

AG25, AG25

Actuator with **PROFI[®]**
NET interface

User manual



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1 General Information

1.1 Documentation

The following documents are associated with this document:

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

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

2 Display and controls

2.1 General Information

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

2.2 Displays

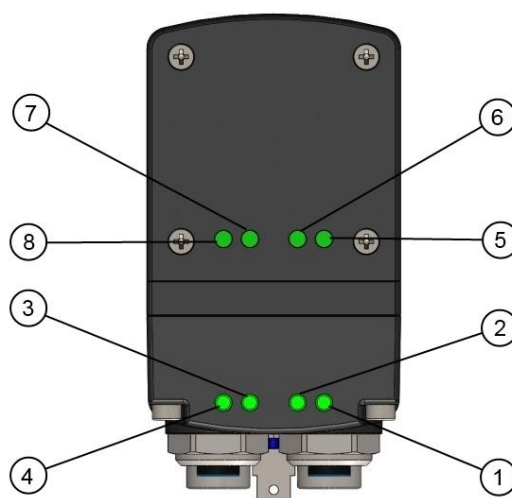


Fig.. 1: Displays

2.2.1 Ethernet module statuses

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

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

2.2.1.1 Module status LED 1

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

2.2.1.2 Link/Activity LED 2, 3

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

2.2.1.3 Network status LED 4

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

2.2.2 Drive status

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

2.2.2.1 Status LED 5

LED statuses valid with factory setting.

LED state	Description
Green	Operating voltage applied to control, no fault
Red, flashing	Operating voltage applied to control, active fault
Off	Operating voltage of control missing

2.2.2.2 Status LEDs 6, 7

LED statuses valid with factory setting.

LED state	Description
Off	No function

2.2.2.3 Status LED 8

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

LED statuses valid with factory setting.

LED state	Description
Green	Actuator is within the programmed positioning window. Operating voltage of the output stage is applied.
Green, flashing	Actuator is within the programmed position 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.

2.3 Controls

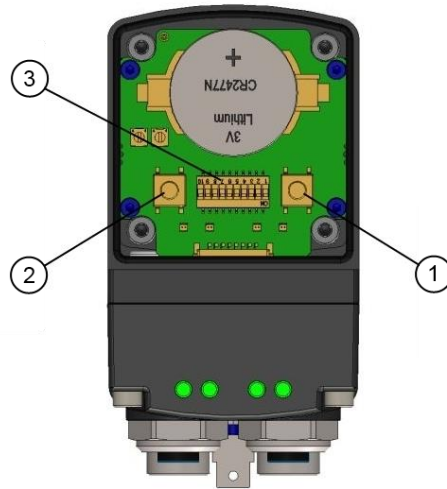


Fig. 2: Controls

2.3.1 Control keys

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

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

Key ①: Inching mode 2 in e direction

Key ②: Inching mode 2 in i direction

2.3.2 DIP switch

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

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

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

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

3 Digital inputs and outputs

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

Function and switching behavior can be set.

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

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

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

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

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

[Digital Output Functionalities State](#) (PNU 0302h).

3.1 Examples of digital input configurations

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

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

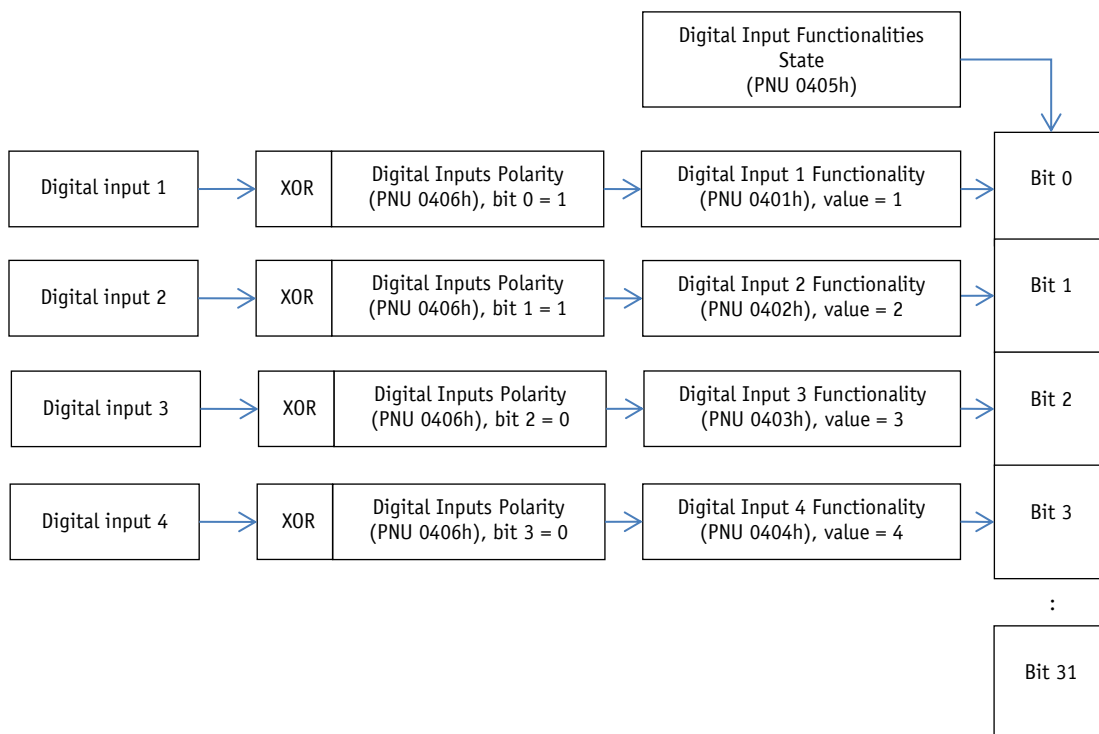


Fig. 3: Examples of digital input configurations

3.2 Example of digital output configuration

Digital output 1: Inpos (high-active)

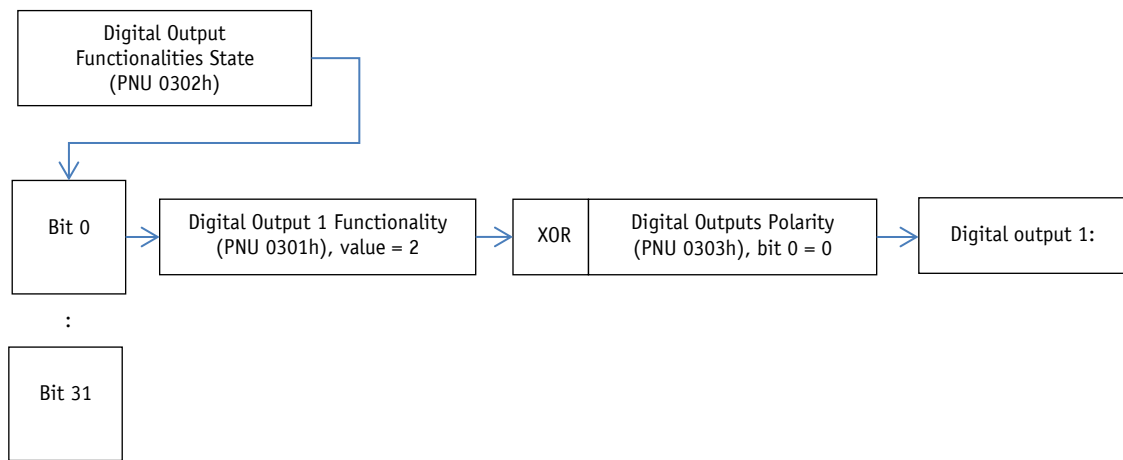


Fig. 4: Example of digital output configuration

4 Functional description

4.1 Control of the drive

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

4.1.1 Operating modes

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

4.1.1.1 Positioning mode

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

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

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

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

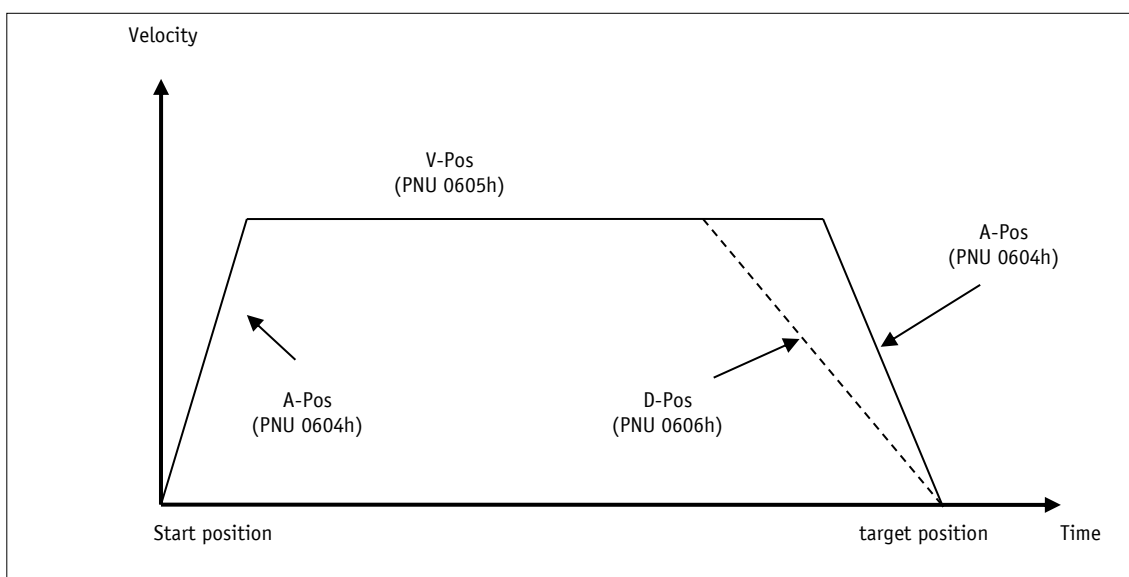


Fig. 5: Ramp travel, direct positioning mode

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

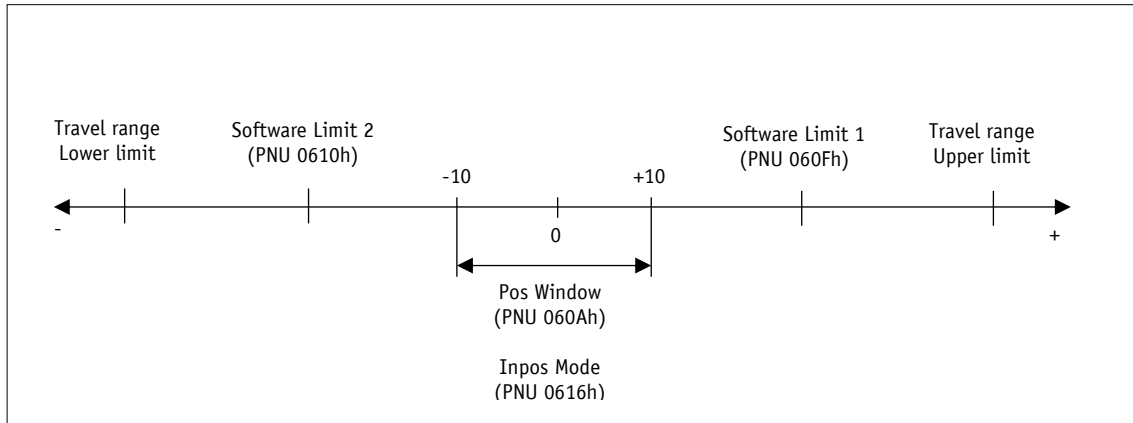


Fig. 6: Positioning mode

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

4.1.1.1.1 Loop positioning

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

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

Example:

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

Case 1 ⇒ new position is greater than actual position:

Direct travel to required position

Case 2 ⇒ new position is smaller than actual position:

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

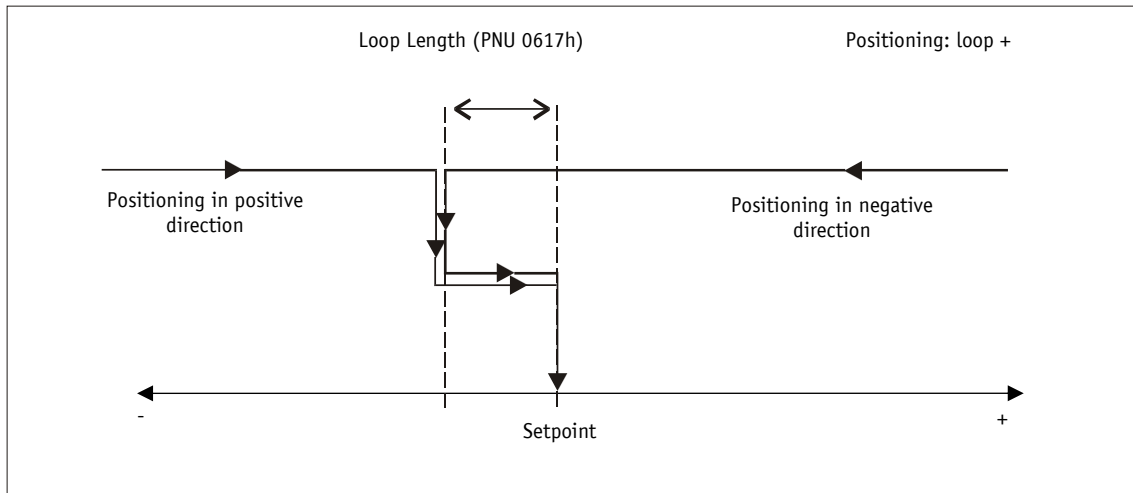


Fig. 7: Loop+ positioning

4.1.1.2 Inching mode

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

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

4.1.1.2.1 Inching mode 1

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

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

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

Delta Inch < 0: negative travel direction

Delta Inch > 0: positive travel direction

Reaching of the target position will be signaled accordingly.

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

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

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

4.1.1.2.2 Inching mode 2

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

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

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

The resulting inching speed in this example will be:

$$\text{Inching speed} = v - \text{Tipp} * \text{Offset inching 2} = 10 \text{ rpm} * 85 \% = 9 \text{ rpm}$$

Results are always rounded to integers.

Minimum speed is 1 rpm.

4.1.1.3 Rotational speed mode

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

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

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

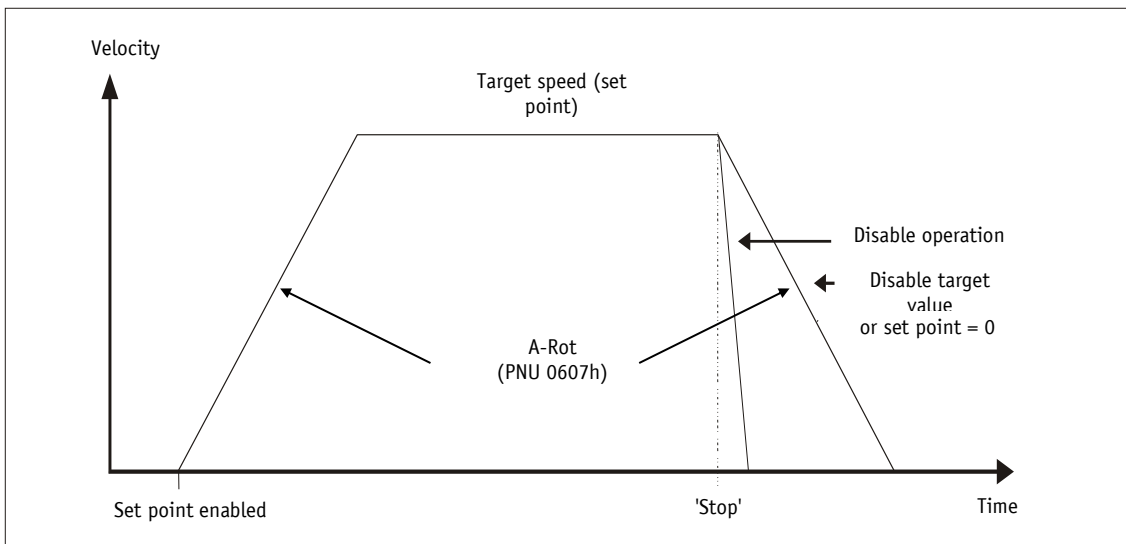


Fig. 8: Ramp speed mode

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

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

4.1.1.4 Position Control Mode

NOTICE	<p>Via the control word in the process data, the superordinate control can cancel travel jobs started by the position control mode. For this purpose, a negative flank 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.</p>
---------------	--

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

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

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

4.1.1.4.1 Examples of configuration of the digital inputs for the PCM

Digital input 1: PCM Start (high-active)

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

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

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

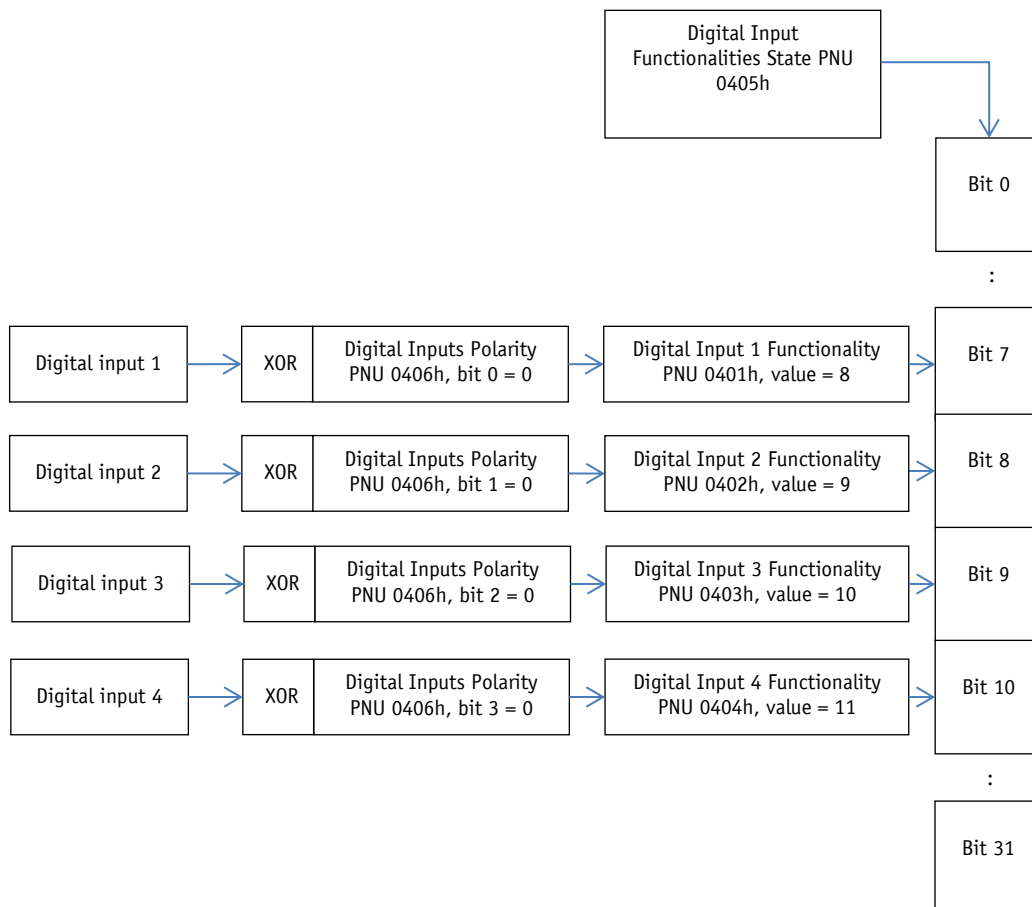


Fig. 9: Examples of configuration of the digital inputs for the PCM

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

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

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

Resetting the PCM Start input during an active positioning process will result in cancellation of the travel job but the drive will continue to be controlled.

An example of calling travel data set no. 3 is shown below

Step 1: Create number of travel data set

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

Step 2: Start the positioning job

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

4.1.2 Current limiting

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

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

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

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

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

4.1.3 Limit switch

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

4.1.3.1 Example of limit switch configuration

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

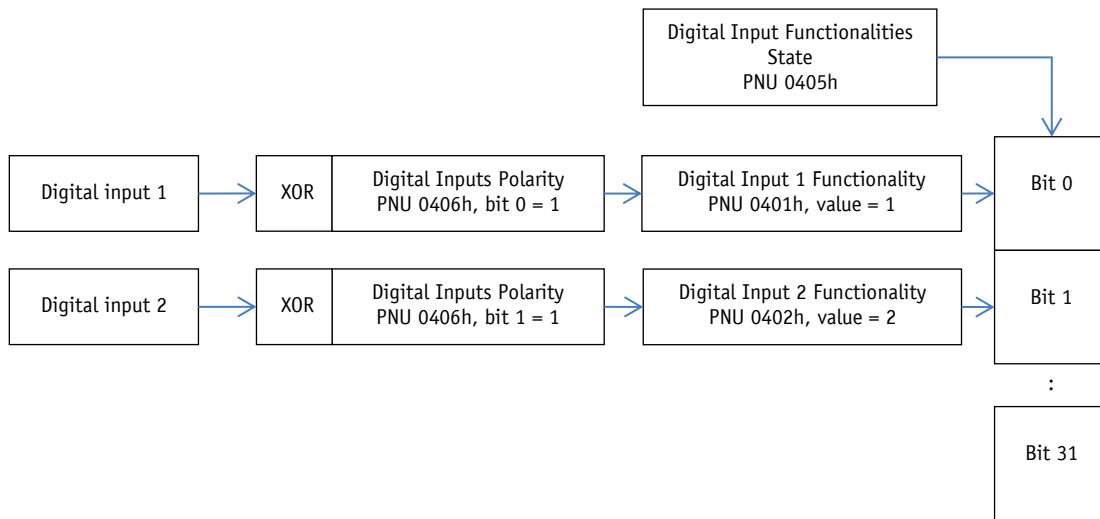


Fig. 10: Example of limit switch configuration

4.1.3.2 Arrangement of the limit switches

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

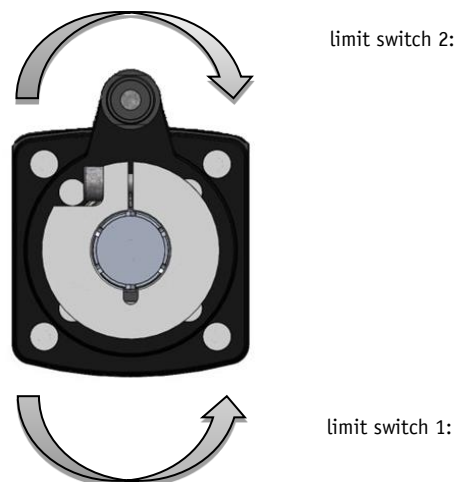


Fig. 11: Arrangement of the limit switches

5 Calibration

NOTICE

Calibration is only possible when no travel job is active!

Two steps are required for executing calibration:

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

Execute calibration (software command or calibration input)

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

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

$$\text{Position value} = 0 + \text{Calibration Value (PNU 060Eh)} + \text{Offset Value (PNU 061Ch)}$$

6 External transmission

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

Example (see Fig. 12: External transmission):

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

[Gear Ratio Numerator](#) and [Gear Ratio Denominator](#) must be programmed as follows:

Parameter [Gear Ratio Numerator](#) = 5

Parameter [Gear Ratio Denominator](#) = 1

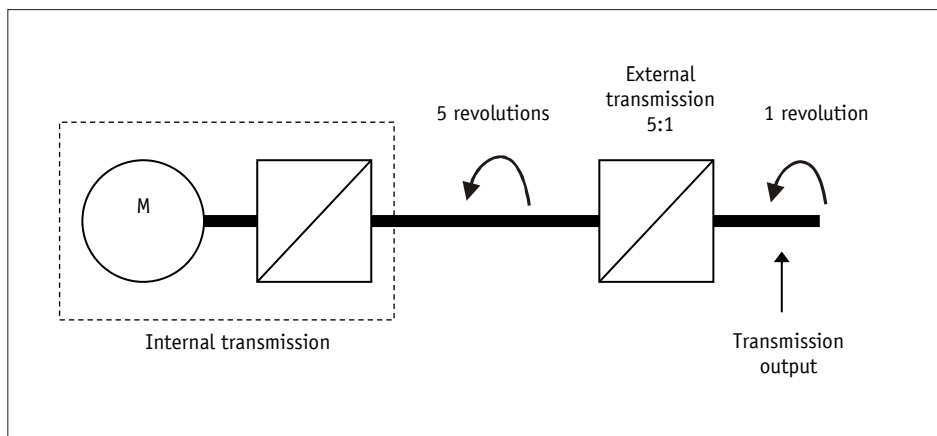


Fig. 12: External transmission

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

Transmission reduction = 3.78

Parameter [Gear Ratio Numerator](#) = 378

Parameter [Gear Ratio Denominator](#) = 100

7 Warnings / Errors

7.1 Warnings

Warnings do not influence the operation of the actuator.

Warnings disappear after removing the cause.

Possible warnings:

- Battery voltage for absolute encoder is below limit \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

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

Error code	Fault
00h	No error
06h	Low battery voltage: → empty battery, replace battery → bonding error, check battery bonding → wrong battery type inserted, insert correct battery type
07h	Low control electronics voltage → check control operating voltage
08h	Control electronics overvoltage → check control operating voltage
09h	Power electronics overvoltage → check output stage operating voltage
0Ah	Output stage excess temperature → reduce ambient temperature → reduce load
0Bh	Contouring error → reduce load → reduce acceleration → reduce speed
0Ch	Output shaft blocked → disengage shaft
0Dh	Power electronics not supplied → check output stage operating voltage
0Fh	SIN COS monitoring → shield from stray magnetic fields → check EMC measures
10h	EEPROM queue overrun → internal error
13h	EEPROM check sum → reset parameters to factory settings
14h	Ethernet module watchdog → internal error
15h	Ethernet module in the ERROR status while travel job is active → internal error
16h	Ethernet module in the EXCEPTION status → internal error, power-on reset necessary

Table 1: Error codes

8 PROFINET IO

8.1 Description

The drive has been designed as PROFINET IO-Device.

8.1.1 Cyclic data exchange

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

8.1.2 Acyclic data exchange

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

8.1.3 Operating modes and synchronization

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

8.1.4 Diagnostics alarms

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

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

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

Code	ChannelErrorType	Description
06h	0106h	Low battery voltage:
07h	0107h	Low voltage of control electronic system
08h	0108h	Overvoltage of control electronic system
09h	0109h	Overvoltage of power electronic system
0Ah	010Ah	Output stage excess temperature
0Bh	010Bh	Contouring error
0Ch	010Ch	Output shaft blocked
0Dh	010Dh	Power electronic system not supplied
0Fh	010Fh	SIN COS monitoring
10h	0110h	EEPROM queue overrun
13h	0113h	EEPROM check sum
14h	0114h	Ethernet module watchdog
15h	0115h	Ethernet module in the ERROR state while travel job is active
16h	0116h	Ethernet module in the EXCEPTION state

8.1.5 Control lines when IOPS = BAD

All output data are set to zero.

8.1.6 Response of outputs to disconnect

All output data are set to zero.

8.1.7 Response of outputs to a network

All output data are set to zero.

8.2 Overview of parameters

PNU = Parameter number

PNU	Parameter name	Page
0001h	Digital Outputs Control	30
0002h	Control Word	30
0003h	Target Value	31
0101h	Digital Inputs State	35
0102h	Status Word	35
0103h	Actual Value	36
0201h	LED Functionality	38
0221h	Digital Output 1 Functionality	40
0301h	Digital Output Functionalities State	41
0302h	Digital Outputs Polarity	41
0303h	Digital Input 1 Functionality	42
0401h	Digital Input 2 Functionality	43
0402h	Digital Input 3 Functionality	43
0404h	Digital Input 4 Functionality	43
0405h	Digital Input Functionalities State	44
0406h	Digital Inputs Polarity	45
0601h	Controller Parameter P	45
0602h	Controller Parameter I	45
0603h	Controller Parameter D	46
0604h	A-Pos	46
0605h	V-Pos	46
0606h	D-Pos	47
0607h	A-Rot	47
0608h	A-Inch	47
0609h	V-Inch	48
060Ah	Pos Window	48
060Bh	Gear Ratio Numerator	48
060Ch	Gear Ratio Denominator	49
060Dh	Spindle Pitch	49
060Eh	Calibration Value	49
060Fh	Software Limit 1	50
0610h	Software Limit 2	50
0611h	Delta Inch	51
0612h	Sense of Rotation	51
0613h	Pos Type	52
0614h	Operating Mode	52
0615h	Inching 2 Stop Mode	53
0616h	Inpos Mode	53
0617h	Loop Length	54

PNU	Parameter name	Page
0618h	Contouring Error Limit	54
0619h	Current Limiting	55
061Ah	Inching 2 Offset	55
061Bh	Inching 2 Acceleration Type	56
061Ch	Offset	56
0922h	PCM Position 1	57
0923h	PCM Position 2	57
0924h	PCM Position 3	57
0925h	PCM Position 4	58
0926h	PCM Position 5	58
0927h	PCM Position 6	58
0928h	PCM Position 7	59
0942h	PCM Acceleration 1	59
0943h	PCM Acceleration 2	59
0944h	PCM Acceleration 3	60
0945h	PCM Acceleration 4	60
0946h	PCM Acceleration 5	60
0947h	PCM Acceleration 6	61
0948h	PCM Acceleration 7	61
0962h	PCM Velocity 1	61
0963h	PCM Velocity 2	62
0964h	PCM Velocity 3	62
0965h	PCM Velocity 4	62
0966h	PCM Velocity 5	63
0967h	PCM Velocity 6	63
0968h	PCM Velocity 7	63
0982h	PCM Deceleration 1	64
0983h	PCM Deceleration 2	64
0984h	PCM Deceleration 3	65
0985h	PCM Deceleration 4	65
0986h	PCM Deceleration 5	66
0987h	PCM Deceleration 6	66
0988h	PCM Deceleration 7	67
0A01h	Output Stage Temperature	67
0A02h	Voltage of Control	67
0A03h	Voltage of Output Stage	68
0A04h	Voltage of Battery	68
0A05h	Motor Current	68
0A06h	Actual Position	68
0A07h	Actual Rotational Speed	69
0A08h	Serial Number	69
0A09h	Production Date	69

PNU	Parameter name	Page
0A0Ah	SW Motor Controller	69
0A0Bh	Gear Reduction	70
0A0Ch	System Status Word	71
0A0Dh	Encoder Resolution	73
0A0Eh	Device ID	73
0B01h	Number of Errors	73
0B02h	Error Number 1	73
0B03h	Error Number 2	74
0B04h	Error Number 3	74
0B05h	Error Number 4	74
0B06h	Error Number 5	74
0B07h	Error Number 6	75
0B08h	Error Number 7	75
0B09h	Error Number 8	75
0B0Ah	Error Number 9	75
0B0Bh	Error Number 10	76
0C01h	S-Command	77

8.2.1 Parameter description

8.2.1.1 Digital Outputs Control

PNU	0001h
Description	Digital output control byte
Access	rw (Component of process data)
Data type	Unsigned8
Default	No
EEPROM	No
Value range	Unsigned8

Bit	Description
0	Digital output 1
1 ... 7	Reserved, always 0

8.2.1.2 Control Word

PNU	0002h
Description	Control word
Access	rw (Component of process data)
Data type	Unsigned16

Default	No
EEPROM	No
Value range	Unsigned16

8.2.1.2.1 Control word: Positioning mode (master ⇒ slave)

Bit	Description
Bit 0 OFF1 (enable)	0 = OFF1 active Current travel job is canceled. The actuator is activated. 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 programmed 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 flank starts a travel job
Bit 5 Acknowledge error	Positive flank acknowledges an error Afterwards, the actuator changes to the switch-lock state.
Bit 6 Inching mode 1	0 = no inching mode 1 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 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 ... 15	Reserved, always 0

Table 2: Positioning mode control word

8.2.1.2.2 Flow chart: Operating mode: Positioning mode

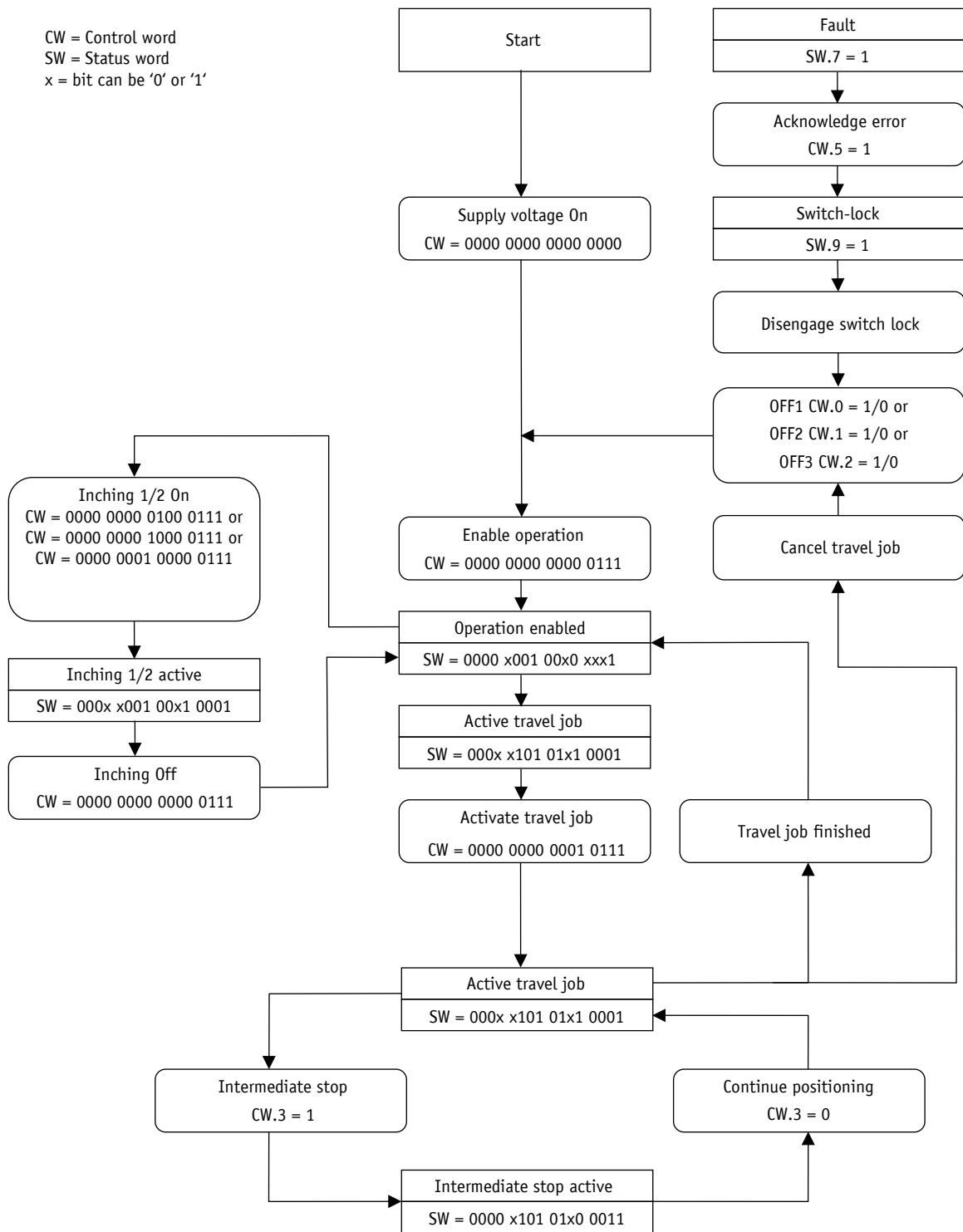


Fig. 13: Flow chart of PROFINET positioning mode

8.2.1.2.3 Control word Operating mode: Speed mode

Bit	Description
Bit 0 OFF1 (enable)	0 = OFF1 active Current travel job is canceled. The actuator is activated. 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 flank starts a travel job
Bit 5 Acknowledge error	Positive flank acknowledges an error Afterwards, the actuator changes to the switch-lock state.
Bit 6 ... 15	Reserved, always 0

Table 3: Control word speed mode

8.2.1.2.4 Flow chart: Speed mode

SW = 0000 x001 00x0 0011
 CW = Control word
 SW = Status word
 x = Bit can be '0' or '1'

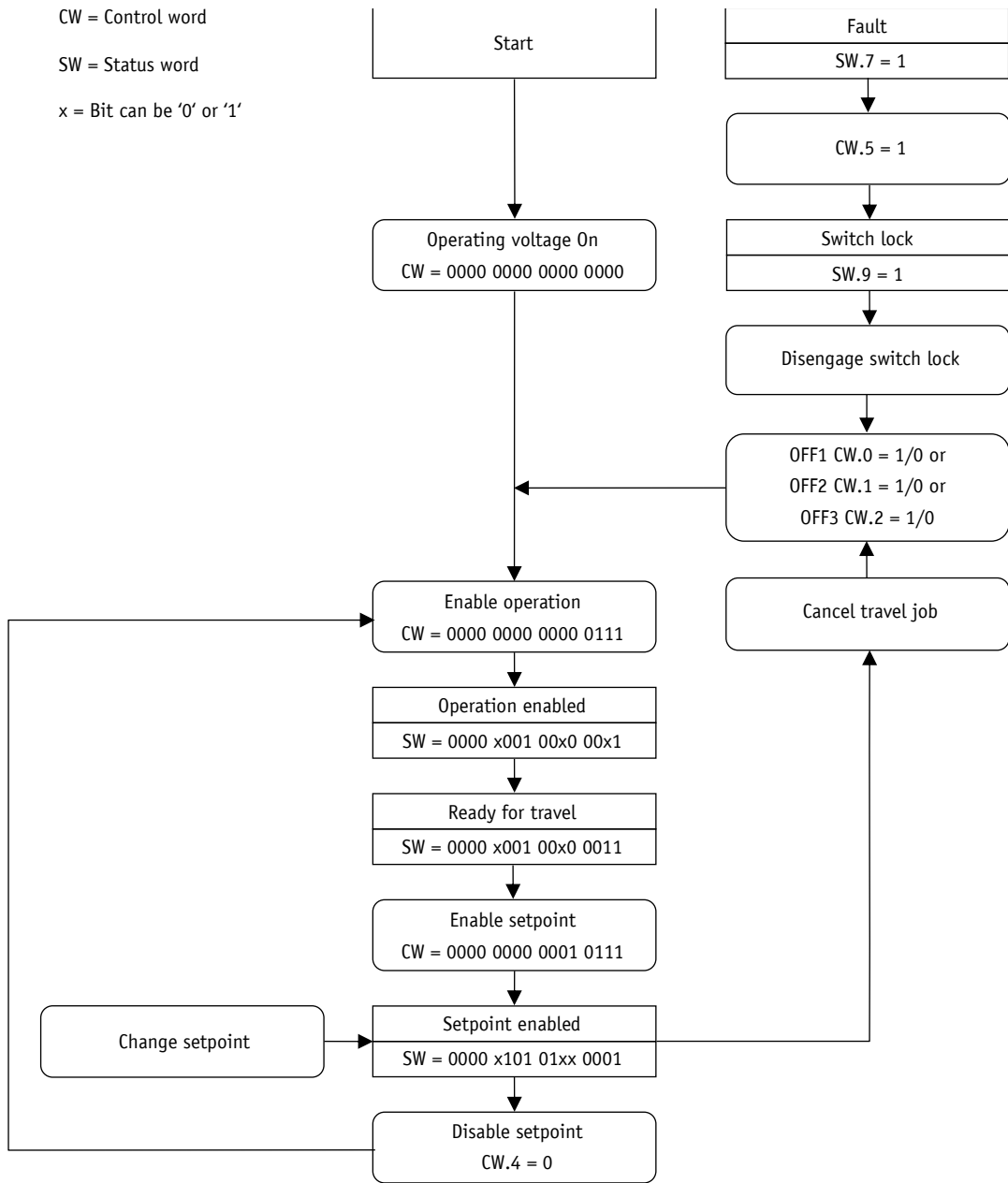


Fig. 14: Flow chart of PROFINET speed mode

8.2.1.3 Target Value

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

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

PNU	0003h
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

PNU	0101h
Description	States of the digital inputs
Access	ro (component of process data)
Data type	Unsigned8
Default	No
EEPROM	No

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

8.2.1.5 Status Word

PNU	0102h
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 flank 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 (PNU 0619h)

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 flank 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 (PNU 0619h)

Table 5: Status word of speed mode

8.2.1.6 Actual Value

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

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

PNU	0103h
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 state of the drive. Alternately, the LEDs can represent the states of the digital inputs.

PNU	0201h
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 fault
		Red, flashing	Operating voltage applied to control. Active error
		Off	Operating voltage of control missing
	LED6	Off	No function
	LED7	Off	No function
	LED8	Green	Actuator is within the programmed positioning window. 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			Active error
Green			Digital input 1 active:
Off			Operating voltage of control missing
LED6		Red	Digital input 2 inactive
		Red, flashing	Active error
		Green	Digital input 2 active:
		Off	Operating voltage of control missing
LED7		Red	Digital input 3 inactive
		Red, flashing	Active error
		Green	Digital input 3 active:
		Off	Operating voltage of control missing
LED8		Red	Digital input 4 inactive
		Red, flashing	Active error
		Green	Digital input 4 active:
		Off	Operating voltage of control missing

Table 6: Functionality of the system LEDs

8.2.1.8 Service Interface Baud rate

PNU	0221h
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.

PNU	0301h
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 control 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.

PNU	0302h
Description	Status of the digital output functionalities
Access	ro
Data type	Unsigned32
Default	No
EEPROM	No

Bit	Description
0	Fault 0 = no error 1 = fault 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.

PNU	771 dec /303 hex
Description	Polarity of the digital output
Access	Rw
Data type	Unsigned8
Default	0
EEPROM	Yes
Value range	0 ... 15

Value of the assigned bits:

0 = positive logics (high-active)

1 = negative logics (low-active)

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

8.2.1.12 Digital Input 1 Functionality

This parameter determines the functionality of digital input 1.

With a value greater than 0 set, a function is assigned to the digital input.

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

PNU	0401h
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.

PNU	0402h
Description	Input 2 functionality
Access	rw
Data type	Unsigned8
Default	0
EEPROM	Yes
Value range	0 ... 11

Description, see [Table 7: Configuration of digital inputs](#).

8.2.1.14 Digital Input 3 Functionality

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

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

PNU	0403h
Description	Input 3 functionality
Access	rw
Data type	Unsigned8
Default	0
EEPROM	Yes
Value range	0 ... 11

Description, see [Table 7: Configuration of digital inputs](#).

8.2.1.15 Digital Input 4 Functionality

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

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

PNU	0404h
Description	input 4 functionality
Access	rw
Data type	Unsigned8
Default	0
EEPROM	Yes
Value range	0 ... 11

Description, see [Table 7: Configuration of digital inputs](#).

8.2.1.16 Digital Input Functionalities State

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

PNU	0405h
Description	Status of the digital input functionalities
Access	ro
Data type	Unsigned32
Default	No
EEPROM	No

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

Table 8: States of the digital inputs

8.2.1.17 Digital Inputs Polarity

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

PNU	0406h
Description	Polarity of the digital output
Access	rw
Data type	Unsigned8
Default	0
EEPROM	Yes
Value range	0 ... 15

Value of the assigned bit

0 = positive logics (high-active)

1 = negative logics (low-active)

Bit	Description
0	Digital input 1 polarity
1	Digital input 2 polarity
2	Digital input 3 polarity
3	Digital input 4 polarity
4 ... 15	Not assigned

8.2.1.18 Controller Parameter P

This setting applies to all operating modes.

PNU	0601h
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.

PNU	0602h
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.

PNU	0603h
Description	D gain of controller
Access	rw
Data type	Integer16
Default	0
EEPROM	Yes
Value range	0 ... 500

8.2.1.21 A-Pos

PNU	0604h
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 ² Transmission 98:1 \Rightarrow 2.05 rps ² Transmission 188:1 \Rightarrow 1.06 rps ² Transmission 368:1 \Rightarrow 0.54 rps ²

8.2.1.22 V-Pos

PNU	0605h
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

PNU	0606h
Description	Delay in the positioning mode
Access	rw
Data type	Interger16
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 ² Transmission 98:1 \Rightarrow 2.05 rps ² Transmission 188:1 \Rightarrow 1.06 rps ² Transmission 368:1 \Rightarrow 0.54 rps ²

8.2.1.24 A-Rot

PNU	0607h
Description	Acceleration in speed mode
Access	rw
Data type	Interger16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 \Rightarrow 3.04 rps ² Transmission 98:1 \Rightarrow 2.05 rps ² Transmission 188:1 \Rightarrow 1.06 rps ² Transmission 368:1 \Rightarrow 0.54 rps ²

8.2.1.25 A-Inch

PNU	0608h
Description	Acceleration in inching mode 1 /2
Access	rw
Data type	Interger16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 \Rightarrow 3.04 rps ² Transmission 98:1 \Rightarrow 2.05 rps ² Transmission 188:1 \Rightarrow 1.06 rps ² Transmission 368:1 \Rightarrow 0.54 rps ²

8.2.1.26 V-Inch

PNU	0609h
Description	Maximum speed in inching mode 1/2
Access	rw
Data type	Interger16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm 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 increments

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

Operating mode: Speed mode:

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

PNU	060Ah
Description	Positioning window
Access	rw
Data type	Interger16
Default	10
EEPROM	Yes
Value range	0 ... 1000

8.2.1.28 Gear Ratio Numerator

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

PNU	060Bh
Description	Numerator transmission ratio
Access	rw
Data type	Interger16
Default	1
EEPROM	Yes
Value range	1 ... 10000

8.2.1.29 Gear Ratio Denominator

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

PNU	060Ch
Description	Denominator gear ratio
Access	rw
Data type	Interger16
Default	1
EEPROM	yes
Value range	1 ... 10000

8.2.1.30 Spindle Pitch

Spindle pitch parameter = 0:

Position value is output in increments (720 increments 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 increments. 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.

PNU	060Dh
Description	Spindle pitch
Access	rw
Data type	Interger32
Default	0
EEPROM	Yes
Value range	0 ... 1000000

8.2.1.31 Calibration Value

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

Position value = 0 + calibration value + offset value

PNU	060Eh
Description	Calibration value
Access	rw
Data type	Interger32
Default	0
EEPROM	Yes
Value range	-999999 ... 999999

8.2.1.32 Software Limit 1

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

Positioning mode:

Spindle pitch = 0: Values refer to increments

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

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

PNU	060Fh
Description	Limit 1
Access	rw
Data type	Integer32
Default	99999
EEPROM	Yes
Value range	-9999999 ... 9999999

8.2.1.33 Software Limit 2

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

Positioning mode:

Spindle pitch = 0: Values refer to increments

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

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

PNU	0610h
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 increments

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

PNU	0611h
Description	Travel distance jog 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

PNU	0612h
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

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

Speed mode:

Irrelevant

Operating mode: Positioning mode

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

PNU	0613h
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

PNU	0614h
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.

PNU	0615h
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.

PNU	0616h
Description	Inpos mode
Access	rw
Data type	Unsigned8
Default	0
EEPROM	Yes
Value range	0 ... 2

Speed mode:

Irrelevant

Positioning mode:

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

8.2.1.40 Loop Length

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

Positioning mode

Spindle pitch = 0: Values refer to increments

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

Speed mode:

Irrelevant

PNU	0617h
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 position setpoints in order to reach the target position with the desired speed profile (A-Pos, V-Pos, D-Pos).

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

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

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

The maximum admissible contouring error is indicated as increments.

PNU	0618h
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 % of nominal current.

PNU	0619h
Description	Current limiting
Access	rw
Data type	Unsigned8
Default	110
EEPROM	Yes
Value range	25 ... 110 %

8.2.1.43 Inching 2 Offset

The inching speed in Inching operation 2 can be influenced via this parameter

Values are entered in percentage of parameter V-Inch, PNU 1545

PNU	061Ah
Description	Inching 2 Offset
Access	rw
Data type	Unsigned8
Default	100
EEPROM	No
Value range	10 ... 100 %

8.2.1.44 Inching 2 Acceleration Type

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

PNU	061Bh
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, PNU 1544:
1	Incremental acceleration Acceleration occurs to final speed as defined under parameter A-Inch, PNU 1544 with the following increments: 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

PNU	061Ch
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 increments

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

PNU	0922h
Description	Positioning mode via digital inputs: Position 1
Access	rw
Data type	Interger32
Default	0
EEPROM	Yes
Value range	Interger32

8.2.1.47 PCM Position 2

Spindle pitch = 0: values refer to increments

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

PNU	0923h
Description	Positioning mode via digital inputs: Position 2
Access	rw
Data type	Interger32
Default	0
EEPROM	Yes
Value range	Interger32

8.2.1.48 PCM Position 3

Spindle pitch = 0: values refer to increments

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

PNU	0924h
Description	Positioning mode via digital inputs: Position 3
Access	rw
Data type	Interger32
Default	0
EEPROM	Yes
Value range	Interger32

8.2.1.49 PCM Position 4

Spindle pitch = 0: values refer to increments

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

PNU	0925h
Description	Positioning mode via digital inputs: Position 4
Access	rw
Data type	Interger32
Default	0
EEPROM	Yes
Value range	Interger32

8.2.1.50 PCM Position 5

Spindle pitch = 0: values refer to increments

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

PNU	0926h
Description	Positioning mode via digital inputs: Position 5
Access	rw
Data type	Interger32
Default	0
EEPROM	Yes
Value range	Interger32

8.2.1.51 PCM Position 6

Spindle pitch = 0: values refer to increments

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

PNU	0927h
Description	Positioning mode via digital inputs: Position 6
Access	rw
Data type	Interger32
Default	0
EEPROM	Yes
Value range	Interger32

8.2.1.52 PCM Position 7

Spindle pitch = 0: values refer to increments

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

PNU	0928h
Description	Positioning mode via digital inputs: Position 7
Access	rw
Data type	Interger32
Default	0
EEPROM	Yes
Value range	Interger32

8.2.1.53 PCM Acceleration 1

PNU	0942h
Description	Positioning mode via digital inputs: Acceleration 1
Access	rw
Data type	Interger16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 ⇒ 3.04 rps ² Transmission 98:1 ⇒ 2.05 rps ² Transmission 188:1 ⇒ 1.06 rps ² Transmission 368:1 ⇒ 0.54 rps ²

8.2.1.54 PCM Acceleration 2

PNU	0943h
Description	Positioning mode via digital inputs: Acceleration 2
Access	rw
Data type	Interger16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 ⇒ 3.04 rps ² Transmission 98:1 ⇒ 2.05 rps ² Transmission 188:1 ⇒ 1.06 rps ² Transmission 368:1 ⇒ 0.54 rps ²

8.2.1.55 PCM Acceleration 3

PNU	0944h
Description	Positioning mode via digital inputs: Acceleration 3
Access	rw
Data type	Interger16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 \Rightarrow 3.04 rps ² Transmission 98:1 \Rightarrow 2.05 rps ² Transmission 188:1 \Rightarrow 1.06 rps ² Transmission 368:1 \Rightarrow 0.54 rps ²

8.2.1.56 PCM Acceleration 4

PNU	0945h
Description	Positioning mode via digital inputs: Acceleration 4
Access	rw
Data type	Interger16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 \Rightarrow 3.04 rps ² Transmission 98:1 \Rightarrow 2.05 rps ² Transmission 188:1 \Rightarrow 1.06 rps ² Transmission 368:1 \Rightarrow 0.54 rps ²

8.2.1.57 PCM Acceleration 5

PNU	0946h
Description	Positioning mode via digital inputs: Acceleration 5
Access	rw
Data type	Interger16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 \Rightarrow 3.04 rps ² Transmission 98:1 \Rightarrow 2.05 rps ² Transmission 188:1 \Rightarrow 1.06 rps ² Transmission 368:1 \Rightarrow 0.54 rps ²

8.2.1.58 PCM Acceleration 6

PNU	0947h
Description	Positioning mode via digital inputs: Acceleration 6
Access	rw
Data type	Interger16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 \Rightarrow 3.04 rps ² Transmission 98:1 \Rightarrow 2.05 rps ² Transmission 188:1 \Rightarrow 1.06 rps ² Transmission 368:1 \Rightarrow 0.54 rps ²

8.2.1.59 PCM Acceleration 7

PNU	0948h
Description	Positioning mode via digital inputs: Acceleration 7
Access	rw
Data type	Interger16
Default	50
EEPROM	Yes
Value range	1 ... 100 % 100 % correspond to: Transmission 66:1 \Rightarrow 3.04 rps ² Transmission 98:1 \Rightarrow 2.05 rps ² Transmission 188:1 \Rightarrow 1.06 rps ² Transmission 368:1 \Rightarrow 0.54 rps ²

8.2.1.60 PCM Velocity 1

PNU	0962h
Description	Positioning mode via digital inputs: Velocity 1
Access	rw
Data type	Interger16
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

PNU	0963h
Description	Positioning mode via digital inputs: Velocity 2
Access	rw
Data type	Interger16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm 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

PNU	0964h
Description	Positioning mode via digital inputs: Velocity 3
Access	rw
Data type	Interger16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm 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

PNU	0965h
Description	Positioning mode via digital inputs: Velocity 4
Access	rw
Data type	Interger16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm 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

PNU	0966h
Description	Positioning mode via digital inputs: Velocity 5
Access	rw
Data type	Interger16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm 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

PNU	0967h
Description	Positioning mode via digital inputs: Velocity 6
Access	rw
Data type	Interger16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm 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

PNU	0968h
Description	Positioning mode via digital inputs: Velocity 7
Access	rw
Data type	Interger16
Default	10
EEPROM	Yes
Value range	Transmission 66:1 ⇒ max. 75 rpm 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

PNU	0982h
Description	Positioning mode via digital inputs: Delay 1
Access	rw
Data type	Interger16
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 \Rightarrow 3.04 rps² Transmission 98:1 \Rightarrow 2.05 rps² Transmission 188:1 \Rightarrow 1.06 rps² Transmission 368:1 \Rightarrow 0.54 rps²</p>

8.2.1.68 PCM Deceleration 2

PNU	0983h
Description	Positioning mode via digital inputs: Delay 2
Access	rw
Data type	Interger16
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 \Rightarrow 3.04 rps² Transmission 98:1 \Rightarrow 2.05 rps² Transmission 188:1 \Rightarrow 1.06 rps² Transmission 368:1 \Rightarrow 0.54 rps²</p>

8.2.1.69 PCM Deceleration 3

PNU	0984h
Description	Positioning mode via digital inputs: Delay 3
Access	rw
Data type	Interger16
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 \Rightarrow 3.04 rps² Transmission 98:1 \Rightarrow 2.05 rps² Transmission 188:1 \Rightarrow 1.06 rps² Transmission 368:1 \Rightarrow 0.54 rps²</p>

8.2.1.70 PCM Deceleration 4

PNU	0985h
Description	Positioning mode via digital inputs: Delay 4
Access	rw
Data type	Interger16
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 \Rightarrow 3.04 rps² Transmission 98:1 \Rightarrow 2.05 rps² Transmission 188:1 \Rightarrow 1.06 rps² Transmission 368:1 \Rightarrow 0.54 rps²</p>

8.2.1.71 PCM Deceleration 5

PNU	0986h
Description	Positioning mode via digital inputs: Delay 5
Access	rw
Data type	Interger16
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 ⇒ 3.04 rps² Transmission 98:1 ⇒ 2.05 rps² Transmission 188:1 ⇒ 1.06 rps² Transmission 368:1 ⇒ 0.54 rps²</p>

8.2.1.72 PCM Deceleration 6

PNU	0987h
Description	Positioning mode via digital inputs: Delay 6
Access	rw
Data type	Interger16
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 ⇒ 3.04 rps² Transmission 98:1 ⇒ 2.05 rps² Transmission 188:1 ⇒ 1.06 rps² Transmission 368:1 ⇒ 0.54 rps²</p>

8.2.1.73 PCM Deceleration 7

PNU	0988h
Description	Positioning mode via digital inputs: Delay 7
Access	rw
Data type	Interger16
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 ² Transmission 98:1 \Rightarrow 2.05 rps ² Transmission 188:1 \Rightarrow 1.06 rps ² Transmission 368:1 \Rightarrow 0.54 rps ²

8.2.1.74 Output Stage Temperature

PNU	0A01h
Description	Output stage temperature
Unit	1/10 °C
Access	ro
Data type	Interger16
Default	No
EEPROM	No

8.2.1.75 Voltage of Control

PNU	0A02h
Description	Operating voltage of control
Unit	1/10 V
Access	ro
Data type	Interger16
Default	No
EEPROM	No

8.2.1.76 Voltage of Output Stage

PNU	0A03h
Description	Operating voltage of output stage
Unit	1/10 V
Access	ro
Data type	Interger16
Default	No
EEPROM	No

8.2.1.77 Voltage of Battery

PNU	0A04h
Description	Battery voltage
Unit	1/100 V
Access	ro
Data type	Interger16
Default	No
EEPROM	No

8.2.1.78 Motor Current

PNU	0A05h
Description	Motor current
Unit	mA
Access	ro
Data type	Interger16
Default	No
EEPROM	No

8.2.1.79 Actual Position

PNU	0A06h
Description	Current position
Unit	Spindle pitch = 0: Increments Spindle pitch > 0: 1/100 mm
Access	ro
Sata type	Interger32
Default	No
EEPROM	No

8.2.1.80 Actual Rotational Speed

PNU	0A07h
Description	Current speed
Unit	rpm
Access	ro
Data type	Integer16
Default	No
EEPROM	No

8.2.1.81 Serial Number

PNU	0A08h
Description	Serial number
Unit	-
Access	ro
Data type	Integer32
Default	No
EEPROM	Yes

8.2.1.82 Production Date

PNU	0A09h
Description	Production date
Unit	DDMMYYYY
Access	ro
Data type	Integer32
Default	No
EEPROM	Yes

8.2.1.83 SW Motor Controller

PNU	0A0Ah
Description	Motor Controller software version
Unit	-
Access	ro
Data type	Integer32
Default	No
EEPROM	No

8.2.1.84 Gear Reduction

PNU	0A0Bh
Description	Transmission ratio 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 drive.

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

Fig. 15: Structure of the system status word

Example (gray background):

binary: ⇒ 0010 1001 0100 1000

hex: ⇒ 2 9 4 8

PNU	0A0Ch
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 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'	Positioning mode: Irrelevant

Bit	State	Description
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 travelling 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 12	'1'	Battery voltage: Battery voltage < 2.6 V
	'0'	Battery voltage OK
Bit 13	'1'	Current limiting Current limiting active
	'0'	Current limiting not active
Bit 14	'1'	Positioning mode: Status Positioning active in positioning mode.
	'0'	Positioning inactive.
	'1'	Speed mode: Status Enable target speed
	'0'	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

PNU	0A0Dh
Description	Encoder resolution
Unit	Increments per revolution of the output shaft
Access	ro
Data type	Integer16
Default	No
EEPROM	Yes

8.2.1.87 Device ID

1 = AG25

2 = AG26

PNU	0A0Eh
Description	Device identification
Unit	-
Access	ro
Data type	Unsigned8
Default	No
EEPROM	Yes

8.2.1.88 Number of Errors

PNU	0B01h
Description	Number of errors
Unit	-
Access	ro
Data type	Unsigned8
Default	No
EEPROM	No

8.2.1.89 Error Number 1

PNU	0B02h
Description	Error 1
Unit	-
Access	ro
Data type	Unsigned8
Default	No
EEPROM	Yes

8.2.1.90 Error Number 2

PNU	0B03h
Description	Error 2
Unit	-
Access	ro
Data type	Unsigned8
Default	No
EEPROM	Yes

8.2.1.91 Error Number 3

PNU	0B04h
Description	Error 3
Unit	-
Access	ro
Data type	Unsigned8
Default	No
EEPROM	Yes

8.2.1.92 Error Number 4

PNU	0B05h
Description	Error 4
Unit	-
Access	ro
Data type	Unsigned8
Default	No
EEPROM	Yes

8.2.1.93 Error Number 5

PNU	0B06h
Description	Error 5
Unit	-
Access	ro
Data type	Unsigned8
Default	No
EEPROM	Yes

8.2.1.94 Error Number 6

PNU	0B07h
Description	Error 6
Unit	-
Access	ro
Data type	Unsigned8
Default	No
EEPROM	Yes

8.2.1.95 Error Number 7

PNU	0B08h
Description	Error 7
Unit	-
Access	ro
Data type	Unsigned8
Default	No
EEPROM	Yes

8.2.1.96 Error Number 8

PNU	0B09h
Description	Error 8
Unit	-
Access	ro
Data type	Unsigned8
Default	No
EEPROM	Yes

8.2.1.97 Error Number 9

PNU	0B0Ah
Description	Error 9
Unit	-
Access	ro
Data type	Unsigned8
Default	No
EEPROM	Yes

8.2.1.98 Error Number 10

PNU	0B0Bh
Description	Error 10
Unit	-
Access	ro
Data type	Unsigned8
Default	No
EEPROM	Yes

8.2.1.99 Configuration

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

PNU	0B21h
Description	Configuration of the actuator
Access	rw
Data type	Unsigned16
Default	15
EEPROM	yes
Value range	0 ... 63

Bit	Description
0	SHICP (Secure Host IP Configuration Protocol) 0 = off 1 = on (factory setting) Changes will take effect after a reset.
1	Web server 0 = off 1 = on (factory setting) Changes will take effect after a reset.
2	Parameter access via web 0 = off 1 = on (factory setting) Changes will take effect after a reset.
3	FTP server 0 = off 1 = on (factory setting) Changes will take effect after a reset.
4	FTP server administrator rights 0 = no (factory setting) 1 = yes Changes will take effect after a reset.
5	PROFINET diagnostics alarms 0 = no (factory setting) 1 = yes
6 ... 15	Reserved, always 0

8.2.1.100 S-Command

PNU	0C01h
Description	S command
Unit	-
Access	rw
Data type	Unsigned8
Default	No
EEPROM	No

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

9 Service protocol

NOTICE	If there is process data exchange with a network master, writing of parameters and execution of commands via the service protocol is 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

Chapter	starting with page
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9.3 Parameters

9.3.1 Positioning

9.3.1.1 Target Value

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

9.3.1.2 Actual Position

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

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

9.3.1.3 Actual Rotational Speed

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

9.3.1.4 Calibration Value

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

9.3.1.5 Loop Length

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

9.3.1.6 Offset Value

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

9.3.1.7 Pos Type

Read command	Q	see chapter 9.8 ASCII command structure
Write command	Lx	
Description	see chapter 8.2.1.36 Pos Type	
Info	Reading of the positioning type is via the flag register (see chapter 9.3.6.6: Flag Register). 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 9.8 ASCII command structure
Write command	H09xxxxx	
Description	see chapter 8.2.1.27 Pos Window	

9.3.1.9 Sense of Rotation

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

9.3.1.10 Spindle Pitch

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

9.3.2 Actuator**9.3.2.1 A-Pos**

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

9.3.2.2 V-Pos

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

9.3.2.3 D-Pos

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

9.3.2.4 A-Rot

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

9.3.2.5 A-Inch

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

9.3.2.6 V-Inch

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

9.3.2.7 Gear Ratio Denominator

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

9.3.2.8 Gear Ratio Numerator

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

9.3.3 Limiting values**9.3.3.1 Software Limit 1**

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

9.3.3.2 Software Limit 2

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

9.3.3.3 Current Limiting

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

9.3.3.4 Contouring Error Limit

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

9.3.4 Options**9.3.4.1 Operating Mode**

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

9.3.4.2 Inpos Mode

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

9.3.4.3 Delta Inch

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

9.3.4.4 Inching 2 Acceleration Type

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

9.3.4.5 Inching 2 Offset

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

9.3.4.6 Inching 2 Stop Mode

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

9.3.4.7 LED Functionality

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

9.3.4.8 Service Interface Baud Rate

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

9.3.4.9 Configuration

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

9.3.5 Controller parameter

9.3.5.1 Controller Parameter P

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

9.3.5.2 Controller Parameter I

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

9.3.5.3 Controller Parameter D

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

9.3.6 Device information

9.3.6.1 Motor Current

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

9.3.6.2 Output Stage Temperature

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

9.3.6.3 Voltage of Control

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

9.3.6.4 Voltage of Output Stage

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

9.3.6.5 Voltage of Battery

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

9.3.6.6 Flag Register

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

9.3.6.8 Device Type

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

9.3.6.9 Gear Reduction

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

9.3.6.10 Motor Type

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

9.3.6.11 Network Type

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

9.3.6.12 Production Date

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

9.3.6.13 Serial Number

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

9.3.6.14 SW Ethernet Module

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

9.3.6.15 SW Motor Controller

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

9.3.7 Digital input/output**9.3.7.1 Digital Input 1 Functionality**

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

9.3.7.2 Digital Input 2 Functionality

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

9.3.7.3 Digital Input 3 Functionality

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

9.3.7.4 Digital Input 4 Functionality

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

9.3.7.5 Digital Input Functionalities State

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

9.3.7.6 Digital Inputs Polarity

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

9.3.7.7 Digital Inputs State

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

9.3.7.8 Digital Output 1 Functionality

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

9.3.7.9 Digital Outputs Control

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

9.3.7.10 Digital Output Functionalities State

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

9.3.7.11 Digital Outputs Polarity

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

9.3.8 Error memory**9.3.8.1 Number of Errors**

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

9.3.8.2 Error Number 1

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

9.3.8.3 Error Number 2

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

9.3.8.4 Error Number 3

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

9.3.8.5 Error Number 4

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

9.3.8.6 Error Number 5

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

9.3.8.7 Error Number 6

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

9.3.8.8 Error Number 7

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

9.3.8.9 Error Number 8

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

9.3.8.10 Error Number 9

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

9.3.8.11 Error Number 10

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

9.4 Commands**9.4.1 Start travel job**

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

9.4.2 Start of inching mode 1

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

9.4.3 Start inching mode 2 positive travel direction

Command	, (2C _{hex})	see chapter 9.8 ASCII command structure
Description	Drive travels in positive direction as long as the "," ASCII character is permanently sent (only in positioning mode).	

9.4.4 Start inching mode 2 negative travel direction

Command	. (2E _{hex})	see chapter 9.8 ASCII command structure
Description	Drive travels in negative direction as long as the "." ASCII character is permanently sent (only in positioning mode).	

9.4.5 Cancel current travel job in positioning mode

Command	I (49 _{hex})	see chapter 9.8 ASCII command structure
Description	Motor remains in control state	

9.4.6 Motor stop fast

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

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

9.4.7 Motor stop

NOTICE	If a contouring error is pending at the time of the "0" command, the motor will be enabled.
---------------	---

Command	0	see chapter 9.8 ASCII command structure
Description	motor decelerates with programmed delay. Motor remains in control state!	

9.4.8 Enable motor

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

9.4.9 Factory setting: all parameters

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

9.4.10 Factory setting: Standard parameter

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

9.4.11 Factory setting: Controller parameter

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

9.4.12 Acknowledge error

Command	S11103	see chapter 9.8 ASCII command structure
Description	Acknowledge error	

9.4.13 Calibrate

Command	S11104	see chapter 9.8 ASCII command structure
Description	Calibrate actuator	

9.4.14 Delete error memory

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

9.4.15 Software Reset

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

9.5 Flow charts

9.5.1 Flow chart: Operating mode: Positioning mode

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

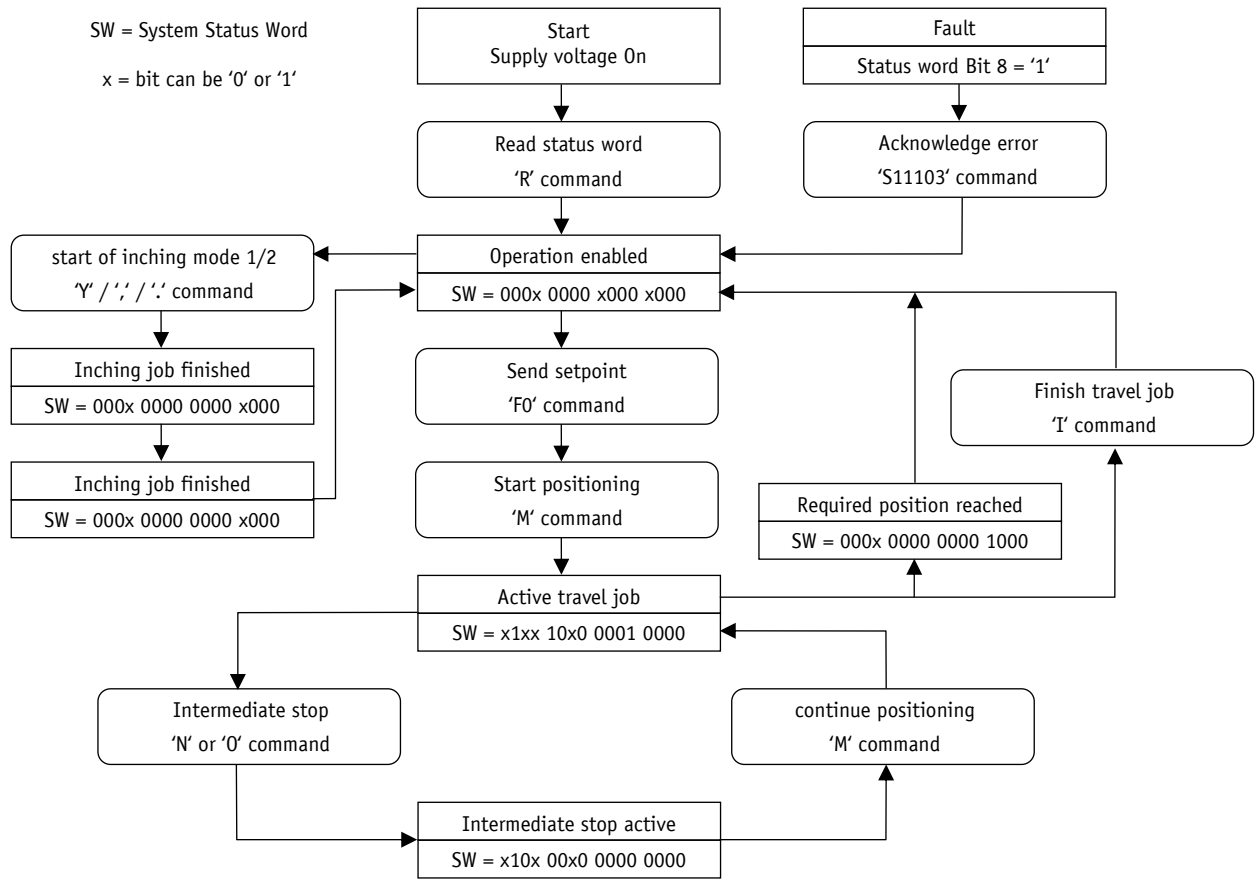


Fig. 16: Flowchart positioning mode SIKONETZ5

9.5.2 Flow chart: Operating mode: Speed mode

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

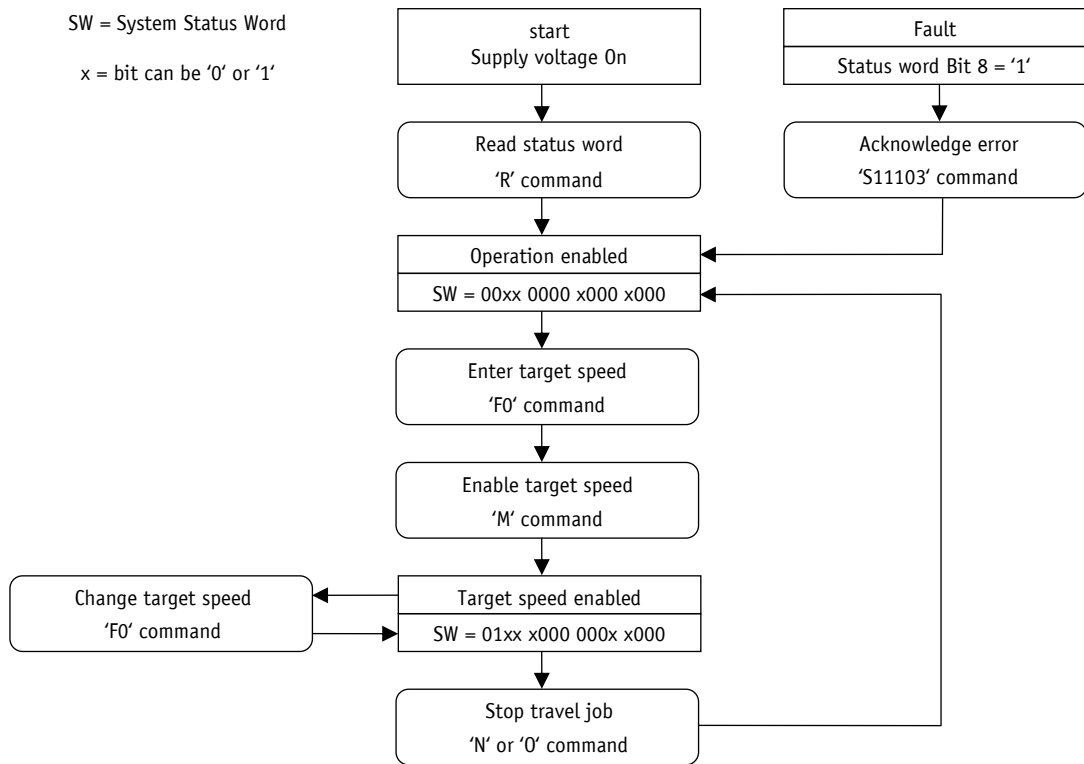


Fig. 17: Flow chart speed mode service protocol

9.6 Error number encoding

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

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

9.7 Examples

9.7.1 Write and read setpoint +500

Write command: F0+0000500 (10 characters)

Reply: ><CR> (2 characters)

Read command: E0 (2 characters)

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

9.7.2 Start travel job

Command M (1 character)

Reply: ><CR> (2 characters)

9.8 ASCII command structure

Command	Length	Access	Reply	CR	Length	Description
Ay	2	read	xxxxxxxx>	x	10	Device information (constants) y = address xxxxxxxx = string
Byy	3	read	±xxxxxxxx>	x	10	Device information (actual values) yy = address ±xxxxxxxx = decimal value
Ey	2	read	±xxxxxxxx>	x	10	Read parameter (3-byte) y = address ±xxxxxxxx = decimal value
Fy±xxxxxxxx	10	write	>	x	2	Write parameter (3-byte) y = address ±xxxxxxxx = 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 current 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
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	0xhhl>	x	8	System status word hh = hexadecimal value High byte II = 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

Command	Length	Access	Reply	CR	Length	Description
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
, (2Chex)	1	write			0	Start inching mode 2 positive travel direction
. (2Ehex)	1	write			0	Start inching mode 2 negative travel direction

10 Block diagram

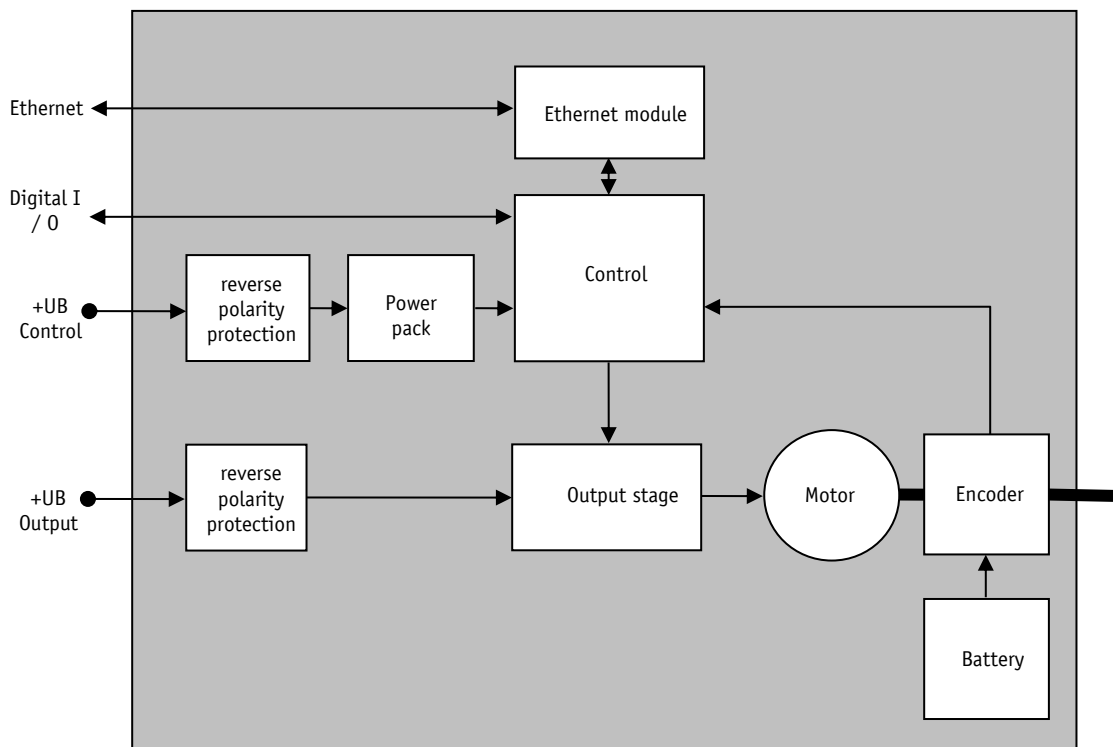


Fig. 18: Block diagram

11 Web server

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

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

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

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

The screenshot shows the SIKO web interface for configuring network settings. The left sidebar contains a menu with items: Overview, Parameters, FW Update, NETWORK, Status, Configuration (highlighted with a red box), SERVICES, and SMTP. The main content area is titled 'IP Configuration' and includes fields for DHCP (set to Disabled), IP Address (192.168.1.164), Subnet Mask (255.255.255.0), Gateway Address (192.168.1.1), Host Name, Domain name, DNS Server #1 (0.0.0.0), and DNS Server #2 (0.0.0.0). Below this is an 'Ethernet Configuration' section with Port 1 and Port 2 both set to 'Auto'. A 'Save settings' button is present at the bottom of each section.

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

The screenshot shows the SIKO web interface displaying a list of parameters. The left sidebar menu has 'Parameters' highlighted with a red box. The main content area shows a table with columns for '#', 'Name', and 'Value'. The table lists parameters 1 through 770, with values ranging from 0:0 to 0:33. A red box highlights the first five rows of the table, which include 'Digital Outputs Control', 'Control Word', 'Target Value', 'Digital Inputs State', and 'Status Word'. A 'Refresh' button is located at the top right of the table.

The web server can be activated or deactivated via the parameter [Configuration](#) (PNU 0B21h). With factory settings, the web server is activated.

12 FTP-Server

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

The following port numbers are used for FTP communication:

TCP, Port 20 (FTP data transmission)

TCP, Port 21 (FTP control)

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

With factory settings, the protocol is activated.

13 Secure Host IP Configuration Protocol (Secure HICP)

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

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

With factory settings, the protocol is activated.