Which options exist for reading hardware limit switch signals into a technology CPU?

**Technology CPU** 

FAQ • June 2013



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## Question

Which options exist for reading hardware limit switch signals into a technology CPU?

### Answer

The instructions and notes listed in this document provide a detailed answer to this question.

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# 1 Introduction

Monitoring the mechanical end-position of an axis occurs mainly via hardware limit switches which are operated by the axis as soon as the end position approaches.

For linear axes two hardware limit switches are required for complete monitoring of the end positions to enable monitoring the end position in positive and negative direction separately.

Generally, hardware limit switches are normally closed contacts which enable the CPU to also detect a wire-break as "end position" and to stop the axis.

For the technology CPU the limit switch signals are processed for the respective axis in the integrated technology. For transferring the signals to the integrated technology several options are available which are explained in this FAQ in greater detail.

## 1.1 Reading in the hardware limit switches

To be able to use the limit switch signals in the integrated technology of the technology CPU, they must be read in there, or be transferred there. There are the following options:

- Direct connection of the hardware limit switch to the integrated technology via the digital OnBoard inputs of the technology CPU.
- Distributed connection of the hardware limit switches at the integrated technology via the digital inputs of a distributed I/O ET200 connected at the DP (Drive).
- Usage of the digital inputs of the drive device.

Figure 1-1 Example for the transfer options



## **1.2 Principle procedure for processing the signal**

Principally, the following procedures are necessary for using the hardware limit switch signals in the integrated technology of the technology CPU:

- **Reading in** the hardware limit switches directly at the technology CPU or via input modules which are connected at the integrated technology.
- **Transferring** the signals into the integrated technology. This point does not apply for direct connection of the hardware limit switches at the technology CPU.
- **Assigning** the transferred signals as limit switch signals to the respective axis in the integrated technology.

The procedures required for the individual points are described for the respective connection type of the hardware limit switch in the following chapters.

# 2 Direct Connection at the OnBoard Inputs

The easiest option of making limit switch signals available in the integrated technology of the technology CPU is connecting the hardware limit switches to the OnBoard inputs of the technology CPU.

## 2.1 Reading in the limit switch signals

The four digital inputs existing on the technology CPU can be evaluated directly in the integrated technology and be used for technological functions such as e.g. reference point detection.

The hardware limit switches of an axis can also be connected to these inputs. Figure 2-1 OnBoard interfaces of the technology CPU



Four digital inputs of the integrated technology for the technological functions, e.g. reference point detection or HW limit switch.

Eight digital outputs of the integrated technology for technology functions, e.g. fast cam switch functions.

The evaluation of the limit switch signals of the OnBoard inputs in the integrated technology occurs via the I/O address of the OnBoard inputs.

#### Determining the I/O address

Open the HW Config and mark a slot of technology CPU in the SIMATIC rack.

In the Details section of HW Config the I/O addresses of the OnBoard inputs and outputs of the technology CPU are then displayed.

Double-clicking the slot of the OnBoard inputs and outputs of the technology CPU enables modifying the I/O address of the inputs and outputs. For using the OnBoard inputs and outputs in the integrated technology for technological functions select a **I/O address \geq64**.

**Note I/O addresses <64** can only be used in the PLC section of the technology CPU and are therefore available not available for technological functions in the integrated technology.

Image: Signature         Signature	Help						
D 😅 🐎 🖩 🗞   🎒   🛍 💼   🏙 🎰   🎁 E	3   🎎   🕅	?					
Image: CPU 315T-2 DP           X7         MPI/DP           3         Image: CPU 315T-2 DP           X7         MPI/DP           3         Image: CPU 315T-2 DP           X7         Image: CPU 315T-2 DP           X3         Image: CPU 315T-2 DP           X1         Image: CPU 315T-2 DP           X3         Image: CPU 315T-2 DP           X11         Image: CPU 315T-2 DP		PROFIBI	US(Drive): DF	a master system	<u>(1)</u>		
•	9						<b>•</b>
(0) UR							
Slot Module Order number	Firmware	MPI address	l address	Q address	1	Q	Comment
2 CPU 315T-2 DP 6ES7 315-6TG10-0AB0	V2.6	2			-		
X1 MFI/DF		2	2047**				
3 Jechnology	¥4.1.1						
X3 DF(DRIVE)		<b>[</b>	1123*				
X11 J IO(Technology)			66	66			
4		<b></b>			-		
	L		L	L			<b></b>
Press F1 to get Help.							

Figure 2-2 Determining the I/O addresses in HW Config

#### Determining the bit number

Between the bit numbers and the input terminals of the OnBoard inputs of the technology CPU there is a linear correlation so that the bit number can be determined very simply.

Figure 2-3 Determining the bit numbers



## 2.2 Assigning the limit switch signals in S7T Config

Now the determined I/O address must be entered in the mask for setting the hardware limit switch at the appropriate axis in S7T Config.

In S7T Config you open the configuration of the appropriate axis and select the configuration mask for the **limits**.

Activate the hardware limit switch and enter the determined I/O address in HW Config and the bit number of the input terminal.



Figure 2-4 Assigning the I/O address in S7T Config

Save and compile the settings and download them into the technology CPU.

# 3 Distributed Connection at the DP(Drive) via ET200

The hardware limit switches can also be read in decentralized via an input module of an ET200 S or ET200 M which are connected at the DP(Drive) of the technology CPU.

**Note** Only use ET200 modules at **DP(Drive)** of the technology CPU, which are listed in the profile **SIMATIC technology CPU** of the hardware catalog of HW Config.

#### **Example configuration**

The connection of the hardware limit switch to an ET200 S is displayed in this FAQ as an example.

### 3.1 Reading in the limit switch signals

Connect the hardware limit switches to an input module of the ET200 S.

#### Determining the I/O address

Open the HW Config and mark the respective ET200 S module at the DP(Drive) of the technology CPU.

In the Details section of HW Config the I/O address of the respective ET200 S module (electronics module) can now be read off.

Double-clicking the electronics module in the Details section of the HW Config also enables modifying the I/O address. To be able to use the inputs in the integrated technology of the technology CPU, the **I/O address \geq64** must be selected.





#### Determining the bit number

Between the bit numbers and the input terminals of the ET200 S there is the following correlation:

Figure 3-2 Determining the bit numbers



## 3.2 Transferring the limit switch signals

The signals of the hardware limit switches are transferred to the technology CPU by the ET200 S via the equidistant PROFIBUS DP(Drive).

#### Setting the equidistance at the ET200 S

Double-click the ET200 S in HW Config.

Select the **Isochrone Mode** tab for making the settings.

Figure 3-3 Activating the equidistant PROFIBUS for ET200 S



#### Adjusting the DP(Drive)

After adding the ET200 S the cycle time of the DP(Drive) and the setting of the  $T_i$  and  $T_o$  times may need to be adjusted.

The DP(Drive) can be adjusted via a double-click on the PROFIBUS line of the DP(Drive).

You reach the mask displayed below via the **Properties** button and in the **Network Settings** tab via the **Options** button.



Figure 3-4 Setting the equidistance at DP(Drive)

## 3.3 Assigning the limit switch signals in S7T Config

Finally the determined I/O address must be entered in the mask for setting the hardware limit switch at the appropriate axis in S7T Config.

In S7T Config you open the configuration of the appropriate axis and select the configuration mask for the **limits**.

Activate the hardware limit switch and enter the determined I/O address in HW Config and the bit number of the input terminal.



Figure 3-5 Assigning the I/O address in S7T Config

# 4

# Connection at the Inputs of SINAMICS S120

The hardware limit switches can also be connected to the digital inputs of the drive device and via the drive message frames to the technology CPU.

There are two basic options:

• Using a special message frame of the drive

By providing a special message frame (telegram 390) the SINAMICS S120 enables transferring the signals of the digital inputs and outputs of the control unit in a very comfortable way to the integrated technology of the technology CPU.

#### • Expanding the drive message frame

Should the digital inputs and outputs of an optionally pluggable terminal board TB 30 be used, an expansion of the drive message frame must be performed and the signals be switched to the message frame via BiCo technology.

## 4.1 Reading in the limit switch signals

The hardware limit switches can be connected to the SINAMICS S120 on the Control Unit CU 320 at the locations below:

- Digital inputs of the Control Unit CU 320
   For transferring the signals of the digital inputs of the control unit CU 320 the message frames 390 to 392 are available.
- Digital inputs on the optional terminal board TB 30

If the optional terminal board TB 30 is plugged on the control unit CU 320 of the SINAMICS S120, the hardware limit switches can also be connected on the existing additional digital inputs there.

However, no special telegrams are available in this case for the transmission of the signals. The transmission must be performed by a message frame expansion and manual assignment of signals via BiCo technology.

Input and output of the Control Unit CU 320 Option slot, e.g. for the terminal board TB 30, via which the additional digital inputs and outputs are provided.

Figure 4-1 Reading in the hardware limit switches at the SINAMICS CU 320

#### 4.1.1 Selecting the communication message frame

#### Digital inputs of the CU 320

If the hardware limit switches are connected at the digital inputs of the CU 320, message frame 390 to 392 can be selected for the CU 320. In this message frame the signals for the digital inputs and outputs of the control unit can be automatically transferred.

After changing the message frame settings an alignment with HW Config must be performed, the configuration be saved and compiled and be loaded to the drive, and there be transferred from RAM to ROM.

Droject Edit Incent Taxact guidem Vie	COSCO - Coninguration]	
×	PROFIBUS message frame Version overview	
E-ED T-CPU		
SIMATIC 300	The drive objects are supplied with data in the following sequence from the PHUFIBUS m	essage frame:
E Technology	I he input data corresponds to the send and the output data of the receive	e direction of the drive object.
AXES		Innut data Output data
EXTERNAL ENCODERS	Object Drive object No Message frame type	Length Address Length Address
SINAMICS_5120_CU320	1 SERVO_02 2 SIEMENS telegram 105, PZD-10/10	✓ 10 256.275 10 256.275
> Overview	CENERIO DE CENERIO LI Symmet CEL PED 10110	<u> </u>
Configuration	3 CU_S_003 1 SIEMENS telegram 390, PZD-2/2	✓ 2 296299 2 296299
	4 1650_04 4 Pree nessage trane configuration with bico technology Without PZDs (no cyclic data exchange)	0 0
🗈 🔄 Infeeds		
🗈 🔄 Input/output compone		
MONITOR		
En incluitor		
	Dejete line Ins <u>e</u> rt line ▼ <u>C</u> onfigure message frame	
		Transfer to HW Config
		🚮 Close Help
Technology	Axis_1 M SINAMICS_S120_CU320	
×		
		-
Error in configurati	on data_j	
Press F1 to open Help display.	Offlin	e mode NUM

Figure 4-2 Selecting the message frame 390 at the Control Unit CU 320

#### **Optional Terminal Board TB 30**

If on the other hand the hardware limit switches are connected at the optional terminal board TB 30, a telegram expansion in the configuration of the SINAMICS S120 must be performed and the limit switch signals must be transferred to the message frame expansion via BiCo technology.

Figure 4-3 Message frame expansion at terminal board TB 30

Object	Drive object	но	Maggaya frama tuna		Inp	ut data	Outp	out data		
object	Drive object		message name type		Length	Address	Length	Address		
1	SERVO_02	2	SIEMENS telegram 105, PZD-10/10	*	10	256275	10	256275		
2	SERVO_03	3	SIEMENS telegram 105, PZD-10/10	*	10	276295	10	276295		
3	CU_S_003	1	SIEMENS telegram 390, PZD-2/2	*	2	296299	2	296299		
4	TB30_04	4	Free message frame configuration with BICO technology	1	2	300303	2	300303		
Without	t PZDs (no cycl	ic da	ita exchange)				$<$ $\setminus$			
Γ	Prolonging the input data by Prolonging the output data by									
Inter		2	words nal board		2 ۱	words		е		
framL			h addition					to		

converter. The individual bits of the inputs are thereby entered into the converter...

S7T Config - T-CPU - [SINAMICS_S120_(	LU320.TB30_04 - Inputs/outputs]
222 Project Terminal module Edit Insert Ta	arget system View Options Window Help
T-CPU Insert single drive unit Insert single drive unit Insert single drive unit Insert single drive unit ArkEs → ExtERNAL ENCODERS → ExtERNAL ENCODERS → ExtERNAL ENCODERS → Configuration → Configuration	Analog inputs Analog outputs Isolated digital inputs Isolated digital outputs          Analog inputs Analog outputs Isolated digital inputs Isolated digital outputs         X481         1       Digital input 0         0       Digital input 0         0       Digital input 0         0       Digital input 0         1       Digital input 0         0       Digital input 0         1       Digital input 0         2       Digital input 0 </td
-> PROFIBUS	- Mex Further interconnections
	2:/ Close Help
Technology	Basinamics_s120_cu320 ZZZ TB30_04
	•
Symbol browser	
Press F1 to open Help display.	Offline mode

Figure 4-4 Connecting the inputs with the BiCo converter

...and the complete converter word is then transferred to the message frame which is sent to the technology CPU.

Figure 4-5 Transferring the BiCo connector WORD to the message frame



After modifying the message frame settings an alignment with HW Config must also be performed here.

ST Cooling T-CRIL CONAMICS 5120 CL	1220 - Configu	wation]	-							
Project Edit Insert Target system View	Options Win	dow Help								_ 8 ×
	<b>№</b> 1 <b>№</b> 1	ka 🖳 🖂	*1		3			€lkali		
								7° <u>K.</u> L		
E-Bat-cpu	PROFIBUS	message frame	Ve	rsion overview						
📩 Insert single drive unit	The drive of	bjects are supp	blied	with data in the following sequence from the PROFIBUS m	essag	ge frame:				
SIMATIC 300	The inpu	t data corres	pon	ds to the send and the output data of the receive	dire	ection o	f the drive	object.		
AXES	Master vi	iew:	_							
EXTERNAL ENCODERS	Object	Drive object	No	Message frame type	-	Inp	ut data	Outp	ut data	
E-CAMS		SERVO 02	2	SIEMENS telegram 105 PZD-10/10	-	Length 10	Address	Length 10	Address 256 275	
> Overview	2	SERVO_02	3	SIEMENS telegram 105, PZD-10/10	~	10	276295	10	276295	
Configuration	3	CU_S_003	1	SIEMENS telegram 390, PZD-2/2	*	2	296299	2	296299	
Topology	4 Without	TB30_04	4	Free message frame configuration with BICO technology to evolve and a second	<b>~</b>	2	300303	2	300303	
E	without	rzbs (no cyci	ic ua	ka exchange)						
🗈 🔄 Input/output compone										
E C Drives							1			
H-MONITOR									<u> </u>	
	Deje	te line	h	nsert line 🔻 Configure message frame						
							Tra	ansfer to j	<u>-I</u> W Config	ם ר
										╧┛║
							5	Close	- F	lelp
Technology	O Auia 1 61		:120	CI1550						
		a SINAMICS_S	5120							
×										•
Symbol browser Error in configuration	n data				_					
Offline				Offlin	ет	ode			NUM	

Figure 4-6 Alignment with HW Config after message frame expansion of the TB 30

#### 4.1.2 Determining the I/O address

After the alignment with HW Config the respective addresses are assigned to the individual message frames in the configuration of the SINAMICS S120.

The I/O address of the hardware limit switch can either be determined via the configuration of the SINAMICS S120 in S7T Config...

Figure 4-7 Determining the I/O address in S7T Config

Object	Drive object	но	Messave frame tune		Input data		Outp	out data
object	brive object		message frame type		Length	Address	Length	Address
1	SERVO_02	2	SIEMENS telegram 105, PZD-10/10	*	10	256275	10	256275
2	SERVO_03	3	SIEMENS telegram 105, PZD-10/10	*	10	276 295	10	276295
3	CU_S_003	1	SIEMENS telegram 390, PZD-2/2	*	2	296299	2	296299
4	TB30_04	4	Free message frame configuration with BICO technology	*	2	300.303	2	300303
Without	PZDs (no cycl	ic da	nta exchange)					

... or via the drive device in HW Config.

Figure 4-8 Determining the I/O address in HW Config

<u> </u>	⇒	(3) SI	NAMICS_S120_CU320			
Slot		М.,	Message frame selection / default	I address	O address	Comment
8		Drive	SIENENS message frame 105, FZD-10/10		276295	▲
9		Drive				
10		Drive	SIEMENS message frame 390, FZD-2/2	296299		
11		Drive	SIEMENS message frame 390, F2D-2/2		296299	
12		Drive				
13		Drive	User-defined	300303		
14		Drive	User-defined		300303	
15						

#### 4.1.3 Determining the bit number

#### Digital inputs of the CU 320

For determining the bit number within the message frame the **Big Endian format** must be observed which is applied when transferring data between drive and CPU.

Figure 4-9 Bit numbers of the hardware limit switches in message frame 390



#### **Optional Terminal Board TB 30**

When using the terminal board TB 30 while using the message frame expansion the **Big Endian Format** is also used for transferring data to the technology CPU. Additionally, however, the assignment of the inputs via the BiCo technology must be observed.

Figure 4-10 Bit numbers of the hardware limit switches at the terminal board TB 30



## 4.2 Transferring the limit switch signals

After adding the message frame 390 or the message frame expansion the cycle time of the DP(Drive) and the setting of the  $T_i$  and  $T_o$  times may need to be adjusted.

The settings occur analog to the displayed procedure for using the ET200 S at the DP(Drive).

## 4.3 Assigning the limit switch signals in S7T Config

Finally the determined I/O address must be entered in the mask for setting the hardware limit switch at the appropriate axis in S7T Config.

In S7T Config you open the configuration of the appropriate axis and select the configuration mask for the **limits**.

Activate the hardware limit switch and enter the determined I/O address in HW Config and the bit number of the input terminal.

57T Config - T-CPU - [Technology.Axis_1	- Limits]
2 Project Edit Insert Target system View	
T-CPU     Insert single drive unit     SIMATIC 300     Gardenboogy     AXES     AXES     AXES     AXES     Configuration     AXES     AXES     Configuration     AXES     AXES     Configuration     AXES     AXES	Position and velocity Dynamic response Fixed enditop Hardware limit switch: Uog. address: 298 Bit number: 0 Software limit switch: Behavior for travel to software limit switch: Positive end position Positive for travel to software limit switch: Positive end position Positive end position Tolerance window for the retraction: There are two different limits:
<b>∢∫</b> →	- Limits which mails reverte exceeded because of mechanical reasons Limits which has be modified by programs. Max. velocity:
×	ut   III BICDServer   III Error in continuation data   III Compile/check output   III Load to PG output
Press F1 to open Help display.	Offline mode NUM //

Figure 4-11 Assigning the limit switch signals of Control Unit CU 320





# 5 Additional Notes

## 5.1 Deactivating the hardware limit switches in S7T Config

Deactivating the hardware limit switches in S7T Config requires entering the value **65535** for the I/O address or **log. address**. Otherwise an error-free compilation of the technology in S7T Config is no longer possible.

57T Config - T-CPU - [Technology.Axis]	1 - Limits]
🔒 Project Axis Edit Insert Target syste	m View Options Window Help
Insert single drive unit     Insert single drive unit     Im SIMATIC 300     Insert single drive unit     Insert single drive unit     ExtEnsinal ENCODERS     E CAMS     E Monitor     Monitor	Position and velocity Dynamic response Fixed endstop Hardware limit switch: Positive end position Log. address: 65535 Bit number: 0 V 0 V 0 V 0 V 0 V 0 V 0 V 0 V 0 V 0
	Behavior for travel to software limit switch: Monitoring of the SW limit switch at the start of motion with position-controlled traversing
	Negative end position         Image: Positive end position           Position:         100000000000.0   mm
	Tolerance window for the retraction: 0.0 mm
	There are two different limits: - Limits which must never be exceeded because of mechanical reasons. - Limits which can be modified by programs.
	Max. velocity:         500.0         mm/s         □         Direction-dependent dyn. response           Pos. prog. velocity:         >         100000000000.         mm/s         V         ↑
Technology	Axis_1
Symbol browser	ion data 🔠 Compile/check output
Press F1 to open Help display.	Offline mode

Figure 5-1 Deactivation of the hardware limit switches in S7T Config

## 5.2 Observe the states of the hardware limit switches

The states of the hardware limit switches can be monitored via the technology data block of the respective axes or via the expert list of the axis in S7T Config.

#### Monitoring the hardware limit switches in the technology data block

Two different displays for the states of the hardware limit switches are available in the technology data block:

#### ErrorStatus.LimiSwitchActive

Display of the error status of the integrated technology. This bit indicates that a limit switch has picked up. The bit is only deleted if the occurred error has been acknowledged in the integrated technology.

 Statusword.HWLimitSwitchMinus / Statusword.HWLimitSwitchPlus Display of the current status of the input terminals and hence the hardware limit switches.

🕅 D <u>a</u> t	a block <u>E</u> dit	PLC Debug View Window Help					
2	~ 🖬 🚳   1	ဂလန် ရာ 🛍 🛛 🐇 🚵 🗖	ŵ° <b>∖</b> ?				
	Address	Name	Туре	Initial value	@Actual val	Actual value	Comment
)	37.4	ErrorStatus.SoftwareLimitPos	BOOL	FALSE	FALSE	FALSE	Software limit switch (upper limit)
	37.5	ErrorStatus.SoftwareLimitNeg	BOOL	FALSE	FALSE	FALSE	Software limit switch (lower limit)
	37.6	ErrorStatus.LimitSwitchActive	BOOL	FALSE	TRUE	FALSE	Hardware limit switch
2	37.7	ErrorStatus.SensorFreqViolation	BOOL	FALSE	FALSE	FALSE	Limit frequency of measuring system exceeded
3	38.0	ErrorStatus.ReferenceNotFound	BOOL	FALSE	FALSE	FALSE	Reference output cam not found
1	38.1	ErrorStatus.ZeroMonitoring	BOOL	FALSE	FALSE	FALSE	Encoder zero mark not found
5	38.2	ErrorStatus.Overspeed	BOOL	FALSE	FALSE	FALSE	Overspeed drive
5	38.3	ErrorStatus.FollowObjectError	BOOL	FALSE	FALSE	FALSE	Error at the following object
7	38.4	ErrorStatus.SupImpFollowObjectError	BOOL	FALSE	FALSE	FALSE	Error at the superimposed following object
8	38.5	ErrorStatus.Reserve21	BOOL	FALSE	FALSE	FALSE	Reserved
9	38.6	ErrorStatus.Reserve22	BOOL	FALSE	FALSE	FALSE	Reserved
)	38.7	ErrorStatus.Reserve23	BOOL	FALSE	FALSE	FALSE	Reserved
1	39.0	ErrorStatus.Reserve24	BOOL	FALSE	FALSE	FALSE	Reserved
2	39.1	ErrorStatus.Reserve25	BOOL	FALSE	FALSE	FALSE	Reserved
3	39.2	ErrorStatus Reserve26	BOOL	FALSE	FALSE	FALSE	Reserved
4	39.3	ErrorStatus Reserve27	BOOL	FALSE	FALSE	FALSE	Reserved
5	39.4	ErrorStatus Reserve28	BOOL	FALSE	FALSE	FALSE	Reserved
- 6	39.5	ErrorStatus Reserve29	BOOL	EALSE	EALSE	EALSE	Reserved
7	39.6	ErrorStatus Reserve30	BOOL	FALSE	FALSE	FALSE	Reserved
8	39.7	ErrorStatus Reserve31	BOOL	FALSE	FALSE	FALSE	Reserved
9	40.0	Statusword DriveEnabled	BOOL	FALSE	FALSE	FALSE	Drive enabled
	40.1	Statusword HomingDone	BOOL	FALSE	TRUE	FALSE	Homing completed
1	40.1	Statusword Done	BOOL	FALSE	TRUE	FALSE	Command huffer empty (idle operation)
2	40.3	Statusword SuperImposedCommand	BOOL	FALSE	FALSE	FALSE	Process superimposed command
3	40.5	Statusword Error	BOOL	FALSE	TRUE	FALSE	Axis error: refer to error ID in TO DB
4	40.4	Statusword Erroraton	BOOL	EALCE	TRUE	FALCE	Drive stopped after error
с.	40.5	Statusword Stanning	BOOL	FALSE	FALSE	FALSE	Reserved: "MC Stop" command is processed
2	40.0	Statusword Standatill	BOOL	FALSE	TRUE	FALSE	Stondotil drive
.7	40.7	Status word BostioningCommand	BOOL	FALSE	EALCE	FALSE	Statustill unve
0	41.0	Status word PositioningCommand	BOOL	FALSE	FALSE	FALSE	Single axis positioning motion command in process
0	41.1	Statusword Suppler Command	BOOL	FALSE	FALSE	FALSE	Single axis continuous motion command in process
0	41.2	Status word. Synchr Command	BOOL	FALSE	FALSE	FALSE	Synchronized motion command in process
-0	41.5	Statusword Fellevel la Centrel	BOOL	FALSE	TRUE	FALSE	Followum control onting
1	41.4	Statusword Pollowopcontrol	BOOL	FALSE	TOUE	FALSE	Poliow up control active
2	41.5	Statusword.Constant velocity	BOOL	FALSE	TRUE	FALSE	Motor moves with constant velocity
3	41.6	Statusword Accelerating	BOOL	FALSE	FALSE	FALSE	Increasing energy of the motor
4	41.7	Statusword.Decelerating	BOOL	FALSE	FALSE	FALSE	Decreasing energy of the motor
5	42.0	Statusword.Requesticestart	BOOL	FALSE	FALSE	FALSE	Parameter modification requests restart
ь	42.1	Statusword.Simulation	BOOL	FALSE	FALSE	FALSE	Simulation active
7	42.2	Statusword.CyclicInterface	BOOL	FALSE	TRUE	FALSE	Cyclic communication to slave
8	42.3	Statusword.EncoderValid	BOOL	FALSE	TRUE	FALSE	Actual value of position valid
9	42.4	Statusword.SpeedMode	BOOL	FALSE	FALSE	FALSE	Speed controlled operation
0	42.5	Statusword.TorqueLimiting	BOOL	FALSE	FALSE	FALSE	Drive works at torque limit
1	42.6	Statusword.SupimpSynchrCommand	BOOL	FALSE	FALSE	FALSE	Superimposed synchronized motion command in pro
Z	42.7	Statusword.TorqueLimitingCommand	BOOL	FALSE	FALSE	FALSE	Torque limiting command active
3	43.0	Statusword.RequestStartUp	BOOL	FALSE	FALSE	FALSE	Configuration modification requests StartUp
4	43.1	Statusword.TOdeactivated	BOOL	FALSE	FALSE	FALSE	TO is not processed in the CPU
5	43.2	Statusword.HWLimitSwitchMinus	BOOL	FALSE	TRUE	FALSE	HVVLimitSwitch is activated
6	43.3	Statusword.HWLimitSwitchPlus	BOOL	FALSE	FALSE	FALSE	HVVLimitSwitch is activated
7	43.4	Statusword.Reserve28	BOOL	FALSE	FALSE	FALSE	Reserved
0	496	Chatrian word Resource 30	BOOL	CALCE	CALCE	CALCE	Passwind
Mer	sanes						
LINES	Jugos						

Figure 5-2 Monitoring the hardware limit switches in the technology data block

#### Monitoring the hardware limit switches via the expert list in S7T Config

The signals of the hardware limit switches are available in the expert list of the respective axis in the **sensormonitoring** section.

There the following signals for monitoring the states of the hardware limit switches are output:

• hwlimitswitchinput

Display whether the evaluation of the hardware limit switches in the configuration have been switched active or inactive.

hwlimitswitchminus

Switching state of the hardware limit switch in negative direction.

• hwlimitswitchplus

Switching state of the hardware limit switch in positive direction.

Additionally after pickup of a hardware limit switch in the alarm window the respective technology error messages are output.

S7T Config - T-CPU - [Technology.Axis_1	l - Expert list]							2
Project Edit Insert Target system View	V Options Window H	elp						- 81>
				<u></u>				
E-B T-CPU		• <u>M</u> E	🕒 🖉 📔 Linea	raxis (:	standard/press	ure)	<u>_</u>	-
Insert single drive unit		* abc / /10 P12						
E	Configuration data Sy	stem variables selected parameters						
nsert axis	+ Parameter	Parameter text	Current value	Unit	Data type	Minimum	Maximum	<b>_</b>
🖻 🕂 🚔 Axis_1	sensormonitoring	Monitoring of the active encoder s						
Configuration	-acceleration	Limit acceleration	o_k_(102)	-	'enumlimitexce			
-> Mechanics	-actualadditionalsens	Number of the active additional tra	0	-	UDINT	0	4294967295	
-> Default	-actualsensor	Number of the active encoder/tran	1	-	UDINT	0	4294967295	
-> Limits	-cyclicinterface	Cyclic drive interface active	active (4)	-	'enumactiveina			
-> Act.val.	-hwlimitswitchinput	Positive and negative hardware lim	activated (945)	-	'enumactivated			
-> Closed-loop contro	hwlimitswitchminus	Hardware minus limit position swit	limit_exceeded (71)	-	'enumlimitexce			
-> Homing	-hwlimitswitchplus	Hardware plus limit position switch	o_k_(102)	-	'enumlimitexce			
-> Monitoring		maximum permissione measuring e	0.0		ter Marrie			
-> Control panel	-passingbacklash	Backlash on reversal is calculated	no (91)	-	'enumyesno' =			
😟 🚞 MEASURING INPU	-position	Actual value range	o_k_(102)	-	'enumlimitexce			
🗄 🚞 OUTPUT CAM	slippagetolerance	Slip monitoring	o_k_(102)	-	'enumlimitexce			
E 📄 EXTERNAL ENCODERS	-velocity	Limit velocity	o_k_(102)	-	'enumlimitexce			
庄 🧰 CAMS	Lzeromarkermonitorin	Zero mark monitoring	o_k_(102)	-	enumokfaultec			
E 📲 🚛 SINAMICS_S120_CU32	+ sensorsettings	Actual value via system variable						
HONITOR	+ servodata	Current servo data						
	+ servomonitoring	Monitoring in the servo						
	+ servosettings	Setpoint influence						
	<ul> <li>setforcecommandv</li> </ul>	Execution status of force/pressur						
	simulation	Simulation mode	inactive (61)	-	'enumactiveina			
	speedmode	Speed mode of the position axis	inactive (61)	-	'enumactiveina			-
<u> </u>	Ľ	P	10-2-20 - 204 N	-	11	1		_
Technology	Axis_1							
All	🔽 Disp	lay informationA	sknowledge all		Acknowledge		Help for eve	nt
Level	19	ource	Message					
			moorage					
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25.06.94 2	3:30:43:850 I	echnology: Axis_1	Error 50009 :	r'ositioi	n imit switch activ	e: (Parameter)	1: 2) only one trave	asing airec
								Þ
Alarms Symbol browser Error	in configuration data	Compile/check output	et system output					
Opens the expert list				Onl	ine mode		NU	M

Figure 5-3 Monitoring the hardware limit switches in S7T Config

#### Note

# Please note the **inverse logic** when evaluation the hardware limit switches which are required for wire-break detection by the CPU:

- Signal =  $0 \Rightarrow$  hardware limit switch has picked up.
- Signal = 1 ⇒ hardware limit switch has **not** picked up.