# AG25, AG26

## Actuator with PROFINET® interface

User manual

155/22

## Table of contents

# 1 General Information

## 1.1 Documentation

The following documents are associated with this document:

- The data sheet describes the technical data, the dimensions, the pin assignment, the accessories and the order key.
- The installation instructions describe the mechanical and electrical installation with all safety-relevant conditions and the associated technical specifications.
- The User manual for actuator commissioning and integration into a Industrial Ethernet network.

You can also download these documents at http://www.siko-global.com/p/AG25.

### 1.1.1 History

| Mod. status | Date | Description |
|---|---|---|
| 155/22 | 25.08.2022 | from firmware V114<br>Chapter 1.1.1 History new<br>Chapter 13 Secure Host IP Configuration Protocol (Secure HICP) add text |

## 1.2 Definitions

If not explicitly stated, decimal values are given as digits without addition (e.g.; 1234), binary values are marked with b (e.g.; 1011b), hexadecimal values with h (e.g.; 280h) after the digits.

Individual bits of the control word or status word are abbreviated as follows:

- Control word bit 7: CW.7
- Status word bit 10: SW.10

# 2 Display and controls

## 2.1 General Information

The drive has various LEDs that indicate the statuses of the drive and of the Ethernet module. The controls are located below the cover.

## 2.2 Displays

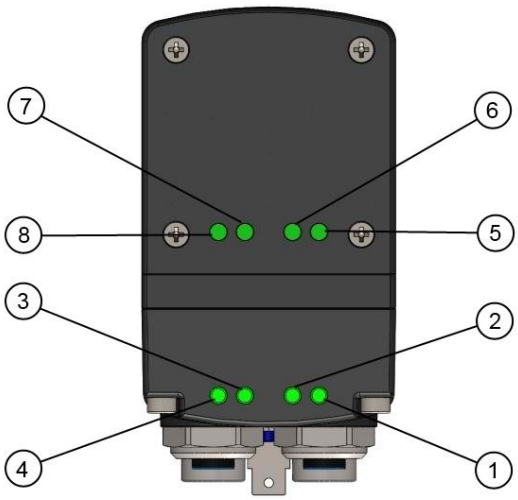



*Fig.. 1: Displays*

### 2.2.1 Ethernet module statuses

The ①, ②, ③, ④ LEDs inform about the statuses of the Ethernet module. The Ethernet module LEDs' functions are permanently defined and cannot be changed.

| LED | Display and controls |
|---|---|
| 1 | Modul status LED |
| 2 | Link/Activity LED Port 2 |
| 3 | Link/Activity LED Port 1 |
| 4 | Network status LED |

#### 2.2.1.1 Module status LED 1

| LED state | Description |
|---|---|
| Off | No error or no operating voltage |
| Green | Normal operation |
| Green, flashing 1x | Diagnostic event |
| Red | Fatal event |

#### 2.2.1.2 Link/Activity LED 2, 3

| LED state | Description |
|---|---|
| Off | No connection or no operating voltage |
| Green | Connection established, no activity |
| Green, flashing | Connection established, activity |

#### 2.2.1.3 Network status LED 4

| LED state | Description |
|---|---|
| OFF | No error or no operating voltage |
| Green | On-line (RUN) |
| Green, flashing 1x | On-line (STOP) |
| Green, flackert | Blink (DCP Service Set Signal) |
| Red | Fatal event |
| Red, flashing 1x | Station name error (Station name not set) |
| Red, flashing 2x | IP-address error (no IP-address) |
| Red, flashing 3x | Correctable error. The module has been configured but the stored parameters differ from the parameters presently used. |

### 2.2.2 Drive status

With factory setting, the ⑤, ⑥, ⑦, ⑧ inform about the drive's status.
The functions of the drive status LEDs can be configured.

#### 2.2.2.1 Status LED 5

LED statuses valid with factory setting.

| LED state | Description |
|---|---|
| Green | Operating voltage applied to control, no fault |
| Red, flashing | Operating voltage applied to control, active fault |
| Red/green, flashing | Operating voltage applied to control, switch lock active |
| Off | Operating voltage of control missing |

#### 2.2.2.2 Status LEDs 6, 7

LED statuses valid with factory setting.

| LED state | Description |
|---|---|
| Off | No function |

#### 2.2.2.3 Status LED 8

| | |
|---|---|
| ***NOTICE*** | If the actual value is unequal after switching on the module and if it is outside the programmed positioning window, then the LED status is “red” or “red, flashing” due to volatile storage of the setpoint. The setpoint is initialized with the value 0 after switching on. |

LED statuses valid with factory setting.

| LED state | Description |
|---|---|
| Green | Actuator is within the programmed positioning window.<br>Operating voltage of the output stage is applied. |
| Green, flashing | Actuator is within the programmed position window.<br>Operating voltage of the output stage missing. |
| Red | Actuator is outside the programmed positioning window.<br>Operating voltage of the output stage is applied. |
| Red, flashing | Actuator is outside the programmed positioning window.<br>Operating voltage of the output stage missing. |
| Off | Operating voltage of control missing. |

## 2.3 Controls

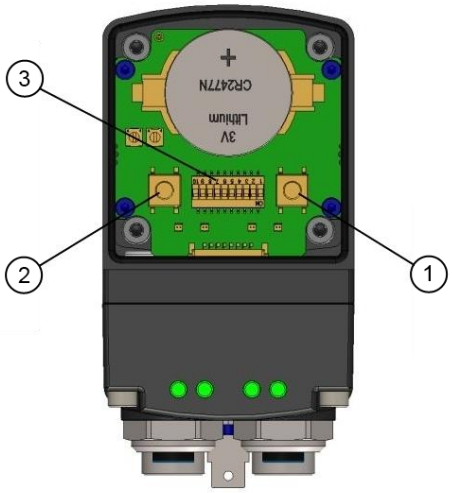



*Fig. 2: Controls*

### 2.3.1 Control keys

| | |
|---|---|
| **NOTICE** | Manual setup operation is only available if there is no process data exchange going on. |

Manual setup mode (corresponding to inching mode 2) can be started by means of the control keys. This enables actuator movement without a superordinate control.

Key ①: Inching mode 2 in e direction

Key ②: Inching mode 2 in i direction

### 2.3.2 DIP switch

| | |
|---|---|
| **NOTICE** | DIP-switch is only read in when supply voltage of PLC is switched on. Any modification will hence only become effective after a power-on reset of the PLC's supply voltage. |

| | |
|---|---|
| **NOTICE** | If station name setting was made via DIP-switch, a subsequent change in DIP-switch setting to position DCP will lead to a reset of all network parameter (eg. station name and IP-address) to parameter setting as made ex factory. |

| Switch | Assigment |
|---|---|
| SW1-SW8 | Setting of PROFINET station name in format"siko-ag2x-yyy"<br>yyy = set value in decimal format |
| SW9, SW10 | No Function |

| SW1 | SW2 | SW3 | SW4 | SW5 | SW6 | SW7 | SW8 | PROFINET Station name |
|---|---|---|---|---|---|---|---|---|
| OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | Station name is allocated via the DCP-protocol |
| ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF | "siko-ag2x-001" |
| OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF | "siko-ag2x-002" |
| … | … | … | … | … | … | … | … | … |
| OFF | ON | ON | ON | ON | ON | ON | ON | "siko-ag2x-254" |
| ON | ON | ON | ON | ON | ON | ON | ON | "siko-ag2x-255" |

# 3 Digital inputs and outputs

The actuator has four configurable digital inputs and one configurable digital output.

Function and switching behavior can be set.

No function has been assigned to the digital inputs in the factory setting.

The logical status of the digital inputs is mapped in the process data independent of the assigned function.

If a function was assigned to the digital input, the functions' conditions of the digital inputs can be read in the register Digital Input Functionalities State (PNU 0405h).

With factory settings, the digital output can be actuated via the process data.

If a function is assigned to the digital output, it is actuated via register

Digital Output Functionalities State (PNU 0302h).

## 3.1 Examples of digital input configurations

The following configuration deviates from the factory setting and requires parameterization by the user.

- Digital input 1: Limit switch 1 (low-active) proximity switch DC PNP NC
- Digital input 2: Limit switch 2 (low-active) proximity switch DC PNP NC
- Digital input 3: Inching mode 2 positive travel direction (high-active) pushbutton
- Digital input 4: Inching mode 2 negative travel direction (high-active) pushbutton

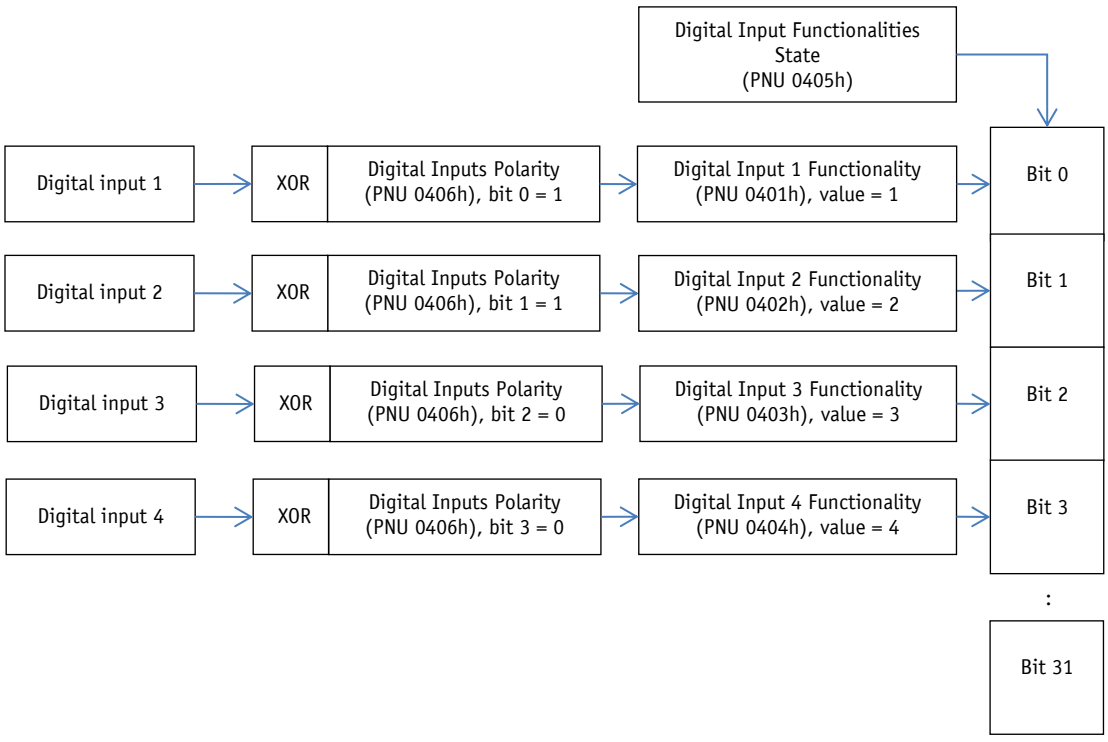



*Fig. 3: Examples of digital input configurations*

## 3.2 Example of digital output configuration

Digital output 1: Inpos (high-active)

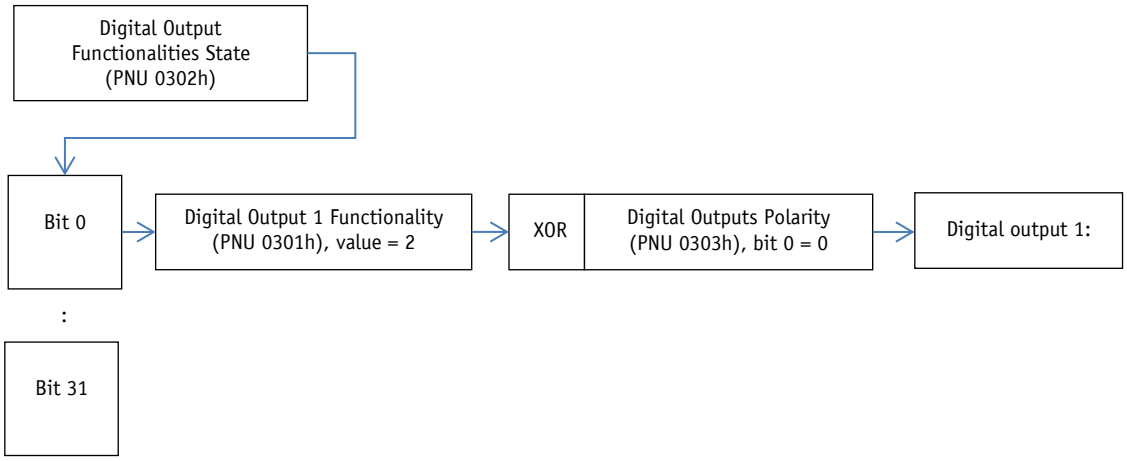



*Fig. 4: Example of digital output configuration*

# 4 Functional description

## 4.1 Control of the drive

The drive can be moved manually via the keys or digital inputs without upstream control. The drive can be controlled and configured in the bus operating mode and via the service interface.

### 4.1.1 Operating modes

The following operating modes are distinguished: positioning mode and speed mode. In the positioning mode there is the additional option of traveling in the inching mode. The position control mode can be started via the digital inputs independent of the chosen operating mode.

#### 4.1.1.1 Positioning mode

In the positioning mode, positioning to the specified set point is executed by means of a ramp function (see Fig. 5: Ramp travel, direct positioning mode) calculated on the basis of the actual position as well as the programmed controller parameters P (proportional factor), I (integral factor), D (differential factor), acceleration and speed.

Upon activation of the travel job, the actuator accelerates to the specified speed with the acceleration programmed. The measure of delay to the setpoint is defined by the parameter A-Pos (PNU 0604h) as well.

Alternately, a value deviating from acceleration can be chosen for delay by means of parameter D-Pos (PNU 0606h).

Changing controller parameters during a positioning process does not influence the current positioning operation.

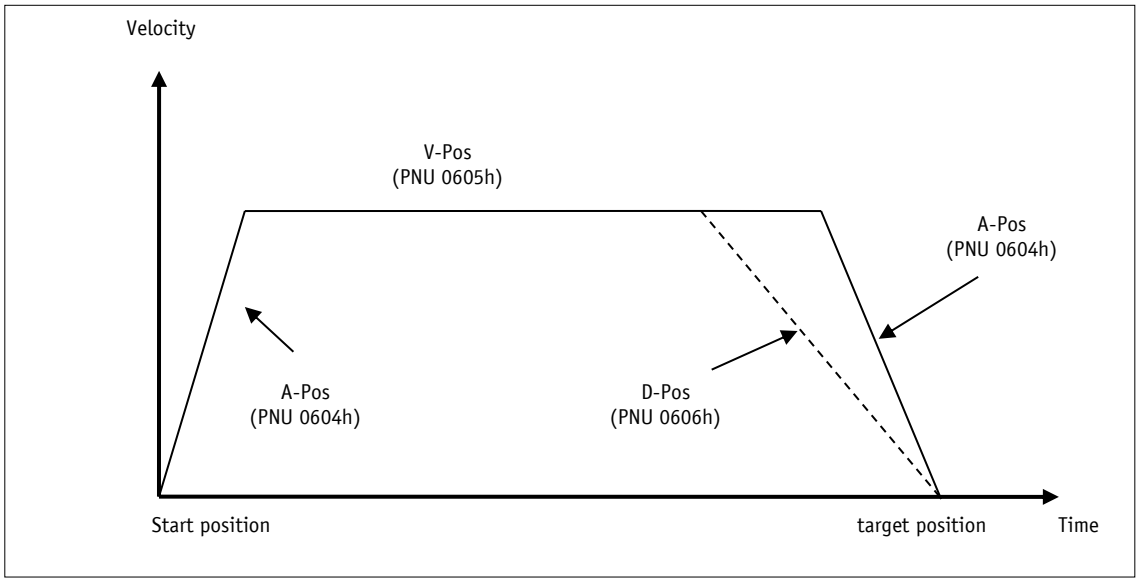



*Fig. 5: Ramp travel, direct positioning mode*

The status word indicates whether the actual position is within the window defined by parameter Pos Window (PNU 060Ah). Upon reaching the programmed window via parameter Inpos Mode (PNU 0616h), you can define the behavior of the actuator.

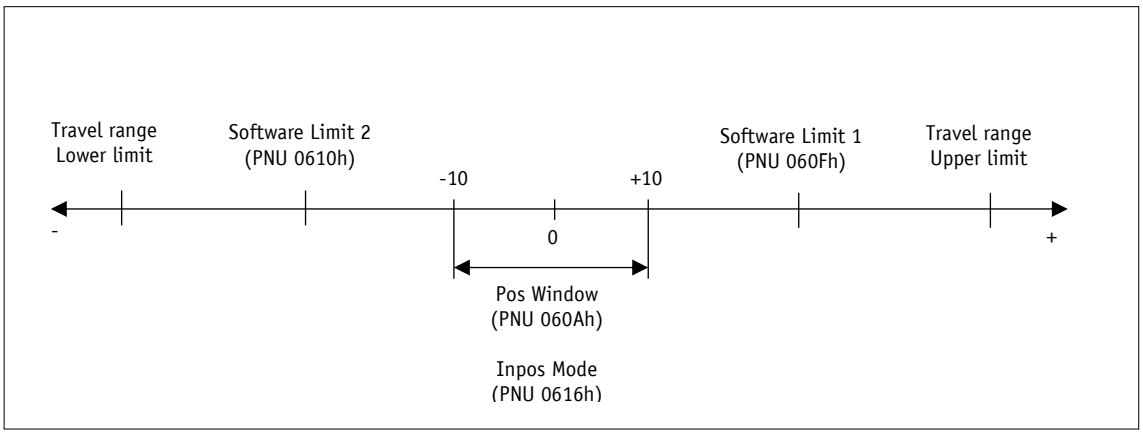



*Fig. 6: Positioning mode*

The max. travel range depends on transmission and scaling. The number of revolutions specified in the product data sheet must not be exceeded.

#### 4.1.1.1.1 Loop positioning

| NOTICE | A travel order will not be executed if loop positioning would exceed the limiting values specified by parameters Software Limit 1 (PNU 060Fh) and Software Limit 2 (PNU 0610h) although the setpoint is within the limiting values. |
|---|---|

If the actuator is operated on a spindle or an additional transmission, the spindle or external transmission backlash can be compensated by means of loop positioning. In this case, traveling to the target value is always from the same direction. This travel direction can be determined via parameter Pos Type (PNU 0613h). Loop length is set via parameter Loop Length(PNU 0617h).

Example:

The direction from which every target position shall be driven to is positive.

Case 1 ⇒ new position is greater than actual position:

Direct travel to required position

Case 2 ⇒ new position is smaller than actual position:

The actuator drives beyond the target position by the loop length; afterwards, the set point is approached in positive direction.

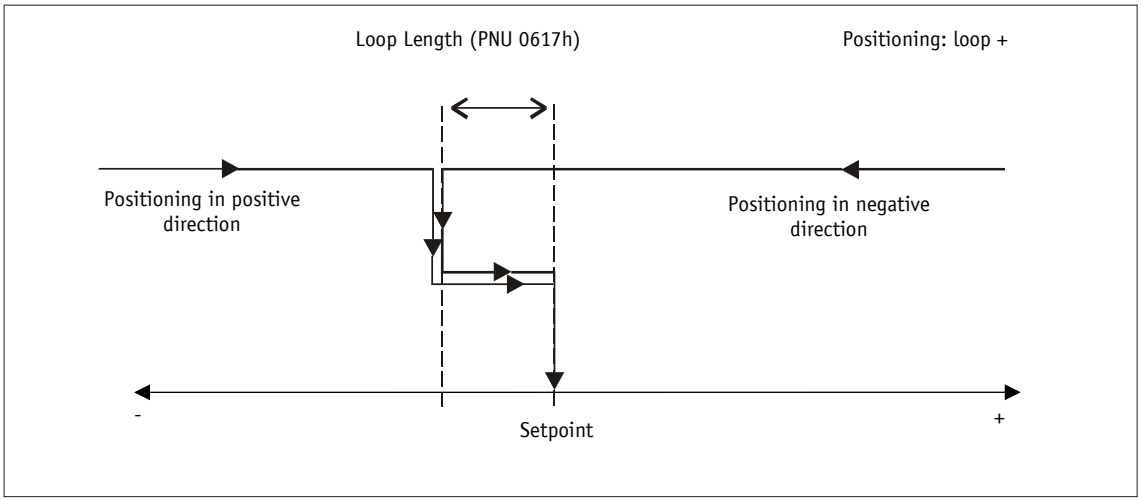



*Fig. 7: Loop+ positioning*

#### 4.1.1.2 Inching mode

| NOTICE | There is no compensation for spindle backlash (loop positioning) in this operating mode. |
|---|---|

Inching mode is enabled in the positioning mode only. You can program via parameters acceleration as well as speed in the inching mode.

##### 4.1.1.2.1 Inching mode 1

| NOTICE | If the Spindle pitch parameter is programmed to zero, then the traveling distance occurs by steps. If Spindle pitch is unequal zero, then the information of the Delta Tipp parameter refers to the travel distance in 1/100 mm. |
|---|---|

| NOTICE | If the actual position is outside the programmed limiting values, then traveling from this position in the respective direction must be performed by means of inching mode 1 or 2! |
|---|---|

The drive travels once from the current actual position by the value Delta Inch (PNU 0611h) depending on the mathematical sign of the value entered.

Delta Inch < 0: negative travel direction

Delta Inch > 0: positive travel direction

Reaching of the target position will be signaled accordingly.

The digital input can be configured for starting inching mode 1.

The following conditions must be met for enabling the start of inching modes 1 and 2:

- Supply voltage of the output stage is applied.
- Operation enabled
- Drive stands still

#### 4.1.1.2.2 Inching mode 2

The actuator travels from the current position as long as the relevant command is active. You can influence the inching speed via two parameters and it will be calculated in the actuator as illustrated in the example below:

V-Inch (PNU 0609h) = 10 rpm (can only be changed in the idle state)

Inching 2 Offset (PNU 061Ah) = 85 % (can be changed during inching operation)

The resulting inching speed in this example will be:

Inching speed= v - Tipp * Offset inching 2 = 10 rpm * 85 % = 9 rpm

Results are always rounded to integers.
Minimum speed is 1 rpm.

### 4.1.1.3 Rotational speed mode

| | |
|---|---|
| **NOTICE** | Limits 1 + 2 are inactivated in this operational mode. |

| | |
|---|---|
| **NOTICE** | Exceeding the resolution of the absolute encoder results in a jump of the actual position. |

With the set point enabled, the actuator when in the rotational speed mode accelerates to the target speed and maintains this speed until the set point is disabled or a different target speed specified. Speed is adjusted immediately to the new value when the rotational target speed is changed. The arithmetical sign of the set point determines the travel direction in the rotational speed mode.

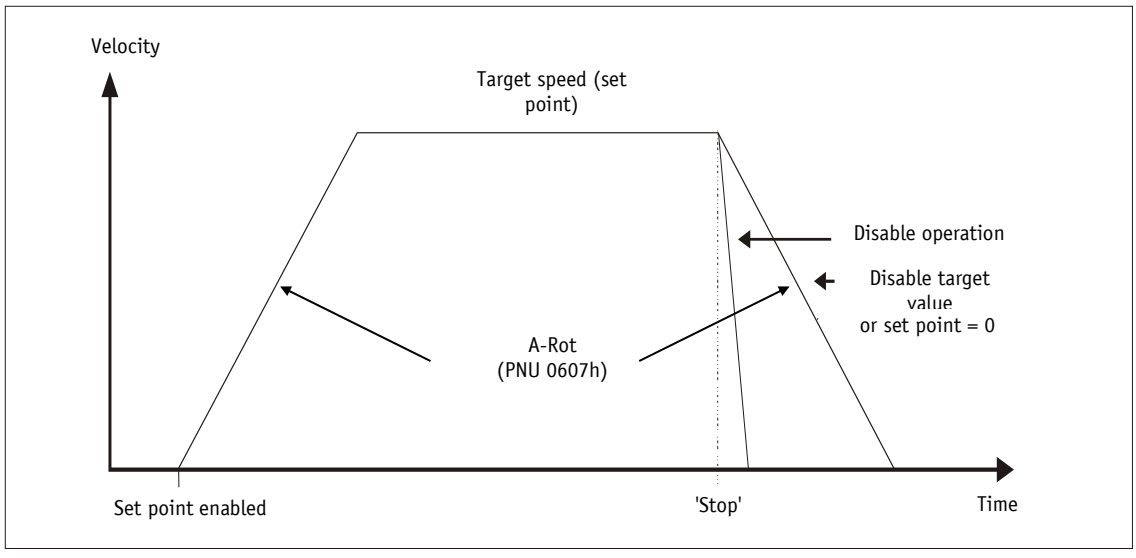



*Fig. 8: Ramp speed mode*

The following conditions must be met for enabling the start of the rotational speed mode:

- Supply voltage of the output stage is applied.
- Operation enabled
- Drive stands still

#### 4.1.1.4 Position Control Mode

| NOTICE | Via the control word in the process data, the superordinate control can cancel travel jobs started by the position control mode.<br>For this purpose, a negative flank must be created on bits OFF1, OFF2, or OFF3 in the control word.<br>Conversely, the PCM mode cannot cancel a travel order initiated via the superordinate control. |
|---|---|

The position control mode enables travel data sets to be called via the digital inputs. A total of 7 travel data sets can be saved.

The use of the position control mode requires previous configuration of the digital inputs.

The desired travel data set can be selected via PCM inputs 1 to 3 in binary addressing. Travel data set 0 does not exist.

##### 4.1.1.4.1 Examples of configuration of the digital inputs for the PCM

Digital input 1: PCM Start (high-active)

Digital input 2: PCM input 1 (high-active)

Digital input 3: PCM input 2 (high-active)

Digital input 4: PCM input 3 (high-active)

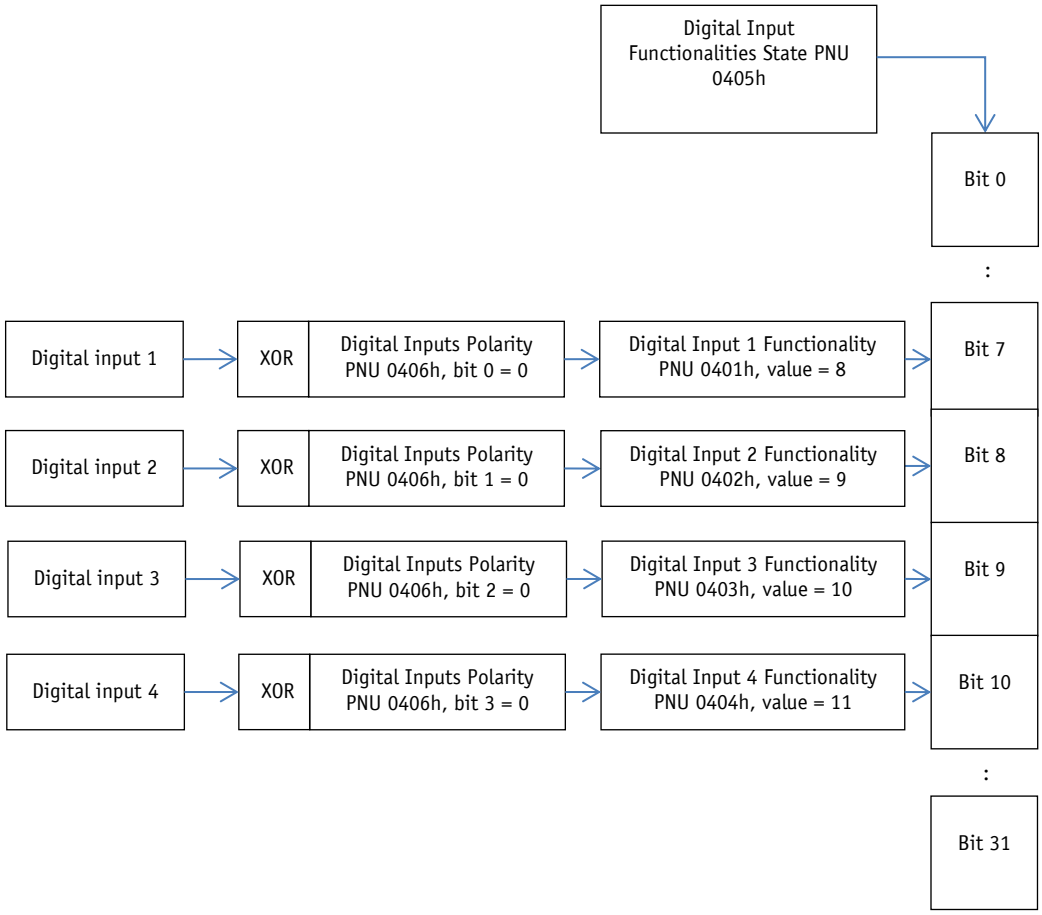


*Fig. 9: Examples of configuration of the digital inputs for the PCM*

Example of the parameter set of travel data set no. 3

| Parameter | PNU |
|---|---|
| PCM Position 3 | 0924h |
| PCM Acceleration 3 | 0944h |
| PCM Velocity 3 | 0964h |
| PCM Deceleration 3 | 0984h |

After applying the coding to the inputs, the desired travel job can be started by a positive flank on the PCM Start input.

Resetting the PCM Start input during an active positioning process will result in cancellation of the travel job but the drive will continue to be controlled.
An example of calling travel data set no. 3 is shown below

Step 1: Create number of travel data set

| Input | State |
|---|---|
| PCM Start | 0 |
| PCM input 1 | 1 |
| PCM input 2 | 1 |
| PCM input 3 | 0 |

Step 2: Start the positioning job

| Input | State |
|---|---|
| PCM Start | 0/1 |
| PCM input 1 | 1 |
| PCM input 2 | 1 |
| PCM input 3 | 0 |

### 4.1.2 Current limiting

| | |
|---|---|
| **NOTICE** | The actual motor current cannot be indicated by measuring the supply current. With cycled output stages, the supply current does not correspond to the motor current. Actual motor current can be read via the interface. |

The current limit is set via Parameter Current Limiting (PNU 0619h), which serves primarily for protecting the drive against overload.

With default set, nominal speed indicated on the product data sheet is achieved.

Actuator overload results in limiting the motor current to the set value.

As a consequence, the actuator cannot maintain the speed set, the contouring error increases. The actuator changes to the error status if the contouring error exceeds the contouring error limit defined by the Contouring Error Limit parameter (PNU 0618h): contouring error.

### 4.1.3 Limit switch

Two digital inputs must be configured correspondingly if the limit switch function is to be used.

#### 4.1.3.1 Example of limit switch configuration

Exemplary configuration for the connection of proximity switches DC PNP NC.

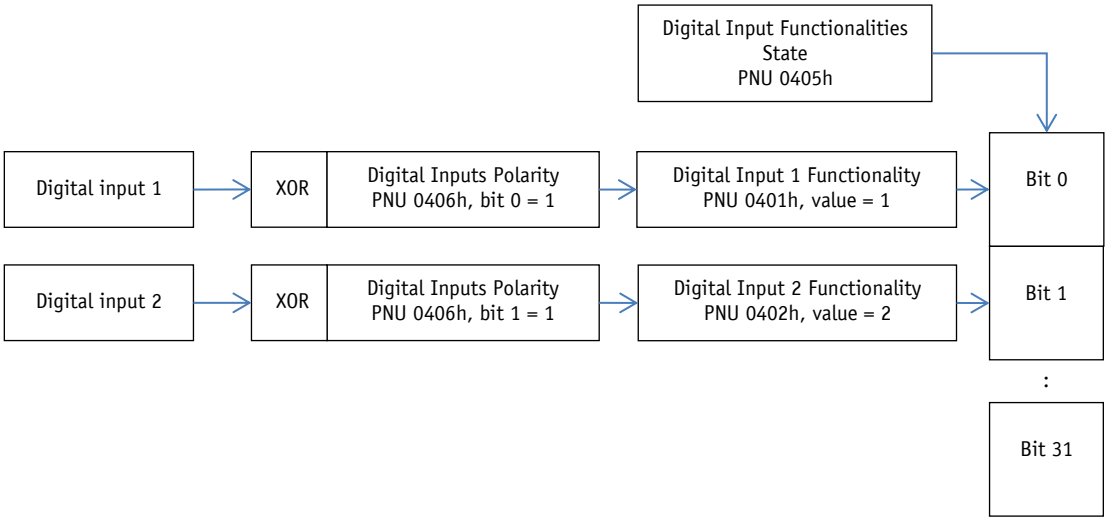



*Fig. 10: Example of limit switch configuration*

#### 4.1.3.2 Arrangement of the limit switches

The arrangement of the limit switches is independent of the configured sense of rotation according to the following pattern:

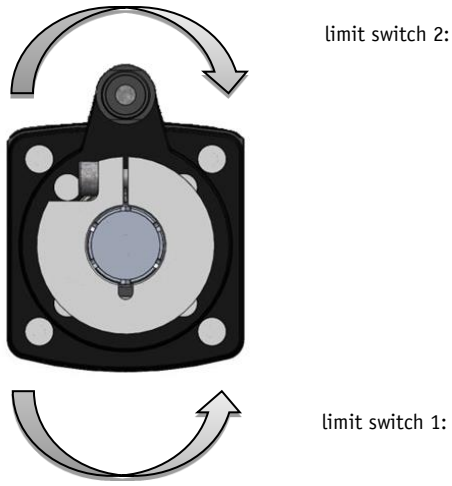



*Fig. 11: Arrangement of the limit switches*

## 5 Calibration

| NOTICE | Calibration is only possible when no travel job is active! |
|---|---|

Two steps are required for executing calibration:

Write calibration value: see Calibration Value (PNU 060Eh)

Execute calibration (software command or calibration input)

Calibration can be performed by a positive edge at CW.15, or initiated by writing the value 7 to parameter S-Command (PNU 0C01h). Alternately, a digital input can be configured as calibration input as well.

Since the measuring system is an absolute system, calibration is necessary only once with commissioning. With calibration, the calibration value is adopted for calculation of the position value. The following equation is applied in case of calibration:

Position value = 0 + Calibration Value (PNU 060Eh) + Offset Value (PNU 061Ch)

## 6 External transmission

If external transmission is used, a factor can be programmed via the parameters Gear Ratio Numerator (PNU 060Bh) and Gear Ratio Denominator (PNU 060Ch) in order to include the transmission ratio in position sensing.

Example (see Fig. 12: External transmission):

The actuator is operated on a transmission with reduction of 5:1. For this purpose, the

Gear Ratio Numerator and Gear Ratio Denominator must be programmed as follows:

Parameter Gear Ratio Numerator = 5

Parameter Gear Ratio Denominator = 1

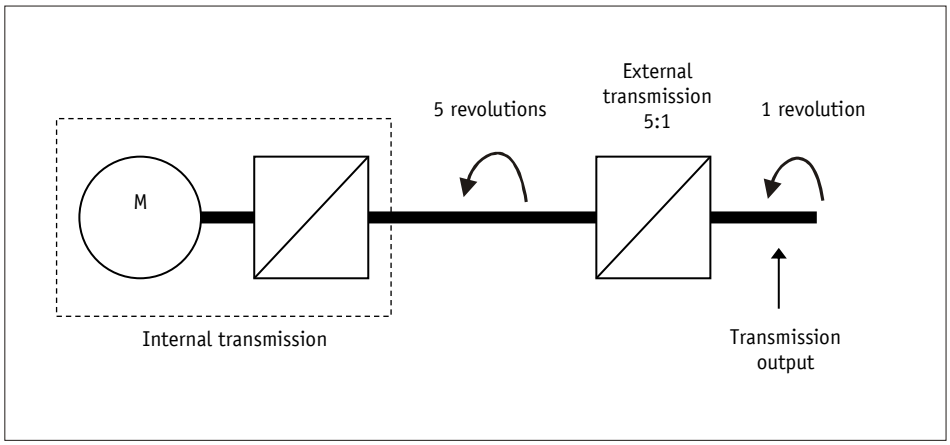



*Fig. 12: External transmission*

Input of an odd transmission reduction value is possible according to the following example:

Transmission reduction = 3.78

Parameter Gear Ratio Numerator = 378

Parameter Gear Ratio Denominator = 100

# 7 Warnings / Errors

## 7.1 Warnings

Warnings do not influence the operation of the actuator.
Warnings disappear after removing the cause.

Possible warnings:

- Battery voltage for absolute encoder is below limit ⇒ exchange battery within the next 6 months.
- Current limiting active

## 7.2 Errors

Errors cause an immediate stop of drive movement.

Errors are indicated via the drive status LEDs.

The error bit is set in the status word.

The error messages are entered in the error memory in the order of their detection. The last 10 error messages are displayed when the error memory is full.

The cause of error can be tracked down with the help of the error codes.

### 7.2.1 Error codes

| | |
|---|---|
| **NOTICE** | If the error cannot be acknowledged after removal of the cause of error and the error persists after power-on reset, then the drive must be inspected in the factory. |

| | |
|---|---|
| **NOTICE** | In the web server, the fault codes as well as the actual values, such as battery and operating voltages, temperature and motor current, are displayed in decimal format. |

| Error code | Fault | Troubleshooting |
|---|---|---|
| 0 (00h) | No error | |
| 6 (06h) | Battery undervoltage | Battery dead: Change battery |
| | | Contact errors: Check battery contacts |
| | | Incorrect battery type inserted: use correct battery type |
| 7 (07h) | Control electronics undervoltage | Check operating voltage control |
| | | Check line losses |
| | | Check contacts of the plug and terminals |

| Error code | Fault | Troubleshooting |
|---|---|---|
| 8 (08h) | Control electronics overvoltage | Check operating voltage control |
| 9 (09h) | Power electronics overvoltage | Check operating voltage output stage |
| 10 (0Ah) | Output stage excess temperature | Reduce ambient temperature |
| | | Reduce load |
| 11 (0Bh) | Contouring error | Reduce load |
| | | Reduce acceleration or speed |
| | | Check operating voltage output stage at load |
| | | Check line losses |
| 12 (0Ch) | Output shaft blocked | Loosen shaft |
| 15 (0Fh) | SIN/COS monitoring | Shield foreign magnetic fields |
| | | Check EMC measures |
| 16 (10h) | EEPROM queue overrun | Internal error |
| 19 (13h) | EEPROM check sum | Reset parameters to factory settings |
| 20 (14h) | Ethernet module watchdog | Internal error |
| 21 (15h) | Ethernet module in status ERROR while travel job is active | Internal error |
| 22 (16h) | Ethernet module in status EXCEPTION<br>The behavior of the drive when this fault occurs can be set with the parameter configuration, bit 6 (see chapter 8.2.1.99). | Internal error |

*Table 1: Error codes*

# 8 PROFINET IO

## 8.1 Description

The drive has been designed as PROFINET IO-Device.

### 8.1.1 Cyclic data exchange

Process data of the actuator are exchanged as 7 byte input and output data each time. The mapping is static and cannot be changed.

### 8.1.2 Acyclic data exchange

All parameters of the object directory (data record) can be accessed acyclically.

### 8.1.3 Operating modes and synchronization

RT classes: RT_Class1, RT_Class2 and RT_Class3 are supported. The device cycle of the actuator is not synchronized.

### 8.1.4 Diagnostics alarms

| | |
|---|---|
| **NOTICE** | Diagnosis alarms are only transmitted if bit 5 of the Configuration (PNU 0B21h) parameter is set. With factory settings, no diagnosis alarms are transmitted. |

| | |
|---|---|
| **NOTICE** | Diagnosis alarms result in an interruption of the program run on a Siemens control unit and in invocation of the OB82 or OB86 functional modules.<br>If the selected modules are not available on the CPU, the CPU will switch over to the STOP condition. |

The actuator's PROFINET interface supports diagnosis alarms in case of a device error. For displaying diagnosis information, the USI, User Structure Identifier 8000h is used for channel diagnosis. The error codes are converted into the ChannelErrorType according to the following table.

| Code | ChannelErrorType | Description |
|---|---|---|
| 06h | 0106h | Low battery voltage: |
| 07h | 0107h | Low voltage of control electronic system |
| 08h | 0108h | Overvoltage of control electronic system |
| 09h | 0109h | Overvoltage of power electronic system |
| 0Ah | 010Ah | Output stage excess temperature |
| 0Bh | 010Bh | Contouring error |
| 0Ch | 010Ch | Output shaft blocked |
| 0Fh | 010Fh | SIN COS monitoring |
| 10h | 0110h | EEPROM queue overrun |
| 13h | 0113h | EEPROM check sum |
| 14h | 0114h | Ethernet module watchdog |
| 15h | 0115h | Ethernet module in the ERROR state while travel job is active |
| 16h | 0116h | Ethernet module in the EXCEPTION state |

### 8.1.5 Control lines when IOPS = BAD

All output data are set to zero.

### 8.1.6 Response of outputs to disconnect

All output data are set to zero.

### 8.1.7 Response of outputs to a network

All output data are set to zero.

## 8.2 Overview of parameters

PNU = Parameter number

### 8.2.1 Parameter description

#### 8.2.1.1 Digital Outputs Control

| | |
|---|---|
| PNU | 1d / 1h |
| Description | Digital output control byte |
| Access | rw (Component of process data) |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | No |
| Value range | Unsigned8 |

| Bit | Description |
|---|---|
| 0 | Digital output 1 |
| 1 … 7 | Reserved, always 0 |

#### 8.2.1.2 Control Word

| | |
|---|---|
| PNU | 2d / 2h |
| Description | Control word |
| Access | rw (Component of process data) |
| Data type | Unsigned16 |

| | |
|---|---|
| Default | No |
| EEPROM | No |
| Value range | Unsigned16 |

#### 8.2.1.2.1 Control word: Positioning mode (master ⇒ slave)

| Bit | Description |
|---|---|
| Bit 0<br>OFF1 (enable ) | 0 = OFF1 active<br>Current travel job is canceled.<br>The actuator is activated. |
| | 1 = OFF1 inactive |
| Bit 1<br>OFF2 (max. delay) | 0 = OFF2 active<br>Current travel job is canceled.<br>The actuator is decelerated with max. delay, the actuator continues to be controlled. |
| | 1 = OFF2 inactive |
| Bit 2<br>OFF3 (progr. delay) | 0 = OFF3 active<br>Current travel job is canceled.<br>The actuator is decelerated with programmed delay, the actuator continues to be controlled. |
| | 1 = OFF3 inactive |
| Bit 3<br>Intermediate stop | 0 = no intermediate stop |
| | 1 = intermediate stop active |
| Bit 4<br>Start travel job | Positive flank starts a travel job |
| Bit 5<br>Acknowledge error | Positive flank acknowledges an error<br>Afterwards, the actuator changes to the switch-lock state. |
| Bit 6<br>Inching mode 1 | 0 = no inching mode 1<br>If the travel job is not completed yet it will be canceled. |
| | 1 = inching operation 1<br>As long as this bit is set, the actuator travels the distance specified in parameter Delta Tipp. |
| Bit 7<br>Inching mode 2 positive | 0 = no inching mode 2 positive |
| | 1 = inching mode 2 positive<br>The actuator travels in positive direction |
| Bit 8<br>Inching mode 2 negative | 0 = no inching mode 2 negative |
| | 1 = inching mode 2 negative<br>The actuator travels in negative direction |
| Bit 9 | Reserved, always 0 |
| Bit 10<br>Relative positioning | 0 = absolute positioning |
| | 1 = relative positioning |
| Bit 11 ... 14 | Reserved, always 0 |
| Bit 15<br>Calibration | Positive edge calibrates the drive (see chapter 5) |

*Table 2: Positioning mode control word*

### 8.2.1.2.2 Flow chart: Operating mode: Positioning mode

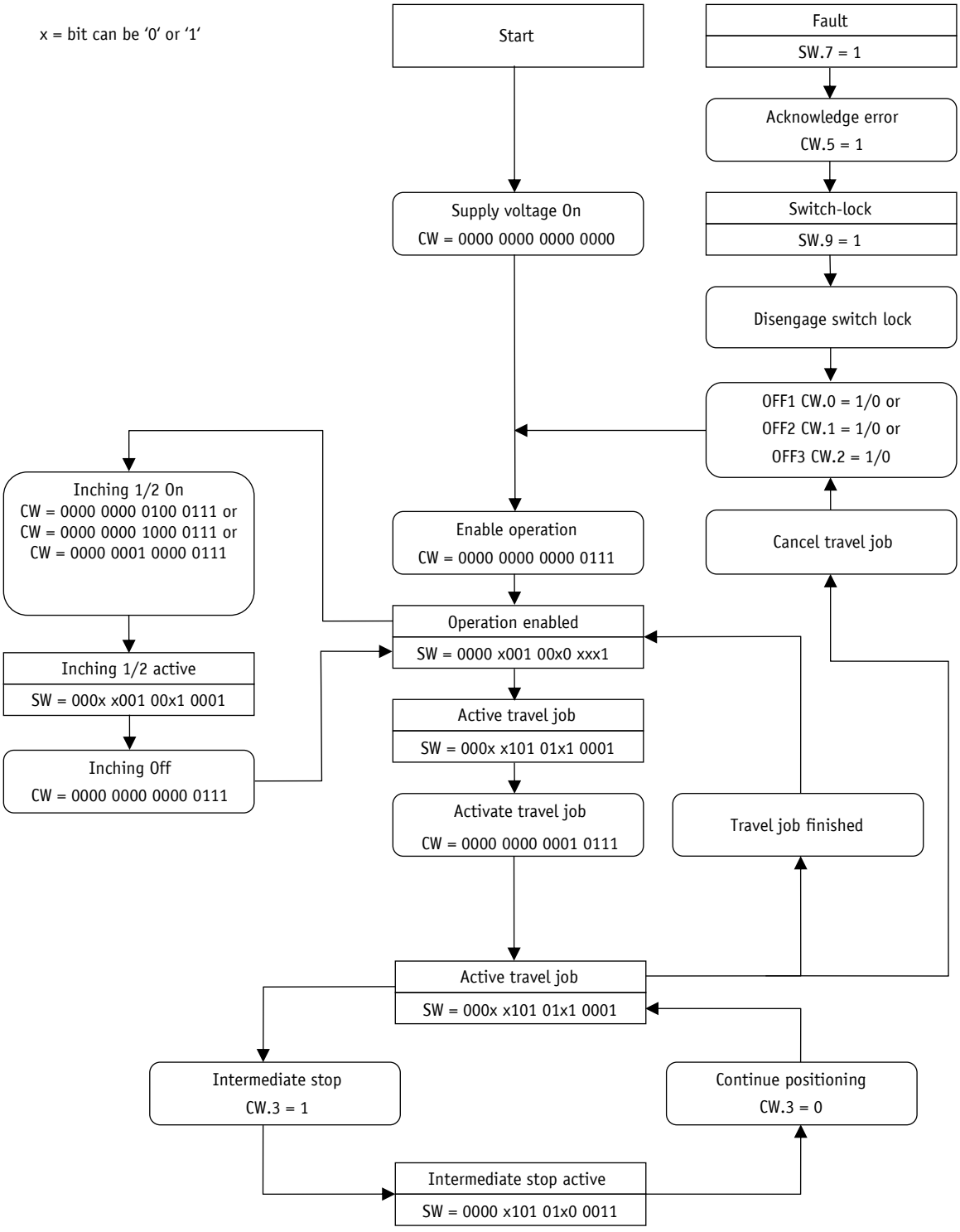



*Fig. 13: Flow chart of PROFINET positioning mode*

#### 8.2.1.2.3 Control word Operating mode: Speed mode

| Bit | Description |
|---|---|
| Bit 0<br>OFF1 (enable ) | 0 = OFF1 active<br>Current travel job is canceled.<br>The actuator is activated. |
| | 1 = OFF1 inactive |
| Bit 1<br>OFF2 (max.delay) | 0 = OFF2 active<br>Current travel job is canceled.<br>The actuator is decelerated with max. delay, the actuator continues to be controlled. |
| | 1 = OFF2 inactive |
| Bit 2<br>OFF3 (progr. delay) | 0 = OFF3 active<br>Current travel job is canceled.<br>The actuator is decelerated with prog. delay, the actuator continues to be controlled. |
| | 1 = OFF3 inactive |
| Bit 3 | Reserved, always 0 |
| Bit 4<br>Start travel job | Positive flank starts a travel job |
| Bit 5<br>Acknowledge error | Positive flank acknowledges an error<br>Afterwards, the actuator changes to the switch-lock state. |
| Bit 6 ... 15 | Reserved, always 0 |

*Table 3: Control word speed mode*

#### 8.2.1.2.4 Flow chart: Speed mode

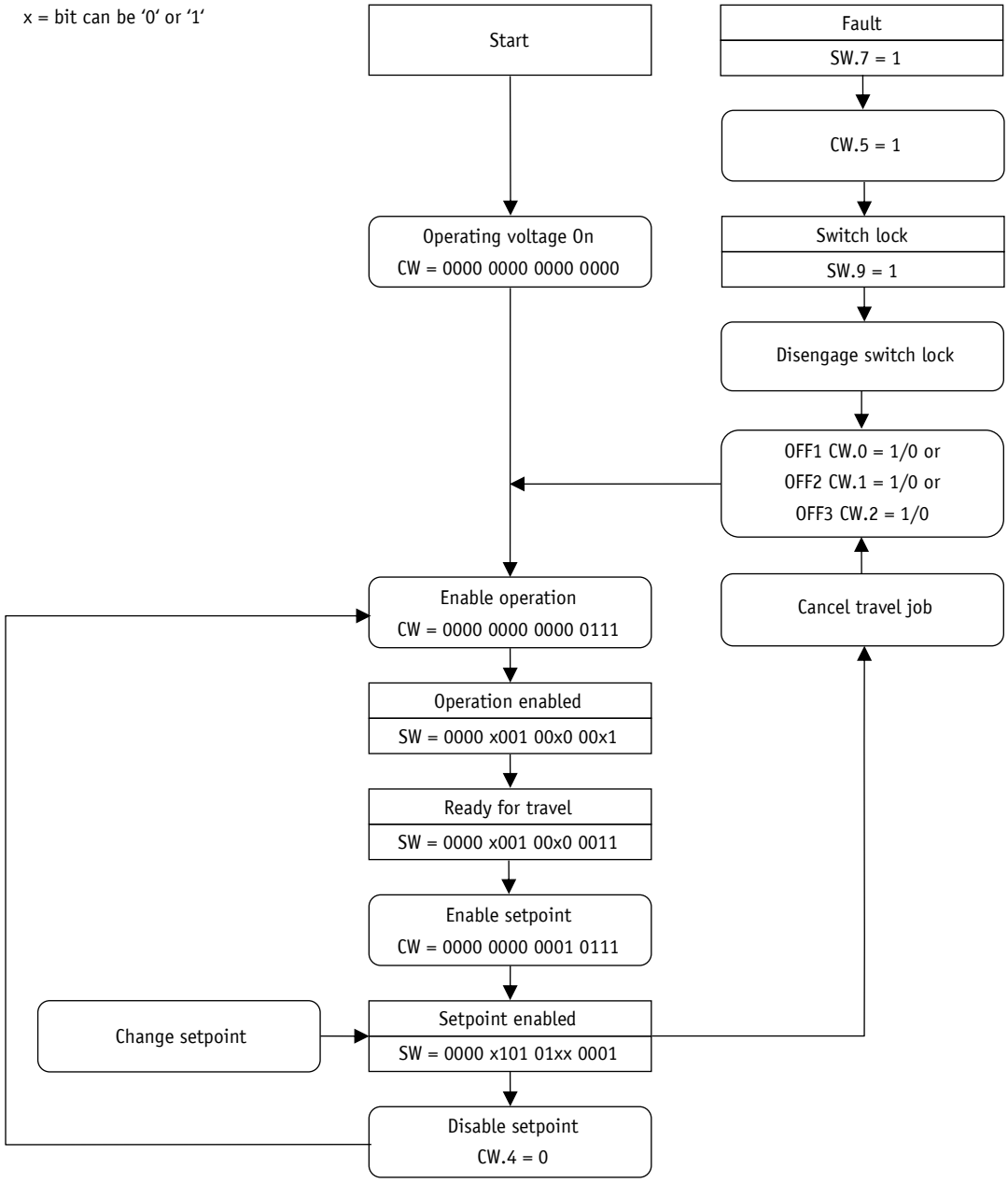



*Fig. 14: Flow chart of PROFINET speed mode*

#### 8.2.1.3 Target Value

Positioning mode: Target position (volatile)
with spindle pitch = 0: Indicated as steps
with spindle pitch > 0: Indicated as 1/100 mm

Speed mode: Target speed (volatile)
indicated as $min^{-1}$

| | |
|---|---|
| PNU | 3d / 3h |
| Description | Setpoint |
| Access | Rw (component of process data) |
| Data type | Interger32 |
| Default | No |
| EEPROM | No |
| Value range | Integer32 |

#### 8.2.1.4 Digital Inputs State

| | |
|---|---|
| PNU | 257d / 101h |
| Description | States of the digital inputs |
| Access | ro (component of process data) |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | No |

| Bit | Description |
|---|---|
| 0 | State of digital input 1 |
| 1 | State of digital input 2 |
| 2 | State of digital input 3 |
| 3 | State of digital input 4 |

#### 8.2.1.5 Status Word

| | |
|---|---|
| PNU | 258d / 102h |
| Description | Status word |
| Access | ro (component of process data) |
| Data type | Unsigned16 |
| Default | No |
| EEPROM | No |

#### 8.2.1.5.1 Status word: Positioning mode (slave ⇒ master)

| Bit | Description |
|---|---|
| Bit 0<br>Supply | 0 = output stage supply voltage missing |
| | 1 = supply voltage of the output stage is applied |
| Bit 1<br>Readiness to travel | 0 = not ready to travel |
| | 1 = ready to travel |
| Bit 2<br>Upper limit | 0 = no violation of limit |
| | 1 = upper limit exceeded |
| Bit 3<br>Lower limit: | 0 = no violation of limit |
| | 1 = lower limit undercut |
| Bit 4<br>Actuator travels/stands still | 0 = actuator stands still |
| | 1 = actuator travels: |
| Bit 5<br>Inpos | 0 = actuator is outside the position window. |
| | 1 = actuator is inside the position window. |
| Bit 6<br>Active travel job | 0 = no active travel job |
| | 1 = active travel job |
| Bit 7<br>Fault | 0 = no error |
| | 1 = Error<br>Acknowledgment with positive flank on CW.5 |
| Bit 8<br>Operation enabled | 0 = operation not enabled |
| | 1 = operation enabled |
| Bit 9<br>Switch-lock | 0 = no switch-lock |
| | 1 = switch-lock |
| Bit 10<br>Travel job acknowledgment | 0 = no acknowledgment |
| | 1 = acknowledgment<br>The bit is set when the travel job was adopted. If CW.4 is reset, this bit will be reset as well |
| Bit 11<br>Battery warning | 0 = no warning, battery loading state is OK |
| | 1 = battery warning<br>Battery voltage is below 2.6 V.<br>Battery change is required. |
| Bit 12<br>Current limiting | 0 = current limiting inactive |
| | 1 = current limiting active<br>Motor current exceeds the value set under parameter Current Limiting (PNU 0619h) |
| Bit 13<br>Limit switch 1 | 0 = Limit switch not active |
| | 1 = Limit switch active (configuration of a digital input required, see chapter 4.1.3) |
| Bit 14<br>Limit switch 2 | 0 = Limit switch not active |
| | 1 = Limit switch active (configuration of a digital input required, see chapter 4.1.3) |
| Bit 15<br>Calibration acknowledgment | 0 = No acknowledgment |
| | 1 = Acknowledgment<br>The bit is set when the calibration has been performed successfully. If CW.15 is reset, this bit is also reset. |

*Table 4: Status word of positioning mode*

#### 8.2.1.5.2 Status word: Speed mode

| Bit | Description |
|---|---|
| Bit 0<br>Supply | 0 = output stage supply voltage missing |
| | 1 = supply voltage of the output stage is applied |
| Bit 1<br>Readiness to travel | 0 = not ready to travel |
| | 1 = ready to travel |
| Bit 2 | no function |
| Bit 3 | no function |
| Bit 4<br>Actuator travels/stands still | 0 = actuator stands still |
| | 1 = actuator travels: |
| Bit 5<br>Inpos | 0 = actuator is outside the position window. |
| | 1 = actuator is inside the position window. |
| Bit 6<br>Active travel job | 0 = no active travel job |
| | 1 = active travel job |
| Bit 7<br>Fault | 0 = no error |
| | 1 = Error<br>Acknowledgment with positive flank on control word bit 5 |
| Bit 8<br>Operation enabled | 0 = operation not enabled |
| | 1 = operation enabled |
| Bit 9<br>Switch-lock | 0 = no switch-lock |
| | 1 = switch-lock |
| Bit 10<br>Travel job acknowledgment | 0 = no acknowledgment |
| | 1 = acknowledgment<br>The bit is set when the travel job was adopted. If bit 4 is reset in the control word, this bit will be reset as well |
| Bit 11<br>Battery warning | 0 = no warning, battery loading state is OK |
| | 1 = battery warning<br>Battery voltage is below 2.6 V.<br>Battery change is required. |
| Bit 12<br>Current limiting | 0 = current limiting inactive |
| | 1 = current limiting active<br>Motor current exceeds the value set under parameter Current Limiting (PNU 0619h) |

*Table 5: Status word of speed mode*

#### 8.2.1.6 Actual Value

Positioning mode: Actual position
with spindle pitch = 0: Indicated as steps
with spindle pitch > 0: Indicated as 1/100 mm

Speed mode: Actual speed
indicated as $min^{-1}$

| | |
|---|---|
| PNU | 259d / 103h |
| Description | Actual value |
| Access | ro (component of process data) |
| Data type | Interger32 |
| Default | No |
| EEPROM | No |

#### 8.2.1.7 LED Functionality

This parameter determines the functions of the four system LEDs. With factory settings, the four LEDs indicate the operational state of the drive. Alternately, the LEDs can represent the states of the digital inputs.

| | |
|---|---|
| PNU | 513d / 201h |
| Description | Functionality of the system LEDs |
| Access | Rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 ... 1 |

*Description, see chapter Table 6: Functionality of the system LEDs*

| Value | LED | State | Description |
|---|---|---|---|
| 0 | LED5 | Green | Operating voltage applied to control.<br>No fault |
| | | Red,<br>flashing | Operating voltage applied to control.<br>Active error |
| | | Off | Operating voltage of control missing |
| | LED6 | Off | No function |
| | LED7 | Off | No function |
| | LED8 | Green | Actuator is within the programmed positioning window.<br>Operating voltage of the output stage is applied. |
| | | Green,<br>flashing | Actuator is within the programmed positioning window.<br>Operating voltage of the output stage Missing. |
| | | Red | Actuator is outside the programmed positioning window.<br>Operating voltage of the output stage is applied. |
| | | Red,<br>flashing | Actuator is outside the programmed positioning window.<br>Operating voltage of the output stage Missing. |
| | | Off | Operating voltage of control missing |
| 1 | LED5 | Red | Digital input 1 inactive |
| | | Red,<br>flashing | Active error |
| | | Green | Digital input 1 active: |
| | | Off | Operating voltage of control missing |
| | LED6 | Red | Digital input 2 inactive |
| | | Red,<br>flashing | Active error |
| | | Green | Digital input 2 active: |
| | | Off | Operating voltage of control missing |
| | LED7 | Red | Digital input 3 inactive |
| | | Red,<br>flashing | Active error |
| | | Green | Digital input 3 active: |
| | | Off | Operating voltage of control missing |
| | LED8 | Red | Digital input 4 inactive |
| | | Red,<br>flashing | Active error |
| | | Green | Digital input 4 active: |
| | | Off | Operating voltage of control missing |

*Table 6: Functionality of the system LEDs*

#### 8.2.1.8 Service Interface Baud rate

| | |
|---|---|
| PNU | 545d / 221h |
| Description | Baud rate of the service interface. |
| Access | rw |
| Data type | Unsigned8 |
| Default | 1 |
| EEPROM | Yes |
| Value range | 0 ... 3<br>0 = 19.2 Kbit/s<br>1 = 57.6 Kbit/s<br>2 = 115.2 Kbit/s<br>3 = 9.6 Kbit/s |

#### 8.2.1.9 Digital Output 1 Functionality

This parameter determines the function of digital output 1.

This setting determines the bit position in the Digital Outputs Status register, which governs the state of the digital output.

| | |
|---|---|
| PNU | 769d / 301h |
| Description | Digital output 1 functionality |
| Access | rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 ... 3 |

| Value | Description |
|---|---|
| 0 | General use<br>Control of the control output is directly via bit DO1 in the process data. |
| 1 | Fault<br>The output is switched active in case of fault. |
| 2 | Inpos<br>The state of bit Inpos in the status word defines the state of the digital output. |
| 3 | Output on<br>The output is switched on permanently. |

### 8.2.1.10 Digital Output Functionalities State

The functional states that can be assigned to the digital output can be read from this register.

| | |
|---|---|
| PNU | 770d / 302h |
| Description | Status of the digital output functionalities |
| Access | ro |
| Data type | Unsigned32 |
| Default | No |
| EEPROM | No |

| Bit | Description |
|---|---|
| 0 | Fault<br>0 = no error<br>1 = fault active |
| 1 | Inpos<br>0 = actual value outside the positioning window<br>1 = actual value inside the positioning window |
| 2 | Output on<br>The bit is permanently set |
| 3 ... 31 | Not assigned |

### 8.2.1.11 Digital Outputs Polarity

This parameter determines the switching behavior individually for every digital output.
A bit that defines the switching logics is assigned to every digital output.

| | |
|---|---|
| PNU | 771d / 303h |
| Description | Polarity of the digital output |
| Access | Rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 ... 15 |

Value of the assigned bits:
0 = positive logics (high-active)
1 = negative logics (low-active)

| Bit | Description |
|---|---|
| 0 | Digital output 1 polarity |
| 1 ... 15 | Not assigned |

#### 8.2.1.12 Digital Input 1 Functionality

This parameter determines the functionality of digital input 1.
With a value greater than 0 set, a function is assigned to the digital input.

The functional state can be read from the Digital Input Functionalities State register.

| | |
|---|---|
| PNU | 1025d / 401h |
| Description | Input 1 functionality |
| Access | rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 … 11 |

| Value | Description |
|---|---|
| 0 | General use<br>No function is assigned to the digital input. |
| 1 | Limit switch 1 |
| 2 | Limit switch 2 |
| 3 | Inching operation 2 positive direction |
| 4 | Inching operation 2 negative direction |
| 5 | Calibrate |
| 6 | Acknowledge error |
| 7 | Inching mode 1 |
| 8 | PCM Start |
| 9 | PCM input 1 |
| 10 | PCM input 2 |
| 11 | PCM input 3 |

*Table 7: Configuration of digital inputs*

#### 8.2.1.13 Digital Input 2 Functionality

This parameter determines the functionality of digital input 2.
With a value greater than 0 set, a function is assigned to the digital input.

The functional state can be read from the Digital Input Functionalities State register.

| | |
|---|---|
| PNU | 1026d / 402h |
| Description | Input 2 functionality |
| Access | rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 … 11 |

*Description, see Table 7: Configuration of digital inputs.*

#### 8.2.1.14 Digital Input 3 Functionality

This parameter determines the functionality of digital input 3.
With a value greater than 0 set, a function is assigned to the digital input.

The functional state can be read from the Digital Input Functionalities State register.

| | |
|---|---|
| PNU | 1027d / 403h |
| Description | Input 3 functionality |
| Access | rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 … 11 |

*Description, see Table 7: Configuration of digital inputs.*

#### 8.2.1.15 Digital Input 4 Functionality

This parameter determines the functionality of digital input 1.
With a value greater than 0 set, a function is assigned to the digital input.

The functional state can be read from the Digital Input Functionalities State register.

| | |
|---|---|
| PNU | 1028d / 404h |
| Description | input 4 functionality |
| Access | rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 … 11 |

*Description, see Table 7: Configuration of digital inputs.*

#### 8.2.1.16 Digital Input Functionalities State

The states of the digital inputs are mapped in this register according to the functionalities set. A bit is assigned to every function.

| | |
|---|---|
| PNU | 1029d / 405h |
| Description | Status of the digital input functionalities |
| Access | ro |
| Data type | Unsigned32 |
| Default | No |
| EEPROM | No |

| Bit | Description |
|---|---|
| 0 | Limit switch 1: |
| 1 | Limit switch 2: |
| 2 | Inching operation 2 positive direction |
| 3 | Inching operation 2 negative direction |
| 4 | Calibrate |
| 5 | Acknowledge error |
| 6 | Inching mode 1 |
| 7 | PCM Start |
| 8 | PCM input 1 |
| 9 | PCM input 2 |
| 10 | PCM input 3 |
| 11 ... 31 | Not assigned |

*Table 8: States of the digital inputs*

### 8.2.1.17 Digital Inputs Polarity

This parameter determines the switching behavior individually for every digital input.
A bit that defines the switching logics is assigned to every digital input.

| | |
|---|---|
| PNU | 1030d / 406h |
| Description | Polarity of the digital output |
| Access | rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 … 15 |

Value of the assigned bit
0 = positive logics (high-active)
1 = negative logics (low-active)

| Bit | Description |
|---|---|
| 0 | Digital input 1 polarity |
| 1 | Digital input 2 polarity |
| 2 | Digital input 3 polarity |
| 3 | Digital input 4 polarity |
| 4 … 15 | Not assigned |

### 8.2.1.18 Controller Parameter P

This setting applies to all operating modes.

| | |
|---|---|
| PNU | 1537d / 601h |
| Description | P gain of controller |
| Access | rw |
| Data type | Interger16 |
| Default | 300 |
| EEPROM | Yes |
| Value range | 1 … 500 |

### 8.2.1.19 Controller Parameter I

This setting applies to all operating modes.

| | |
|---|---|
| PNU | 1538d / 602h |
| Description | I gain of controller |
| Access | rw |
| Data type | Interger16 |
| Default | 2 |
| EEPROM | Yes |
| Value range | 0 … 500 |

#### 8.2.1.20 Controller Parameter D

This setting applies to all operating modes.

| | |
|---|---|
| PNU | 1539d / 603h |
| Description | D gain of controller |
| Access | rw |
| Data type | Interger16 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 … 500 |

#### 8.2.1.21 A-Pos

| | |
|---|---|
| PNU | 1540d / 604h |
| Description | Acceleration in the positioning mode |
| Access | rw |
| Data type | Interger16 |
| Default | 50 |
| EEPROM | Yes |
| Value range | 1 … 100 %<br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

#### 8.2.1.22 V-Pos

| | |
|---|---|
| PNU | 1541d / 605h |
| Description | Maximum speed in the positioning mode |
| Access | rw |
| Data type | Integer16 |
| Default | 10 |
| EEPROM | Yes |
| Value range | Transmission 66:1 ⇒ max. 75 rpm<br>Transmission 98:1 ⇒ max. 50 rpm<br>Transmission 188:1 ⇒ max. 30 rpm<br>Transmission 368:1 ⇒ max. 15 rpm |

#### 8.2.1.23 D-Pos

| | |
|---|---|
| PNU | 1542d / 606h |
| Description | Delay in the positioning mode |
| Access | rw |
| Data type | Interger16 |
| Default | 101 |
| EEPROM | Yes |
| Value range | 1 … 101 %<br>101 % = the delay is determined by the A-Pos parameter<br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

#### 8.2.1.24 A-Rot

| | |
|---|---|
| PNU | 1543d / 607h |
| Description | Acceleration in speed mode |
| Access | rw |
| Data type | Interger16 |
| Default | 50 |
| EEPROM | Yes |
| Value range | 1 … 100 %100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

#### 8.2.1.25 A-Inch

| | |
|---|---|
| PNU | 1544d / 608h |
| Description | Acceleration in inching mode 1 /2 |
| Access | rw |
| Data type | Interger16 |
| Default | 50 |
| EEPROM | Yes |
| Value range | 1 … 100 %<br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

#### 8.2.1.26 V-Inch

| | |
|---|---|
| PNU | 1545d / 609h |
| Description | Maximum speed in inching mode 1/2 |
| Access | rw |
| Data type | Interger16 |
| Default | 10 |
| EEPROM | Yes |
| Value range | Transmission 66:1 ⇒ max. 75 rpm<br>Transmission 98:1 ⇒ max. 50 rpm<br>Transmission 188:1 ⇒ max. 30 rpm<br>Transmission 368:1 ⇒ max. 15 rpm |

#### 8.2.1.27 Pos Window

Operating mode: Positioning mode

If the actual position of the drive is within the programmed set point ± this window, bit SW.5 is set.

Spindle pitch = 0: Values refer to steps
Spindle pitch > 0: Values refer to travel distance as 1/100 mm

Operating mode: Speed mode:

If the actual rotational speed is within the target rotational speed ± this window, bit SW.5 is set.

| | |
|---|---|
| PNU | 1546d / 60Ah |
| Description | Positioning window |
| Access | rw |
| Data type | Interger16 |
| Default | 10 |
| EEPROM | Yes |
| Value range | 0 ... 1000 |

#### 8.2.1.28 Gear Ratio Numerator

a transmission factor can be programmed here when an external gear unit is used.

| | |
|---|---|
| PNU | 1547d / 60Bh |
| Description | Numerator transmission ratio |
| Access | rw |
| Data type | Interger16 |
| Default | 1 |
| EEPROM | Yes |
| Value range | 1 ... 10000 |

### 8.2.1.29 Gear Ratio Denominator

a transmission factor can be programmed here when an external gear unit is used.

| | |
|---|---|
| PNU | 1548d / 60Ch |
| Description | Denominator gear ratio |
| Access | rw |
| Data type | Interger16 |
| Default | 1 |
| EEPROM | yes |
| Value range | 1 ... 10000 |

### 8.2.1.30 Spindle Pitch

Spindle pitch parameter = 0:

Position value is output in steps (720 steps per revolution of the output shaft).

Spindle pitch parameter > 0 (when operating the actuator on a spindle):

Position value is output as traveling distance in 1/100 mm rather than in steps. Input of the target position is now in 1/100 mm as well, e.g., spindle with a pitch of 2 mm ⇒ spindle pitch parameter = 200.

| | |
|---|---|
| PNU | 1549d / 60Dh |
| Description | Spindle pitch |
| Access | rw |
| Data type | Interger32 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 ... 1000000 |

### 8.2.1.31 Calibration Value

Changes to the calibration value are adopted for calculation of the position value only after calibration via S command.

Position value = 0 + calibration value + offset value

| | |
|---|---|
| PNU | 1550d / 60E h |
| Description | Calibration value |
| Access | rw |
| Data type | Interger32 |
| Default | 0 |
| EEPROM | Yes |
| Value range | -999999 ... 999999 |

### 8.2.1.32 Software Limit 1

| | |
|---|---|
| NOTICE | Positioning mode:<br>Software limit value monitoring is deactivated if Software Limit 1 is equal Software Limit 2. Exceeding the resolution of the absolute encoder results in a jump of the actual position.<br>Speed mode:<br>Irrelevant |

Positioning mode:

Spindle pitch = 0: Values refer to steps
Spindle pitch > 0 values refer to travel distance in 1/100 mm

If the drive's position is beyond the range defined by Software Limit 1 and Software Limit 2 (travel range), traveling will only be possible in inching mode in the direction of the travel range.

| | |
|---|---|
| PNU | 1551d / 60F h |
| Description | Limit 1 |
| Access | rw |
| Data type | Interger32 |
| Default | 99999 |
| EEPROM | Yes |
| Value range | -9999999 ... 9999999 |

### 8.2.1.33 Software Limit 2

| | |
|---|---|
| NOTICE | Positioning mode:<br>Software limit value monitoring is deactivated if Software Limit 1 is equal Software Limit 2. Exceeding the resolution of the absolute encoder results in a jump of the actual position.<br>Speed mode:<br>Irrelevant |

Positioning mode:

Spindle pitch = 0: Values refer to steps
Spindle pitch > 0 values refer to travel distance in 1/100 mm

If the drive's position is beyond the range defined by Software Limit 1 and Software Limit 2 (travel range), traveling will only be possible in inching mode in the direction of the travel range.

| | |
|---|---|
| PNU | 1552d / 610h |
| Description | Limit 2 |
| Access | rw |
| Data type | Interger32 |
| Default | -19999 |
| EEPROM | Yes |
| Value range | -9999999 ... 9999999 |

### 8.2.1.34 Delta Inch

Indicates the relative traveling distance.

Positive value ⇒ positive travel direction
Negative value ⇒ negative travel direction

Spindle pitch = 0: Values refer to steps
Spindle pitch > 0 values refer to travel distance in 1/100 mm

| | |
|---|---|
| PNU | 1553d / 611h |
| Description | Travel distance jog mode 1 |
| Access | rw |
| Data type | Interger32 |
| Default | 720 |
| EEPROM | yes |
| Value range | -1000000 ... 1000000 |

### 8.2.1.35 Sense of Rotation

With shaft rotating counter-clockwise (view on the output shaft)

i sense of rotation: positive counting direction
e sense of rotation: negative counting direction

| | |
|---|---|
| PNU | 1554d / 612h |
| Description | Sense of rotation |
| Access | rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 = i sense of rotation (cw):<br>1 = e sense of rotation (ccw) |

### 8.2.1.36 Pos Type

| NOTICE | Loop positioning is executed in the positioning mode only. |
|---|---|

Speed mode:

Irrelevant

Operating mode: Positioning mode

| Type of positioning | Description |
|---|---|
| Direct | Direct traveling from actual position to target value. |
| Loop + | Traveling to the target value is always in positive direction to compensate for spindle play. |
| Loop - | Traveling to the target value is always in negative direction to compensate for spindle play |

| | |
|---|---|
| PNU | 1555d / 613h |
| Description | Positioning type |
| Access | rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 = direct<br>1 = loop +<br>2 = loop - |

### 8.2.1.37 Operating Mode

| | |
|---|---|
| PNU | 1556d / 614h |
| Description | Operating mode |
| Access | rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 = positioning mode<br>1 = speed mode |

### 8.2.1.38 Inching 2 Stop Mode

The delay ramp in Inching operation 2 can be influenced via this parameter.

| | |
|---|---|
| PNU | 1557d / 615h |
| Description | Stop mode inching 2 |
| Access | rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 = stop with maximum delay<br>1 = stop with programmed delay |

### 8.2.1.39 Inpos Mode

This parameter determines the drive's behavior after reaching the positioning window.

| | |
|---|---|
| PNU | 1558d / 616h |
| Description | Inpos mode |
| Access | rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 ... 2 |

Speed mode:

Irrelevant

Positioning mode:

| Value | Description |
|---|---|
| 0 | Permanent positioning regulation to setpoint. |
| 1 | Positioning control Off and short circuit of the motor windings |
| 2 | Positioning control Off and drive enable |

### 8.2.1.40 Loop Length

This parameter determines the loop length for the loop + and loop - positioning types.

Positioning mode

Spindle pitch = 0: Values refer to steps
Spindle pitch > 0 values refer to travel distance as 1/100 mm

Speed mode:

Irrelevant

| | |
|---|---|
| PNU | 1559d / 617h |
| Description | Loop length |
| Access | rw |
| Data type | Interger16 |
| Default | 360 |
| EEPROM | yes |
| Value range | 0 ... 30000 |

### 8.2.1.41 Contouring Error Limit

Upon starting a travel job, the ramp generator generates position setpoints in order to reach the target position with the desired speed profile (A-Pos, V-Pos, D-Pos).

Position regulation attempts to readjust the drive's actual position and to keep the control deviation as small as possible.

Disturbance variables such as load or friction can disable the drive's following the position values.

Control deviation (contouring error) will increase steadily. If control deviation exceeds the value of the contouring error limit, this will result in the contouring error fault.

The maximum admissible contouring error is indicated as steps.

| | |
|---|---|
| PNU | 1560d / 618h |
| Description | Contouring error limit |
| Access | rw |
| Data type | Interger16 |
| Default | 400 |
| EEPROM | Yes |
| Value range | 1 ... 30000 |

### 8.2.1.42 Current Limiting

This parameter determines the setting for limiting the motor current.

The values are indicated as % of nominal current.

| | |
|---|---|
| PNU | 1561d / 619h |
| Description | Current limiting |
| Access | rw |
| Data type | Unsigned8 |
| Default | 110 |
| EEPROM | Yes |
| Value range | 25 ... 110 % |

### 8.2.1.43 Inching 2 Offset

The inching speed in Inching operation 2 can be influenced via this parameter
Values are entered in percentage of parameter V-Inch, PNU 1545

| | |
|---|---|
| PNU | 1562d / 61Ah |
| Description | Inching 2 Offset |
| Access | rw |
| Data type | Unsigned8 |
| Default | 100 |
| EEPROM | No |
| Value range | 10 ... 100 % |

### 8.2.1.44 Inching 2 Acceleration Type

The acceleration type in Inching operation 2 can be influenced via this parameter.

| | |
|---|---|
| PNU | 1563d / 61Bh |
| Description | Inching mode 2 acceleration type |
| Access | rw |
| Data type | Unsigned8 |
| Default | 0 |
| EEPROM | Yes |
| Value range | 0 ... 1 |

| Value | Description |
|---|---|
| 0 | Static acceleration<br>Acceleration occurs to final speed as defined under parameter A-Inch, PNU 1544: |
| 1 | Incremental acceleration<br>Acceleration occurs to final speed as defined under parameter A-Inch, PNU 1544 with the following steps:<br>4 s to 20 % of final speed<br>2 s to 50 % of final speed<br>1 s to 100 % of final speed |

### 8.2.1.45 Offset Value

Changes to the offset value are immediately considered in the calculation of the position value.

The following equation is applied in case of calibration:
Position value = 0 + calibration value + offset value

| | |
|---|---|
| PNU | 1564d / 61Ch |
| Description | Offset value |
| Access | rw |
| Data type | Interger32 |
| Default | 0 |
| EEPROM | Yes |
| Value range | -999999 ... 999999 |

#### 8.2.1.46 PCM Position 1

Spindle pitch = 0: values refer to steps
Spindle pitch > 0: values refer to travel distance as 1/100 mm

| | |
|---|---|
| PNU | 2338d / 922h |
| Description | Positioning mode via digital inputs: Position 1 |
| Access | rw |
| Data type | Interger32 |
| Default | 0 |
| EEPROM | Yes |
| Value range | Interger32 |

#### 8.2.1.47 PCM Position 2

Spindle pitch = 0: values refer to steps
Spindle pitch > 0: values refer to travel distance as 1/100 mm

| | |
|---|---|
| PNU | 2339d / 923h |
| Description | Positioning mode via digital inputs: Position 2 |
| Access | rw |
| Data type | Interger32 |
| Default | 0 |
| EEPROM | Yes |
| Value range | Interger32 |

#### 8.2.1.48 PCM Position 3

Spindle pitch = 0: values refer to steps
Spindle pitch > 0: values refer to travel distance as 1/100 mm

| | |
|---|---|
| PNU | 2340d / 924h |
| Description | Positioning mode via digital inputs: Position 3 |
| Access | rw |
| Data type | Interger32 |
| Default | 0 |
| EEPROM | Yes |
| Value range | Interger32 |

### 8.2.1.49 PCM Position 4

Spindle pitch = 0: values refer to steps
Spindle pitch > 0: values refer to travel distance as 1/100 mm

| | |
|---|---|
| PNU | 2341d / 925h |
| Description | Positioning mode via digital inputs: Position 4 |
| Access | rw |
| Data type | Interger32 |
| Default | 0 |
| EEPROM | Yes |
| Value range | Interger32 |

### 8.2.1.50 PCM Position 5

Spindle pitch = 0: values refer to steps
Spindle pitch > 0: values refer to travel distance as 1/100 mm

| | |
|---|---|
| PNU | 2342d / 926h |
| Description | Positioning mode via digital inputs: Position 5 |
| Access | rw |
| Data type | Interger32 |
| Default | 0 |
| EEPROM | Yes |
| Value range | Interger32 |

### 8.2.1.51 PCM Position 6

Spindle pitch = 0: values refer to steps
Spindle pitch > 0: values refer to travel distance as 1/100 mm

| | |
|---|---|
| PNU | 2343d / 927h |
| Description | Positioning mode via digital inputs: Position 6 |
| Access | rw |
| Data type | Interger32 |
| Default | 0 |
| EEPROM | Yes |
| Value range | Interger32 |

### 8.2.1.52 PCM Position 7

Spindle pitch = 0: values refer to steps
Spindle pitch > 0: values refer to travel distance as 1/100 mm

| | |
|---|---|
| PNU | 2344d / 928h |
| Description | Positioning mode via digital inputs: Position 7 |
| Access | rw |
| Data type | Interger32 |
| Default | 0 |
| EEPROM | Yes |
| Value range | Interger32 |

### 8.2.1.53 PCM Acceleration 1

| | |
|---|---|
| PNU | 2370d / 942h |
| Description | Positioning mode via digital inputs: Acceleration 1 |
| Access | rw |
| Data type | Interger16 |
| Default | 50 |
| EEPROM | Yes |
| Value range | 1 … 100 %<br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.54 PCM Acceleration 2

| | |
|---|---|
| PNU | 2371d / 943h |
| Description | Positioning mode via digital inputs: Acceleration 2 |
| Access | rw |
| Data type | Interger16 |
| Default | 50 |
| EEPROM | Yes |
| Value range | 1 … 100 %<br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.55 PCM Acceleration 3

| | |
|---|---|
| PNU | 2372d / 944h |
| Description | Positioning mode via digital inputs: Acceleration 3 |
| Access | rw |
| Data type | Interger16 |
| Default | 50 |
| EEPROM | Yes |
| Value range | 1 … 100 %<br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.56 PCM Acceleration 4

| | |
|---|---|
| PNU | 2373d / 945h |
| Description | Positioning mode via digital inputs: Acceleration 4 |
| Access | rw |
| Data type | Interger16 |
| Default | 50 |
| EEPROM | Yes |
| Value range | 1 … 100 %<br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.57 PCM Acceleration 5

| | |
|---|---|
| PNU | 2374d / 946h |
| Description | Positioning mode via digital inputs: Acceleration 5 |
| Access | rw |
| Data type | Interger16 |
| Default | 50 |
| EEPROM | Yes |
| Value range | 1 … 100 %<br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.58 PCM Acceleration 6

| | |
|---|---|
| PNU | 2375d / 947h |
| Description | Positioning mode via digital inputs: Acceleration 6 |
| Access | rw |
| Data type | Interger16 |
| Default | 50 |
| EEPROM | Yes |
| Value range | 1 ... 100 %<br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.59 PCM Acceleration 7

| | |
|---|---|
| PNU | 2376d / 948h |
| Description | Positioning mode via digital inputs: Acceleration 7 |
| Access | rw |
| Data type | Interger16 |
| Default | 50 |
| EEPROM | Yes |
| Value range | 1 ... 100 %<br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.60 PCM Velocity 1

| | |
|---|---|
| PNU | 2402d / 962h |
| Description | Positioning mode via digital inputs: Velocity 1 |
| Access | rw |
| Data type | Interger16 |
| Default | 10 |
| EEPROM | Yes |
| Value range | Transmission 66:1 ⇒ max. 75 rpm<br>Transmission 98:1 ⇒ max. 50 rpm<br>Transmission 188:1 ⇒ max. 30 rpm<br>Transmission 368:1 ⇒ max. 15 rpm |

### 8.2.1.61 PCM Velocity 2

| | |
|---|---|
| PNU | 2403d / 963h |
| Description | Positioning mode via digital inputs: Velocity 2 |
| Access | rw |
| Data type | Interger16 |
| Default | 10 |
| EEPROM | Yes |
| Value range | Transmission 66:1 ⇒ max. 75 rpm<br>Transmission 98:1 ⇒ max. 50 rpm<br>Transmission 188:1 ⇒ max. 30 rpm<br>Transmission 368:1 ⇒ max. 15 rpm |

### 8.2.1.62 PCM Velocity 3

| | |
|---|---|
| PNU | 2404d / 964h |
| Description | Positioning mode via digital inputs: Velocity 3 |
| Access | rw |
| Data type | Interger16 |
| Default | 10 |
| EEPROM | Yes |
| Value range | Transmission 66:1 ⇒ max. 75 rpm<br>Transmission 98:1 ⇒ max. 50 rpm<br>Transmission 188:1 ⇒ max. 30 rpm<br>Transmission 368:1 ⇒ max. 15 rpm |

### 8.2.1.63 PCM Velocity 4

| | |
|---|---|
| PNU | 2405d / 965h |
| Description | Positioning mode via digital inputs: Velocity 4 |
| Access | rw |
| Data type | Interger16 |
| Default | 10 |
| EEPROM | Yes |
| Value range | Transmission 66:1 ⇒ max. 75 rpm<br>Transmission 98:1 ⇒ max. 50 rpm<br>Transmission 188:1 ⇒ max. 30 rpm<br>Transmission 368:1 ⇒ max. 15 rpm |

#### 8.2.1.64 PCM Velocity 5

| | |
|---|---|
| PNU | 2406d / 966h |
| Description | Positioning mode via digital inputs: Velocity 5 |
| Access | rw |
| Data type | Interger16 |
| Default | 10 |
| EEPROM | Yes |
| Value range | Transmission 66:1 ⇒ max. 75 rpm<br>Transmission 98:1 ⇒ max. 50 rpm<br>Transmission 188:1 ⇒ max. 30 rpm<br>Transmission 368:1 ⇒ max. 15 rpm |

#### 8.2.1.65 PCM Velocity 6

| | |
|---|---|
| PNU | 2407d / 967h |
| Description | Positioning mode via digital inputs: Velocity 6 |
| Access | rw |
| Data type | Interger16 |
| Default | 10 |
| EEPROM | Yes |
| Value range | Transmission 66:1 ⇒ max. 75 rpm<br>Transmission 98:1 ⇒ max. 50 rpm<br>Transmission 188:1 ⇒ max. 30 rpm<br>Transmission 368:1 ⇒ max. 15 rpm |

#### 8.2.1.66 PCM Velocity 7

| | |
|---|---|
| PNU | 2408d / 968h |
| Description | Positioning mode via digital inputs: Velocity 7 |
| Access | rw |
| Data type | Interger16 |
| Default | 10 |
| EEPROM | Yes |
| Value range | Transmission 66:1 ⇒ max. 75 rpm<br>Transmission 98:1 ⇒ max. 50 rpm<br>Transmission 188:1 ⇒ max. 30 rpm<br>Transmission 368:1 ⇒ max. 15 rpm |

### 8.2.1.67 PCM Deceleration 1

| | |
|---|---|
| PNU | 2434d / 982h |
| Description | Positioning mode via digital inputs: Delay 1 |
| Access | rw |
| Data type | Interger16 |
| Default | 101 |
| EEPROM | Yes |
| Value range | 1 ... 101 %<br><br>101 % = the delay is determined by the PCM Acceleration 1 parameter.<br><br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.68 PCM Deceleration 2

| | |
|---|---|
| PNU | 2435d / 983h |
| Description | Positioning mode via digital inputs: Delay 2 |
| Access | rw |
| Data type | Interger16 |
| Default | 101 |
| EEPROM | Yes |
| Value range | 1 ... 101 %<br><br>101 % = the delay is determined by the PCM Acceleration 2 parameter.<br><br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.69 PCM Deceleration 3

| | |
|---|---|
| PNU | 2436d / 984h |
| Description | Positioning mode via digital inputs: Delay 3 |
| Access | rw |
| Data type | Interger16 |
| Default | 101 |
| EEPROM | Yes |
| Value range | 1 ... 101 %<br><br>101 % = the delay is determined by the PCM Acceleration 3 parameter.<br><br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.70 PCM Deceleration 4

| | |
|---|---|
| PNU | 2437d / 985h |
| Description | Positioning mode via digital inputs: Delay 4 |
| Access | rw |
| Data type | Interger16 |
| Default | 101 |
| EEPROM | Yes |
| Value range | 1 ... 101 %<br><br>101 % = the delay is determined by the PCM Acceleration 4 parameter.<br><br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.71 PCM Deceleration 5

| | |
|---|---|
| PNU | 2438d / 986h |
| Description | Positioning mode via digital inputs: Delay 5 |
| Access | rw |
| Data type | Interger16 |
| Default | 101 |
| EEPROM | Yes |
| Value range | 1 ... 101 %<br><br>101 % = the delay is determined by the PCM Acceleration 5 parameter.<br><br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.72 PCM Deceleration 6

| | |
|---|---|
| PNU | 2439d / 987h |
| Description | Positioning mode via digital inputs: Delay 6 |
| Access | rw |
| Data type | Interger16 |
| Default | 101 |
| EEPROM | Yes |
| Value range | 1 ... 101 %<br><br>101 % = the delay is determined by the PCM Acceleration 6 parameter.<br><br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.73 PCM Deceleration 7

| | |
|---|---|
| PNU | 2440d / 988h |
| Description | Positioning mode via digital inputs: Delay 7 |
| Access | rw |
| Data type | Interger16 |
| Default | 101 |
| EEPROM | Yes |
| Value range | 1 ... 101 %<br><br>101 % = the delay is determined by the PCM Acceleration 7 parameter.<br><br>100 % correspond to:<br>Transmission 66:1 ⇒ 3.04 rps²<br>Transmission 98:1 ⇒ 2.05 rps²<br>Transmission 188:1 ⇒ 1.06 rps²<br>Transmission 368:1 ⇒ 0.54 rps² |

### 8.2.1.74 Output Stage Temperature

| | |
|---|---|
| PNU | 2561d / A01h |
| Description | Output stage temperature |
| Unit | 1/10 °C |
| Access | ro |
| Data type | Interger16 |
| Default | No |
| EEPROM | No |

### 8.2.1.75 Voltage of Control

| | |
|---|---|
| PNU | 2562d / A02h |
| Description | Operating voltage of control |
| Unit | 1/10 V |
| Access | ro |
| Data type | Interger16 |
| Default | No |
| EEPROM | No |

#### 8.2.1.76 Voltage of Output Stage

| | |
|---|---|
| PNU | 2563d / A03h |
| Description | Operating voltage of output stage |
| Unit | 1/10 V |
| Access | ro |
| Data type | Interger16 |
| Default | No |
| EEPROM | No |

#### 8.2.1.77 Voltage of Battery

| | |
|---|---|
| PNU | 2564d / A04h |
| Description | Battery voltage |
| Unit | 1/100 V |
| Access | ro |
| Data type | Interger16 |
| Default | No |
| EEPROM | No |

#### 8.2.1.78 Motor Current

| | |
|---|---|
| PNU | 2565d / A05h |
| Description | Motor current |
| Unit | mA |
| Access | ro |
| Data type | Interger16 |
| Default | No |
| EEPROM | No |

#### 8.2.1.79 Actual Position

| | |
|---|---|
| PNU | 2566d / A06h |
| Description | Current position |
| Unit | Spindle pitch = 0: Steps<br>Spindle pitch > 0: 1/100 mm |
| Access | ro |
| Sata type | Interger32 |
| Default | No |
| EEPROM | No |

#### 8.2.1.80 Actual Rotational Speed

| | |
|---|---|
| PNU | 2567d / A07h |
| Description | Current speed |
| Unit | rpm |
| Access | ro |
| Data type | Interger16 |
| Default | No |
| EEPROM | No |

#### 8.2.1.81 Serial Number

| | |
|---|---|
| PNU | 2568d / A08h |
| Description | Serial number |
| Unit | - |
| Access | ro |
| Data type | Interger32 |
| Default | No |
| EEPROM | Yes |

#### 8.2.1.82 Production Date

| | |
|---|---|
| PNU | 2569d / A09h |
| Description | Production date |
| Unit | DDMMYYYY |
| Access | ro |
| Data type | Interger32 |
| Default | No |
| EEPROM | Yes |

#### 8.2.1.83 SW Motor Controller

| | |
|---|---|
| PNU | 2570d / A0Ah |
| Description | Motor Controller software version |
| Unit | - |
| Access | ro |
| Data type | Interger32 |
| Default | No |
| EEPROM | No |

#### 8.2.1.84 Gear Reduction

| | |
|---|---|
| PNU | 2571d / A0Bh |
| Description | Transmission ratio reduction |
| Unit | - |
| Access | ro |
| Data type | Interger16 |
| Default | No |
| EEPROM | Yes |

### 8.2.1.85 System Status Word

The system status word consists of 2 bytes and reflects the state of the drive.

| High Byte | | | | | | | | Low Byte | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit number | | | | | | | | | | | | | | | |
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 2 | | | | 9 | | | | 4 | | | | 8 | | | |

*Fig. 15: Structure of the system status word*

Example (gray background):

binary: ⇒ 0010 1001 0100 1000

hex: ⇒ 2 9 4 8

| PNU | 2572d / A0Ch |
|---|---|
| Description | System status word |
| Unit | - |
| Access | ro |
| Data type | Unsigned16 |
| Default | No |
| EEPROM | No |

*Description of the bits, see Table 9: System Status Word*

The table below informs about the meaning of the individual bits of the system status word:

| Bit | State | Description |
|---|---|---|
| Bit 0 | '0' | Irrelevant |
| Bit 1 | '0' | Irrelevant |
| Bit 2 | '0' | Irrelevant |
| Bit 3 | '1'<br>'0' | Positioning mode In Position<br>Actual position is within the positioning window of the programmed target value.<br>Actual position is outside the positioning window of the programmed target value. |
| | '1'<br>'0' | Speed mode: In Position<br>Actual speed is inside the specified tolerance window of target speed.<br>Actual speed is outside the specified tolerance window. |
| Bit 4 | '1'<br>'0' | Actuator travels:<br>Actuator travels<br>Actuator stands still (rotational speed < 2 rpm) |
| Bit 5 | '1'<br>'0' | Positioning mode: Upper limit<br>Actual position is above the programmed limiting value. Traveling is possible only in negative direction in inching mode.<br>Actual position is below the programmed limiting value. |
| | '0' | Positioning mode: Irrelevant |

| Bit | State | Description |
|---|---|---|
| Bit 6 | ‘1‘<br><br>‘0‘ | Positioning mode: Lower limit<br>Actual position is below the programmed limiting value. Traveling is possible only in positive direction in inching mode.<br>Actual position is above the programmed limiting value. |
| | ‘0‘ | Positioning mode: Irrelevant |
| Bit 7 | ‘1‘<br>‘0‘ | Driver state:<br>Motor is enabled<br>Motor in control |
| Bit 8 | ‘1‘<br><br>‘0‘ | Error:<br>Actuator has switched to error. The cause of the error must be removed and acknowledged.<br>No error present |
| Bit 9 | ‘1‘<br>‘0‘ | Positioning mode: Loop travel<br>If travel direction unequal start direction (with loop travel )<br>If travel direction equal start direction |
| | ‘0‘ | Positioning mode: Irrelevant |
| Bit 10 | ‘1‘<br>‘0‘ | Output stage supply voltage<br>No voltage, no travelling possible<br>Voltage applied |
| Bit 11 | ‘1‘<br>‘0‘ | Ready for travel:<br>Not ready for travel<br>Ready for travel:<br>Actuator not in error state<br>No active positioning<br>Supply voltage of the output stage is applied<br>Actual position within limits (only positioning mode) |
| Bit 12 | ‘1‘<br>‘0‘ | Battery voltage:<br>Battery voltage < 2.6 V<br>Battery voltage OK |
| Bit 13 | ‘1‘<br>‘0‘ | Current limiting<br>Current limiting active<br>Current limiting not active |
| Bit 14 | ‘1‘<br>‘0‘ | Positioning mode: Status<br>Positioning active in positioning mode.<br>Positioning inactive. |
| | ‘1‘<br>‘0‘ | Speed mode: Status<br>Enable target speed<br>Target speed disabled: |
| Bit 15 | ‘1‘<br><br><br><br>‘0‘ | Contouring error:<br>Contouring error ⇒ the actuator cannot reach the preset speed due to too high load.<br>The actuator switches the contouring error fault.<br>Remedy: reduce programmed speed!<br>No contouring error ⇒ actual speed corresponds with required speed. |

*Table 9: System Status Word*

### 8.2.1.86 Encoder Resolution

| | |
|---|---|
| PNU | 2573d / A0Dh |
| Description | Encoder resolution |
| Unit | Steps per revolution of the output shaft |
| Access | ro |
| Data type | Interger16 |
| Default | No |
| EEPROM | Yes |

### 8.2.1.87 Device ID

1 = AG25
2 = AG26

| | |
|---|---|
| PNU | 2574d / A0Eh |
| Description | Device identification |
| Unit | - |
| Access | ro |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | Yes |

### 8.2.1.88 Number of Errors

| | |
|---|---|
| PNU | 2817d / B01h |
| Description | Number of errors |
| Unit | - |
| Access | ro |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | No |

### 8.2.1.89 Error Number 1

| | |
|---|---|
| PNU | 2818d / B02h |
| Description | Error 1 |
| Unit | - |
| Access | ro |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | Yes |

### 8.2.1.90 Error Number 2

| | |
|---|---|
| PNU | 2819d / B03h |
| Description | Error 2 |
| Unit | - |
| Access | ro |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | Yes |

### 8.2.1.91 Error Number 3

| | |
|---|---|
| PNU | 2820d / B04h |
| Description | Error 3 |
| Unit | - |
| Access | ro |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | Yes |

### 8.2.1.92 Error Number 4

| | |
|---|---|
| PNU | 2821d / B05h |
| Description | Error 4 |
| Unit | - |
| Access | ro |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | Yes |

### 8.2.1.93 Error Number 5

| | |
|---|---|
| PNU | 2822d / B06h |
| Description | Error 5 |
| Unit | - |
| Access | ro |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | Yes |

#### 8.2.1.94 Error Number 6

| | |
|---|---|
| PNU | 2823d / B07h |
| Description | Error 6 |
| Unit | - |
| Access | ro |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | Yes |

#### 8.2.1.95 Error Number 7

| | |
|---|---|
| PNU | 2824d / B08h |
| Description | Error 7 |
| Unit | - |
| Access | ro |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | Yes |

#### 8.2.1.96 Error Number 8

| | |
|---|---|
| PNU | 2825d / B09h |
| Description | Error 8 |
| Unit | - |
| Access | ro |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | Yes |

#### 8.2.1.97 Error Number 9

| | |
|---|---|
| PNU | 2826d / B0Ah |
| Description | Error 9 |
| Unit | - |
| Access | ro |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | Yes |

#### 8.2.1.98 Error Number 10

| | |
|---|---|
| PNU | 2827d / B0Bh |
| Description | Error 10 |
| Unit | - |
| Access | ro |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | Yes |

### 8.2.1.99 Configuration

Various functions of the actuator can be configured via this parameter.

| | |
|---|---|
| PNU | 2849d / B21h |
| Description | Configuration of the actuator |
| Access | rw |
| Data type | Unsigned16 |
| Default | 15 |
| EEPROM | yes |
| Value range | 0 … 65535 |

| Bit | Description |
|---|---|
| 0 | SHICP (Secure Host IP Configuration Protocol)<br>0 = off<br>1 = on (factory setting)<br>Changes will take effect after a reset. |
| 1 | Web server<br>0 = off<br>1 = on (factory setting)<br>Changes will take effect after a reset. |
| 2 | Parameter access via web server<br>0 = off<br>1 = on (factory setting)<br>Changes will take effect after a reset. |
| 3 | FTP server<br>0 = off<br>1 = on (factory setting)<br>Changes will take effect after a reset. |
| 4 | FTP server administrator rights<br>0 = no (factory setting)<br>1 = yes<br>Changes will take effect after a reset. |
| 5 | PROFINET diagnostics alarms<br>0 = no (factory setting)<br>1 = yes |
| 6 | Auto reset in the EXCEPTION state<br>0 = switched off (factory setting):<br>In the EXCEPTION state, the drive stops participating in network traffic and can no longer be addressed. To exit this state, a Power On Reset is required.<br>1 = switched on:<br>In the EXCEPTION state, the drive automatically performs a reset. After the restart, the EXCEPTION fault is triggered. |
| 7 … 15 | Reserved, always 0 |

### 8.2.1.100 S-Command

| | |
|---|---|
| PNU | 3073d / C01h |
| Description | S command |
| Unit | - |
| Access | rw |
| Data type | Unsigned8 |
| Default | No |
| EEPROM | No |

| Value | Description |
|---|---|
| 1 | All parameters to default |
| 2 | Only standard parameters to default |
| 3 | Controller parameters to default |
| 6 | Reset error |
| 7 | Calibrate |
| 8 | Delete error memory |

# 9 Service protocol

| | |
|---|---|
| **NOTICE** | If there is process data exchange with a network master, writing of parameters and execution of commands via the service protocol are disabled. In this case, the drive replies with the error code “?03”, no operating authorization |

## 9.1 General Information

The service protocol enables parameterization and control of the drive by ASCII commands via an ASCII terminal.

### 9.1.1 Communication

### 9.1.2 Settings

Available baud rates: 9.6 kBit/s / 19.2 kBit/s / 57.6 kBit/s (factory setting), 115.2 kBit/s

Additional settings: no parity, 8 data bits, 1 stop bit, no handshake

### 9.1.3 ASCII commands

An ASCII command consists of an ASCII character and additional arguments such as parameter address, mathematical sign and value.

Length and format of an ASCII command are defined unchangeably.

### 9.1.4 Responses

Except for a few cases, the actuator responds to ASCII commands with a terminating string (ASCII-character ">" + Carriage Return "<CR>" The responses to read commands contain return values in addition. Length and format of the response are defined unchangeably.

## 9.2 Overview of parameters



## 9.3 Parameters

### 9.3.1 Positioning

#### 9.3.1.1 Target Value

| | | |
|---|---|---|
| Read command | E0 | see chapter 9.8 ASCII command structure |
| Write command | F0±xxxxxxx | |
| Description | see chapter 8.2.1.3 Target Value | |

#### 9.3.1.2 Actual Position

| | | |
|---|---|---|
| Read command | Z | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | Decimal format see chapter 8.2.1.79 Actual Position | |

| | | |
|---|---|---|
| Read command | W | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | Binary format see chapter 8.2.1.79 Actual Position | |

#### 9.3.1.3 Actual Rotational Speed

| | | |
|---|---|---|
| Read command | V | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.80 Actual Rotational Speed | |

#### 9.3.1.4 Calibration Value

| | | |
|---|---|---|
| Read command | E3 | see chapter 9.8 ASCII command structure |
| Write command | F3±xxxxxxx | |
| Description | see chapter 8.2.1.31 Calibration Value | |

#### 9.3.1.5 Loop Length

| | | |
|---|---|---|
| Read command | G17 | see chapter 9.8 ASCII command structure |
| Write command | H17xxxxx | |
| Description | see chapter 8.2.1.40 Loop Length | |

#### 9.3.1.6 Offset Value

| | | |
|---|---|---|
| Read command | E5 | see chapter 9.8 ASCII command structure |
| Write command | F5±xxxxxxx | |
| Description | see chapter 8.2.1.45 Offset Value | |

#### 9.3.1.7 Pos Type

| | | |
|---|---|---|
| Read command | Q | see chapter 9.8 ASCII command structure |
| Write command | Lx | |
| Description | see chapter 8.2.1.36Pos Type | |
| Info | Reading of the positioning type is via the flag register<br>(see chapter 9.3.6.6: Flag Register).<br>x = 0: Positioning direct<br>x = 1: positioning with loop positive<br>x = 2: positioning with loop negative | |

#### 9.3.1.8 Pos Window

| | | |
|---|---|---|
| Read command | G09 | see chapter 9.8 ASCII command structure |
| Write command | H09xxxxx | |
| Description | see chapter 8.2.1.27 Pos Window | |

#### 9.3.1.9 Sense of Rotation

| | | |
|---|---|---|
| Read command | Q | see chapter 9.8 ASCII command structure |
| Write command | Tx | |
| Description | see chapter 8.2.1.35 Sense of Rotation | |
| Info | Reading of the sense of rotation is via the flag register<br>(see chapter 9.3.6.6: Flag Register).<br>x = 0: i sense of rotation (cw)<br>x = 1: e sense of rotation | |

#### 9.3.1.10 Spindle Pitch

| | | |
|---|---|---|
| Read command | G13 | see chapter 9.8 ASCII command structure |
| Write command | H13xxxxx | |
| Description | see chapter 8.2.1.30 Spindle Pitch | |

### 9.3.2 Actuator

#### 9.3.2.1 A-Pos

| | | |
|---|---|---|
| Read command | G03 | see chapter 9.8 ASCII command structure |
| Write command | H03xxxxx | |
| Description | see chapter A-PosA-Pos A-Pos | |

#### 9.3.2.2 V-Pos

| | | |
|---|---|---|
| Read command | G04 | see chapter 9.8 ASCII command structure |
| Write command | H04xxxxx | |
| Description | see chapter 8.2.1.22 V-Pos | |

#### 9.3.2.3 D-Pos

| | | |
|---|---|---|
| Read command | G44 | see chapter 9.8 ASCII command structure |
| Write command | H44xxxxx | |
| Description | see chapter 8.2.1.23 D-Pos | |

#### 9.3.2.4 A-Rot

| | | |
|---|---|---|
| Read command | G05 | see chapter 9.8 ASCII command structure |
| Write command | H05xxxxx | |
| Description | see chapter 8.2.1.24 A-Rot | |

#### 9.3.2.5 A-Inch

| | | |
|---|---|---|
| Read command | G07 | see chapter 9.8 ASCII command structure |
| Write command | H07xxxxx | |
| Description | see chapter 8.2.1.25 A-Inch | |

#### 9.3.2.6 V-Inch

| | | |
|---|---|---|
| Read command | G08 | see chapter 9.8 ASCII command structure |
| Write command | H08xxxxx | |
| Description | see chapter 8.2.1.26 V-Inch | |

#### 9.3.2.7 Gear Ratio Denominator

| | | |
|---|---|---|
| Read command | G11 | see chapter 9.8 ASCII command structure |
| Write command | H11xxxxx | |
| Description | see chapter 8.2.1.29 Gear Ratio Denominator | |

#### 9.3.2.8 Gear Ratio Numerator

| | | |
|---|---|---|
| Read command | G10 | see chapter 9.8 ASCII command structure |
| Write command | H10xxxxx | |
| Description | see chapter 8.2.1.28 Gear Ratio Numerator | |

### 9.3.3 Limiting values

#### 9.3.3.1 Software Limit 1

| | | |
|---|---|---|
| Read command | E1 | see chapter 9.8 ASCII command structure |
| Write command | F1±xxxxxxx | |
| Description | see chapter 8.2.1.32 Software Limit 1 | |

#### 9.3.3.2 Software Limit 2

| | | |
|---|---|---|
| Read command | E2 | see chapter 9.8 ASCII command structure |
| Write command | F2±xxxxxxx | |
| Description | see chapter 8.2.1.33 Software Limit 2 | |

#### 9.3.3.3 Current Limiting

| | | |
|---|---|---|
| Read command | G24 | see chapter 9.8 ASCII command structure |
| Write command | H24xxxxx | |
| Description | see chapter 9.3.3.3 Current Limiting | |

#### 9.3.3.4 Contouring Error Limit

| | | |
|---|---|---|
| Read command | G18 | see chapter 9.8 ASCII command structure |
| Write command | H18xxxxx | |
| Description | see chapter 8.2.1.41 Contouring Error Limit | |

### 9.3.4 Options

#### 9.3.4.1 Operating Mode

| | | |
|---|---|---|
| Read command | Q | see chapter 9.8 ASCII command structure |
| Write command | Xy | |
| Description | see chapter 8.2.1.37 Operating Mode | |
| Info | Reading of the operating mode is via the flag register<br>(see chapter 9.3.6.6: Flag Register).<br>y = 0: Positioning mode<br>y = 1: Rotational speed mode | |

#### 9.3.4.2 Inpos Mode

| | | |
|---|---|---|
| Read command | G16 | see chapter 9.8 ASCII command structure |
| Write command | H16xxxxx | |
| Description | see chapter 8.2.1.39 Inpos Mode | |

#### 9.3.4.3 Delta Inch

| | | |
|---|---|---|
| Read command | E4 | see chapter 9.8 ASCII command structure |
| Write command | F4±xxxxxxx | |
| Description | see chapter 8.2.1.34 Delta Inch | |

#### 9.3.4.4 Inching 2 Acceleration Type

| | | |
|---|---|---|
| Read command | G39 | see chapter 9.8 ASCII command structure |
| Write command | H39xxxxx | |
| Description | see chapter 9.3.4.4 Inching 2 Acceleration Type | |

#### 9.3.4.5 Inching 2 Offset

| | | |
|---|---|---|
| Read command | G27 | see chapter 9.8 ASCII command structure |
| Write command | H27xxxxx | |
| Description | see chapter 8.2.1.43 Inching 2 Offset | |

#### 9.3.4.6 Inching 2 Stop Mode

| | | |
|---|---|---|
| Read command | G15 | see chapter 9.8 ASCII command structure |
| Write command | H15xxxxx | |
| Description | see chapter 9.3.4.6 Inching 2 Stop Mode | |

#### 9.3.4.7 LED Functionality

| | | |
|---|---|---|
| Read command | G45 | see chapter 9.8 ASCII command structure |
| Write command | H45xxxxx | |
| Description | see chapter 8.2.1.7 LED Functionality | |

#### 9.3.4.8 Service Interface Baud Rate

| | | |
|---|---|---|
| Read command | G25 | see chapter 9.8 ASCII command structure |
| Write command | H25xxxxx | |
| Description | see chapter 8.2.1.8 Service Interface Baud rate | |

#### 9.3.4.9 Configuration

| | | |
|---|---|---|
| Read command | G61 | see chapter 9.8 ASCII command structure |
| Write command | H61xxxxx | |
| Description | see chapter 8.2.1.99 Configuration | |

### 9.3.5 Controller parameter

#### 9.3.5.1 Controller Parameter P

| | | |
|---|---|---|
| Read command | G00 | see chapter 9.8 ASCII command structure |
| Write command | H00xxxxx | |
| Description | see chapter 8.2.1.18 Controller Parameter P | |

#### 9.3.5.2 Controller Parameter I

| | | |
|---|---|---|
| Read command | G01 | see chapter 9.8 ASCII command structure |
| Write command | H01xxxxx | |
| Description | see chapter 8.2.1.19 Controller Parameter I | |

#### 9.3.5.3 Controller Parameter D

| | | |
|---|---|---|
| Read command | G02 | see chapter 9.8 ASCII command structure |
| Write command | H02xxxxx | |
| Description | see chapter 8.2.1.20 Controller Parameter D | |

### 9.3.6 Device information

#### 9.3.6.1 Motor Current

| | | |
|---|---|---|
| Read command | B04 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.78 Motor Current | |

#### 9.3.6.2 Output Stage Temperature

| | | |
|---|---|---|
| Read command | B00 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.74Output Stage Temperature | |

#### 9.3.6.3 Voltage of Control

| | | |
|---|---|---|
| Read command | B01 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.75 Voltage of Control | |

#### 9.3.6.4 Voltage of Output Stage

| | | |
|---|---|---|
| Read command | B02 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.76 Voltage of Output Stage | |

#### 9.3.6.5 Voltage of Battery

| | | |
|---|---|---|
| Read command | B03 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.77 Voltage of Battery | |

#### 9.3.6.6 Flag Register

| | | |
|---|---|---|
| Read command | Q | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | x x x x x x x x = binary representation of the flag register<br>7 6 5 4 3 2 1 0 Bit<br>Bit 0: Sense of rotation: '0' = i (cw)<br>‘1’ = e (ccw)<br><br>Bit 1+2: Type of positioning: ‘00’ = direct<br>‘01’ = loop +<br>‘10’ = loop –<br>Bit 3: not assigned<br><br>Bit 4: Operating mode: ‘0’ = positioning mode<br>‘1’ = speed mode<br><br>Bit 5+6+7: not assigned | |

#### 9.3.6.7 System Status Word

| | | |
|---|---|---|
| Read command | R | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.85 System Status Word | |

#### 9.3.6.8 Device Type

| | | |
|---|---|---|
| Read command | A0 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | Response format: "AG25 >" | |

#### 9.3.6.9 Gear Reduction

| | | |
|---|---|---|
| Read command | A4 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | Response format: "98 >" | |

#### 9.3.6.10 Motor Type

| | | |
|---|---|---|
| Read command | A7 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | Response format: "50W >" | |

#### 9.3.6.11 Network Type

| | | |
|---|---|---|
| Read command | A3 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | Response format: "EPN >" | |

#### 9.3.6.12 Production Date

| | | |
|---|---|---|
| Read command | A6 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | Response format: "DDMMYYYY>" | |

#### 9.3.6.13 Serial Number

| | | |
|---|---|---|
| Read command | A5 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | Response format: "12345678>" | |

#### 9.3.6.14 SW Ethernet Module

| | | |
|---|---|---|
| Read command | A2 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | Response format: "01:02:63>" | |

#### 9.3.6.15 SW Motor Controller

| | | |
|---|---|---|
| Read command | A1 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | Response format: "V1.00 >" | |

### 9.3.7 Digital input/output

#### 9.3.7.1 Digital Input 1 Functionality

| | | |
|---|---|---|
| Read command | G49 | see chapter 9.8 ASCII command structure |
| Write command | H49xxxxx | |
| Description | see chapter 8.2.1.12 Digital Input 1 Functionality | |

#### 9.3.7.2 Digital Input 2 Functionality

| | | |
|---|---|---|
| Read command | G50 | see chapter 9.8 ASCII command structure |
| Write command | H50xxxxx | |
| Description | see chapter 8.2.1.13 Digital Input 2 Functionality | |

#### 9.3.7.3 Digital Input 3 Functionality

| | | |
|---|---|---|
| Read command | G51 | see chapter 9.8 ASCII command structure |
| Write command | H51xxxxx | |
| Description | see chapter 8.2.1.14 Digital Input 3 Functionality | |

#### 9.3.7.4 Digital Input 4 Functionality

| | | |
|---|---|---|
| Read command | G52 | see chapter 9.8 ASCII command structure |
| Write command | H52xxxxx | |
| Description | see chapter 8.2.1.15 Digital Input 4 Functionality | |

#### 9.3.7.5 Digital Input Functionalities State

| | | |
|---|---|---|
| Read command | U1029 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.16 Digital Input Functionalities State | |

#### 9.3.7.6 Digital Inputs Polarity

| | | |
|---|---|---|
| Read command | G54 | see chapter 9.8 ASCII command structure |
| Write command | H54xxxxx | |
| Description | see chapter 8.2.1.17 Digital Inputs Polarity | |

#### 9.3.7.7 Digital Inputs State

| | | |
|---|---|---|
| Read command | B05 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.4 Digital Inputs State | |

#### 9.3.7.8 Digital Output 1 Functionality

| | | |
|---|---|---|
| Read command | G46 | see chapter 9.8 ASCII command structure |
| Write command | H46xxxxx | |
| Description | see chapter 8.2.1.9 Digital Output 1 Functionality | |

#### 9.3.7.9 Digital Outputs Control

| | | |
|---|---|---|
| Read command | G60 | see chapter 9.8 ASCII command structure |
| Write command | H60xxxxx | |
| Description | see chapter 8.2.1.1 Digital Outputs Control | |

#### 9.3.7.10 Digital Output Functionalities State

| | | |
|---|---|---|
| Read command | U0770 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.10 Digital Output Functionalities State | |

#### 9.3.7.11 Digital Outputs Polarity

| | | |
|---|---|---|
| Read command | G48 | see chapter 9.8 ASCII command structure |
| Write command | H48xxxxx | |
| Description | see chapter 8.2.1.11 Digital Outputs Polarity | |

### 9.3.8 Error memory

#### 9.3.8.1 Number of Errors

| | | |
|---|---|---|
| Read command | J00 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.88 Number of Errors | |

#### 9.3.8.2 Error Number 1

| | | |
|---|---|---|
| Read command | J01 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.89 Error Number 1 | |

#### 9.3.8.3 Error Number 2

| | | |
|---|---|---|
| Read command | J02 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.90 Error Number 2 | |

#### 9.3.8.4 Error Number 3

| | | |
|---|---|---|
| Read command | J03 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.91 Error Number 3 | |

#### 9.3.8.5 Error Number 4

| | | |
|---|---|---|
| Read command | J04 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.92 Error Number 4 | |

#### 9.3.8.6 Error Number 5

| | | |
|---|---|---|
| Read command | J05 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.93 Error Number 5 | |

#### 9.3.8.7 Error Number 6

| | | |
|---|---|---|
| Read command | J06 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.94 Error Number 6 | |

#### 9.3.8.8 Error Number 7

| | | |
|---|---|---|
| Read command | J07 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.95 Error Number 7 | |

#### 9.3.8.9 Error Number 8

| | | |
|---|---|---|
| Read command | J08 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.96 Error Number 8 | |

#### 9.3.8.10 Error Number 9

| | | |
|---|---|---|
| Read command | J09 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.97 Error Number 9 | |

#### 9.3.8.11 Error Number 10

| | | |
|---|---|---|
| Read command | J10 | see chapter 9.8 ASCII command structure |
| Write command | read-only | |
| Description | see chapter 8.2.1.97 Error Number 9 | |

## 9.4 Commands

### 9.4.1 Start travel job

| | | |
|---|---|---|
| Command | M | see chapter 9.8 ASCII command structure |
| Description | Positioning mode:<br>– start of positioning process to programmed set point<br>Speed mode:<br>–start of speed mode | |

### 9.4.2 Start of inching mode 1

| | | |
|---|---|---|
| Command | Y | see chapter 9.8 ASCII command structure |
| Description | only in positioning mode | |

### 9.4.3 Start inching mode 2 positive travel direction

| | | |
|---|---|---|
| Command | , (2Ch) | see chapter 9.8 ASCII command structure |
| Description | Drive travels in positive direction as long as the "," ASCII character is permanently sent (only in positioning mode). | |

### 9.4.4 Start inching mode 2 negative travel direction

| | | |
|---|---|---|
| Command | . (2Eh) | see chapter 9.8 ASCII command structure |
| Description | Drive travels in negative direction as long as the "." ASCII character is permanently sent (only in positioning mode). | |

### 9.4.5 Cancel current travel job in positioning mode

| | | |
|---|---|---|
| Command | I | see chapter 9.8 ASCII command structure |
| Description | Motor remains in control state | |

### 9.4.6 Motor stop fast

| | |
|---|---|
| NOTICE | If a contouring error is pending at the time of the 'N' command, the motor will be enabled |

| | | |
|---|---|---|
| Command | N | see chapter 9.8 ASCII command structure |
| Description | motor decelerates with maximum delay. Motor remains in control state! | |

### 9.4.7 Motor stop

| | |
|---|---|
| NOTICE | If a contouring error is pending at the time of the "O" command, the motor will be enabled. |

| | | |
|---|---|---|
| Command | O | see chapter 9.8 ASCII command structure |
| Description | motor decelerates with programmed delay. Motor remains in control state! | |

### 9.4.8 Enable motor

| | | |
|---|---|---|
| Command | P | see chapter 9.8 ASCII command structure |
| Description | Motor is enabled | |

### 9.4.9 Factory setting: all parameters

| | | |
|---|---|---|
| Command | S11100 | see chapter 9.8 ASCII command structure |
| Description | Reset all parameters to factory settings | |

### 9.4.10 Factory setting: Standard parameter

| | | |
|---|---|---|
| Command | S11101 | see chapter 9.8 ASCII command structure |
| Description | Reset only standard parameters to factory settings | |

### 9.4.11 Factory setting: Controller parameter

| | | |
|---|---|---|
| Command | S11102 | see chapter 9.8 ASCII command structure |
| Description | Reset only controller parameters to factory settings | |

### 9.4.12 Acknowledge error

| | | |
|---|---|---|
| Command | S11103 | see chapter 9.8 ASCII command structure |
| Description | Acknowledge error | |

### 9.4.13 Calibrate

| | | |
|---|---|---|
| Command | S11104 | see chapter 9.8 ASCII command structure |
| Description | Calibrate actuator | |

### 9.4.14 Delete error memory

| | | |
|---|---|---|
| Command | S11105 | see chapter 9.8 ASCII command structure |
| Description | Deleting of the error mermory | |

### 9.4.15 Software Reset

| | | |
|---|---|---|
| Command | C | see chapter 9.8 ASCII command structure |
| Description | Execute software reset | |

## 9.5 Flow charts

### 9.5.1 Flow chart: Operating mode: Positioning mode

The flow chart below shows the control of positioning in the positioning mode via service protocol (see chapter 9: Service protocol).

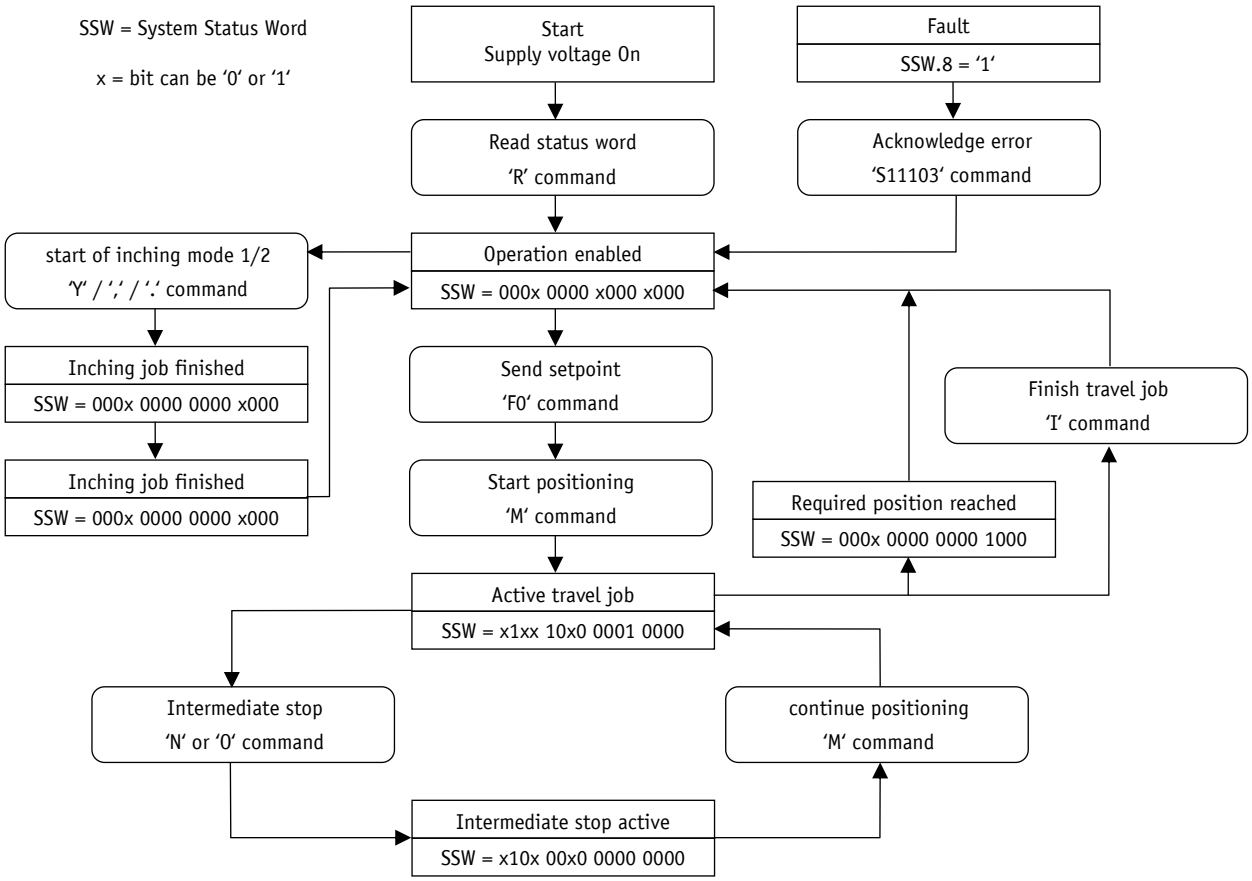



*Fig. 16: Flow chart positioning mode service protocol*

### 9.5.2 Flow chart: Operating mode: Speed mode

The flow chart below illustrates the control in the rotational speed mode via service protocol (see chapter 9: Service protocol).

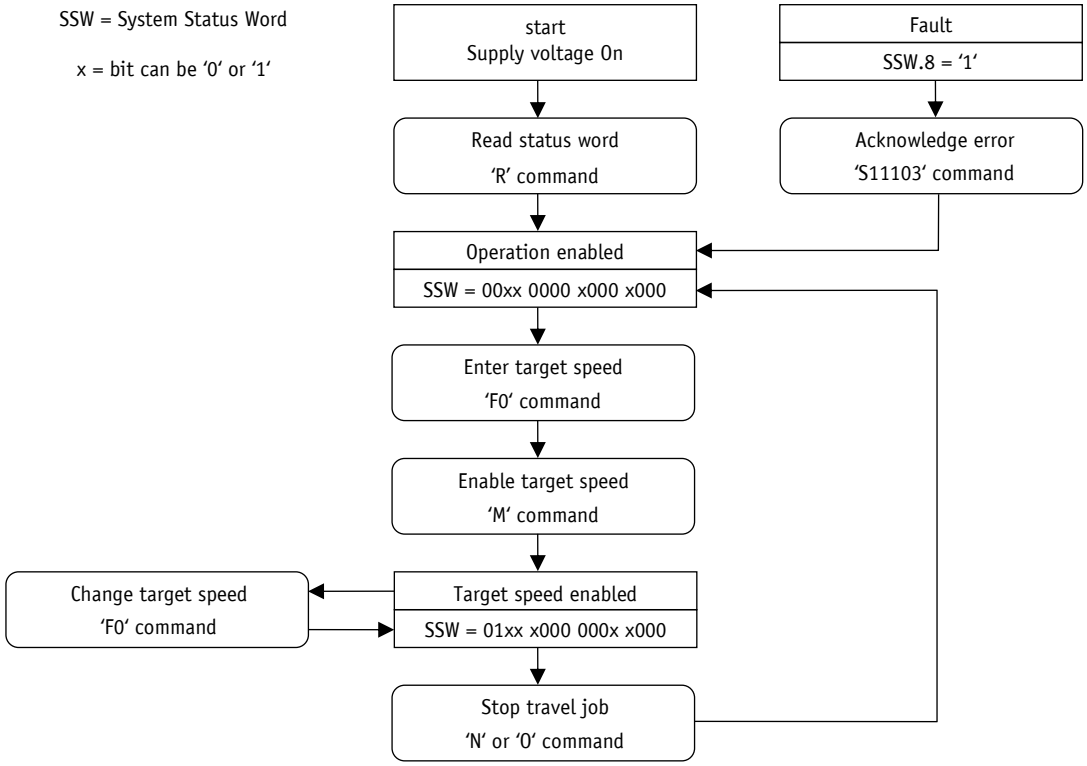



*Fig. 17: Flow chart speed mode service protocol*

## 9.6 Error number encoding

Faulty inputs are acknowledged with an error message. An error message is always prefixed by a question mark, followed by a two-digit error code. The error message ends with a carriage return "<CR>".

| Code | Description |
|---|---|
| ?01 | input of illegal parameter number |
| ?02 | illegal value range: |
| ?03 | No operating authorization (active process data exchange with network master) |
| ?04 | Input disabled due to operating state |
| ?05 | limit switch 1 active |
| ?06 | limit switch 2 active |
| ?07 | Actual or target value > upper software limit |
| ?08 | Actual or target value < lower software limit |
| ?09 | setpoint entered exceeds limiting value |
| ?10 | Fault |
| ?11 | active EEPROM write access |
| ?12 | Actual or target value < lower area limit |
| ?13 | Actual or target value > upper area limit |
| ?14 | Operating voltage of control missing |

## 9.7 Examples

### 9.7.1 Write and read setpoint +500

Write command: F0+0000500 (10 characters)

Reply: ><CR> (2 characters)

Read command: E0 (2 characters)

Reply: +0000500><CR> (10 characters)

### 9.7.2 Start travel job

Command M (1 character)

Reply: ><CR> (2 characters)

## 9.8 ASCII command structure

| Command | Length | Access | Reply | CR | Length | Description |
|---|---|---|---|---|---|---|
| Ay | 2 | read | xxxxxxxx> | x | 10 | Device information (constants)<br>y = address<br>xxxxxxxx = string |
| Byy | 3 | read | ±xxxxxxx> | x | 10 | Device information (actual values)<br>yy = address<br>±xxxxxxx = decimal value |
| Ey | 2 | read | ±xxxxxxx> | x | 10 | Read parameter (3-byte)<br>y = address<br>±xxxxxxx = decimal value |
| Fy±xxxxxxx | 10 | write | > | x | 2 | Write parameter (3-byte)<br>y = address<br>±xxxxxxx = decimal value |
| Gyy | 3 | read | "xxxxx>" | x | 7 | Read parameter (2-byte)<br>yy = address<br>xxxxx = decimal value |
| Hyyxxxxx | 8 | write | > | x | 2 | Write parameter (2-byte)<br>yy = address<br>xxxxx = decimal value |
| I | 1 | write | > | x | 2 | Cancel current travel job in positioning mode |
| Jyy | 3 | read | 0xhh> | x | 6 | Error memory<br>yy = address<br>hh = hexadecimal value |
| K | 1 | write | > | x | 2 | Software Reset |
| Lx | 2 | write | > | x | 2 | Type of positioning<br>x = decimal value |
| M | 1 | write | > | x | 2 | Start travel job |
| N | 1 | write | > | x | 2 | Motor stop fast |
| O | 1 | write | > | x | 2 | Motor stop |
| P | 1 | write | > | x | 2 | enable motor |
| Q | 1 | read | 0xhh> | x | 6 | Flag Register<br>hh = hexadecimal value |
| R | 1 | read | 0xhhll> | x | 8 | System status word<br>hh = hexadecimal value<br>High byte<br>II = hexadecimal value<br>Low byte |
| Sxxxxx | 6 | write | > | x | 2 | System command<br>xxxxx = code |
| Tx | 2 | write | > | x | 2 | Sense of rotation<br>x = decimal value |
| Uxxxx | 5 | read | bbbb | | 4 | Read parameter (4-byte)<br>bbbb = binary value in the Big-Endian format |

| Command | Length | Access | Reply | CR | Length | Description |
|---|---|---|---|---|---|---|
| V | 1 | read | ±xxxx> | x | 7 | Actual rotational speed<br>±xxxx = decimal value<br>with arithmetical sign |
| W | 1 | read | bbbb | | 4 | Position value in binary format<br>bbbb = binary value in the<br>Big-Endian format |
| Xy | 2 | write | > | x | 2 | Operating mode<br>y = decimal value |
| Y | 1 | write | > | x | 2 | start of inching mode 1 |
| Z | 1 | read | ±xxxxxxx> | x | 10 | Position value<br>±xxxxxxx decimal value |
| , (2Chex) | 1 | write | | | 0 | Start inching mode 2 positive<br>travel direction |
| . (2Ehex) | 1 | write | | | 0 | Start inching mode 2 negative<br>travel direction |

## 10 Block diagram

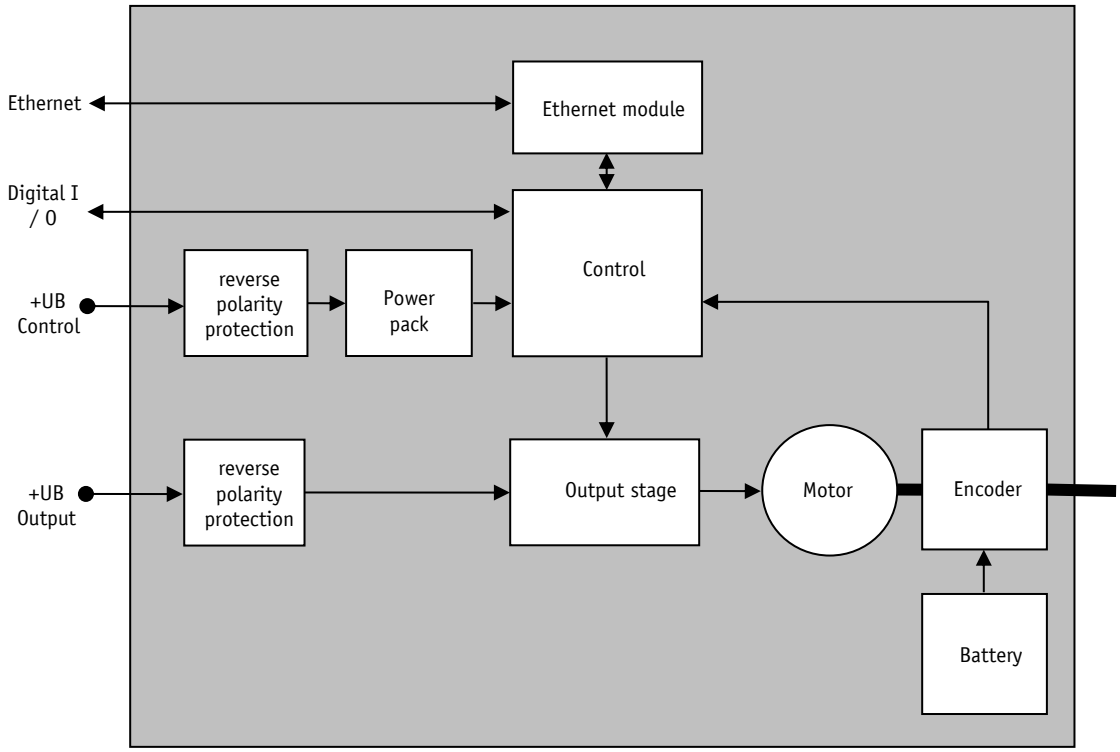



*Fig. 18: Block diagram*

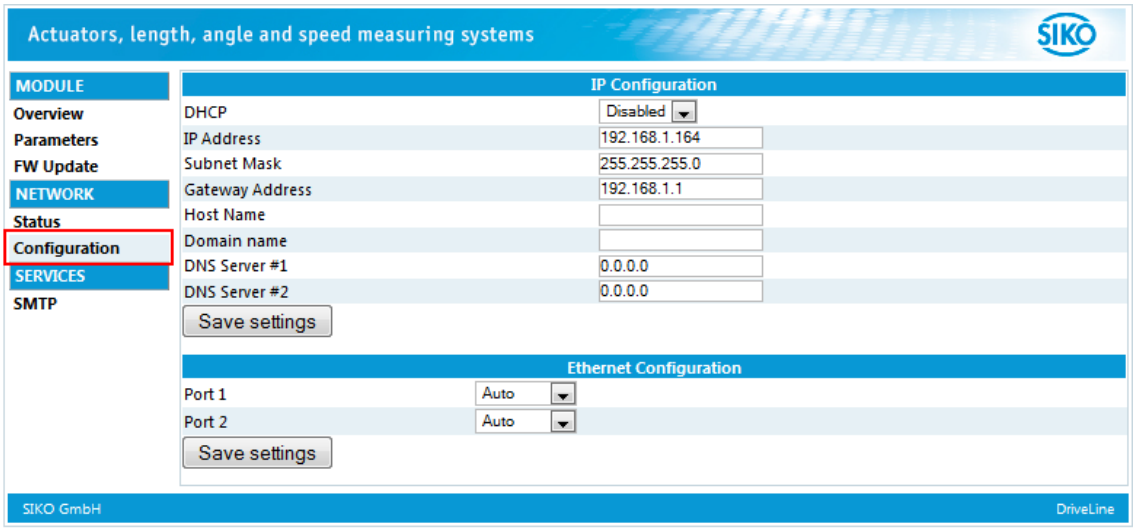
# 11 Web server

| NOTICE | No parameters that are components of process data can be changed. Drive control via web server is not possible. Only an authorized network master can access the process data via the network. |
|---|---|

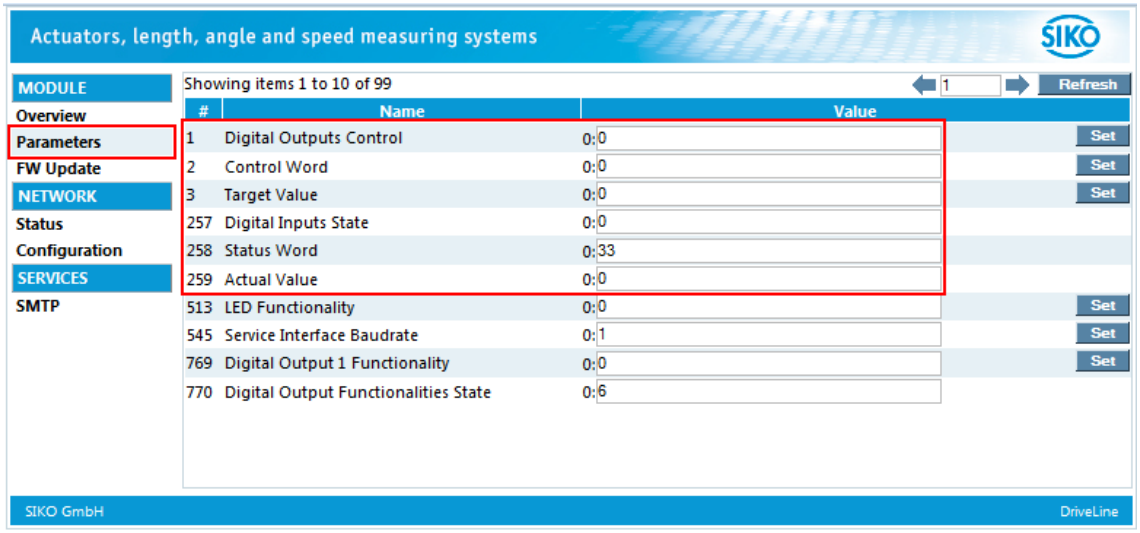
The inbuilt web server enables configuration and parameterization without network master via the Ethernet interface.

The web server can be accessed via the set IP address.

Settings for IP and Ethernet can be made via the Configuration menu.




Below, the parameter menu is shown. The process data is within the red mark.




The web server can be activated or deactivated via the parameter Configuration (PNU 0B21h).

With factory settings, the web server is activated.

## 12 FTP-Server

The integrated FTP server enables access to the file system of the Ethernet module via a FTP client. Thus, the firmware of the Ethernet module can be updated via the network.

The following port numbers are used for FTP communication:

- TCP, Port 20 (FTP data transmission)
- TCP, Port 21 (FTP control)

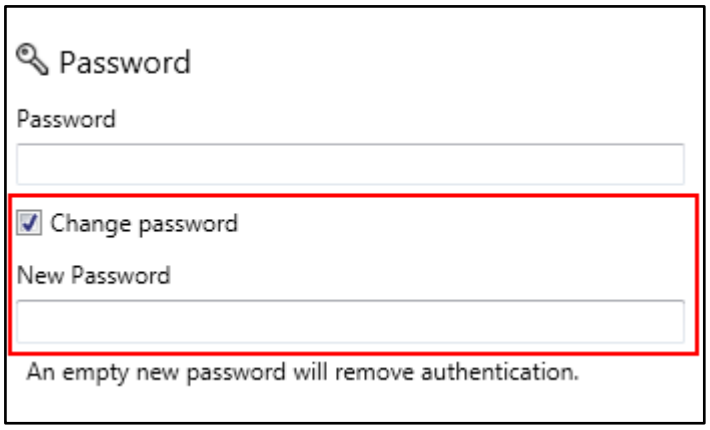
The FTP server can be activated or deactivated via the parameter Configuration (PNU 0B21h).

With factory settings, the protocol is activated.

## 13 Secure Host IP Configuration Protocol (Secure HICP)

The drive supports the Secure HICP protocol, which is used by the Anybus IPconfig application for changing the settings of IP address, subnet mask and DHCP via the network.

With Anybus IPconfig a password can be assigned to protect against unauthorized access via SHICP:




The protocol can be activated or deactivated via the parameter Configuration(PNU 0B21h).

With factory settings, the protocol is activated.

The HICP protocol communicates via UDP port 3250.

## 14 Cyber Security

| | |
|---|---|
| **NOTICE** | To reduce the number of possible attack vectors, we recommend deactivating the FTP and web server after commissioning. The same applies to SHICP if no password has been assigned. |