

# AG25, AG26

Actuator with ETHERNET **POWERLINK** interface

User manual



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## 1 General Information

### 1.1 Documentation

The following documents are associated with this product:

- Product data sheet; describes the technical data, the dimensions, the pin assignment, the accessories and the order key.
- Installation instructions, describe the mechanical and electrical installation with all safety-relevant conditions and the associated technical specifications.
- User manual describing the migration of the actuator into an Industrial Ethernet network and its commissioning.

These documents can also be found at <http://www.siko-global.com/de-de/service-downloads>.

## 2 Display and operating elements

### 2.1 General Information

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

### 2.2 Displays

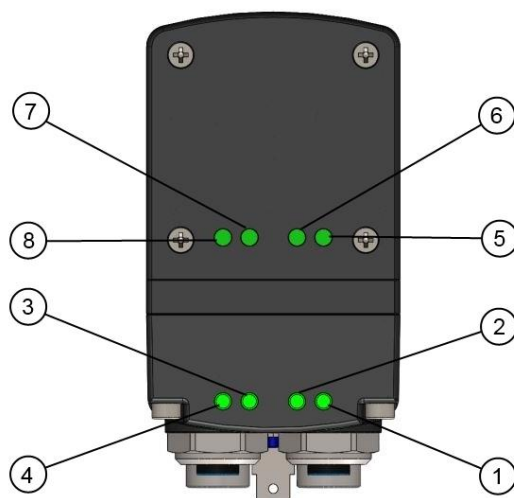


Fig. 1: Displays

### 2.2.1 Ethernet module statuses

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

LED	Description
1	ERROR LED
2	Link/Activity LED Port 2
3	Link/Activity LED Port 1
4	STATUS LED

#### 2.2.1.1 ERROR LED 1

LED state	Description
Off	No error or No operating voltage
Red	A Non-fatal error has occurred if the STATUS LED is Not red. A fatal error has occurred if the STATUS LED is red.

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

LED state	Description
Off	No connection or No operating voltage
Green	Connection detected, No activity
Green, flickering	Connection detected, activity

### 2.2.1.3 STATUS LED 4

LED state	Description
Off	No error or No operating voltage
Green, quickly flashing <sup>a</sup>	No Powerlink traffic detected
Green, flashing 1x	NMT_CS_PRE_OPERATIONAL_1 Only asynchronous data
Green, flashing 2x	NMT_CS_PRE_OPERTIOANL_2 Asynchronous and synchronous data No PDO data
Green, flashing 3x	NMT_CS_READY_TO_OPERATE Ready to operate
Green	NMT_CS_OPERATIONAL In operation PDO data is sent and received.
Green, slowly flashing <sup>b</sup>	Module stopped (e.g. for controlled shutdown) No PDO data
Red	A fatal event has occurred if the ERROR LED is also red

a. 50 ms On, 50 ms Off

b. 200 ms On, 200 ms Off

### 2.2.2 Drive status

In factory setting, the ⑤, ⑥, ⑦, ⑧ LEDs inform about the drive's status.  
The function 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

<b>NOTICE</b>	If the actual value is unequal 0 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. Operating voltage of the output stage is applied.
Green, flashing	Actuator is within the programmed positioning window. Operating voltage of output stage is missing
Red	Actuator is outside the programmed positioning window. Operating voltage of the output stage is applied.
Red, flashing	Actuator is outside the programmed positioning window. Operating voltage of output stage is missing
Off	Operating voltage of control missing

## 2.3 Operating elements

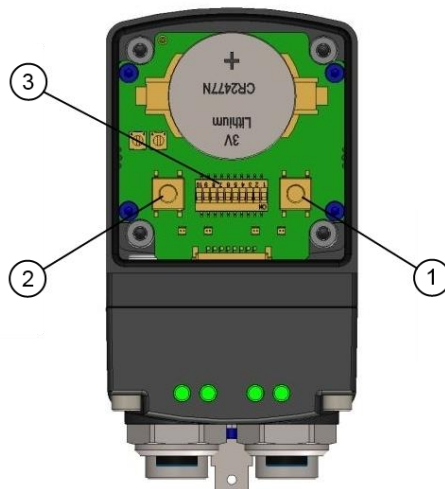


Fig. 2: Operating elements

### 2.3.1 Operating keys

<b>NOTICE</b>	Manual setup operation is only available if there is No process data exchange
---------------	---

Manual setup mode (corresponding to inching mode 2) can be started by means of the operator keys. This makes it possible to move the actuator 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:

<b>NOTICE</b>	The DIP switch is only read while the control's operating voltage is switched on. Therefore, any change takes effect only after power-on reset of the control's operating voltage.
---------------	--

Switch 4	Assignment
SW1-SW8	Setting of Powerlink Node ID in binary format, admissible Node IDs for controlled Nodes (CN) 1 ... 239
SW9-SW10	No function, always off

SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	Powerlink Node ID
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	0
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	2
...	...	...	...	...	...	...	...	...
OFF	ON	ON	ON	ON	ON	ON	ON	254
ON	ON	ON	ON	ON	ON	ON	ON	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 function's conditions of the digital inputs can be read in the register [Digital Input Functionalities State](#) (Object 2405h).

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](#) (Object 2302h).

### 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

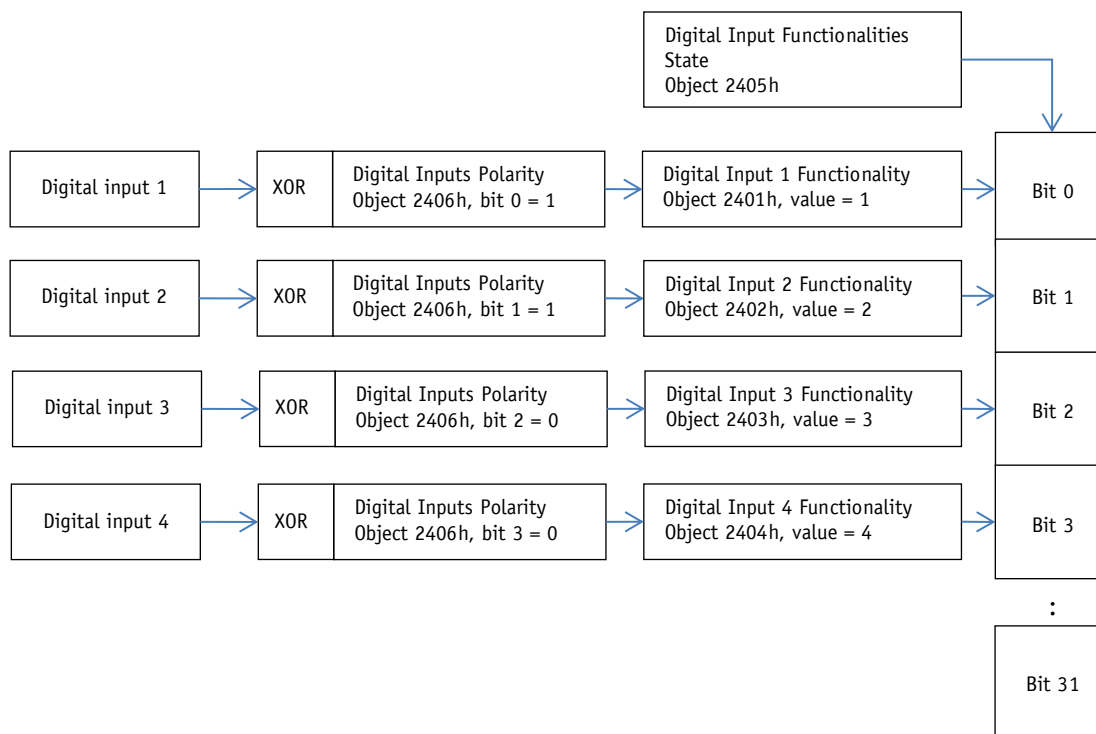


Fig. 3: Examples of digital input configurations

### 3.2 Example of digital output configuration

- Digital output 1: Inpos (high-active)

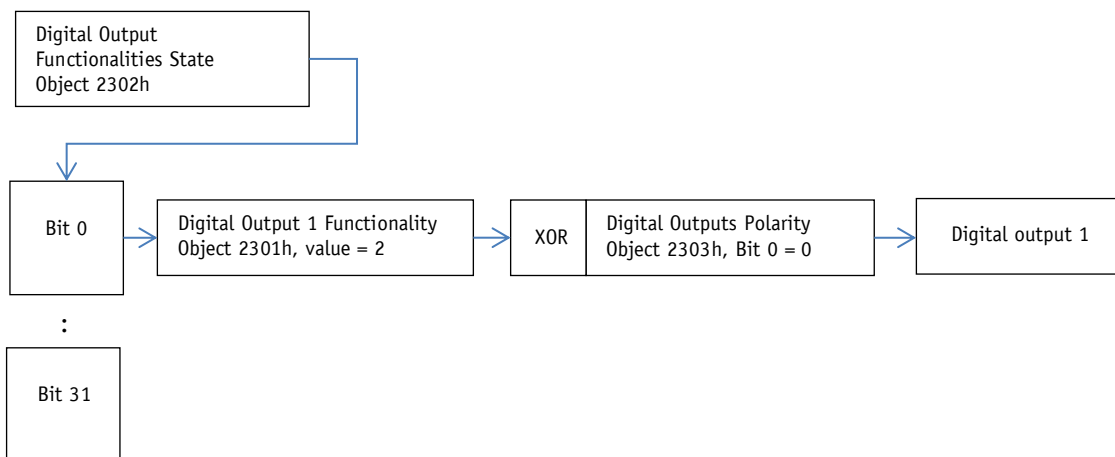


Fig. 4: Example of digital output configuration

## 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 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 operating mode chosen.

##### 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 velocity.

Upon activation of the travel order, 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** (Object 2604h) as well.

Alternately, a value deviating from acceleration can be chosen for delay by means of parameter **D-Pos** (Object 2606h).

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

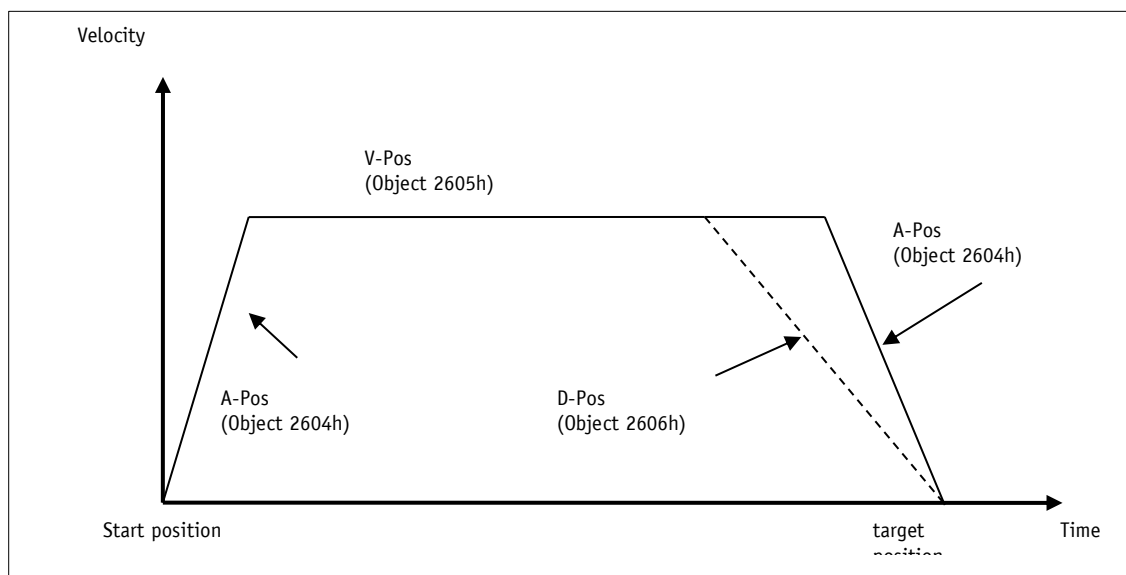


Fig. 5: Ramp travel, direct positioning mode



The status word indicates whether the actual position is within the window defined by parameter **Pos Window** (Object 260Ah). You can define the behavior of the actuator upon reaching the programmed window via parameter **Inpos Mode** (Object 2616h).

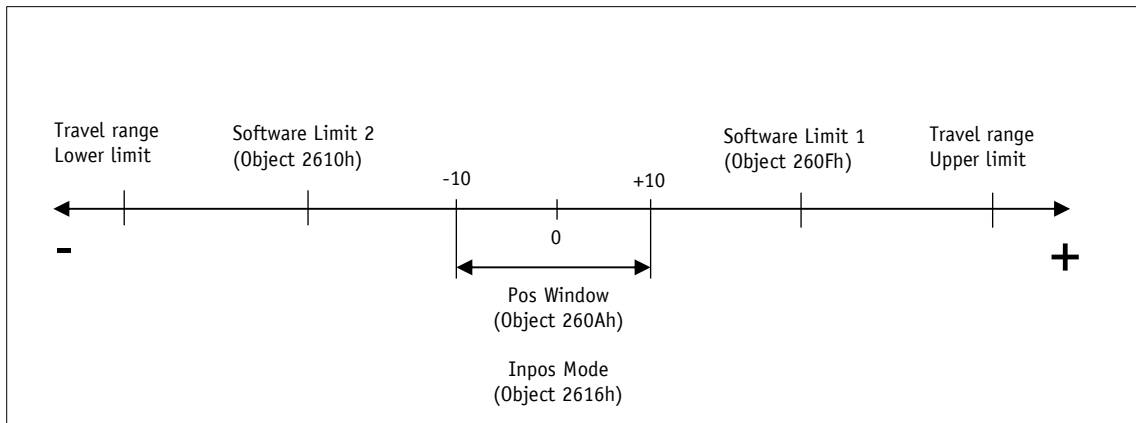


Fig. 6: Positioning mode

The max. travel range depends on gear 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 a loop positioning would exceed the limiting values specified by parameters **Software Limit 1** (Object 260Fh) and **Software Limit 2** (Object 2610h) although the setpoint is within the limiting values.

If the actuator is operated on a spindle or an additional gear, the spindle or external gear 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** (Object 2613h). The loop length is set via parameter **Loop Length** (Object 2617h).

Example:

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

Case 1  $\Rightarrow$  new position is greater than actual position:

Direct travel to target position

Case 2  $\Rightarrow$  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.

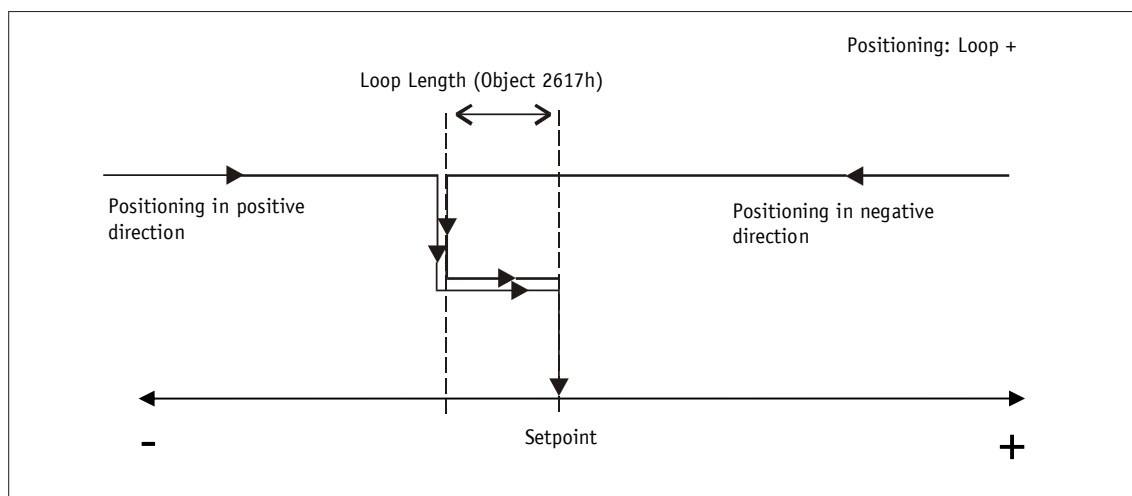


Fig. 7: Loop+ positioning

#### 4.1.1.2 Inching mode

<b>NOTICE</b>	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 acceleration as well as speed in the inching mode via parameters.

##### 4.1.1.2.1 Inching mode 1

<b>NOTICE</b>	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.
---------------	--

<b>NOTICE</b>	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** (Object 2611h) 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.

A 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 actual 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** (Object 2609h) = 10 rpm (can only be changed in the idle state)

**Inching 2 Offset** = 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

The results are always rounded to integers.

The 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.

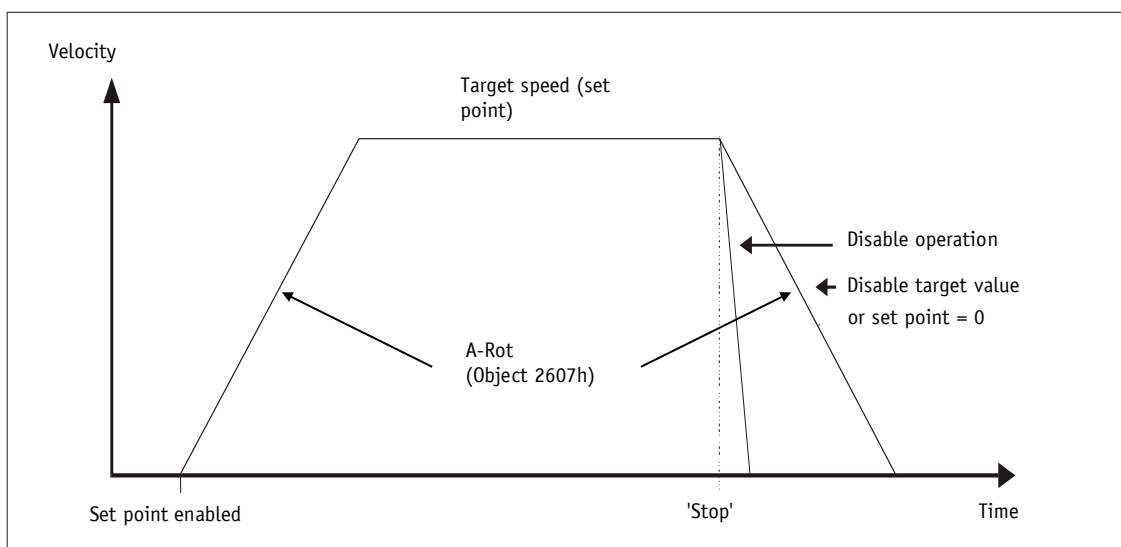


Fig. 8: Ramp speed mode

The following conditions must be met for enabling the start of the 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 orders started by the position control mode. For this purpose, a negative slope must be created on bits OFF1, OFF2, or OFF3 in the control word. 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 inputs PCM, input 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)

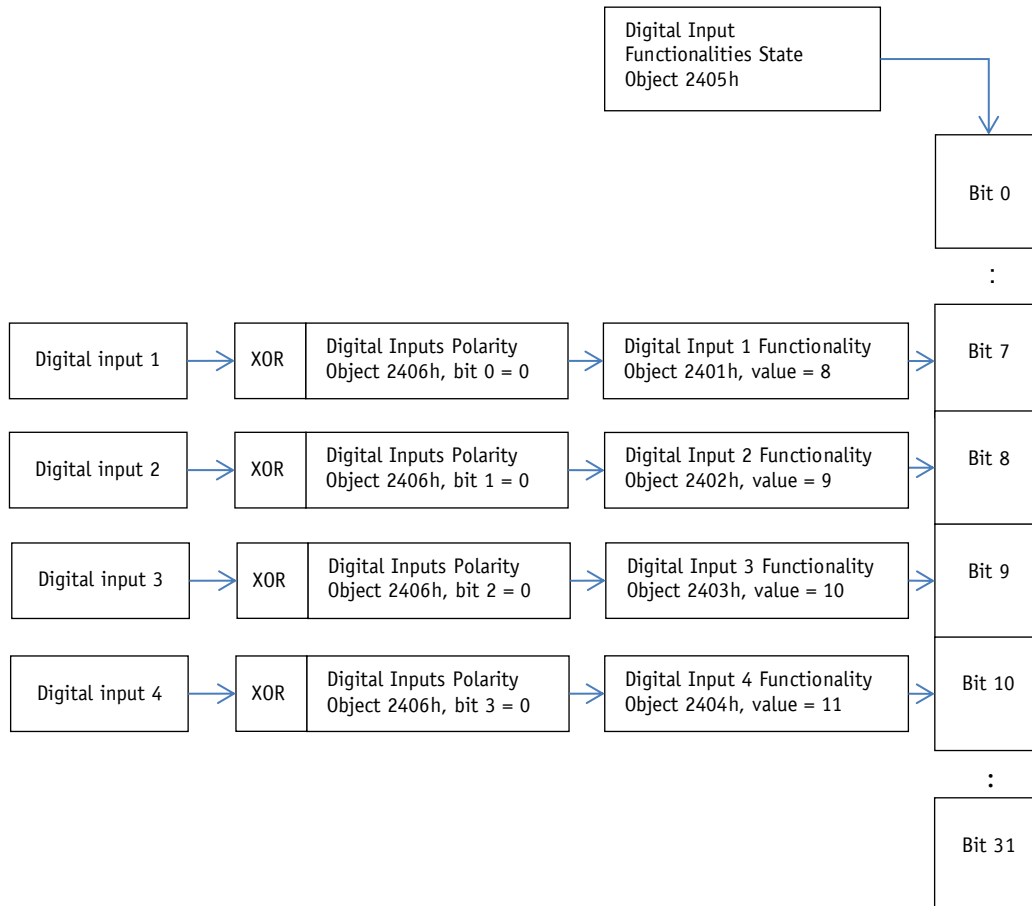


Fig. 9: Examples of configuration of the digital inputs for the PCM

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

Parameter	Object
PCM Position 3	2924h
PCM Acceleration 3	2944h
PCM Velocity 3	2964h
PCM Deceleration 3	2984h

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

Resetting the PCM Start input during an active positioning process will result in cancelation 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

<b>NOTICE</b>	Measuring the supply current cannot indicate the actual motor 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](#) (Object 2619h), which serves primarily for protecting the drive against overload.

With the default set, the Nominal torque indicated on the product data sheet is achieved.

Drive 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 parameter [Contouring Error Limit](#) (Object 2618h): 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.

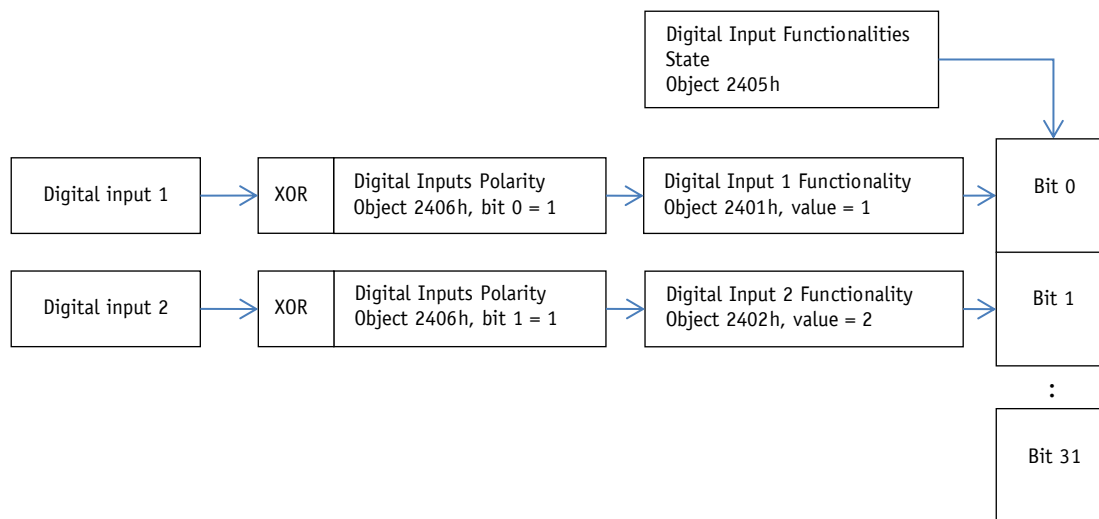


Fig. 10: Example of limit switch configuration

### 4.1.3.2 Arrangement of the limit switches

The limit switches are arranged according to the following pattern independent of the configured sense of rotation:

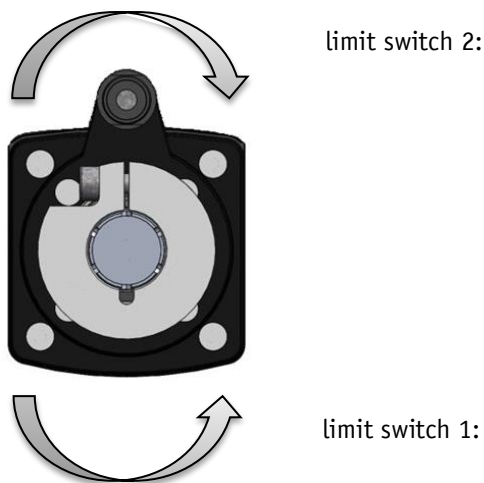


Fig. 11: Arrangement of the limit switches

## 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](#) (Object 260Eh)

Execute calibration (software command or calibration input)

Calibration can be performed by a positive edge at control word bit 15, or initiated by writing the value 7 to parameter [S-Command](#) (Object 2C01h). 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](#) (Object 260Eh) + [Offset Value](#) (Object 261Ch)

## 6 External gear

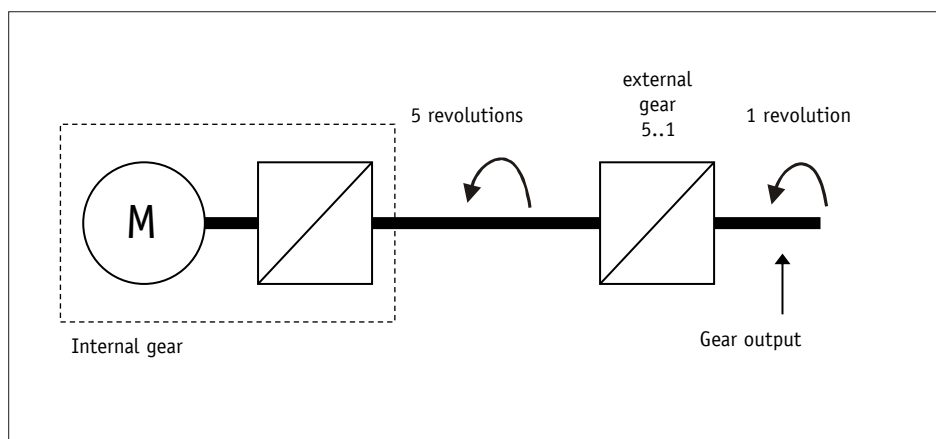
If an external gear is used, a factor can be programmed via the parameters [Gear Ratio Numerator](#) (Object 260Bh) and [Gear Ratio Denominator](#) (Object 260Ch) in order to include the gear ratio in position sensing.

Example (see [Fig. 12: external](#)):

The actuator is operated on a gear with transmission reduction of 5:1. For this purpose, the [Gear Ratio Numerator](#) and [Gear Ratio Denominator](#) parameters must be programmed as follows:

Parameter [Gear Ratio Numerator](#) = 5

Parameter [Gear Ratio Denominator](#) = 1



*Fig. 12: external gear*



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  $\Rightarrow$  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

<b>NOTICE</b>	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.
---------------	---

Error code	Fault
0x00	No error
0x06	Low battery voltage → Empty battery, replace battery → Bonding error, check battery bonding → Wrong battery type inserted, insert correct battery type
0x07	Low voltage of control electronic system → Check control operating voltage
0x08	Overvoltage of control electronic system → Check control operating voltage
0x09	Overvoltage of power electronic system → Check output stage operating voltage
0x0A	Output stage excess temperature → Reduce ambient temperature → Reduce load
0x0B	Contouring error → Reduce load → Reduce acceleration → Reduce velocity
0x0C	Output shaft blocked → Disengage shaft
0x0F	SIN COS monitoring → Shield from stray magnetic fields → Check EMC measures
0x10	EEPROM queue overrun → Internal error
0x13	EEPROM check sum → Reset parameters to factory settings
0x14	Ethernet module watchdog → Internal error
0x15	Ethernet module in the ERROR status while travel job is active → Internal error
0x16	Ethernet module in the EXCEPTION status → Internal error The behavior of the drive when this fault occurs can be set with the parameter configuration, bit 6 (see chapter 8.2.1.99).

Table 1: Error codes

## 8 Ethernet Powerlink

### 8.1 Description

The actuator is an Ethernet Powerlink Controlled Node (CN). The Ethernet Powerlink communication profile is based on the DS301 and DS302 CANopen communication profiles.

#### 8.1.1 Cyclic data exchange

Cyclic process data is exchanged via PDO. The actuator supports 1 TPDO and 1 RPDO. Mapping is static and cannot be changed.

#### 8.1.2 Acyclic data exchange

Acyclic data is exchanged via SDO frames.

#### 8.1.3 Operating modes and synchronization

The actuator is not synchronized.

### 8.2 Directory of objects

The actuator uses the following object areas:

1000h - 1FFFh standard objects according to DS301

2000h - 5FFFh manufacturer-specific objects

Index	Parameter name	Page
1000h	NMT_DeviceType_U32	78
1001h	ERR_ErrorRegister_U8	78
1006h	NMT_CycleLen_U32	78
1008h	NMT_ManufactDevName_VS	78
1009h	NMT_ManufactHwVers_VS	79
100Ah	NMT_ManufactSwVers_VS	79
1018h	NMT_IdentityObject_REC	79
1020h	CFM_VerifyConfiguration_REC	80
1030h	NMT_InterfaceGroup_00h_REC	81
1300h	SDO_SequLayerTimeout_U32	83
1400h	PDO_RxCommParam_00h_REC	83
1600h	PDO_RxMappParam_00h_AU64	83
1800h	PDO_TxCommParam_00h_REC	84
1A00h	PDO_TxMappParam_00h_AU64	85
1C0Bh	DLL_CNLossSoC_REC	85

Index	Parameter name	Page
1C0Fh	DLL_CNCRCErrror_REC	86
1C14h	DLL_CNLossOfSocTolerance_U32	87
1F50h	PDL_DownloadProgData_ADCOM	88
1F51h	PDL_ProgCtrl_AU8	88
1F52h	PDL_LocVerApplSw_REC	88
1F81h	NMT_NodeAssignment_AU32	89
1F82h	NMT_FeatureFlags_U32	89
1F83h	NMT_EPLVersion_U8	90
1F8Ch	NMT_CurrNMTState_U8	90
1F8Dh	NMT_PresPayloadLimitList_AU16	90
1F93h	NMT_EPLNodeID_REC	91
1F98h	NMT_CycleTiming_REC	91
1F99h	NMT_CNBasicEthernetTimeout_U32	93
1F9Bh	NMT_MultiplCycleAssign_AU8	93
1F9Eh	NMT_ResetCmd_U8	94
2001h	Digital Outputs Control	31
2002h	Control Word	31
2003h	Target Value	32
2101h	Digital Inputs State	36
2102h	Status Word	36
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2401h	Digital Input 1 Functionality	43
2402h	Digital Input 2 Functionality	43
2403h	Digital Input 3 Functionality	44
2404h	Digital Input 4 Functionality	44
2405h	Digital Input Functionalities State	45
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2603h	Controller Parameter D	47
2604h	A-Pos	47
2605h	V-Pos	47
2606h	D-Pos	48
2607h	A-Rot	48
2608h	A-Inch	48
2609h	V-Inch	49
260Ah	Pos Window	49

Index	Parameter name	Page
260Bh	Gear Ratio Numerator	49
260Ch	Gear Ratio Denominator	50
260Dh	Spindle Pitch	50
260Eh	Calibration Value	50
260Fh	Software Limit 1	51
2610h	Software Limit 2	51
2611h	Delta Inch	52
2612h	Sense of Rotation	52
2613h	Pos Type	53
2614h	Operating Mode	53
2615h	Inching 2 Stop Mode	54
2616h	Inpos Mode	54
2617h	Loop Length	55
2618h	Contouring Error Limit	55
2619h	Current Limiting	56
261Ah	Inching 2 Offset	56
261Bh	Inching 2 Acceleration Type	57
261Ch	Offset	57
2922h	PCM Position 1	58
2923h	PCM Position 2	58
2924h	PCM Position 3	58
2925h	PCM Position 4	59
2926h	PCM Position 5	59
2927h	PCM Position 6	59
2928h	PCM Position 7	60
2942h	PCM Acceleration 1	60
2943h	PCM Acceleration 2	60
2944h	PCM Acceleration 3	61
2945h	PCM Acceleration 4	61
2946h	PCM Acceleration 5	61
2947h	PCM Acceleration 6	62
2948h	PCM Acceleration 7	62
2962h	PCM Velocity 1	62
2963h	PCM Velocity 2	63
2964h	PCM Velocity 3	63
2965h	PCM Velocity 4	63
2966h	PCM Velocity 5	64
2967h	PCM Velocity 6	64
2968h	PCM Velocity 7	64
2982h	PCM Deceleration 1	65
2983h	PCM Deceleration 2	65
2984h	PCM Deceleration 3	66

Index	Parameter name	Page
2985h	PCM Deceleration 4	66
2986h	PCM Deceleration 5	67
2987h	PCM Deceleration 6	67
2988h	PCM Deceleration 7	68
2A01h	Output Stage Temperature	68
2A02h	Voltage of Control	68
2A03h	Voltage of Output Stage	69
2A04h	Voltage of Battery	69
2A05h	Motor Current	69
2A06h	Actual Position	69
2A07h	Actual Rotational Speed	70
2A08h	Serial Number	70
2A09h	Production Date	70
2A0Ah	SW Motor Controller	70
2A0Bh	Gear Reduction	71
2A0Ch	System Status Word	71
2A0Dh	Encoder Resolution	73
2A0Eh	Device ID	74
2B01h	Number of Errors	74
2B02h	Error Number 1	74
2B03h	Error Number 2	74
2B04h	Error Number 3	75
2B05h	Error Number 4	75
2B06h	Error Number 5	75
2B07h	Error Number 6	75
2B08h	Error Number 7	76
2B09h	Error Number 8	76
2B0Ah	Error Number 9	76
2B0Bh	Error Number 10	76
2C01h	S-Command	77

## 8.2.1 Parameter description of manufacturer-specific objects

### 8.2.1.1 Digital Outputs Control

Object	2001h
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

Object	2002h
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 Operating mode: Positioning mode (master ⇒ slave)

Bit	Description
Bit 0 OFF1 (enable )	0 = OFF1 active Current travel job is canceled. The actuator is enabled. 1 = OFF1 inactive
Bit 1 OFF2 (max. delay)	0 = OFF2 active Current travel job is canceled. The actuator is decelerated with max. delay, the actuator continues to be controlled. 1 = OFF2 inactive
Bit 2 OFF3 (progr. delay)	0 = OFF3 active Current travel job is canceled. The actuator is decelerated with progr. delay, the actuator continues to be controlled. 1 = OFF3 inactive
Bit 3 Intermediate stop	0 = No intermediate stop 1 = intermediate stop active
Bit 4 Start travel job	Positive slope starts a travel job
Bit 5 Acknowledge error	Positive slope acknowledges an error Afterwards, the actuator changes to the switch-lock state.
Bit 6 Inching mode 1	0 = No inching mode1 If the travel job is Not completed yet it will be canceled. 1 = inching operation 1 As long as this bit is set, the actuator travels over the distance specified in parameter Delta Tipp.
Bit 7 Inching mode 2 positive	0 = No inching mode 2 positive 1 = inching mode 2 positive The actuator travels in positive direction
Bit 8 Inching mode 2 negative	0 = No inching mode 2 negative 1 = inching mode 2 negative The actuator travels in negative direction
Bit 9	Reserved, always 0
Bit 10 Relative positioning	0 = absolute positioning 1 = relative positioning
Bit 11 ... 14	Reserved, always 0
Bit 15 Calibration	Positive edge calibrates the drive (see chapter 5).

Table 2: Control word of positioning mode



8.2.1.2.2 Flow chart: Operating mode: Positioning mode

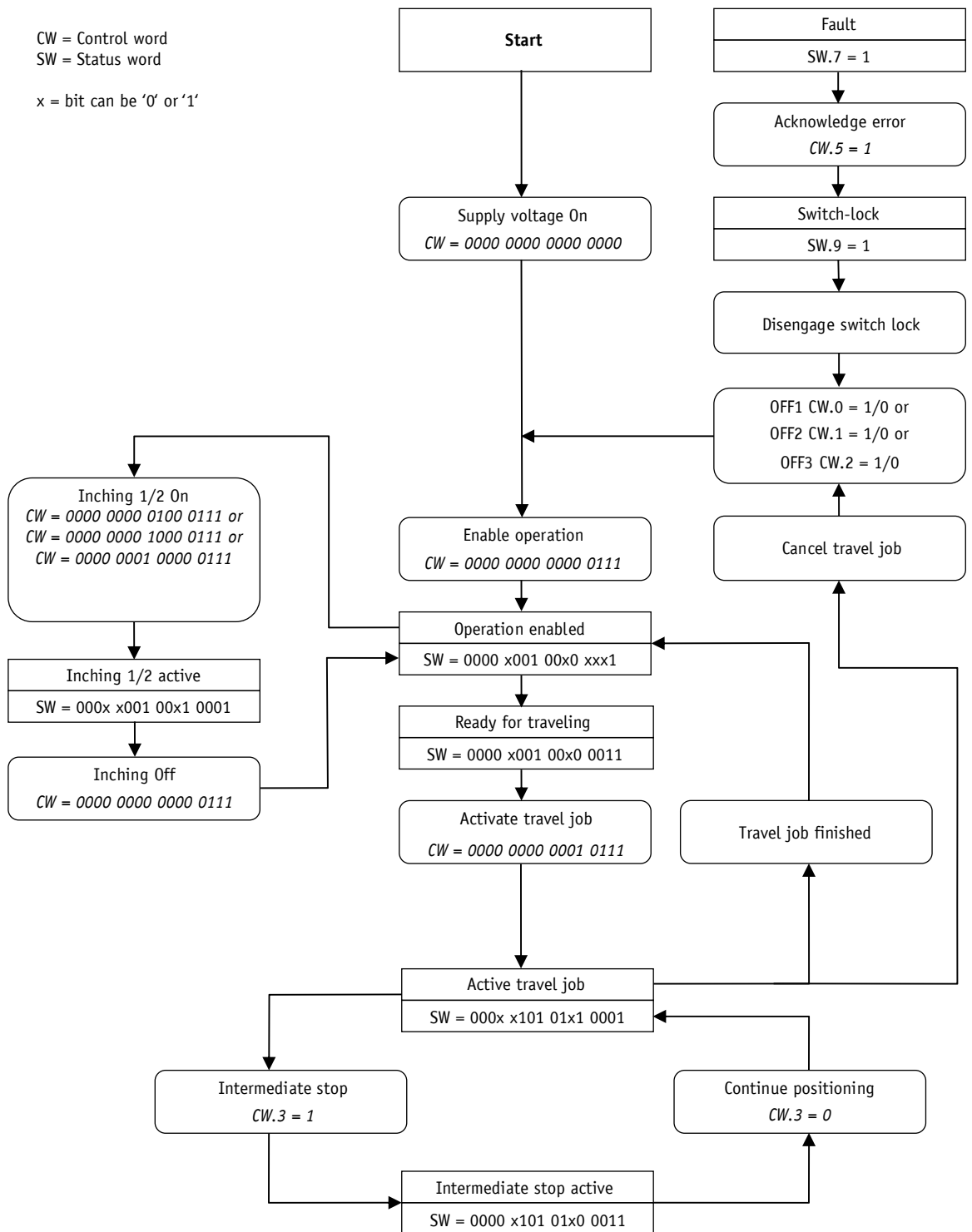


Fig. 13: Flow chart of positioning mode of Ethernet Powerlink

**8.2.1.2.3 Control word: Speed mode**

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

*Table 3: Control word of speed mode*

### 8.2.1.2.4 Flow chart: Speed mode

CW = Control word  
 SW = Status word  
 x = Bit can be '0' or '1'

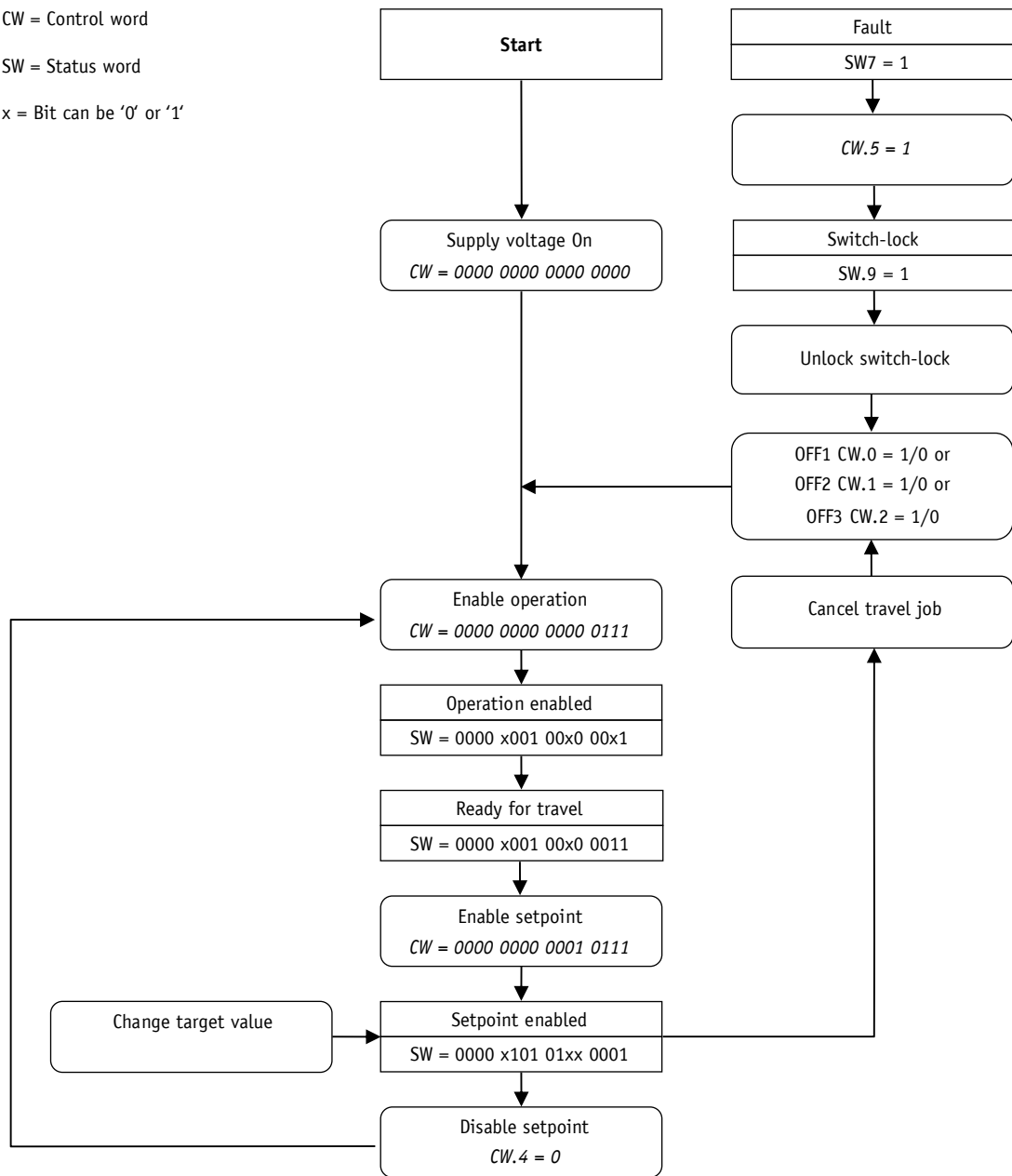


Fig. 14: Flow chart of speed mode Ethernet Powerlink

**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  $\text{min}^{-1}$

Object	2003h
Description	Setpoint
Access	rw (component of process data)
Data type	INTEGER32
Default	No
EEPROM	No
Value range	INTEGER32

**8.2.1.4 Digital Inputs State**

Object	2101h
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**

Object	2102h
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 Supply	0 = output stage supply voltage missing 1 = supply voltage of the output stage is applied
Bit 1 Readiness to travel	0 = Not ready to travel 1 = ready to travel
Bit 2 upper limit	0 = No violation of limit 1 = upper limit exceeded
Bit 3 lower limit:	0 = No violation of limit 1 = lower limit undercut
Bit 4 Actuator travels/stands still	0 = actuator stands still 1 = actuator travels
Bit 5 Inpos	0 = actuator is outside the position window. 1 = actuator is inside the position window.
Bit 6 Active travel job	0 = No active travel job 1 = active travel job
Bit 7 Fault	0 = No error 1 = error Acknowledgment with positive slope on control word bit 5
Bit 8 Operation enabled	0 = operation Not enabled 1 = operation enabled
Bit 9 Switch-lock	0 = No switch-lock 1 = switch-lock
Bit 10 Travel job acknowledgment	0 = No acknowledgment 1 = acknowledgment 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 Battery warning	0 = No warning, battery loading state is OK 1 = battery warning Battery voltage is below 2.6 V. Battery change is required.
Bit 12 Current limiting	0 = current limiting inactive 1 = current limiting active Motor current exceeds the value set under parameter Current Limiting (Object 2619h).
Bit 13 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 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 Calibration acknowledgment	0 = No acknowledgment 1 = Acknowledgment The bit is set when the calibration has been performed successfully. If bit 15 is reset in the control parameter, 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 Supply	0 = output stage supply voltage missing 1 = supply voltage of the output stage is applied
Bit 1 Readiness to travel	0 = Not ready to travel 1 = ready to travel
Bit 2	No function
Bit 3	No function
Bit 4 Actuator travels/stands still	0 = actuator stands still 1 = actuator travels
Bit 5 Inpos	0 = actuator is outside the position window. 1 = actuator is inside the position window.
Bit 6 Active travel job	0 = No active travel job 1 = active travel job
Bit 7 Fault	0 = No error 1 = error Acknowledgment with positive slope on control word bit 5
Bit 8 Operation enabled	0 = operation Not enabled 1 = operation enabled
Bit 9 Switch-lock	0 = No switch-lock 1 = switch-lock
Bit 10 Travel job acknowledgment	0 = No acknowledgment 1 = acknowledgment 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 Battery warning	0 = No warning, battery loading state is OK 1 = battery warning Battery voltage is below 2.6 V. Battery change is required.
Bit 12 Current limiting	0 = current limiting inactive 1 = current limiting active Motor current exceeds the value set under parameter Current Limiting (Object 2619h).

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  $\text{min}^{-1}$

Object	2103h
Description	Actual value
Access	ro (component of process data)
Data type	INTEGER32
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 states of the drive. Alternately, the LEDs can represent the states of the digital inputs.

Object	2201h
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. No error
		Red, flashing	Operating voltage applied to control. Error is active
		Off	Operating voltage of control missing
	LED6	Off	No function
	LED7	Off	No function
	LED8	Green	Actuator is within the programmed positioning window. Operating voltage of the output stage is applied.
		Green, flashing	Actuator is within the programmed positioning window. Operating voltage of the output stage missing.
		Red	Actuator is outside the programmed positioning window. Operating voltage of the output stage is applied.
		Red, flashing	Actuator is outside the programmed positioning window. Operating voltage of the output stage missing.
		Off	Operating voltage of control missing
	1	LED5	Red
Red, flashing			Error is active
Green			Digital input 1 active
Off			Operating voltage of control missing
LED6		Red	Digital input 2 inactive
		Red, flashing	Error is active
		Green	Digital input 2 active:
		Off	Operating voltage of control missing
LED7		Red	Digital input 3 inactive
		Red, flashing	Error is active
		Green	Digital input 3 active
		Off	Operating voltage of control missing
LED8		Red	Digital input 4 inactive
		Red, flashing	Error is active
		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

Object	2221h
Description	Baud rate of the service interface.
Access	rw
Data type	UNSIGNED8
Default	1
EEPROM	Yes
Value range	0 ... 3 0 = 19.2 Kbit/s 1 = 57.6 Kbit/s 2 = 115.2 Kbit/s 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.

Object	2301h
Description	Digital output 1 functionality
Access	rw
Data type	UNSIGNED8
Default	0
EEPROM	Yes
Value range	0 ... 3

Value	Description
0	General use Control of the digital output is directly via BIT D01 in the process data.
1	Fault The output is switched active in case of fault.
2	Inpos The state of bit Inpos in the status word defines the state of the digital output.
3	Output on 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.

Object	2302h
Description	Status of the digital output functionalities
Access	ro
Data type	UNSIGNED32
Default	No
EEPROM	No

Bit	Description
0	Error 0 = No error 1 = Error active
1	Inpos 0 = actual value outside the positioning window 1 = actual value inside the positioning window
2	Output on 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.

Object	2303h
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.

Object	2401h
Description	Input 1 functionality
Access	rw
Data type	UNSIGNED8
Default	0
EEPROM	Yes
Value range	0 ... 11

Value	Description
0	General use 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.

Object	2402h
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.

Object	2403h
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.

Object	2404h
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.

Object	2405h
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.

Object	2406h
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.

Object	2601h
Description	P gain of controller
Access	rw
Data type	INTEGER16
Default	300
EEPROM	Yes
Value range	1 ... 500

**8.2.1.19 Controller Parameter I**

This setting applies to all operating modes.

Object	2602h
Description	I gain of controller
Access	rw
Data type	INTEGER16
Default	2
EEPROM	Yes
Value range	0 ... 500

**8.2.1.20 Controller Parameter D**

This setting applies to all operating modes.

Object	2603h
Description	D gain of controller
Access	rw
Data type	INTEGER16
Default	0
EEPROM	Yes
Value range	0 ... 500

**8.2.1.21 A-Pos**

Object	2604h
Description	Acceleration in the positioning mode
Access	rw
Data type	INTEGER16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 $\Rightarrow$ 3.04 rps <sup>2</sup> Transmission 98:1 $\Rightarrow$ 2.05 rps <sup>2</sup> Transmission 188:1 $\Rightarrow$ 1.06 rps <sup>2</sup> Transmission 368:1 $\Rightarrow$ 0.54 rps <sup>2</sup>

**8.2.1.22 V-Pos**

Object	2605h
Description	Maximum speed in the positioning mode
Access	rw
Data type	INTEGER16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 $\Rightarrow$ max. 75 rpm Transmission 98:1 $\Rightarrow$ max. 50 rpm Transmission 188:1 $\Rightarrow$ max. 30 rpm Transmission 368:1 $\Rightarrow$ max. 15 rpm

**8.2.1.23 D-Pos**

Object	2606h
Description	Delay in the positioning mode
Access	rw
Data type	INTEGER16
Default	101
EEPROM	Yes
Value range	1 ... 101 % 101 % = the delay is determined by the A-Pos parameter 100 % correspond to: Transmission 66:1 $\Rightarrow$ 3.04 rps <sup>2</sup> Transmission 98:1 $\Rightarrow$ 2.05 rps <sup>2</sup> Transmission 188:1 $\Rightarrow$ 1.06 rps <sup>2</sup> Transmission 368:1 $\Rightarrow$ 0.54 rps <sup>2</sup>

**8.2.1.24 A-Rot**

Object	2607h
Description	Acceleration in speed mode
Access	rw
Data type	INTEGER16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 $\Rightarrow$ 3.04 rps <sup>2</sup> Transmission 98:1 $\Rightarrow$ 2.05 rps <sup>2</sup> Transmission 188:1 $\Rightarrow$ 1.06 rps <sup>2</sup> Transmission 368:1 $\Rightarrow$ 0.54 rps <sup>2</sup>

**8.2.1.25 A-Inch**

Object	2608h
Description	Acceleration in inching mode 1 /2
Access	rw
Data type	INTEGER16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 $\Rightarrow$ 3.04 rps <sup>2</sup> Transmission 98:1 $\Rightarrow$ 2.05 rps <sup>2</sup> Transmission 188:1 $\Rightarrow$ 1.06 rps <sup>2</sup> Transmission 368:1 $\Rightarrow$ 0.54 rps <sup>2</sup>



**8.2.1.26 V-Inch**

Object	2609h
Description	Maximum speed in inching mode 1/2
Access	rw
Data type	INTEGER16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm Transmission 98:1 ⇒ max. 50 rpm Transmission 188:1 ⇒ max. 30 rpm 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  $\pm$  this window, setting bit 5 in the status word of the drive signals this.

Spindle pitch = 0: Values refer to steps

Spindle pitch > 0 Values refer to travel distance in 1/100 mm

Operating mode: Speed mode:

If the actual rotational speed is within the target rotational speed  $\pm$  this window, setting bit 5 in the drive's system status word signals this.

Object	260Ah
Description	Positioning window
Access	rw
Data type	INTEGER16
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.

Object	260Bh
Description	Numerator transmission ratio
Access	rw
Data type	INTEGER16
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.

Object	260Ch
Description	Denominator gear ratio
Access	rw
Data type	INTEGER16
Default	1
EEPROM	Yes
Value range	1 ... 10000

**8.2.1.30 Spindle Pitch**

Spindle pitch = 0:

The 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  $\Rightarrow$  spindle pitch parameter = 200.

Object	260Dh
Description	Spindle pitch
Access	rw
Data type	INTEGER32
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

Object	260Eh
Description	Calibration value
Access	rw
Data type	INTEGER32
Default	0
EEPROM	Yes
Value range	-999999 ... 999999

## 8.2.1.32 Software Limit 1

<b>NOTICE</b>	<p>Operating mode: Positioning mode  Software limit value monitoring is deactivated if <a href="#">Software Limit 1</a> is equal <a href="#">Software Limit 2</a>. Exceeding the resolution of the absolute encoder results in a jump of the actual position.</p> <p>Operating mode: Speed mode:  Irrelevant</p>
---------------	--

Operating mode: 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.

Object	260Fh
Description	Limit 1
Access	rw
Data type	INTEGER32
Default	99999
EEPROM	Yes
Value range	-9999999 ... 9999999

## 8.2.1.33 Software Limit 2

<b>NOTICE</b>	<p>Operating mode: Positioning mode  Software limit value monitoring is deactivated if <a href="#">Software Limit 1</a> is equal <a href="#">Software Limit 2</a>. Exceeding the resolution of the absolute encoder results in a jump of the actual position.</p> <p>Operating mode: Speed mode:  Irrelevant</p>
---------------	--

Operating mode: 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.

Object	2610h
Description	Limit 2
Access	rw
Data type	INTEGER32
Default	-19999
EEPROM	Yes
Value range	-9999999 ... 9999999

**8.2.1.34 Delta Inch**

indicates the relative traveling distance.

Positive value  $\Rightarrow$  positive travel direction

Negative value  $\Rightarrow$  negative travel direction

Spindle pitch = 0: Values refer to steps

Spindle pitch > 0 values refer to travel distance in 1/100 mm

Object	2611h
Description	Travel distance inching mode 1
Access	rw
Data type	INTEGER32
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

Object	2612h
Description	Sense of rotation
Access	rw
Data type	UNSIGNED8
Default	0
EEPROM	Yes
Value range	0 = i sense of rotation (cw) 1 = e sense of rotation (ccw)

**8.2.1.36 Pos Type**

<b>NOTICE</b>	Loop positioning is executed in the positioning mode only.
---------------	--

Operating mode: 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 occurs always in positive direction to compensate for spindle play
Loop -	Traveling to the target value occurs always in negative direction to compensate for spindle play

Object	2613h
Description	Positioning type
Access	rw
Data type	UNSIGNED8
Default	0
EEPROM	Yes
Value range	0 = direct 1 = loop + 2 = loop -

**8.2.1.37 Operating Mode**

Object	2614h
Description	Operating mode
Access	rw
Data type	UNSIGNED8
Default	0
EEPROM	Yes
Value range	0 = positioning mode 1 = speed mode

**8.2.1.38 Inching 2 Stop Mode**

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

Object	2615h
Description	Stop mode inching 2
Access	rw
Data type	UNSIGNED8
Default	0
EEPROM	Yes
Value range	0 = stop with maximum delay 1 = stop with programmed delay

**8.2.1.39 Inpos Mode**

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

Object	2616h
Description	Inpos mode
Access	rw
Data type	UNSIGNED8
Default	0
EEPROM	Yes
Value range	0 ... 2

Operating mode: Speed mode:

Irrelevant

Operating mode: Positioning mode

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

**8.2.1.40 Loop Length**

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

Operating mode: Positioning mode

Spindle pitch = 0: Values refer to steps

Spindle pitch > 0 values refer to travel distance in 1/100 mm

Operating mode: Speed mode:

Irrelevant

Object	2617h
Description	Loop length
Access	rw
Data type	INTEGER16
Default	360
EEPROM	Yes
Value range	0 ... 30000

**8.2.1.41 Contouring Error Limit**

Upon starting a travel job, the ramp generator generates target position values 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 regulation deviation as small as possible.

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

The control deviation (contouring error) will increase steadily. If the 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 in steps.

Object	2618h
Description	Contouring error limit
Access	rw
Data type	INTEGER16
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 percentage of Nominal current.

Object	2619h
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

The values are indicated as percentage of parameter V-Inch, Object 2609h.

Object	261Ah
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.

Object	261Bh
Description	Inching mode 2 acceleration type
Access	rw
Data type	UNSIGNED8
Default	0
EEPROM	Yes
Value range	0 ... 1

Value	Description
0	Static acceleration Acceleration occurs to final speed as defined under parameter A-Inch (Object 2608h)
1	Incremental acceleration Acceleration occurs to final speed as defined under parameter A-Inch (Object 2608h), with the following steps: 4 s to 20 % of final speed 2 s to 50 % of final speed 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

Object	261Ch
Description	Offset value
Access	rw
Data type	INTEGER32
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 in 1/100 mm

Object	2922h
Description	Positioning mode via digital inputs: Position 1
Access	rw
Data type	INTEGER32
Default	0
EEPROM	Yes
Value range	INTEGER32

**8.2.1.47 PCM Position 2**

Spindle pitch = 0: Values refer to steps

Spindle pitch > 0 values refer to travel distance in 1/100 mm

Object	2923h
Description	Positioning mode via digital inputs: Position 2
Access	rw
Data type	INTEGER32
Default	0
EEPROM	Yes
Value range	INTEGER32

**8.2.1.48 PCM Position 3**

Spindle pitch = 0: Values refer to steps

Spindle pitch > 0 values refer to travel distance in 1/100 mm

Object	2924h
Description	Positioning mode via digital inputs: Position 3
Access	rw
Data type	INTEGER32
Default	0
EEPROM	Yes
Value range	INTEGER32

**8.2.1.49 PCM Position 4**

Spindle pitch = 0: Values refer to steps

Spindle pitch > 0 values refer to travel distance in 1/100 mm

Object	2925h
Description	Positioning mode via digital inputs: Position 4
Access	rw
Data type	INTEGER32
Default	0
EEPROM	Yes
Value range	INTEGER32

**8.2.1.50 PCM Position 5**

Spindle pitch = 0: Values refer to steps

Spindle pitch > 0 values refer to travel distance in 1/100 mm

Object	2926h
Description	Positioning mode via digital inputs: Position 5
Access	rw
Data type	INTEGER32
Default	0
EEPROM	Yes
Value range	INTEGER32

**8.2.1.51 PCM Position 6**

Spindle pitch = 0: Values refer to steps

Spindle pitch > 0 values refer to travel distance in 1/100 mm

Object	2927h
Description	Positioning mode via digital inputs: Position 6
Access	rw
Data type	INTEGER32
Default	0
EEPROM	Yes
Value range	INTEGER32

**8.2.1.52 PCM Position 7**

Spindle pitch = 0: Values refer to steps

Spindle pitch > 0 values refer to travel distance in 1/100 mm

Object	2928h
Description	Positioning mode via digital inputs: Position 7
Access	rw
Data type	INTEGER32
Default	0
EEPROM	Yes
Value range	INTEGER32

**8.2.1.53 PCM Acceleration 1**

Object	2942h
Description	Positioning mode via digital inputs: Acceleration 1
Access	rw
Data type	INTEGER16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 $\Rightarrow$ 3.04 rps <sup>2</sup> Transmission 98:1 $\Rightarrow$ 2.05 rps <sup>2</sup> Transmission 188:1 $\Rightarrow$ 1.06 rps <sup>2</sup> Transmission 368:1 $\Rightarrow$ 0.54 rps <sup>2</sup>

**8.2.1.54 PCM Acceleration 2**

Object	2943h
Description	Positioning mode via digital inputs: Acceleration 2
Access	rw
Data type	INTEGER16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 $\Rightarrow$ 3.04 rps <sup>2</sup> Transmission 98:1 $\Rightarrow$ 2.05 rps <sup>2</sup> Transmission 188:1 $\Rightarrow$ 1.06 rps <sup>2</sup> Transmission 368:1 $\Rightarrow$ 0.54 rps <sup>2</sup>

**8.2.1.55 PCM Acceleration 3**

Object	2944h
Description	Positioning mode via digital inputs: Acceleration 3
Access	rw
Data type	INTEGER16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 $\Rightarrow$ 3.04 rps <sup>2</sup> Transmission 98:1 $\Rightarrow$ 2.05 rps <sup>2</sup> Transmission 188:1 $\Rightarrow$ 1.06 rps <sup>2</sup> Transmission 368:1 $\Rightarrow$ 0.54 rps <sup>2</sup>

**8.2.1.56 PCM Acceleration 4**

Object	2945h
Description	Positioning mode via digital inputs: Acceleration 4
Access	rw
Data type	INTEGER16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 $\Rightarrow$ 3.04 rps <sup>2</sup> Transmission 98:1 $\Rightarrow$ 2.05 rps <sup>2</sup> Transmission 188:1 $\Rightarrow$ 1.06 rps <sup>2</sup> Transmission 368:1 $\Rightarrow$ 0.54 rps <sup>2</sup>

**8.2.1.57 PCM Acceleration 5**

Object	2946h
Description	Positioning mode via digital inputs: Acceleration 5
Access	rw
Data type	INTEGER16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 $\Rightarrow$ 3.04 rps <sup>2</sup> Transmission 98:1 $\Rightarrow$ 2.05 rps <sup>2</sup> Transmission 188:1 $\Rightarrow$ 1.06 rps <sup>2</sup> Transmission 368:1 $\Rightarrow$ 0.54 rps <sup>2</sup>

**8.2.1.58 PCM Acceleration 6**

Object	2947h
Description	Positioning mode via digital inputs: Acceleration 6
Access	rw
Data type	INTEGER16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 $\Rightarrow$ 3.04 rps <sup>2</sup> Transmission 98:1 $\Rightarrow$ 2.05 rps <sup>2</sup> Transmission 188:1 $\Rightarrow$ 1.06 rps <sup>2</sup> Transmission 368:1 $\Rightarrow$ 0.54 rps <sup>2</sup>

**8.2.1.59 PCM Acceleration 7**

Object	2948h
Description	Positioning mode via digital inputs: Acceleration 7
Access	rw
Data type	INTEGER16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 $\Rightarrow$ 3.04 rps <sup>2</sup> Transmission 98:1 $\Rightarrow$ 2.05 rps <sup>2</sup> Transmission 188:1 $\Rightarrow$ 1.06 rps <sup>2</sup> Transmission 368:1 $\Rightarrow$ 0.54 rps <sup>2</sup>

**8.2.1.60 PCM Velocity 1**

Object	2962h
Description	Positioning mode via digital inputs: Velocity 1
Access	rw
Data type	INTEGER16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 $\Rightarrow$ max. 75 rpm Transmission 98:1 $\Rightarrow$ max. 50 rpm Transmission 188:1 $\Rightarrow$ max. 30 rpm Transmission 368:1 $\Rightarrow$ max. 15 rpm

**8.2.1.61 PCM Velocity 2**

Object	2963h
Description	Positioning mode via digital inputs: Velocity 2
Access	rw
Data type	INTEGER16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm Transmission 98:1 ⇒ max. 50 rpm Transmission 188:1 ⇒ max. 30 rpm Transmission 368:1 ⇒ max. 15 rpm

**8.2.1.62 PCM Velocity 3**

Object	2964h
Description	Positioning mode via digital inputs: Velocity 3
Access	rw
Data type	INTEGER16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm Transmission 98:1 ⇒ max. 50 rpm Transmission 188:1 ⇒ max. 30 rpm Transmission 368:1 ⇒ max. 15 rpm

**8.2.1.63 PCM Velocity 4**

Object	2965h
Description	Positioning mode via digital inputs: Velocity 4
Access	rw
Data type	INTEGER16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm Transmission 98:1 ⇒ max. 50 rpm Transmission 188:1 ⇒ max. 30 rpm Transmission 368:1 ⇒ max. 15 rpm

**8.2.1.64 PCM Velocity 5**

Object	2966h
Description	Positioning mode via digital inputs: Velocity 5
Access	rw
Data type	INTEGER16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm Transmission 98:1 ⇒ max. 50 rpm Transmission 188:1 ⇒ max. 30 rpm Transmission 368:1 ⇒ max. 15 rpm

**8.2.1.65 PCM Velocity 6**

Object	2967h
Description	Positioning mode via digital inputs: Velocity 6
Access	rw
Data type	INTEGER16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm Transmission 98:1 ⇒ max. 50 rpm Transmission 188:1 ⇒ max. 30 rpm Transmission 368:1 ⇒ max. 15 rpm

**8.2.1.66 PCM Velocity 7**

Object	2968h
Description	Positioning mode via digital inputs: Velocity 7
Access	rw
Data type	INTEGER16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm Transmission 98:1 ⇒ max. 50 rpm Transmission 188:1 ⇒ max. 30 rpm Transmission 368:1 ⇒ max. 15 rpm



**8.2.1.67 PCM Deceleration 1**

Object	2982h
Description	Positioning mode via digital inputs: Deceleration 1
Access	rw
Data type	INTEGER16
Default	101
EEPROM	Yes
Value range	<p>1 ... 101 %</p> <p>101 % = the delay is determined by the PCM Acceleration 1 parameter.</p> <p>100 % correspond to:  Transmission 66:1 <math>\Rightarrow</math> 3.04 rps<sup>2</sup>  Transmission 98:1 <math>\Rightarrow</math> 2.05 rps<sup>2</sup>  Transmission 188:1 <math>\Rightarrow</math> 1.06 rps<sup>2</sup>  Transmission 368:1 <math>\Rightarrow</math> 0.54 rps<sup>2</sup></p>

**8.2.1.68 PCM Deceleration 2**

Object	2983h
Description	Positioning mode via digital inputs: Deceleration 2
Access	rw
Data type	INTEGER16
Default	101
EEPROM	Yes
Value range	<p>1 ... 101 %</p> <p>101 % = the delay is determined by the PCM Acceleration 2 parameter.</p> <p>100 % correspond to:  Transmission 66:1 <math>\Rightarrow</math> 3.04 rps<sup>2</sup>  Transmission 98:1 <math>\Rightarrow</math> 2.05 rps<sup>2</sup>  Transmission 188:1 <math>\Rightarrow</math> 1.06 rps<sup>2</sup>  Transmission 368:1 <math>\Rightarrow</math> 0.54 rps<sup>2</sup></p>

**8.2.1.69 PCM Deceleration 3**

Object	2984h
Description	Positioning mode via digital inputs: Deceleration 3
Access	rw
Data type	INTEGER16
Default	101
EEPROM	Yes
Value range	<p>1 ... 101 %</p> <p>101 % = the delay is determined by the PCM Acceleration 3 parameter.</p> <p>100 % correspond to:  Transmission 66:1 <math>\Rightarrow</math> 3.04 rps<sup>2</sup>  Transmission 98:1 <math>\Rightarrow</math> 2.05 rps<sup>2</sup>  Transmission 188:1 <math>\Rightarrow</math> 1.06 rps<sup>2</sup>  Transmission 368:1 <math>\Rightarrow</math> 0.54 rps<sup>2</sup></p>

**8.2.1.70 PCM Deceleration 4**

Object	2985h
Description	Positioning mode via digital inputs: Deceleration 4
Access	rw
Data type	INTEGER16
Default	101
EEPROM	Yes
Value range	<p>1 ... 101 %</p> <p>101 % = the delay is determined by the PCM Acceleration 4 parameter.</p> <p>100 % correspond to:  Transmission 66:1 <math>\Rightarrow</math> 3.04 rps<sup>2</sup>  Transmission 98:1 <math>\Rightarrow</math> 2.05 rps<sup>2</sup>  Transmission 188:1 <math>\Rightarrow</math> 1.06 rps<sup>2</sup>  Transmission 368:1 <math>\Rightarrow</math> 0.54 rps<sup>2</sup></p>

**8.2.1.71 PCM Deceleration 5**

Object	2986h
Description	Positioning mode via digital inputs: Deceleration 5
Access	rw
Data type	INTEGER16
Default	101
EEPROM	Yes
Value range	<p>1 ... 101 %</p> <p>101 % = the delay is determined by the PCM Acceleration 5 parameter.</p> <p>100 % correspond to:  Transmission 66:1 <math>\Rightarrow</math> 3.04 rps<sup>2</sup>  Transmission 98:1 <math>\Rightarrow</math> 2.05 rps<sup>2</sup>  Transmission 188:1 <math>\Rightarrow</math> 1.06 rps<sup>2</sup>  Transmission 368:1 <math>\Rightarrow</math> 0.54 rps<sup>2</sup></p>

**8.2.1.72 PCM Deceleration 6**

Object	2987h
Description	Positioning mode via digital inputs: Deceleration 6
Access	rw
Data type	INTEGER16
Default	101
EEPROM	Yes
Value range	<p>1 ... 101 %</p> <p>101 % = the delay is determined by the PCM Acceleration 6 parameter.</p> <p>100 % correspond to:  Transmission 66:1 <math>\Rightarrow</math> 3.04 rps<sup>2</sup>  Transmission 98:1 <math>\Rightarrow</math> 2.05 rps<sup>2</sup>  Transmission 188:1 <math>\Rightarrow</math> 1.06 rps<sup>2</sup>  Transmission 368:1 <math>\Rightarrow</math> 0.54 rps<sup>2</sup></p>

**8.2.1.73 PCM Deceleration 7**

Object	2988h
Description	Positioning mode via digital inputs: Deceleration 7
Access	rw
Data type	INTEGER16
Default	101
EEPROM	Yes
Value range	1 ... 101 %  101 % = the delay is determined by the PCM Acceleration 7 parameter.  100 % correspond to: Transmission 66:1 $\Rightarrow$ 3.04 rps <sup>2</sup> Transmission 98:1 $\Rightarrow$ 2.05 rps <sup>2</sup> Transmission 188:1 $\Rightarrow$ 1.06 rps <sup>2</sup> Transmission 368:1 $\Rightarrow$ 0.54 rps <sup>2</sup>

**8.2.1.74 Output Stage Temperature**

Object	2A01h
Description	Output stage temperature
Unit	1/10 °C
Access	ro
Data type	INTEGER16
Default	No
EEPROM	No

**8.2.1.75 Voltage of Control**

Object	2A02h
Description	Operating voltage of control
Unit	1/10 V
Access	ro
Data type	INTEGER16
Default	No
EEPROM	No

**8.2.1.76 Voltage of Output Stage**

Object	2A03h
Description	Operating voltage of output stage
Unit	1/10 V
Access	ro
Data type	INTEGER16
Default	No
EEPROM	No

**8.2.1.77 Voltage of Battery**

Object	2A04h
Description	Battery voltage
Unit	1/100 V
Access	ro
Data type	INTEGER16
Default	No
EEPROM	No

**8.2.1.78 Motor Current**

Object	2A05h
Description	Motor current
Unit	mA
Access	ro
Data type	INTEGER16
Default	No
EEPROM	No

**8.2.1.79 Actual Position**

Object	2A06h
Description	Actual position
Unit	Spindle pitch = 0: Steps Spindle pitch > 0: 1/100 mm
Access	ro
Data type	INTEGER32
Default	No
EEPROM	No

**8.2.1.80 Actual Rotational Speed**

Object	2A07h
Description	Actual speed
Unit	rpm
Access	ro
Data type	INTEGER16
Default	No
EEPROM	No

**8.2.1.81 Serial Number**

Object	2A08h
Description	Serial number
Unit	-
Access	ro
Data type	INTEGER32
Default	No
EEPROM	Yes

**8.2.1.82 Production Date**

Object	2A09h
Description	Production date
Unit	DDMMYYYY
Access	ro
Data type	INTEGER32
Default	No
EEPROM	Yes

**8.2.1.83 SW Motor Controller**

Object	2A0Ah
Description	Motor Controller software version
Unit	-
Access	ro
Data type	INTEGER32
Default	No
EEPROM	No

**8.2.1.84 Gear Reduction**

Object	2A0Bh
Description	Gear reduction
Unit	-
Access	ro
Data type	INTEGER16
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 actuator.

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

Object	2A0Ch
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'	Positioning mode: In Position Actual position is within the positioning window of the programmed target value.
	'0'	Actual position is outside the positioning window of the programmed target value.
	'1'	Speed mode: In Position Actual speed is inside the specified tolerance window of target speed
	'0'	Actual speed is outside the specified tolerance window.
Bit 4	'1'	Actuator travels:
	'0'	Actuator travels Drive stands still (rotational speed < 2 rpm)
Bit 5	'1'	Positioning mode: upper limit Actual position is above the programmed limiting value. Traveling is possible only in negative direction in inching mode.
	'0'	Actual position is below the programmed limiting value.
	'0'	Operating mode: Positioning mode: irrelevant
Bit 6	'1'	Positioning mode: lower limit Actual position is below the programmed limiting value. Traveling is possible only in positive direction in inching mode.
	'0'	Actual position is above the programmed limiting value.
	'0'	Positioning mode: irrelevant
Bit 7	'1'	Driver state Motor is enabled
	'0'	Motor in control
Bit 8	'1'	Error: Actuator has switched to error. The cause of the error must be removed and acknowledged.
	'0'	No error present
Bit 9	'1'	Positioning mode: Loop travel If travel direction unequal start direction (with loop travel )
	'0'	If travel direction equal start direction
	'0'	Positioning mode: irrelevant
Bit 10	'1'	Output stage supply voltage No voltage, no traveling possible
	'0'	Voltage applied
Bit 11	'1'	Ready for travel: Not ready for travel
	'0'	Ready for travel: Actuator not in error state No active positioning Supply voltage of the output stage is applied Actual position within limits (only positioning mode)



Bit	State	Description
Bit 12	'1'	Battery voltage:
	'0'	Battery voltage < 2.6 V Battery voltage OK
Bit 13	'1'	Current limiting
	'0'	Current limiting active Current limiting not active
Bit 14	'1'	Positioning mode: Status
	'0'	Positioning active in positioning mode. Positioning inactive.
	'1'	Speed mode: Status
	'0'	Enable target speed Target speed disabled
Bit 15	'1'	Contouring error: Contouring error ⇒ the actuator cannot reach the preset speed due to too high load. The actuator switches the contouring error fault. Remedy: reduce programmed speed!
	'0'	No contouring error ⇒ actual speed corresponds with required speed.

Table 9: System status word

#### 8.2.1.86 Encoder Resolution

Object	2A0Dh
Description	Encoder resolution
Unit	Steps per revolution of the output shaft
Access	ro
Data type	INTEGER16
Default	No
EEPROM	Yes

**8.2.1.87 Device ID**

Object	2A0Eh
Description	Device identification
Unit	-
Access	ro
Data type	UNSIGNED8
Default	No
EEPROM	Yes

1 = AG25

2 = AG26

**8.2.1.88 Number of Errors**

Object	2B01h
Description	Number of errors
Unit	-
Access	ro
Data type	UNSIGNED8
Default	No
EEPROM	No

**8.2.1.89 Error Number 1**

Object	2B02h
Description	Error 1
Unit	-
Access	ro
Data type	UNSIGNED8
Default	No
EEPROM	Yes

**8.2.1.90 Error Number 2**

Object	2B03h
Description	Error 2
Unit	-
Access	ro
Data type	UNSIGNED8
Default	No
EEPROM	Yes

**8.2.1.91 Error Number 3**

Object	2B04h
Description	Error 3
Unit	-
Access	ro
Data type	UNSIGNED8
Default	No
EEPROM	Yes

**8.2.1.92 Error Number 4**

Object	2B05h
Description	Error 4
Unit	-
Access	ro
Data type	UNSIGNED8
Default	No
EEPROM	Yes

**8.2.1.93 Error Number 5**

Object	2B06h
Description	Error 5
Unit	-
Access	ro
Data type	UNSIGNED8
Default	No
EEPROM	Yes

**8.2.1.94 Error Number 6**

Object	2B07h
Description	Error 6
Unit	-
Access	ro
Data type	UNSIGNED8
Default	No
EEPROM	Yes

**8.2.1.95 Error Number 7**

Object	2B08h
Description	Error 7
Unit	-
Access	ro
Data type	UNSIGNED8
Default	No
EEPROM	Yes

**8.2.1.96 Error Number 8**

Object	2B09h
Description	Error 8
Unit	-
Access	ro
Data type	UNSIGNED8
Default	No
EEPROM	Yes

**8.2.1.97 Error Number 9**

Object	2B0Ah
Description	Error 9
Unit	-
Access	ro
Data type	UNSIGNED8
Default	No
EEPROM	Yes

**8.2.1.98 Error Number 10**

Object	2B0Bh
Description	Error 10
Unit	-
Access	ro
Data type	UNSIGNED8
Default	No
EEPROM	Yes

**8.2.1.99 Configuration**

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

Object	2B21h
Description	Configuration of the actuator
Access	rw
Data type	UNSIGNED16
Default	15
EEPROM	yes
Value range	0 ... 65535

Bit	Description
0 ... 3	reserved, always 1
4 ... 5	reserved, always 0
6	Auto reset in the EXCEPTION state 0 = switched off (factory setting): 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. 1 = switched on: 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**

Object	2C01h
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

## 8.2.2 Standard objects parameter description

### 8.2.2.1 NMT\_DeviceType\_U32

Object	1000h
Sub-index	00h
Description	Device profile
Access	ro
Data type	UNSIGNED32
Default	0000 0000h (no profile)

### 8.2.2.2 ERR\_ErrorRegister\_U8

Object	1001h
Sub-index	00h
Description	Error register
Access	ro
Data type	UNSIGNED8
Default	00h

### 8.2.2.3 NMT\_CycleLen\_U32

Object	1006h
Sub-index	00h
Description	Cycle time in $\mu$ s
Access	rw
Data type	UNSIGNED32
Default	200
Value range	200 ... 2147483 ( $\mu$ s)

### 8.2.2.4 NMT\_ManufactDevName\_VS

Object	1008h
Sub-index	00h
Description	Device name
Access	const
Data type	VISIBLE_STRING
Default	"SIKO DriveLine AG2x EPL"

**8.2.2.5 NMT\_ManufactHwVers\_VS**

Object	1009h
Sub-index	00h
Description	Hardware version
Access	const
Data type	VISIBLE_STRING
Default	Current hardware version format: "HW_1.00"

**8.2.2.6 NMT\_ManufactSwVers\_VS**

Object	100Ah
Sub-index	00h
Description	Software version
Access	const
Data type	VISIBLE_STRING
Default	Current software version "SW_1.00"

**8.2.2.7 NMT\_IdentityObject\_REC**

Object	1018h
Sub-index	00h
Description	Number of entries
Access	const
Data type	UNSIGNED8
Default	04h

Object	1018h
Sub-index	01h
Description	Vendor ID
Access	const
Data type	UNSIGNED32
Default	0000 0195h

Object	1018h
Sub-index	02h
Description	Product code
Access	const
Data type	UNSIGNED32
Default	0000 0101h

Object	1018h
Sub-index	03h
Description	Revision number
Access	const
Data type	UNSIGNED32
Default	Current revision number

Object	1018h
Sub-index	04h
Description	Serial number
Access	const
Data type	UNSIGNED32
Default	Serial number of the device

#### 8.2.2.8 CFM\_VerifyConfiguration\_REC

Object	1020h
Sub-index	00h
Description	Verify configuration, number of entries
Access	const
Data type	UNSIGNED8
Default	02h

Object	1020h
Sub-index	01h
Description	Date of configuration
Access	rw
Data type	UNSIGNED32
Default	0
Value range	0 ... FFFF FFFFh

Object	1020h
Sub-index	02h
Description	Time of configuration
Access	rw
Data type	UNSIGNED32
Default	0
Value range	0 ... FFFF FFFFh



## 8.2.2.9 NMT\_InterfaceGroup\_00h\_REC

Object	1030h
Sub-index	00h
Description	Interface group, number of entries
Access	const
Data type	UNSIGNED8
Default	09h

Object	1030h
Sub-index	01h
Description	InterfaceIndex_U16
Access	ro
Data type	UNSIGNED16
Default	0001h

Object	1030h
Sub-index	02h
Description	InterfaceDescription_VSTR
Access	const
Data type	VISIBLE_STRING194
Default	Depending on the current hardware version

Object	1030h
Sub-index	03h
Description	InterfaceType_U8
Access	const
Data type	UNSIGNED8
Default	06h

Object	1030h
Sub-index	04h
Description	InterfaceMtu_U16
Access	const
Data type	UNSIGNED16
Default	1500 bytes

Object	1030h
Sub-index	05h
Description	InterfacePhysAddress_OSTR
Access	const
Data type	OCTET_STRING6
Default	MAC address

Object	1030h
Sub-index	06h
Description	InterfaceName_VSTR
Access	ro
Data type	VISIBLE_STRING11
Default	"Interface 1"

Object	1030h
Sub-index	07h
Description	InterfaceOperStatus_U8
Access	ro
Data type	UNSIGNED8
Default	01h

Object	1030h
Sub-index	08h
Description	InterfaceAdminState_U8
Access	rw
Data type	UNSIGNED8
Default	01h
Value range	0 ... 1

Object	1030h
Sub-index	09h
Description	Valid_BOOL
Access	rw
Data type	BOOLEAN
Default	01h
Value range	0 ... 1

**8.2.2.10 SDO\_SequLayerTimeout\_U32**

Object	1300h
Sub-index	00h
Description	Timeout for detection of disconnection of the SDO sequence
Access	rw
Data type	UNSIGNED32
Default	15000
Value range	100 ... FFFF FFFFh

**8.2.2.11 PDO\_RxCommParam\_00h\_REC**

Object	1400h
Sub-index	00h
Description	Communication parameters for the Rx PDOs, number of entries
Access	const
Data type	UNSIGNED8
Default	02h

Object	1400h
Sub-index	01h
Description	NodeID_U8
Access	rw
Data type	UNSIGNED8
Default	00h

Object	1400h
Sub-index	02h
Description	MappingVersion_U8
Access	ro
Data type	UNSIGNED8
Default	00h

**8.2.2.12 PDO\_RXMappParam\_00h\_AU64**

Object	1600h
Sub-index	00h
Description	Mapping parameters of Rx PDOs, number of entries
Access	rw
Data type	UNSIGNED8
Default	3

Object	1600h
Sub-index	01h
Description	Mapped Object 001
Access	ro
Data type	UNSIGNED64
Default	0010 0000 0000 2002h

Object	1600h
Sub-index	02h
Description	Mapped Object 002
Access	ro
Data type	UNSIGNED64
Default	0020 0010 0000 2003h

Object	1600h
Sub-index	03h
Description	Mapped Object 003
Access	ro
Data type	UNSIGNED64
Default	0008 0030 0000 2001h

#### 8.2.2.13 PDO\_TxCommParam\_00h\_REC

Object	1800h
Sub-index	00h
Description	Communication parameters of Tx PDOs, number of entries
Access	const
Data type	UNSIGNED8
Default	02h

Object	1800h
Sub-index	01h
Description	NodeID_U8
Access	rw
Data type	UNSIGNED8
Default	00h

Object	1800h
Sub-index	02h
Description	MappingVersion_U8
Access	ro
Data type	UNSIGNED8
Default	00h

#### 8.2.2.14 PDO\_TxMappParam\_00h\_AU64

Object	1A00h
Sub-index	00h
Description	Mapping parameters of TX PDOs, number of entries
Access	rw
Data type	UNSIGNED8
Default	03h

Object	1A00h
Sub-index	01h
Description	Mapped Object 001
Access	ro
Data type	UNSIGNED64
Default	0010 0000 0000 2102h

Object	1A00h
Sub-index	02h
Description	Mapped Object 002
Access	ro
Data type	UNSIGNED64
Default	0020 0010 0000 2103h

Object	1A00h
Sub-index	03h
Description	Mapped Object 003
Access	ro
Data type	UNSIGNED64
Default	0008 0030 0000 2101h

**8.2.2.15 DLL\_CNLossSoC\_REC**

Object	1C0Bh
Sub-index	00h
Description	"Loss of Soc" error counter, number of entries
Access	const
Data type	UNSIGNED8
Default	03h

Object	1C0Bh
Sub-index	01h
Description	CumulativeCnt_U32
Access	rw
Data type	UNSIGNED32
Default	0
Value range	0 ... FFFF FFFFh

Object	1C0Bh
Sub-index	02h
Description	ThresholdCnt_U32
Access	ro
Data type	UNSIGNED32
Default	0

Object	1C0Bh
Sub-index	03h
Description	Threshold_U32
Access	rw
Data type	UNSIGNED32
Default	15
Value range	0 ... FFFF FFFFh

**8.2.2.16 DLL\_CNCRCErrror\_REC**

Object	1C0Fh
Sub-index	00h
Description	CRC error counter
Access	const
Data type	UNSIGNED8
Default	03h

Object	1C0Fh
Sub-index	01h
Description	CumulativeCnt_U32
Access	rw
Data type	UNSIGNED32
Default	0
Value range	0 ... FFFF FFFFh

Object	1C0Fh
Sub-index	02h
Description	ThresholdCnt_U32
Access	ro
Data type	UNSIGNED32
Default	0

Object	1C0Fh
Sub-index	03h
Description	Threshold_U32
Access	rw
Data type	UNSIGNED32
Default	15
Value range	0 ... FFFF FFFFh

#### 8.2.2.17 DLL\_CNLossOfSocTolerance\_U32

Object	1C14h
Sub-index	00h
Description	"Loss of Soc" tolerance interval
Access	rw
Data type	UNSIGNED32
Default	100 000 (ns)
Value range	0 ... 2147483000

**8.2.2.18 PDL\_DownloadProgData\_ADOM**

Object	1F50h
Sub-index	00h
Description	Number of entries
Access	ro
Data type	UNSIGNED8
Default	01h

Object	1F50h
Sub-index	01h
Description	Program
Access	ro
Data type	DOMAIN
Default	-

**8.2.2.19 PDL\_ProgCtrl\_AU8**

Object	1F51h
Sub-index	00h
Description	Number of entries
Access	ro
Data type	UNSIGNED8
Default	01h

Object	1F51h
Sub-index	01h
Description	ProgCtrl
Access	rw
Data type	UNSIGNED8
Default	01h

**8.2.2.20 PDL\_LocVerApplSw\_REC**

Object	1F52h
Sub-index	00h
Description	Number of entries
Access	const
Data type	UNSIGNED8
Default	02h



Object	1F52h
Sub-index	01h
Description	ApplSwDate_U32
Access	ro
Data type	UNSIGNED32
Default	-

Object	1F52h
Sub-index	02h
Description	ApplSwTime_U32
Access	ro
Data type	UNSIGNED32
Default	-

#### 8.2.2.21 NMT\_NodeAssignment\_AU32

Object	1F81h
Sub-index	00h
Description	List of all nodes
Access	rw
Data type	UNSIGNED8
Default	FEh
Value range	01h ... FEh

Object	1F81h
Sub-index	01h - FEh
Description	NodeAssignment
Access	rw
Data type	UNSIGNED32
Default	0

#### 8.2.2.22 NMT\_FeatureFlags\_U32

Object	1F82h
Sub-index	00h
Description	Device properties
Access	const
Data type	UNSIGNED32
Default	0004 8205h

**8.2.2.23 NMT\_EPLVersion\_U8**

Object	1F83h
Sub-index	00h
Description	Supported Ethernet Powerlink version
Access	const
Data type	UNSIGNED8
Default	20h

**8.2.2.24 NMT\_CurrNMTState\_U8**

Object	1F8Ch
Sub-index	00h
Description	Status of the NMT State Machine
Access	ro
Data type	UNSIGNED8
Default	No

**8.2.2.25 NMT\_PresPayloadLimitList\_AU16**

Object	1F8Dh
Sub-index	00h
Description	List of all maximum service loads, number of entries
Access	rw
Data type	UNSIGNED8
Default	254

Object	1F8Dh
Sub-index	01h - FEh
Description	PresPayloadLimit
Access	rw
Data type	UNSIGNED16
Default	36

**8.2.2.26 NMT\_EPLNodeID\_REC**

Object	1F93h
Sub-index	00h
Description	Node ID
Access	const
Data type	UNSIGNED8
Default	02h

Object	1F93h
Sub-index	01h
Description	NodeID_U8
Access	ro
Data type	UNSIGNED8
Default	the configured Node ID

Object	1F93h
Sub-index	02h
Description	NodeIDByHW_BOOL
Access	ro
Data type	BOOLEAN
Default	01h

**8.2.2.27 NMT\_CycleTiming\_REC**

Object	1F98h
Sub-index	00h
Description	Time response of the node, number of entries
Access	const
Data type	UNSIGNED8
Default	08h

Object	1F98h
Sub-index	01h
Description	IsochrTxMaxPayload_U16
Access	const
Data type	UNSIGNED16
Default	1490

Object	1F98h
Sub-index	02h
Description	IsochrRxMaxPayload_U16
Access	const
Data type	UNSIGNED16
Default	1490

Object	1F98h
Sub-index	03h
Description	PresMaxLatency_U32
Access	const
Data type	UNSIGNED32
Default	1000

Object	1F98h
Sub-index	04h
Description	PreqActPayloadLimit_U16
Access	rw
Data type	UNSIGNED16
Default	36
Value range	36 ... 1490

Object	1F98h
Sub-index	05h
Description	PresActPayloadLimit_U16
Access	rw
Data type	UNSIGNED16
Default	36
Value range	36 ... 1490

Object	1F98h
Sub-index	06h
Description	AsndMaxLatency_U32
Access	const
Data type	UNSIGNED32
Default	1000

Object	1F98h
Sub-index	07h
Description	MultiplCycleCnt_U8
Access	rw
Data type	UNSIGNED8
Default	0
Value range	0 ... 255

Object	1F98h
Sub-index	08h
Description	AsyncMTU_U16
Access	rw
Data type	UNSIGNED16
Default	300
Value range	0 ... 1500

#### 8.2.2.28 NMT\_CNBasicEthernetTimeout\_U32

Object	1F99h
Sub-index	00h
Description	Timeout period for the Basic Ethernet mode
Access	rw
Data type	UNSIGNED32
Default	5000000

#### 8.2.2.29 NMT\_MultiplCycleAssign\_AU8

Object	1F9Bh
Sub-index	00h
Description	Configuration setting for multiplexed slot transfer, number of entries
Access	rw
Data type	UNSIGNED8
Default	254
Value range	1 ... 254

Object	1F9Bh
Sub-index	01h
Description	CycleNo
Access	rw
Data type	UNSIGNED8
Default	0
Value range	0 ... 255

#### 8.2.2.30 NMT\_ResetCmd\_U8

Object	1F9Eh
Sub-index	00h
Description	Reset of a node
Access	rw
Data type	UNSIGNED8
Default	255

## 9 Service protocol

<b>NOTICE</b>	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

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### 9.3 Parameters

#### 9.3.1 Positioning

##### 9.3.1.1 Target Value

Read command	E0	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	F0±xxxxxxx	
Description	see chapter <a href="#">8.2.1.3 Target Value</a>	

##### 9.3.1.2 Actual Position

Read command	Z	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	Decimal format see chapter <a href="#">8.2.1.79 Actual Position</a>	

Read command	W	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	Binary format see chapter <a href="#">8.2.1.79 Actual Position</a>	

##### 9.3.1.3 Actual Rotational Speed

Read command	V	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.80 Actual Rotational Speed</a>	

##### 9.3.1.4 Calibration Value

Read command	E3	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	F3±xxxxxxx	
Description	see chapter <a href="#">8.2.1.31 Calibration Value</a>	



**9.3.1.5 Loop Length**

Read command	G17	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H17xxxxx	
Description	see chapter <a href="#">8.2.1.40 Loop Length</a>	

**9.3.1.6 Offset Value**

Read command	E5	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	F5±xxxxxxx	
Description	see chapter <a href="#">8.2.1.45 Offset Value</a>	

**9.3.1.7 Pos Type**

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

**9.3.1.8 Pos Window**

Read command	G09	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H09xxxxx	
Description	see chapter <a href="#">8.2.1.27 Pos Window</a>	

**9.3.1.9 Sense of Rotation**

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

**9.3.1.10 Spindle Pitch**

Read command	G13	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H13xxxxx	
Description	see chapter <a href="#">8.2.1.30 Spindle Pitch</a>	

**9.3.2 Actuator****9.3.2.1 A-Pos**

Read command	G03	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H03xxxxx	
Description	see chapter <a href="#">8.2.1.21 A-Pos</a>	

**9.3.2.2 V-Pos**

Read command	G04	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H04xxxxx	
Description	see chapter <a href="#">8.2.1.22 V-Pos</a>	

**9.3.2.3 D-Pos**

Read command	G44	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H44xxxxx	
Description	see chapter <a href="#">8.2.1.23 D-Pos</a>	

**9.3.2.4 A-Rot**

Read command	G05	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H05xxxxx	
Description	see chapter <a href="#">8.2.1.24 A-Rot</a>	

**9.3.2.5 A-Inch**

Read command	G07	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H07xxxxx	
Description	see chapter <a href="#">8.2.1.25 A-Inch</a>	

**9.3.2.6 V-Inch**

Read command	G08	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H08xxxxx	
Description	see chapter <a href="#">8.2.1.26 V-Inch</a>	

**9.3.2.7 Gear Ratio Denominator**

Read command	G11	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H11xxxxx	
Description	see chapter <a href="#">8.2.1.29 Gear Ratio Denominator</a>	

**9.3.2.8 Gear Ratio Numerator**

Read command	G10	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H10xxxxx	
Description	see chapter <a href="#">8.2.1.28 Gear Ratio Numerator</a>	

**9.3.3 Limiting values****9.3.3.1 Software Limit 1**

Read command	E1	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	F1±xxxxxxx	
Description	see chapter <a href="#">8.2.1.32 Software Limit 1</a>	

**9.3.3.2 Software Limit 2**

Read command	E2	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	F2±xxxxxxx	
Description	see chapter <a href="#">8.2.1.33 Software Limit 2</a>	

**9.3.3.3 Current Limiting**

Read command	G24	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H24xxxxx	
Description	see chapter <a href="#">8.2.1.42 Current Limiting</a>	

**9.3.3.4 Contouring Error Limit**

Read command	G18	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H18xxxxx	
Description	see chapter <a href="#">8.2.1.41 Contouring Error Limit</a>	

**9.3.4 Options****9.3.4.1 Operating Mode**

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

**9.3.4.2 Inpos Mode**

Read command	G16	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H16xxxxx	
Description	see chapter <a href="#">8.2.1.39 Inpos Mode</a>	

**9.3.4.3 Delta Inch**

Read command	E4	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	F4±xxxxxxx	
Description	see chapter <a href="#">8.2.1.34 Delta Inch</a>	

**9.3.4.4 Inching 2 Acceleration Type**

Read command	G39	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H39xxxxx	
Description	see chapter <a href="#">8.2.1.44 Inching 2 Acceleration Type</a>	

**9.3.4.5 Inching 2 Offset**

Read command	G27	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H27xxxxx	
Description	see chapter <a href="#">8.2.1.43 Inching 2 Offset</a>	

**9.3.4.6 Inching 2 Stop Mode**

Read command	G15	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H15xxxxx	
Description	see chapter <a href="#">8.2.1.38 Inching 2 Stop Mode</a>	

**9.3.4.7 LED Functionality**

Read command	G45	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H45xxxxx	
Description	see chapter <a href="#">8.2.1.7 LED Functionality</a>	

**9.3.4.8 Service Interface Baud Rate**

Read command	G25	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H25xxxxx	
Description	see chapter <a href="#">8.2.1.8 Service Interface Baud Rate</a>	

**9.3.4.9 Configuration**

Read command	G61	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H61xxxxx	
Description	see chapter <a href="#">8.2.1.99 Configuration</a>	

**9.3.5 Controller parameters****9.3.5.1 Controller Parameter P**

Read command	G00	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H00xxxxx	
Description	see chapter <a href="#">8.2.1.18 Controller Parameter P</a>	

**9.3.5.2 Controller Parameter I**

Read command	G01	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H01xxxxx	
Description	see chapter <a href="#">8.2.1.19 Controller Parameter I</a>	

**9.3.5.3 Controller Parameter D**

Read command	G02	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H02xxxxx	
Description	see chapter <a href="#">8.2.1.20 Controller Parameter D</a>	

**9.3.6 Device information****9.3.6.1 Motor Current**

Read command	B04	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.78 Motor Current</a>	

**9.3.6.2 Output Stage Temperature**

Read command	B00	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.74 Output Stage Temperature</a>	

**9.3.6.3 Voltage of Control**

Read command	B01	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.75 Voltage of Control</a>	

**9.3.6.4 Voltage of Output Stage**

Read command	B02	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.76 Voltage of Output Stage</a>	

**9.3.6.5 Voltage of Battery**

Read command	B03	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.77 Voltage of Battery</a>	

### 9.3.6.6 Flag Register

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

### 9.3.6.7 System Status Word

Read command	R	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.85 System Status Word</a>	

### 9.3.6.8 Device Type

Read command	A0	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	Response format: "AG25 >"	

### 9.3.6.9 Gear Reduction

Read command	A4	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	Response format: "98 >"	

### 9.3.6.10 Motor Type

Read command	A7	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	Response format: "50W >"	

**9.3.6.11 Network Type**

Read command	A3	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	Response format: "ECT >"	

**9.3.6.12 Production Date**

Read command	A6	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	Response format: "DDMMYYYY>"	

**9.3.6.13 Serial Number**

Read command	A5	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	Response format: "12345678>"	

**9.3.6.14 SW Ethernet Module**

Read command	A2	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	Response format: "01:02:63>"	

**9.3.6.15 SW Motor Controller**

Read command	A1	see chapter <a href="#">9.8 ASCII command structure</a>
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 <a href="#">9.8 ASCII command structure</a>
Write command	H49xxxxx	
Description	see chapter <a href="#">8.2.1.12 Digital Input 1 Functionality</a>	



**9.3.7.2 Digital Input 2 Functionality**

Read command	G50	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H50xxxxx	
Description	see chapter <a href="#">8.2.1.13 Digital Input 2 Functionality</a>	

**9.3.7.3 Digital Input 3 Functionality**

Read command	G51	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H51xxxxx	
Description	see chapter <a href="#">8.2.1.14 Digital Input 3 Functionality</a>	

**9.3.7.4 Digital Input 4 Functionality**

Read command	G52	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H52xxxxx	
Description	see chapter <a href="#">8.2.1.15 Digital Input 4 Functionality</a>	

**9.3.7.5 Digital Input Functionalities State**

Read command	U1029	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.16 Digital Input Functionalities State</a>	

**9.3.7.6 Digital Inputs Polarity**

Read command	G54	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H54xxxxx	
Description	see chapter <a href="#">8.2.1.17 Digital Inputs Polarity</a>	

**9.3.7.7 Digital Inputs State**

Read command	B05	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.4 Digital Inputs State</a>	

**9.3.7.8 Digital Output 1 Functionality**

Read command	G46	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H46xxxxx	
Description	see chapter <a href="#">8.2.1.9 Digital Output 1 Functionality</a>	

**9.3.7.9 Digital Outputs Control**

Read command	G60	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H60xxxxx	
Description	see chapter <a href="#">8.2.1.1 Digital Outputs Control</a>	

**9.3.7.10 Digital Output Functionalities State**

Read command	U0770	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.10 Digital Output Functionalities State</a>	

**9.3.7.11 Digital Outputs Polarity**

Read command	G48	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	H48xxxxx	
Description	see chapter <a href="#">8.2.1.11 Digital Outputs Polarity</a>	

**9.3.8 Error memory****9.3.8.1 Number of Errors**

Read command	J00	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.88 Number of Errors</a>	

**9.3.8.2 Error Number 1**

Read command	J01	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.89 Error Number 1</a>	

**9.3.8.3 Error Number 2**

Read command	J02	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.90 Error Number 2</a>	

**9.3.8.4 Error Number 3**

Read command	J03	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.91 Error Number 3</a>	

**9.3.8.5 Error Number 4**

Read command	J04	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.92 Error Number 4</a>	

**9.3.8.6 Error Number 5**

Read command	J05	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.93 Error Number 5</a>	

**9.3.8.7 Error Number 6**

Read command	J06	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.94 Error Number 6</a>	

**9.3.8.8 Error Number 7**

Read command	J07	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.95 Error Number 7</a>	

**9.3.8.9 Error Number 8**

Read command	J08	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.96 Error Number 8</a>	

**9.3.8.10 Error Number 9**

Read command	J09	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.97 Error Number 9</a>	

**9.3.8.11 Error Number 10**

Read command	J10	see chapter <a href="#">9.8 ASCII command structure</a>
Write command	read-only	
Description	see chapter <a href="#">8.2.1.98 Error Number 10</a>	

**9.4 Commands****9.4.1 Start travel job**

Command	M	see chapter <a href="#">9.8 ASCII command structure</a>
Description	Positioning mode: – start of positioning process to programmed set point Speed mode: – start of speed mode	

**9.4.2 Start inching mode 1**

Command	Y	see chapter <a href="#">9.8 ASCII command structure</a>
Description	only in positioning mode	

**9.4.3 Start inching mode 2 positive travel direction**

Command	, (2C <sub>hex</sub> )	see chapter <a href="#">9.8 ASCII command structure</a>
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	. (2E <sub>hex</sub> )	see chapter <a href="#">9.8 ASCII command structure</a>
Description	Drive travels in negative direction as long as the "." ASCII character is permanently sent (only in positioning mode).	

**9.4.5 Cancel travel job in positioning mode**

Command	I (49 <sub>hex</sub> )	see chapter <a href="#">9.8 ASCII command structure</a>
Description	Motor remains in control state	

**9.4.6 Motor stop fast**

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

Command	N	see chapter <a href="#">9.8 ASCII command structure</a>
Description	Motor decelerates with maximum delay. Motor remains in control state!	

**9.4.7 Motor stop**

<b>NOTICE</b>	If a contouring error is pending at the time of the "O" command, the motor will be enabled.	
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Command	O	see chapter <a href="#">9.8 ASCII command structure</a>
Description	Motor decelerates with programmed delay. Motor remains in control state!	

**9.4.8 enable motor**

Command	P	see chapter <a href="#">9.8 ASCII command structure</a>
Description	Motor is enabled	

**9.4.9 Factory setting: all parameters**

Command	S11100	see chapter <a href="#">9.8 ASCII command structure</a>
Description	Reset all parameters to factory settings	

**9.4.10 Factory setting: Standard parameters**

Command	S11101	see chapter <a href="#">9.8 ASCII command structure</a>
Description	Reset only standard parameters to factory settings	

**9.4.11 Factory setting: Controller parameters**

Command	S11102	see chapter <a href="#">9.8 ASCII command structure</a>
Description	Reset only controller parameters to factory settings	

**9.4.12 Acknowledge error**

Command	S11103	see chapter <a href="#">9.8 ASCII command structure</a>
Description	Acknowledge error	

**9.4.13 Calibrate**

Command	S11104	see chapter <a href="#">9.8 ASCII command structure</a>
Description	Calibrate actuator	

**9.4.14 Delete error memory**

Command	S11105	see chapter <a href="#">9.8 ASCII command structure</a>
Description	Deleting of the error memory	

**9.4.15 Software Reset**

Command	K	see chapter <a href="#">9.8 ASCII command structure</a>
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).

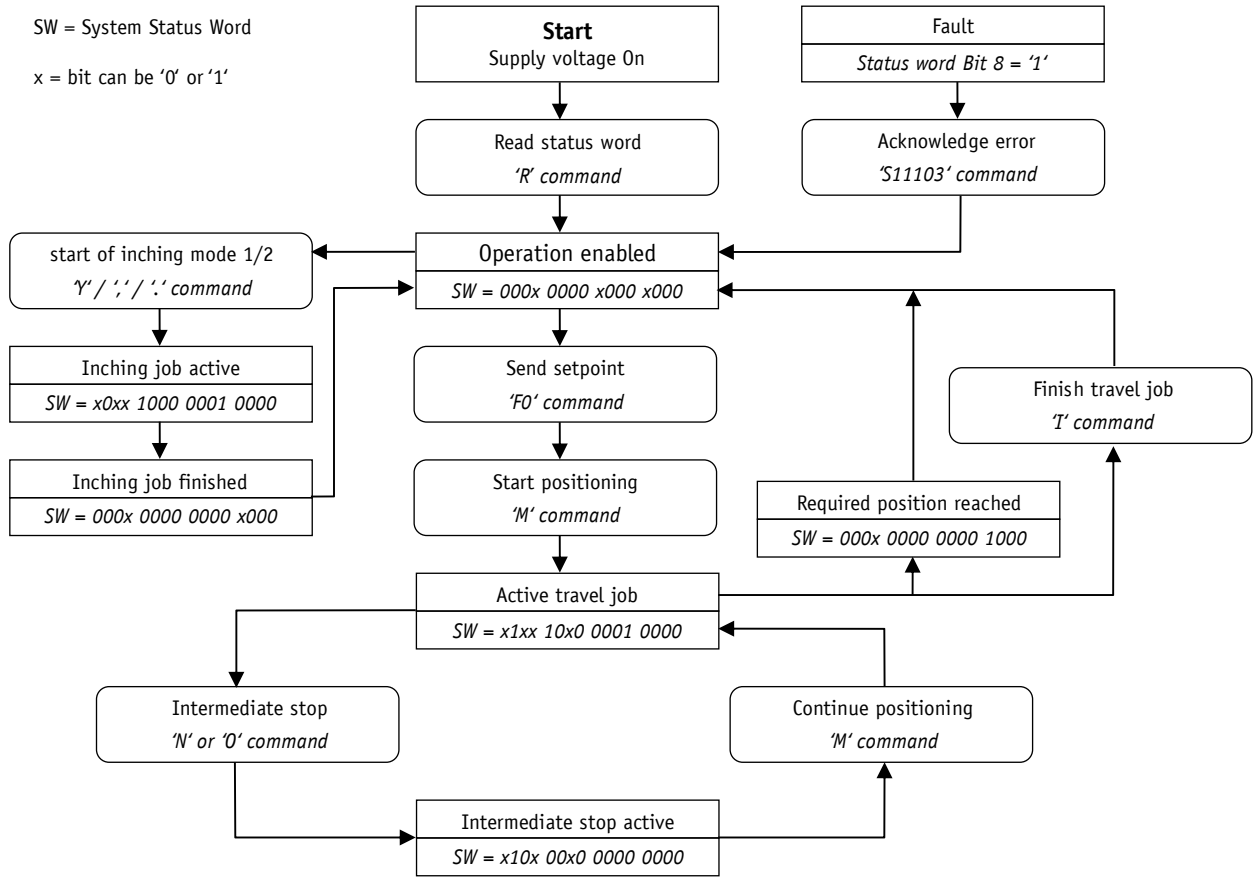


Fig. 16: Flowchart positioning mode service protocol

### 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](#)).

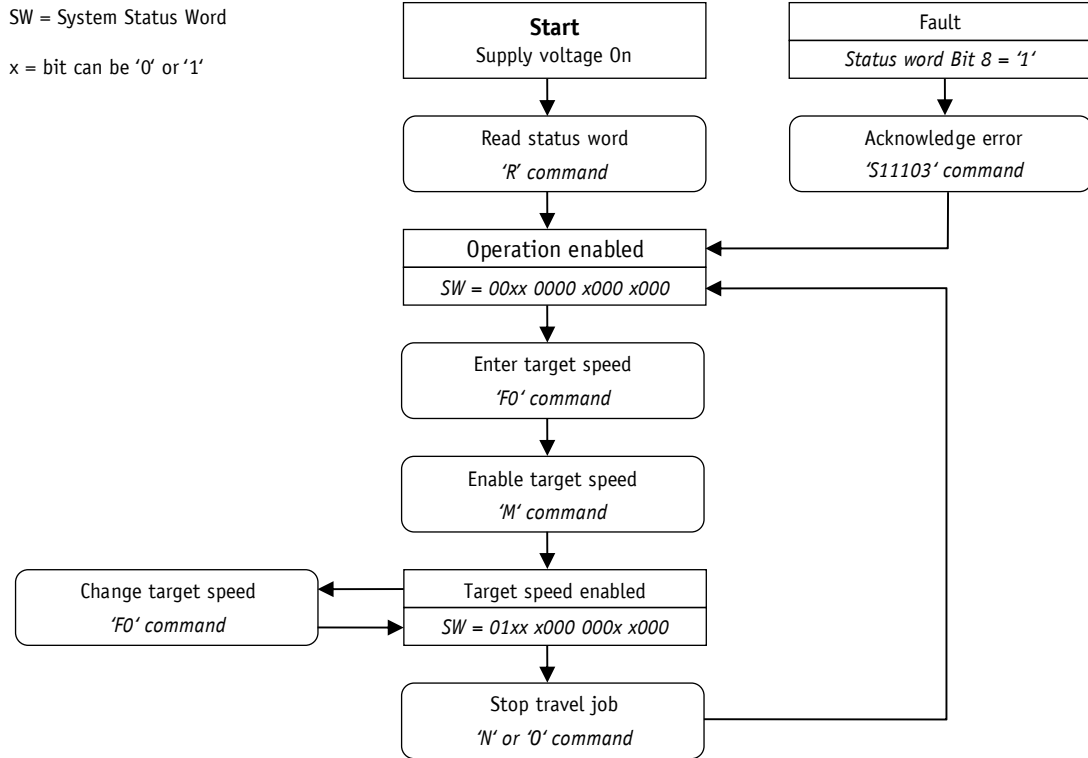


Fig. 17: Flow chart speed mode service protocol



## 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	xxxxxxx>	x	10	Device information (constants) y = address xxxxxxx = string
Byy	3	read	±xxxxxxx>	x	10	Device information (actual values) yy = address ±xxxxxxx = decimal value
Ey	2	read	±xxxxxxx>	x	10	Read parameter (3-byte) y = address ±xxxxxxx = decimal value
Fy±xxxxxxx	10	write	>	x	2	Write parameter (3-byte) y = address ±xxxxxxx = decimal value
Gyy	3	read	"xxxxx>"	x	7	Read parameter (2-byte) yy = address xxxxx = decimal value
Hyyxxxxx	8	write	>	x	2	Write parameter (2-byte) yy = address xxxxx = decimal value
I	1	write	>	x	2	Cancel travel job in positioning mode
Jyy	3	read	0xhh>	x	6	Error memory yy = address hh = hexadecimal value
K	1	write	>	x	2	Software reset
Lx	2	write	>	x	2	Type of positioning x = decimal value
M	1	write	>	x	2	Start travel job

Command	Length	Access	Reply	CR	Length	Description
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 hh = hexadecimal value
R	1	read	0xhll>	x	8	System status word hh = hexadecimal value High byte ll = hexadecimal value Low byte
Sxxxxx	6	write	>	x	2	System command xxxxx = code
Tx	2	write	>	x	2	Sense of rotation x = decimal value
Uxxxx	5	read	bbbb		4	Read parameter (4-byte) bbbb = binary value in the Big-Endian format
V	1	read	±xxxx>	x	7	Actual rotational speed ±xxxx = decimal value with arithmetical sign
W	1	read	bbbb		4	Position value in binary format bbbb = binary value in the Big-Endian format
Xy	2	write	>	x	2	Operating mode y = decimal value
Y	1	write	>	x	2	Start of inching mode 1
Z	1	read	±xxxxxxxx>	x	10	Position value ±xxxxxxxx decimal value
, (2C <sub>hex</sub> )	1	write			0	Start of inching mode 2 positive travel direction
. (2E <sub>hex</sub> )	1	write			0	Start of inching mode 2 negative travel direction

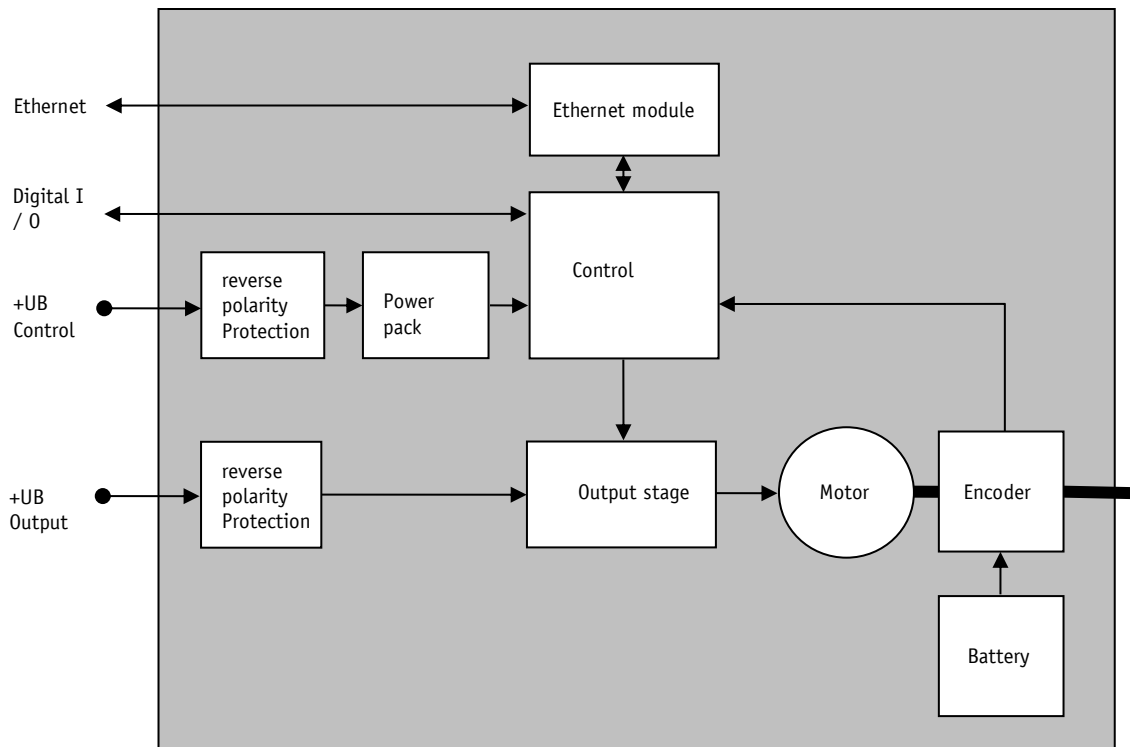
**10 Block diagram**

Fig. 18: Block diagram