the last 19 errors in chronological order. On the topmost position, there is the counter value of the last occured error.

The status of **P-0-0192, Error recorder diagnosis number** at the time the error was deleted in the order in **S-0-0390, Diagnostic message number**.

See also the functional description: "Error memory and operating hour counter".

## P-0-0200, Signal select probe 1

This parameter is used to select what measured quantity will be used for probe input 2.

**The following signals can be selected:**

| P-0-0200: | Selected signal: |
|---|---|
| **0** | Position feedback value 1 or 2, dependent on **S-0-0169, Probe control parameter** bit 4 |
| **1** | Time measurement in µs |
| **2** | Master axis position |
| **3** | Position actual value 1 or 2 with active expectation window |
| **4** | Master axis position with active expectation window |

Fig. 3-38: P-0-0200, Measurement value for probe input 2

See also the functional description: "Probe Input Feature".

## P-0-0201, Signal select probe 2

This parameter is used to select what measured quantity will be used for probe input 2.

**The following signals can be selected:**

| P-0-0201: | Selected signal: |
|---|---|
| **0** | Position feedback value 1 or 2, dependent on **S-0-0169, Probe control parameter** bit 4 |
| **1** | Time measurement in µs |
| **2** | Master axis position |
| **3** | Position actual value 1 or 2 with active expectation window |
| **4** | Master axis position with active expectation window |

Fig. 3-39: P-0-0201, Measurement quantity for the probe input 2

See also the functional description: "Probe Input Feature".

## P-0-0202, Difference probe values 1

The difference between the **S-0-0130, Probe value 1 positive** and the **S-0-0131, Probe value 1 negative** of probe 1 is stored in this parameter. The value is always recalculated when a new positive or negative probe value is latched.

See also the functional description: "Probe Input Feature".

## P-0-0203, Difference probe values 2

The difference between the **S-0-0130, Probe value 2 positive** and the **S-0-0131, Probe value 2 negative** of probe 2 is stored in this parameter. The value is always recalculated when a new positive or negative probe value is latched.

See also the functional description: "Probe Input Feature".

## P-0-0204, Start position for active probe

Probe 1 has the option to ignore the edge of the measuring signal at the probe 1 input.

Using **P-0-0204, Start position for active probe** and **P-0-0205, End position for active probe** opens a window. Only those positions within this window are latched.

To activate this functions one of selection numbers 4 in the signal select for probe 1 (P-0-0200) (act. Pos. Values 1 or 2 with activated window) or 5 (lead axis position with active window) is set.

## P-0-0205, End position for active probe

Probe 1 has the option to ignore the edge of the measuring signal at the probe 1 input.

Using **P-0-0204, Start position for active probe** and **P-0-0205, End position for active probe** opens a window. Only those positions within this window are latched.

To activate this functions one of selection numbers 4 in the signal select for probe 1 (P-0-0200) (act. Pos. Values 1 or 2 with activated window) or 5 (lead axis position with active window) is set.

## P-0-0210, Analog input 1

This parameter displays the analog voltage applied at the analog channel 1 in volts with 3 decimal places.

See also the functional description: "Analog Inputs".

## P-0-0211, Analog input 2

This parameter displays the analog voltage applied at the analog channel 2 in volts with 3 decimal places.

See also the functional description: "Analog Inputs".

## P-0-0212, Analog inputs, IDN list of assignable parameters

The digitalized values of both analog inputs are stored in **P-0-0210, Analog input 1** and **P-0-0211, Analog input 2**. These can be allocated via settable scaling to other drive parameters or cyclically copied. The allowed parameters for allocation are listed in **P-0-0212, Analog inputs, IDN list of assignable parameters**.

**Contents P-0-0212:**

- **S-0-0000, Zero-Parameter to switch off**
- **S-0-0036, Velocity command value**
- **S-0-0037, Additive velocity command value**
- **S-0-0047, Position command value**
- **S-0-0080, Torque/Force command**
- **S-0-0091, Bipolar velocity limit value**
- **S-0-0092, Bipolar torque/force limit value**
- **S-0-0108, Feedrate override**
- **P-0-0083, Gear ratio fine adjust**
- **P-0-0157, Master drive gear output revolutions**
- **P-0-0156, Master drive gear input revolutions**

See also the functional description: "Analog Inputs".

## P-0-0213, Analog input 1, assignment

The digitalized values of both analog inputs are stored in **P-0-0210, Analog input 1** and **P-0-0211, Analog input 2**. These can be allocated via settable scaling to other drive parameters or cyclically copied.

To copy cyclically the analog input 1 to a drive parameter, the ID no. of this parameter must be entered.

If the ID no. Entered in **P-0-0213, Analog input 1, assignment** not in **P-0-0212, Analog inputs, IDN list of assignable parameters**, then the service channel error message "data not correct“ is generated.

**Note:** If the allocation is to be deleted, enter the ID no. S-0-0000.

See also the functional description: "Analog Inputs".

## P-0-0214, Analog input 1, scaling per 10V full scale

The digitalized values of both analog inputs module are stored in the parameters **P-0-0210, Analog input 1** and **P-0-0211, Analog input 2**. These can be assigned to other drive parameters via settable scalings, i.e., copied.

If analog input 1 is cyclically copied to a drive parameter, i.e., an ID no. Has been entered in **P-0-0213, Analog input 1, assignment**, then avalue of 10V of the analog voltage in terms of the assigned parameter is entered.

The unit and the number of decimal places of **P-0-0214, Analog input 1, scaling per 10V full scale** correspond to those of **P-0-0213, Analog input 1, assignment**.When inputting **P-0-0213, Analog input 1, assignment**, both unit and decimal places of **P-0-0214, Analog input 1, scaling per 10V full scale** are switched appropriately.

See also the functional description: "Analog Inputs".

## P-0-0215, Analog input 2, assignment

The digitalized values of both analog inputs are stored in **P-0-0210, Analog input 1** and **P-0-0211, Analog input 2**. These can be allocated via settable scaling to other drive parameters or cyclically copied.

To copy cyclically the analog input 2 to a drive parameter, the ID no. of this parameter must be entered.

If the ID no. Entered in **P-0-0213, Analog input 2, assignment** not in **P-0-0212, Analog inputs, IDN list of assignable parameters**, then the service channel error message "data not correct“ is generated.

**Note:** If the allocation is to be deleted, enter the ID no. S-0-0000.

See also the functional description: "Analog Inputs".

## P-0-0216, Analog input 2, scaling per 10V full scale

The digitalized values of both analog inputs are stored in the parameters **P-0-0210, Analog input 1** and **P-0-0211, Analog input 2**. These can be assigned to other drive parameters via settable scalings, i.e., copied.

If analog input 1 is cyclically copied to a drive parameter, i.e., an ID no. Has been entered in **P-0-0215, Analog input 2, assignment**, then avalue of 10V of the analog voltage in terms of the assigned parameter is entered.

The unit and the number of decimal places of **P-0-0216, Analog input 2, scaling per 10V full scale** correspond to those of **P-0-0215, Analog input 2, assignment**. When inputting **P-0-0215, Analog input 2, assignment**, both unit and decimal places of **P-0-0216, Analog input 2, scaling per 10V full scale** are switched appropriately.

See also the functional description: "Analog Inputs".

## P-0-0217, Analog input 1, offset

The analog channels can be processed with a DC offset. It has the unit millivolt, and this value is subtracted from the analog value.

See also the functional description: "Analog Inputs".

## P-0-0218, Analog input 2, offset

The analog channels can be processed with a DC offset. It has the unit millivolt, and this value is subtracted from the analog value.

See also the functional description: "Analog Inputs".

## P-0-0220, D800 Command Measuring wheel operation mode

With this parameter, the command Measuring wheel operation mode is started.

When position control is active, setting this command switches over to position control with feedback 1 and 2. Before, drive sets the position feedback 2 to the same value as the position feedback 1.

If another operation mode is active, the feedback values are taken from feedback 2.

When the command is cleared, the drive sets the position feedback 1 to the same value as the position feedback 2 and switches back again to position control with feedback 1.

**Condition for starting the command:**

- External feedback present and announced as measuring wheel (P-0-0185 = 3)

If the condition is not met, the command error message „D801 Measuring wheel operation not possible“ is generated.

See also the functional description: "Measuring wheel operation mode".

## P-0-0221, Actual position filter time const. for measuring wheel mode

When the command measuring wheel operation is active, the position loop is closed with the sum of

- the position feedback value 1 and
- the filtered difference between the values of position feedback 2 and position feedback 1.

The time constant of the used filter is determined by this parameter.

The aim of damping the differential position feedback is to smoothen negative effects from a bad coupling between the encoder 2 and the motor shaft (e.g. when the measuring wheel lifts off the material).

The final position is determined by the position feedback value 2 only.

See also the functional description: "Measuring wheel operation mode".

## P-0-0222, State of Travel range limit inputs

This parameter displays the inputs of the travel range limit switches. The parameter is used for diagnostic purposes of the limit switches. The structure is as follows :

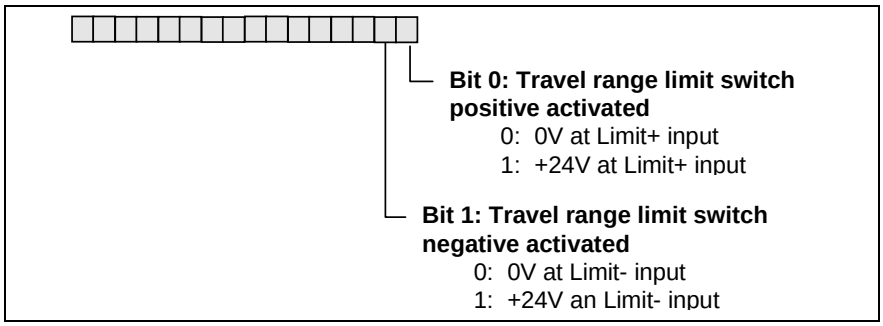



Fig. 3-40: Structure P-0-0222, Travel range limit inputs

See also the functional description: "Travel Zone Limit Switch Monitoring"

## P-0-0223, Status Input E-Stop function

This Parameter shows the state of the emergency stop input. The parameter can be used to read back the E-Stop input oder for display in a setup program.

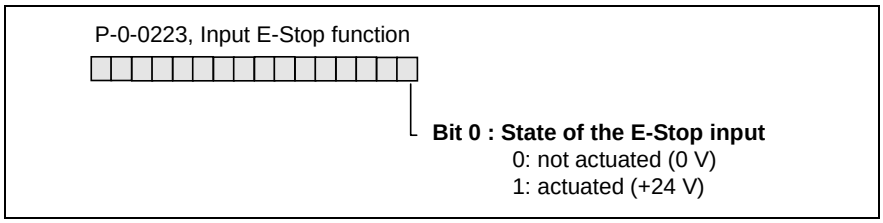



Fig. 3-41: Structure of the parameter P-0-0223, Input E-Stop function

For normal operation of the drive, the hardware input must be actuated with 24V.

See also the functional description: "Emergency stop feature"

## P-0-0420, Analog output 1 signal selection

Using **P-0-0420, Analog output 1 signal selection**, an ID no. can be assigned to the analog AK1 output channel of the drive controller. The parameter with the assigned ID no. can be visualized with an oscilloscope in the form of an analog voltage. Only those ID no. which figure in the list **P-0-0426, Analog outputs, IDN list of assignable parameters** can be used.

See also the functional description: "Analog Output".

## P-0-0421, Analog output 1, expanded signal selection

To be able to show signals as analog voltages, but which are not in **P-0-0426, Analog outputs, IDN list of assignable parameters**, then the option of an expanded signal select is possible. This becomes active as long as no parameter is assigned via **P-0-0420, Analog output 1 signal selection**.

The following expended signal select options are available:

- expanded signal select with permanently defind signals
- byte output
- bit output

**1) Expanded signal selection with fixed signals**

Internal signal numbers are assigned which are not in the drive in the form of ID numbers. These signals have permanent units making an evaluation via **P-0-0422, Analog output 1, scaling per 10V full scale** possible. The evaluation factor 1.0 equals the permanent unit. The following permanently defined signals are possible:

| Signal number P-0-0421 | Output signal | Reference unit: Evaluation factor 1.0000 |
|---|---|---|
| 0x00000001 | motor encoder sine signal | 0.5V/10V |
| 0x00000002 | motor encoder cosine signal | 0.5V/10V |
| 0x00000003 | Opt. enc. sine signal | 0.5V/10V |
| 0x00000004 | Opt. enc. sine cosine | 0.5V/10V |
| 0x00000005 | Position command difference on the pos. controler | rot. ⇒ 1000rpm/10V<br>lin. ⇒ 100m/min/10V |
| 0x00000006 | DC bus power | 1kW/10V |
| 0x00000007 | absolute DC bus power amount | 1kW/10V |
| 0x00000008 | effective current | S-0-0110/10V |
| 0x00000009 | relative current | S-0-0110/10V |
| 0x0000000a | thermal load | 100 % / 10V |
| 0x0000000b | motor temperature | 150°C/10V |
| 0x0000000c | magnetizing current | S-0-0110/10V |
| 0x0000000d | velocity command at the velocity controller | rot. ⇒ 1000rpm/10V<br>lin. ⇒ 100m/min/10V |
| FREE | | |

| | | |
|---|---|---|
| FREE | | |
| ... | | |
| 0x00000014 | synchronous position command value | rot. => 360°/10V<br>lin. => 1mm/10V |
| 0x00000015 | synchronous velocity | rot. => 1000rpm/10V<br>lin. => 100m/min |
| 0x00000016 | master axis position fine interpolation | 2^20/10V |
| 0x00000017 | master axis speed in the NC cycle | rot. => 1000rpm/10V |

Fig. 3-42: Signal select list with predefined signal selection

The outputs are scaling dependent and always relate to the motor shaft given position and velocity data.

**2) Byte output**

It is possible herewith to output memory cells of the data memory as analog voltage. It can only be practically applied if the data storage structure is known. As this is, however, different from version to version, the the function can only be used by the respective developer. The function is activated by setting bit 28 in **P-0-0421, Analog output 1, expanded signal selection**. The adress of the memory cell is defined in the least significant 24 bit of the expanded signal selection.

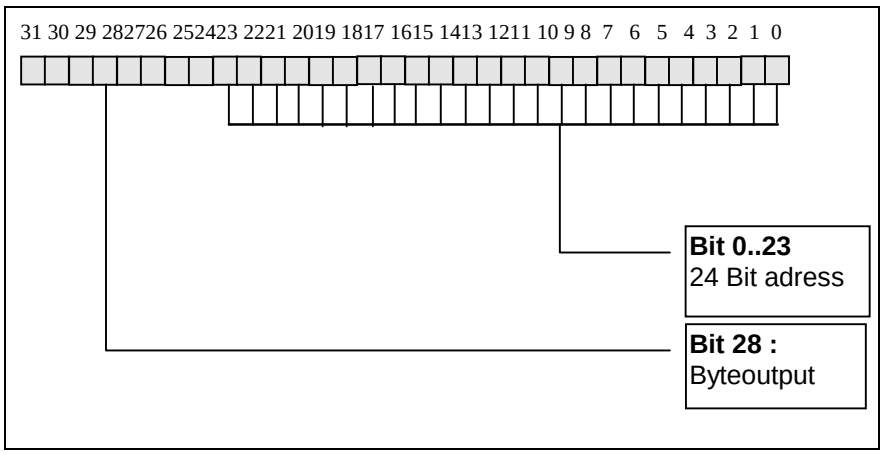



Fig. 3-43: Definition **P-0-0421, Analog output 1, expanded signal selection** with byte output

**3) Bit output**

Individual bits of the data memory can be shown as analog voltage herewith. If the respective bit is set, then 10V voltage is output at the analog output. A cleared bit outputs -10V. The function is activated by setting bit 29 and inputting the desired memory address in **P-0-0421, Analog output 1, expanded signal selection**.

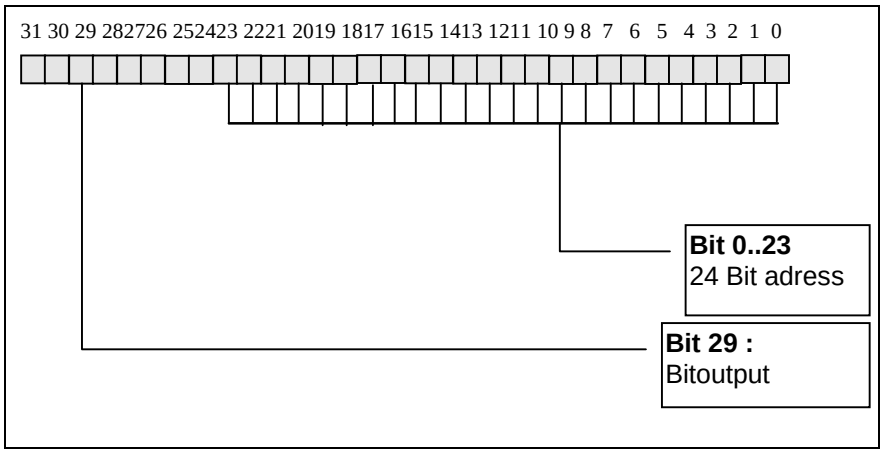



Fig. 3-44: Definition **P-0-0421, Analog output 1, expanded signal selection** with bit output

See also the functional description: "Analog Output".

## P-0-0422, Analog output 1, scaling per 10V full scale

The resolution of the selected signal can be varied with parameter **P-0-0422, Analog output 1 scaling per 10V full scale**. If an ID no. is assigned via **P-0-0420, Analog output 1, signal selection**, the evalution is assigned the same unit as the parameter with the assigned ID number.

The output of pre-defined signals means that the scaling has a decimal factor of 4 decimal places. It has a permanent reference with fixed unit.

The scaling defines the least significant bit for bit and byte outputs. The input is decimal without decimal places.

See also the functional description: "Analog Output".

## P-0-0423, Analog output 2, signal selection

Using **P-0-0423, Analog output 2, signal selection**, an ID no. can be assigned to the analog AK2 output channel of the drive controller. The parameter with the assigned ID no. can be visualized with an oscilloscope in the form of an analog voltage. Only those ID no. which figure in the list **P-0-0426, Analog outputs, IDN list of assignable parameters** can be used.

See also the functional description: "Analog Output".

## P-0-0424, Analog output 2, expanded signal selection

To be able to show signals as analog voltages, but which are not in **P-0-0426, Analog outputs, IDN list of assignable parameters**, then the option of an expanded signal select is possible. This becomes active as long as no parameter is assigned via **P-0-0423, Analog output 2 signal selection**.

The following expended signal select options are available:

- expanded signal select with permanently defind signals
- byte output
- bit output

**1) Expanded signal selection with fixed signals**

Internal signal numbers are assigned which are not in the drive in the form of ID numbers. These signals have permanent units making an evaluation via **P-0-0425, Analog output 2, scalling per 10V full scale** possible. The evaluation factor 1.0 equals the permanent unit. The following permanently defined signals are possible:

| Signal number P-0-0424 | Output signal | Reference unit: Evaluation factor 1.0000 |
|---|---|---|
| 0x00000001 | motor encoder sine signal | 0.5V/10V |
| 0x00000002 | motor encoder cosine signal | 0.5V/10V |
| 0x00000003 | Opt. enc. sine signal | 0.5V/10V |
| 0x00000004 | Opt. enc. sine cosine | 0.5V/10V |
| 0x00000005 | Position command difference on the pos. controler | rot. ⇒ 1000rpm/10V<br>lin. ⇒ 100m/min/10V |
| 0x00000006 | DC bus power | 1kW/10V |
| 0x00000007 | absolute DC bus power amount | 1kW/10V |
| 0x00000008 | effective current | S-0-0110/10V |
| 0x00000009 | relative current | S-0-0110/10V |
| 0x0000000a | thermal load | 100 % / 10V |
| 0x0000000b | motor temperature | 150°C/10V |
| 0x0000000c | magnetizing current | S-0-0110/10V |
| 0x0000000d | velocity command at the velocity controller | rot. ⇒ 1000rpm/10V<br>lin. ⇒ 100m/min/10V |
| FREE | | |
| FREE | | |
| ... | | |
| 0x00000014 | synchronous position command value | rot. => 360°/10V<br>lin. => 1mm/10V |
| 0x00000015 | synchronous velocity | rot. => 1000rpm/10V<br>lin. => 100m/min |
| 0x00000016 | master axis position fine interpolation | 2^20/10V |
| 0x00000017 | master axis speed in the NC cycle | rot. => 1000rpm/10V |

Fig. 3-45: Signal select list with predefined signal selection

The outputs are scaling dependent and always relate to the motor shaft given position and velocity data.

**2) Byte output**

It is possible herewith to output memory cells of the data memory as analog voltage. It can only be practically applied if the data storage structure is known. As this is, however, different from version to version, the the function can only be used by the respective developer. The function is activated by setting bit 28 in **P-0-0424, Analog output 2, expanded signal selection**. The adress of the memory cell is defined in the least significant 24 bit of the expanded signal selection.

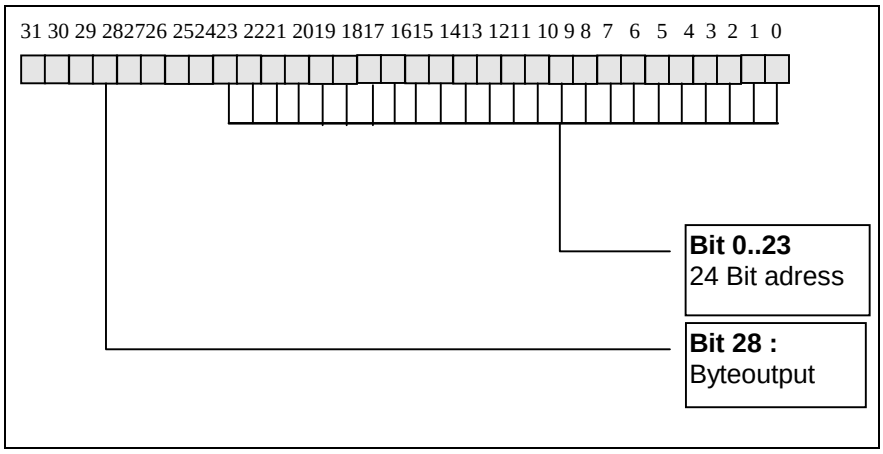



Fig. 3-46: Definition **P-0-0424, Analog output 2, expanded signal selection** with byte output

**3) Bit output**

Individual bits of the data memory can be shown as analog voltage herewith.If the respective bit is set, then 10V voltage is output at the analog output. A cleared bit outputs -10V. The function is activated by setting bit 29 and inputting the desired memory address in **P-0-0424, Analog output 2, expanded signal selection**.

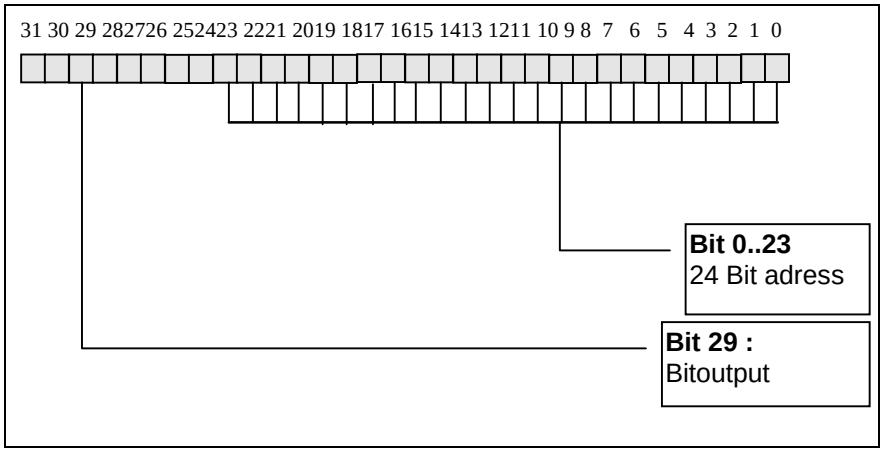



Fig. 3-47: Definition **P-0-0424, Analog output 2, expanded signal selection** with bit output

See also the functional description: "Analog Output".

## P-0-0425, Analog output 2, scaling per 10V full scale

The resolution of the selected signal can be varied with parameter **P-0-0425, Analog output 2 scaling per 10V full scale**. If an ID no. is assigned via **P-0-0423, Analog output 2, signal selection**, the evalution is assigned the same unit as the parameter with the assigned ID number.

The output of pre-defined signals means that the scaling has a decimal factor of 4 decimal places. It has a permanent reference with fixed unit.

The scaling defines the least significant bit for bit and byte outputs. The input is decimal without decimal places.

See also the functional description: "Analog Output".

## P-0-0426, Analog outputs, IDN list of assignable parameters

The parameter **P-0-0426, Analog outputs, IDN list of assignable parameters** contains a list of all parameters assignable via **P-0-0420, Analog output 1 signal selection** and **P-0-0423, Analog output 2, signal selection**.

**Contents P-0-0426:**

- **S-0-0036, Velocity command value**
- **S-0-0040, Velocity feedback value**
- **S-0-0047, Position command value**
- **S-0-0051, Position feedback 1 value**
- **S-0-0053, Position feedback 2 value**
- **S-0-0080, Torque/Force command**
- **S-0-0084, Torque/Force feedback value**
- **S-0-0134, Master control word**
- **S-0-0135, Drive status word**
- **S-0-0182, Manufacturer class 3 diagnostics**
- **S-0-0189, Following error**
- **S-0-0347, Speed deviation**
- **S-0-0383, Motor temperature**
- **S-0-0403, Position feedback value status**
- **P-0-0052, Position feedback value 3**
- **P-0-0053, Master drive position**
- **P-0-0098, Max. model deviation**
- **P-0-0141, Thermal drive load**

See also the functional description: "Analog Output".

## P-0-0502, Encoder emulation, resolution

**IGS Emulation**

If incremental encoder emulatoin is selected in **P-0-4020, Encoder emulation type** (**IGS**), then the number of lines of the simulated incremental encoder can be entered here.

Allowed values with IGS emulation are: **1 - 65536**

**Note:** It must be noted that the maximum output frequency of 1MHz is not exceeded!

**SSI Emulation**

If absolute encoder emulation (SSI) is set in **P-0-4020, Encoder emulation type**, then the bit width of the SSI position to be generated must be entered.

Allowed values with SSI emulation are: **8 - 24**

Also see function description: "Activating Encoder Emulation"

## P-0-0503, Marker pulse offset

With this parameter, the position of the reference pulse (zero pulse) of the emulated incremental encoder output can be shifted within one (electr. or mech.) turn.

See also functional description: "Encoder Emulation".

## P-0-0508, Commutation offset

For synchronous motors, this parameter indicates the offset between the raw value of the motor encoder and the resulting absolute electrical angle between the stator current vector and the rotor flux vector.

For motors with motor feedback data memory, like MKD, the commutation offset is stored in the feedback and therefore does not need to be entered.

This value must always be redetermined, if

- the motor probe system encounters a change in its mechanical structure,
- A mechanical restructuring of primary and secondary portions takes place.

For asynchronous motors, this parameter has no meaning.

See also the functional description: "Synchronous-Asynchronous".

## P-0-0510, Moment of inertia of the rotor

This parameter indicates the moment of inertia of the rotor without load. For motors with feedback memory (e.g. MKD), it is saved in the feedback.

See also the functional description: "Motor Feedback-Data Memory".

## P-0-0511, Brake current

This parameter shows, how much current the brake in the connected motor needs.

## P-0-0520, Hardware code

Parameter for identification of the hardware.

The parameter is determined during the manufacturing stage and cannot be changed.

## P-0-0523, Commutation, probe value

If the commutation offset for linear synchronous motors is to be set with the **P-0-0524, Commutation adjustment command**, then the setting probe value should be entered in the **P-0-0523, Commutation, probe value** parameter.

See also the functional description: "Determining the commutation offset".

## P-0-0524, D300 Commutation adjustment command

**For synchronous kit motors** and linear motors it is necessary to adjust for the commutation during the initial setup. The appropriate command can be started under following **conditions**:

- Operation mode = Torque Control
- Command Torque = 0
- Drive Enable = 1

After starting the command, the drive moves by itself a short distance forward and backward, thereby determining the commutation offset.

The command is cancelled by dropping the drive enable to 0.

For other synchronous motors with intrinsic feedback, e.g. MKD, the commutation offset is determined at the INDRAMAT works, and the customer cannot execute the command any more.

See also the functional description: "Determining the commutation offset".

## P-0-0525, Type of motor brake

This parameter specifies whether an electrically released or electrically engaged brake is being used. If an **MHD** or **MDK** motor is used, then the brake will be electrically released, if there is one. The bit 0 will be set automatically to 0. If other motor types are used, this bit must be entered during the startup procedure.

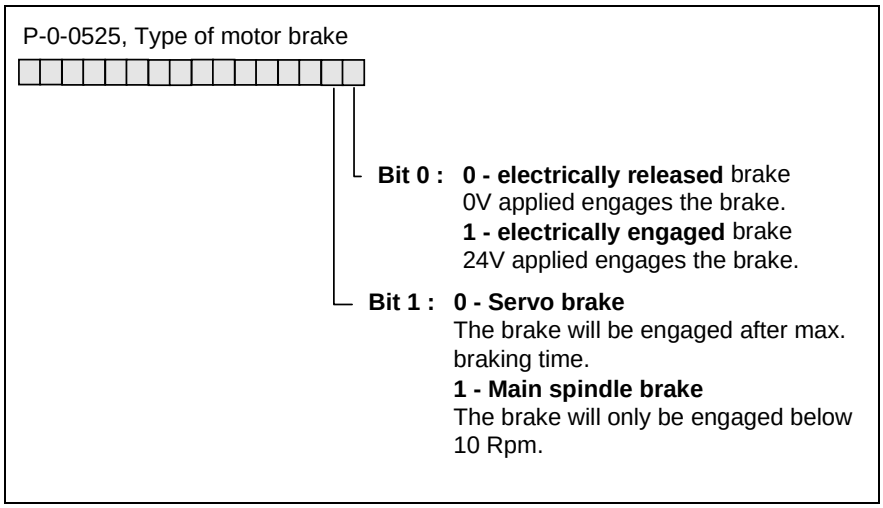



Fig. 3-48: Setting the type of motor brake

See also the functional description: "Motor Holding Brake".

## P-0-0526, Brake control delay

If a holding brake is used, the time delay between the activation of the brake and the time when it gets its full force must be set in this parameter.

It must be sure that the drive is still electrically controlled as long as the brake does not grip firmly.

This value is entered automatically when MHD, MKD or MKE motors are used. When using Indramat brakes in conjunction with asynchronous motors, then the standard value to be entered is 150 ms.

See also the functional description: "Motor Holding Brake".

## P-0-0530, Slip increase

In an asynchronous motor, the rotor resistance and consequently the rotor time constant changes with the temperature. The slip increase compensates for this change.

The slip increase per 100K(elvin) is motor-specific and is specified by Indramat for each individual motor.

See also the functional description: "Asynchronous Motors".

## P-0-0531, Stall current limit

The stall current limit is used to limit the peak current of the motor to reasonable values when operating at high velocities. Higher currents lead only to higher losses, not to more wave power.

This limit value is set by Indramat. If 0 is entered, the limit is inactive.

See also the functional description: "Asynchronous Motors".

## P-0-0532, Premagnetization factor

The pre-magnetization factor is used for application-dependent decreases in the Servo magnetization current. Together with parameter **P-0-4004, Magnetizing current**, it specifies the motor's magnetization current.

Effective magnetization current =

magnetization current • pre-magnetization scaling factor

With a pre-magnetizing factor of 100%, the Servo magnetization current in the motor will flow so that a torque proportional to the momentum-producing current will result in the basic rotation range.

See also the functional description: "Scaling Factor Pre-Magnetizing".

## P-0-0533, Flux loop prop. gain

The flux loop controls the magnetization current in the field-weakening range.

The parameter value is set by Indramat.

See also the functional description: "Asynchronous Motors".

## P-0-0534, Flux loop integral action time

The flux loop controls the magnetization current in the field-weakening range.

The parameter value is set by Indramat.

See also the functional description: "Asynchronous Motors".

## P-0-0535, Motor voltage at no load

The motor voltage in the field-weakening range is set so that it reaches a value lower than or equal to the DC bus voltage.

Under load, the motor voltage will be raised to the maximum motor voltage.

See also the functional description: "Asynchronous Motors".

## P-0-0536, Motor voltage max.

The motor voltage in the field-weakening range is set so that it reaches a value lower than or equal to the DC bus voltage.

At full load, the motor voltage will rise to the maximum motor voltage. The output voltage will be sinusoidal up to a value of 90% .

See also the functional description: "Asynchronous Motors".

## P-0-0538, Motor function parameter 1

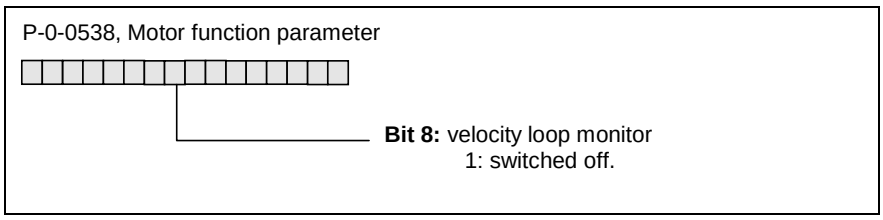



Fig. 3-49: P-0-0538, Motor function parameter

**WARNING**

Attention, danger for life! Danger of runaway axis!

If you switch off the velocity loop monitor, the drive does not survey any more whether the axis follows the velocity command values. E.g. with wrong parameters it can happen that the axis moves inadvertently.

See also the functional description: "Setting the Velocity Controller".

## P-0-1201, Ramp 1 pitch

The parameter **P-0-1201, Ramp 1 pitch**, takes effect in

- "Velocity control" operating mode and
- during the **error response** "Velocity command value zero-switch with pitch and filter".

The acceleration and delay entered here are used to create a pitch starting from the last effective command value to the new command value.

In the Velocity control operating mode, the resulting velocity command value is derived from the sum of the value resulting from the pitch function in **S-0-0036, Velocity command value** and the direct value in **S-0-0037, Additive velocity command value**.

During the error response "Velocity command value, zero-switch with pitch and filter", velocity proceeds from the current feedback velocity to 0, using the effective velocity command value with the delay specified by the parameter in **P-0-1201, Ramp 1 pitch**.

**Note:** With the value in the parameter P-0-1201, Ramp 1 pitch = 0, the ramp is not active.

See also the functional description: "Velocity command value to zero with filter and ramp".

## P-0-1202, Final speed of ramp 1

At the speed in the parameter **P-0-1202 Final speed of ramp1**, the slope of the drive internal speed command ramp changes from **Ramp 1 pitch (P- 0-1201)** to **Ramp 2 pitch (P-0-1203)**.

See also the functional description: "Velocity command value to zero with filter and ramp".

## P-0-1203, Ramp 2 pitch

The parameter **P-0-1203, Ramp 2 pitch**, takes effect in

- "Velocity control" operating mode and
- during the error response "Velocity command value zero-switch with pitch and filter".

The acceleration and deceleration entered here are used to create a pitch starting from the last effective command value to the new command value, as long as the speed at the ramp output is higher than the value in the parameter **P-0-1202, Final speed of ramp 1**.

In the Velocity control operating mode, the resulting velocity command value is derived from the sum of the value resulting from the pitch function in **S-0-0036, Velocity command value** and the direct value in **S-0-0037, Additive velocity command value**.

During the error response "Velocity command value, zero-switch with pitch and filter", velocity proceeds from the current feedback velocity to 0, using the effective velocity command value with the delay specified by the parameter in **P-0-1203, Ramp 2 pitch**.

**Note:** With the value in the parameter P-0-1201, Ramp 1 pitch = 0, the ramp is not active.

See also the functional description: "Velocity command value to zero with filter and ramp".

## P-0-1222, Velocity command filter

The parameter **P-0-1222, Velocity command filter** works

- in the Velocity control operating mode and
- during the error response "Velocity command value zero-switch with slope and filter."

The time constant entered here is used in the velocity control operating mode to pass the value in **S-0-0036, Velocity command value** which has been pitched by **P-0-1201, Ramp 1 pitch**, through a deep-pass filter. This serves to diminish surges in acceleration over the course of command values.

The resulting velocity command value results from the sum of the sloped and filtered value in **S-0-0036, Velocity command value** and the direct value in **S-0-0037, Additive velocity command value**.

When error response "Velocity command value, zero-switch with pitch and filter" is executed, velocity proceeds from the current feedback velocity to 0, using the effective velocity command value with the delay specified by the parameter in **P-0-1201, Ramp 1 pitch**. It is also passes through the deep pass filter specified by **P-0-1222, Velocity command filter**.

See also the functional description: "Velocity command value to zero with filter and ramp".

## P-0-4000, Current-zero-trim phase U

This parameter serves to display the determined result of the zero-trim procedure for the current feedback sensor of phase U.

## P-0-4001, Current-zero-trim phase V

This parameter serves to display the determined result of the zero-trim procedure for the current feedback sensor of phase V.

## P-0-4002, Current-amplify-trim phase U

For trimming of the current sensor regarding its gain error, this parameter is determined in the test area for the Indramat drive controllers.

## P-0-4003, Current-amplify-trim phase V

For trimming of the current sensor regarding its gain error, this parameter is determined in the test area for the Indramat drive controllers.

## P-0-4004, Magnetizing current

This parameter indicates the nominal or servo-magnetization current set by Indramat **for asynchronous motors**. The magnetizing current actually flowing is also dependent on the premagnetization scaling factor.

For synchronous motors, e.g. MKD, this parameter is automatically set to 0.

See also the functional description: "Asynchronous Motors".

## P-0-4006, Process block target position

List of the target positions for the block operated function (positioning interface). You can input a maximum of 64 position values, whereby the first elemet specifies the target position of the process block 0, the second position specifies the target position of the process block 1, and so on.

The number of the target positions must always be greater or equal to the number of the operational process blocks. If a process block is selected for which there is no target position, then the warning „non-programmed process block" will be given.

See also the function description: "Positioning Block Mode".

## P-0-4007, Process block velocity

List of the process block velocities for the block operated function (positioning interface). You can input a maximum of **64** velocities, whereby the first element specifies the maximum velocity of the process block 0, the second element specifies the maximum velocity of the process block 1, and so on.

The number of the process block velocities must always be greater or equal to the number of operational process blocks. If a process block is selected of which there is no process block velocity, then the warning "non-programmed process block" will be given.

See also the function description: "Positioning Block Mode".

## P-0-4008, Process block acceleration

List of the accelerations for the block operated function (positioning interface). You can input a maximum of **64** acceleration values, whereby the first element specifies the maximum acceleration of the process block 0, the second element specifies the maximum acceleration of the process block 1, and so on.

The number of acceleration values must always be greater or equal to the number of operation process blocks. If a process block is selected of which there is no acceleration, then the warning „unprogrammed Process block" will be given.

See also the function description: "Positioning Block Mode".

## P-0-4009, Process block jerk

List of the jerk limit values for the block operated function (positioning interface). You can input a maximum of **64** jerk limit values, whereby the first element specifies the jerk limit value of the process block 0, the second element specifies the jerk value of the process block 1, and so on.

The number of the jerk limit values must be greater or equal to the number of operation process blocks. If a process block is selected of which there is no jerk value, then the warning „non-programmed process block" will be given.

With an input of **0**, the jerk limit can be turned **off**.

See also the function description: "Positioning Block Mode".

## P-0-4010, Load inertia

The load moment of inertia determined with the automatic control loop setting is entered in this parameter, without **P-0-0510, rotor moment of inertia**. The knowledge of the load inertia is important when optimizing the velocity control loop.

**Note:** The inertia relates to the motor and is rotary in nature.

See also the functional description:"Automatic Control Loop Settings".

## P-0-4011, Switching frequency

This parameter is used to set the switching frequency of the pulse with modulation controller to **4 kHz or 8 kHz**.

See also the functional description: "Setting the Active Continuous Current".

## P-0-4012, Slip factor

The slip factor is the most important parameter for asynchronous motors. It indicates the rotor frequency in relation to the torque-producing current. The lower the rotor time constant is, the higher the slip factor.

This parameter is set motor-specifically by Indramat.

See also the functional description: "Asynchronous Motors".

## P-0-4014, Motor type

The motor type can be selected with this parameter. The following motor types are supported:

- 1: MHD
- 2: 2AD / 1MB with NTC sensor
- 3: LSF
- 4: LAR / LAF
- 5: MKD / MKE
- 6: 2AD /1MB with PTC sensor
- 7: synchronous kit motor

See also the functional description: "Setting of the Motor Type through P-0-4014, Motor Type".

## P-0-4015, Intermediate DC bus voltage

The intermediate voltage of the DC bus is stored in the amplifier as a parameter.

The parameter cannot be edited and is only for display and for internal calculations (PWM).

## P-0-4019, Process block mode

Setup of the process block mode for each separate process block.The first element of this list specifies the mode of the process block 0, the second specifies the mode of the process block 1, and so on.

| process block mode | Setup value |
|---|---|
| **Absolute** process block | **1** h |
| **relative** process block without res. path storage | **2** h |
| relative process block with res. path storage | 102 h |
| Movement in positive direction | 4 h |
| Movement in negative direction | 8 h |
| following block at target position without halt (mode 1) | 10 h |
| following block at target position without halt (mode 2) | 20 h |
| following block at target position with halt | 40 h |
| following block with transition at switching signal | 80 h |

Fig. 3-50: Selectable process block modes

The number of the process block modes must always be greater or equal to the number of operational process blocks. If a process block is selected of which there is no process mode, then the warning „non-programmed process block" will be given.

See also the functional description:"Positioning Block Mode".

## P-0-4020, Encoder emulation type

The parameter gives the choice

- between **incremental or absolute** feedback position output as well as
- the **source** of the signal to emulate.

The following table shows the possible combinations:

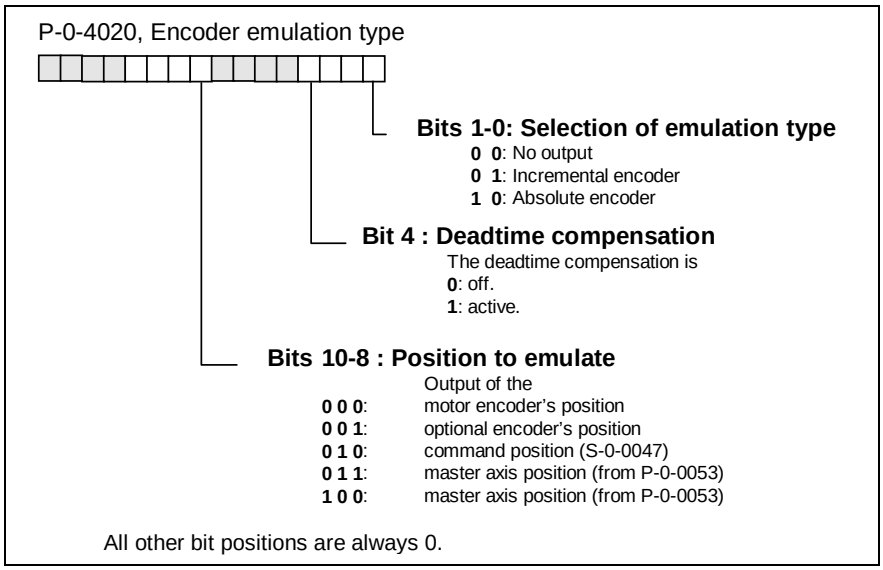



Fig. 3-51: Parameter P-0-4020, Encoder Emulation Type

See also the functional description:"Encoder Emulation".

## P-0-4021, Baud rate RS-232/485

Various baud rates (transmission speeds) can be set for communications via the serial interfaces.

| Baud rate [Baud] | Setting in parameter P-0-4021 |
|---|---|
| 9600 | 0 |
| 19200 | 1 |

Fig. 3-52: Settable baud rates

**ATTENTION**

⇒ All participants on the bus must be set to the same baud rate.

**Note:** Do not change the baud rate in the list of all parameters in *DriveTop*. Doing so would lock out all further communications in *DriveTop* versions < 3.

See also Supplement A: "Serial communications".

## P-0-4022, Drive address

When communicating via **RS485** interface with more than one drive, every drive must have a different address, so that only the addressed drive responds.

**Note:** If you enter the into the communication parameter P-0-4022 the value 256, it's the address switches which determine the device address (1..99) for the serial communication (RSKO + SIS) and not the value 256.

**ATTENTION**

If you set the **address via the serial interface** instead of the switches, **only one drive** may be connected at a time.

Only as soon as the addresses are set, you can connect the entire bus.

See also Supplement A: "Serial communications".

## P-0-4023, C400 Communication phase 2 transition

Switching command **from drive mode** or from phase 3 (P3) **to parameter mode**, Phase 2 (P2).

The command can only be processed when the **drive enable** is **off**.

See also the functional description: "Parametrization Mode - Operating Mode".

## P-0-4024, Test status

Gives information about the product advancement in the factory.

## P-0-4026, Process block selection

With this parameter, you can read during "drive stop", which process block is selected with the input signals Pos1 to Pos5. During the motion (display AF), you can read here the number of the process block currently being processed. If bit 0 is set to ´0´ in parameter **P-0-4060, Process block control word,** then the process block can be pre-selected in this parameter via the serial interface.

See also the functional description: "Positioning Block Mode".

## P-0-4030, Jog velocity

Limit value for the velocity during movement via the jog input. The value must be smaller than that in parameter **S-0-0091, Bipolar Velocity Limit** value.

The velocity of the motion will also be controlled by **S-0-0108, feed rate override** and - during motion with limited velocity - the maximum **Positioning speed (S-0-0259)**.

See also the functional description: "Operating Mode: Jogging".

## P-0-4033, Stepper motor resolution

The number of steps required to go one mechanical revolution of the motor with the **stepper motor interface**.

See also the functional description: "Operating Mode: Stepper motor Operations"

## P-0-4034, Stepper motor interface mode

Setup of the mode of the stepper motor control signals.

| Stepper motor signals | Setting |
|---|---|
| Quadrature signals | 1 |
| Forward/backward signals | 2 |
| Step and direction signals | 3 |

Fig. 3-53: Stepper motor modes

See also the functional description: "Operating Mode: Stepper motor Operations"

## P-0-4035, Trim-current

In this parameter, the current value is stored with which the **current measurement** of the drive control is precisely adjusted in the factory. This eliminates systematical errors in the current measurement. The value has no meaning to the user and **cannot be changed.**

## P-0-4044, Braking resistor load

With this parameter, you can read the average power dissipated in the braking resistance.

**100%** means here that the damping resistance is charged with its **continuous rated power**. For a safe operation, the load should be less than 80% . The value is very much smoothened (filtered).

In order to ensure if a processing cycle does not overload the braking resistance, the analog signal „bleeder load" must be considered.

## P-0-4045, Active permanent current

This parameter shows how much current the drive can supply in the actual cmbination in continual operation. Multiplying with the **P-0-0051, torque constant** of the motor yields the continual operational torque.

With this current, the device is not overloaded. It is also the current to which the current limit reduces.

This parameter is calculated by the drive control during switching to the operating mode and is not changeable. Determining this limit is influenced by the following **current and torque limitations and settings**:

| ID-Nr. | Name | Unit |
|---|---|---|
| S-0-0111 | Motor continuous current at standstill 1) | A |
| S-0-0112 | Amplifier nominal current | A |
| P-0-4058 | Amplifier type data | |
| S-0-0092 | Torque limit bipolar 2) | % |

Fig. 3-54: Active continuous current, dependencies

1) The continuous current at standstill of the motor is that value of which the percentage specifications pocess: it corresponds to 100%.

2) Limits the current if less than 100%

See also the functional description: "Setting the Active Continuous Current".

## P-0-4046, Active peak current

This parameter shows how much current the drive can supply in the actual combination **momentarily** (0.4 s). Multiplying with the **P-0-0051, torque constant** of the motor yields the momentary operation torque (i.e. for acceleration operations).

This parameter is calculated and preset by the drive control during switching to the operating mode. The dynamic current limiting reduces this value according to the load of the amplifier.

Determining this limit is influenced by the following **current and torque limitations and settings**:

| ID-Nr. | Name | Unit |
|---|---|---|
| S-0-0109 | Motor peak current | A |
| S-0-0110 | Amplifier peak current | A |
| P-0-4058 | Amplifier type data | |
| S-0-0092 | Torque limit bipolar | % |

Fig. 3-55: Active peak current, dependencies

See also the functional description: "Setting the Active Peak Current".

## P-0-4047, Motor inductance

Inductance of the motor, measured between two clamps.

The parameter is set at the factory and cannot be changed.

## P-0-4048, Stator resistance

Stator resistance of the motor, measured between two connection clamps.

The parameter is set at the factory and cannot be changed.

## P-0-4050, Delay answer RS-232/485

The **RS-485** interface (bus capable) works in **half duplex** mode. The same pair of wires is used for both directions. The transmission direction must be switched during the data exchange. In oder to allow the connected devices (PC or PLC) a sufficient **time to switch between transmitting and receiving** on their side, the answer time of the drive can be set via this parameter.

**P-0-4050** defines the minimal **time in milliseconds** that must pass after the last symbol of a telegram is received over the serial interface and before the first symbol of the response may be sent. For RS-232 operation, this parameter is not necessary.

The required response delay time is dependent on the Master/PC used. At shipping, the value for the answer delay is set to a value which satisfies most **PCs**.

**Note:** If communication problems arise, for example "TIMEOUT" message in *DriveTop*, then set the answer delay gradually to higher values, until the problems are gone. For safety, multiply the found limit value with the factor 1.5 and input it as answer delay.

See also Supplement A: "Serial communications".

## P-0-4051, Process block acquittance

This parameter reflects the positioning command selection acquittance. It is also accessible in the hardware signals provided for this purpose.

At **Drive_Start = 0** (Drive Halt) the acquittance displays the preselected positioning command, **inverted** (complement), if controller enable = 1.

At **Drive_Start = 1** acquittance displays the current positioning command, and is **not inverted**, if it was accepted.

See also functional description "Positioning Block Mode".

## P-0-4052, Positioning block, last accepted

This parameter stores the number of the last accepted positioning process block. This last process block number is also available after switching off and back on as the positioning block selection acquittance, as long as the drive enable has not been given.

See also the functional description "Positioning Block Mode".

## P-0-4053, Intermediate DC bus voltage gain adjust

The **measurement of the DC bus voltage** must be adjusted during the fabrication.

The correction factor found during the adjustment process is stored permanently in the parameter P-0-4053.

## P-0-4054, Resolver input offset

The signal path for the resolver signals has an offset error. It is measured in the INDRAMAT test field, stored in this parameter and taken into account for the evaluation of the actual position in order not to influence the actual value.

The offset error of the encoder track 1 is stored in the low word, the offset error of the encoder track 2 is stored in the high word.

## P-0-4055, Resolver input, amplitude adjust

The signal path for the resolver signals has a gain error. This error deviates the actual position value. The gain error is measured in the test field.

By compensating the gain error, the amplitudes of the resolver signals are matched together.

The value 0x4000H refers to a correction factor of 1.000 .

## P-0-4056, Jog inputs

This parameter shows the hardware inputs for jogging.

Bit 0 reflects the state of the Jog+ bit.

Bit 1 reflects the state of the Jog- bit.

Depending on the interface of the device, the bits come from hardware inputs or from a field bus.

| Parameter P-0-4056 | Inputs | Effect |
|---|---|---|
| 00 | Jog+ and Jog- = 0 | no Jog direction selected |
| 01 | Jog+ = log. 1, Jog- = 0 | positive Jog direction selected |
| 10 binary | Jog+ = 0, Jog- = log. 1 | negative Jog direction selected |
| 11 binary | Jog+ and Jog- = log. 1 | not allowed (Halt) |

Fig. 3-56: Meaning of the Jog inputs

See also the functional description "Operating Mode: Jogging".

## P-0-4057, Positioning block, input linked blocks

This parameter shows the hardware inputs for the operation with linked positioning process blocks.

Bit 0 reflects the state of the link block cam 1. 24V at the input means 1 in the bit 0.

Bit 1 reflects the state of the link block cam 2. 24V at the input means 1 in the bit 1.

| Parameter P-0-4056 | Bedeutung |
|---|---|
| 0000000000000000 | link block cam 1 and<br>link block cam 2 = 0V |
| 0000000000000001 | link block cam 1 = 24V<br>link block cam 2 = 0V |
| 0000000000000010 | link block cam 1 = 0V<br>link block cam 2 = 24V |
| 0000000000000011 | link block cam 1 = 24V<br>link block cam 2 = 24V |

Fig. 3-57: Meaning of the Input for linked blocks

See also functional description:"Positioning Block Mode".

## P-0-4058, Amplifier type data

In order to be ble to determined amplifier load the firmware must know the physical features of the amplifier.

**Characteristics:**

- transient thermal resistance
- continuous amplifier load
- thermal capacity

## P-0-4059, Braking resistor data

To make the evaluation of the braking resistor (bleeder) load possibel, the firmware must know the physical properties of the braking resistor.

**Technical data:**

- Braking resistor peak power
- Braking resistor continuous power
- Max. allowed energy pulse, assuming that the pulse duration is so short, that no energy can be cooled down.

## P-0-4060, Process block control word

This parameter contains relevant settings for the operation mode with process blocks. The parameter has the following structure :

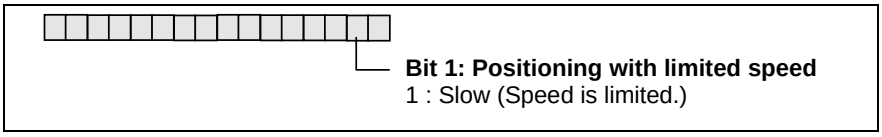



Fig. 3-58: Structure P-0-4060, Process block control word

See also the functional description:"Positioning Block Mode".

## P-0-4061, Mains voltage gain adjust

Using this parameter, the command communications (SERCOS, Profibus, ..) informs the drive about important control information on handling communication phase transitions as well as when releasing hardware inputs for -the drive enable and drive halt. Users cannot write access this parameter. It only supports diagnostics.

**Parameter Structure:**

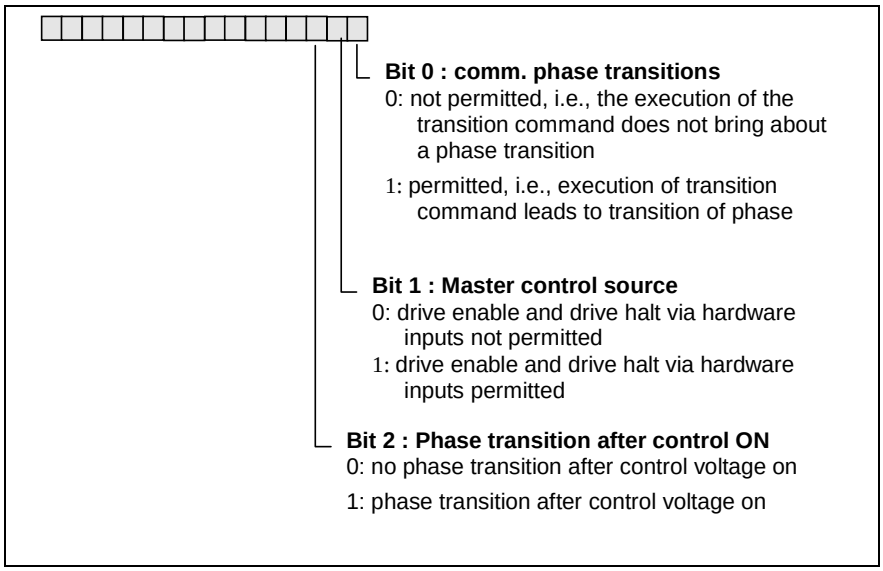



Fig. 3-59: P-0-4061, Mains voltage gain adjust

## P-0-4062, Power supply monitor

This parameter can be used to monitor the activation or deactivation (Bit0 = 0) of an external power module. This is done via (Bit0 = 1).

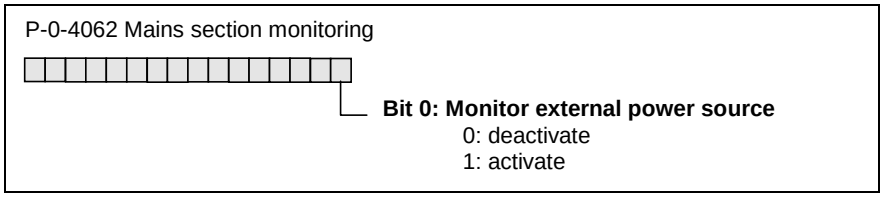



Fig. 3-60: Structure of P-0-4062

**Note:** The monitor evaluates the bb-mains section input (0V →error in power supply module).

## P-0-4086, Command communication status

Command communications (SERCOS, Profibus, ..) uses this parameter to inform the drive about important control information on handling communication phase transitions and for enabling hardware inputs for drive enable and drive halt.

**Note:** The user cannot write access this parameter. It only supports diagnostics.

**Parameter structure:**

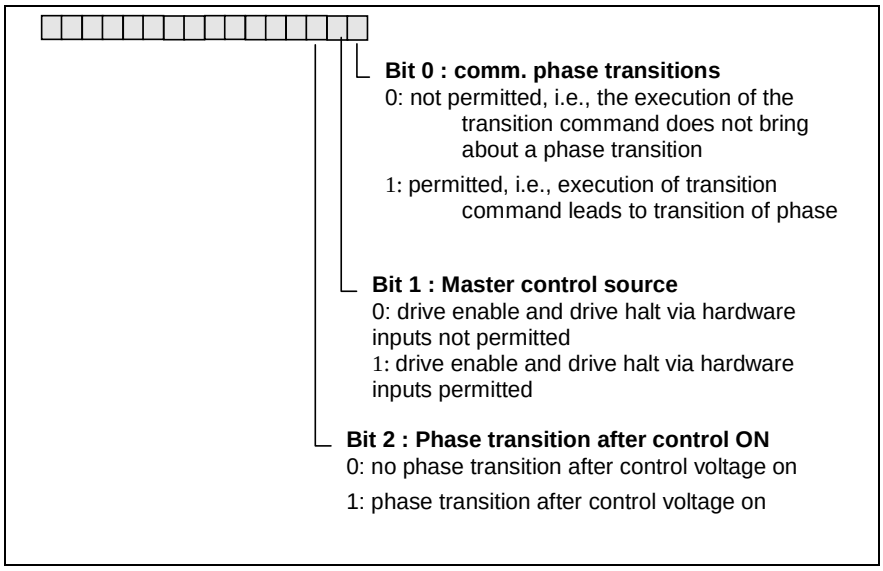



Fig. 3-61: P-0-4086, Command communication status

## P-0-4088, Serial number

**Description:**

The unit's serial number is stored in this parameter. The serial number is made up of a combination of material and continuous serial numbers.

In the event servicing is necessary, then material and serial numbers can be read here.

Serial number structure:

SN <6 place material number>-<6 place serial number>

Example: SN 276813-10021

## P-0-4089, Production index

**Description:**

The finishing index of the drive controller is stored here. In the event servicing becomes necessary, the serial number can be read out for diagnostic purposes.

Example: **A01**

## P-0-4094, C800 Command Base-parameter load

With the execution of this command, all parameters in **S-0-0192, IDN list of backup operation data** are set to their base values.

If the firmware in the prog. module is replaced with another version and the parameter memory is incompatible, then error **F209 PL Load parameter default values** is generated. "**PL**" appears on the display. (At this time, the ser. interface is not yet active.)

Afterwards, execute the command by pressing the S1 button.

See also the functional description: "Basic parameter block".

## P-7-0004, Velocity loop smoothing time constant

The time constant that can be activated in this parameter acts on the velocity loop controller.

This is the default value from the feedback data memory. With the Basic Load procedure, the P-7-parameters are copied into the P-0-parameters.

See also the parameter description for P-0-0004.

## P-7-0018, Number of pole pairs/pole pair distance

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the number of pole pairs of the motor.

## P-7-0051, Torque/force constant

The Torque/Force constant indicates, how much torque or force the motor delivers at a certain real current.

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the torque constant of the motor.

## P-7-0508, Commutation offset

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the commutation offset of the motor. The commutation offset contains the angle of the rotor in relation to the motor encoder.

## P-7-0510, Moment of inertia of the rotor

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the moment of inertia of the motor's rotor.

## P-7-0511, Brake current

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the brake current of the motor.

## P-7-0513, Feedback type 1

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the kind and type of the feedback.

## P-7-0514, Absolute encoder offset

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the absolute encoder offset. This value is changed by the command **P-0-0012, C300 Command 'Set absolute measurement**.

## P-7-0517, Feedback type 2

For optional encoder with feedback data memory, this parameter shows the value stored there for the kind and type of the feedback 2.

## P-7-4028, Impulse wire feedback - offset

The offset of the impulse wires referred to the resolver is saved in this parameter. It is messured in the factory and stored in the feedback memory.

## P-7-4029, Impulse wire feedback - PIC counter value

This parameter contains the information of the absolute position of the encoder.

The value is updated at every position initialization. The value is read-only and cannot be edited by the user.

## P-7-4047, Motor inductance

Inductance of the motor, measured between two clamps.

This is the value from the feedback data memory. During Basic Load, the P-7 parameters are copied into the P-0 parameters.

The parameter is set at the factory and cannot be changed.

## P-7-4048, Stator resistance

Stator resistance of the motor, measured between two connection clamps.

This is the value from the feedback data memory. During Basic Load, the P-7 parameters are copied into the P-0 parameters.

The parameter is set at the factory and cannot be changed.

# Notes

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Kundenbetreuungsstellen in Deutschland - Service agencies in Germany

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Kundenbetreuungsstellen außerhalb Europa - Service agencies outside Europe

# Außerhalb Europa / USA - outside Europe / USA

| | | | |
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Kundenbetreuungsstellen außerhalb Europa / USA
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