

SIMOTION

Frequently asked Questions

How Can the Technological Data Coupling Be
Used with the Drive?
(Available for SIMOTION SCOUT V3.2 or later)



SIEMENS

Technological Data

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Technological Data

1 Question

How can I use the technological data coupling to the drive?

Amendment to the manual "Axis_Technology_Functions", Chapter 2.4.4,
and to the SIMOTION SCOUT online help.

2 Solution

By activating the technological data block, the controller can cyclically
predefine technological data to the drive or read this data from the drive.

This feature is supported by SIMOTION SCOUT V3.2 or later.

For example, technological data is required for the implementation of a
winder functionality with SIMOTION.

Technological data is transmitted in addition to the standard message
frame.

If the technological data block is configured upon the configuration of the
axis, all words transmitted additionally are assigned a specific significance
in SIMOTION.

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3 Configuration

3.1 Assignment of the Variables in the Technological Data Block

The order and significance of the words in the technological data block is predefined in SIMOTION SCOUT.

In the drive, the corresponding parameters must be linked to the additional words in the PROFIBUS message frame.

Table 2-1: Variable designations in the SIMOTION SCOUT and Drive (SINAMICS S120 or SINAMICS_Integrated)

Direction	Word No.	Designation in SIMOTION SCOUT	Designation in the Drive
SIMOTION -> Drive	1	(Axis).DefaultAdditiveTorque	P1511 additional torque 1 P1512 weighting
	2	(Axis).DefaultTorqueLimitPositive	P1522 upper torque limit/motor
	3	(Axis).DefaultTorqueLimitNegative	P1523 lower torque limit/regenerative
Drive -> SIMOTION	1	(Axis).ActualTorque.Value	r80 actual torque value

Table 2-2: Variable designations in the SIMOTION Scout and Drive (SIMODRIVE 611U)

Direction	Word No.	Designation in SIMOTION SCOUT	Designation in the Drive
SIMOTION -> Drive	1	(Axis).DefaultAdditiveTorque	P50113 MsetExt torque setpoint
	2	(Axis).DefaultTorqueLimitPositive	Not existing
	3	(Axis).DefaultTorqueLimitNegative	Not existing
Drive -> SIMOTION	1	(Axis).ActualTorque.Value	P50114 Msetpoint smoothed torque setpoint

Table 2-3: Variable designations in the SIMOTION Scout and Drive (SIMOVERT MASTERDRIVES)

Direction	Word No.	Designation in SIMOTION SCOUT	Designation in the Drive
SIMOTION - > Drive	1	(Axis).DefaultAdditiveTorque	P262 Torque setpoint Q.M(additional)
	2	(Axis).DefaultTorqueLimitPositive	P263 M(limit1,set) upper
	3	(Axis).DefaultTorqueLimitNegative	P264 M(limit2,set) lower
Drive -> SIMOTION	1	(Axis).ActualTorque.Value	R007 Actual torque value

For more detailed information on the parameters for further drives, refer to the corresponding equipment manual.

3.2 Normalization of the Variables

Normalized variables are transmitted via the PROFIBUS. A factor is transmitted instead of transmitting absolute values (for 100%, the factor is 4,000h). Factors from -200 to +200% are therefore supported.

These factors refer to the motor torque that is entered in parameters depending on the drive or calculated from various parameters. For more detailed information, refer to the documentation on the corresponding drive.

In SIMOTION SCOUT, the value stored in the configuration data

(Axis).TypeOfAxis.SetPointDriverInfo.DriveData.maxTorque

will be used as reference torque. This value can be modified in offline mode via the expert menu of the axis.

Figure 2-1 , Axis, maximum torque

SetPointDriverInfo	Drive interface			
DriveData	Drive characteristic values for stand			
maxSpeed	Maximum speed of the drive	6000.0	6000.0	6000.0
maxTorque	Maximum torque of the drive	1.38	1.38	1.38
InvertSetPoint	Direction of rotation adjustment			
factorType	Drive type	NO_TYPE (0)	NO_TYPE (0)	NO_TYPE (0)

To ensure a homogeneous evaluation of the factor transmitted via PROFIBUS, the torque settings in the drive must correspond to the settings in SIMOTION SCOUT.

For SINAMICS_Integrated, this value is defined in P2003.

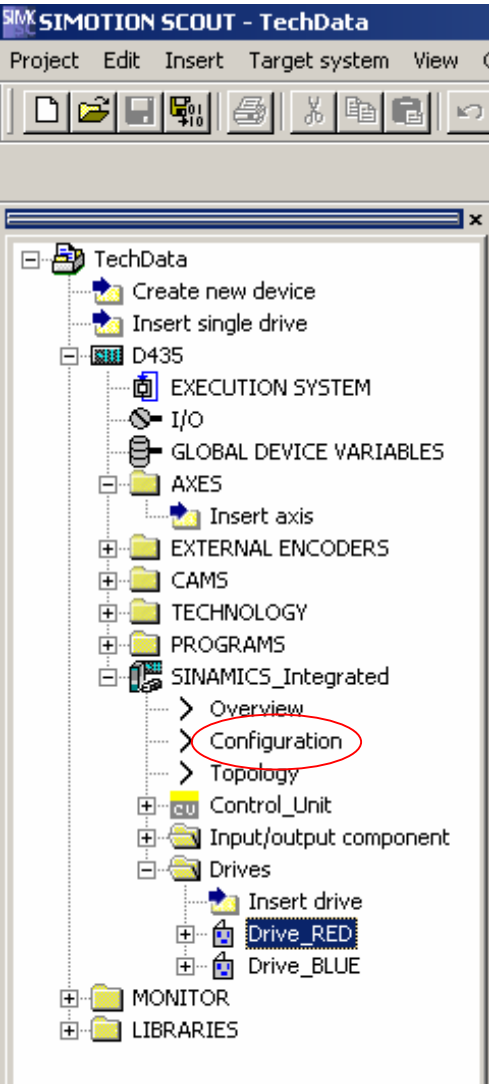
Figure 2-2 , P2003 drive parameter, maximum torque

p1990		Rotor position identification angular comm	0	-
p2000		Reference speed reference frequency	6000.00	rpm
p2001		Reference voltage	1000	V
p2002		Reference current	3.00	A
p2003		Reference torque	1.38	Nm
r2004		Reference power	0.9	kW
r2032	+	Master control, control word effective	0H	-

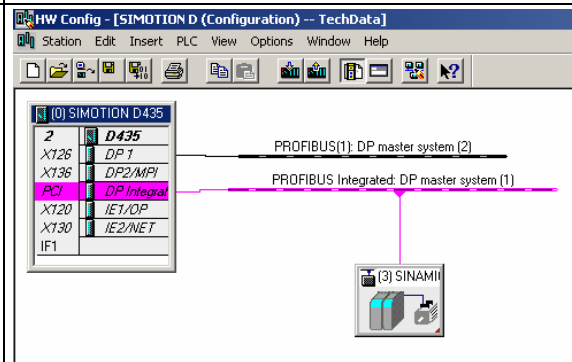
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3.3 Creating Technological Data for the SINAMICS_Integrated Drive

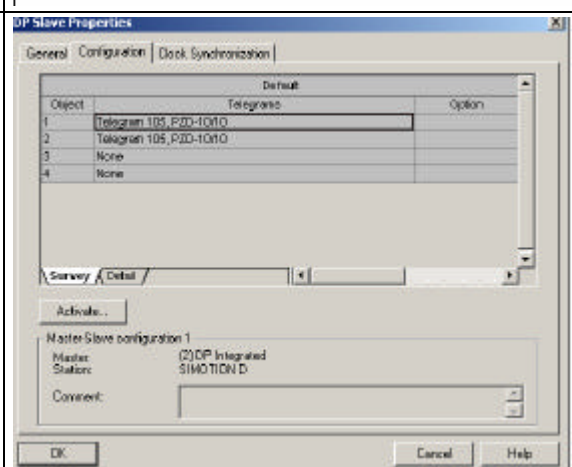
Table 2-4 Manual extension of the PROFIBUS message frame in the hardware configuration, illustrated via the example of a project with SIMOTION D435 and SINAMICS_Integrated and the Axis_RED:

No.	Action	Remark
1	<p>Provide the corresponding prerequisites: Create a project with D435 and SINAMICS_Integrated. Create drives under SINAMICS_Integrated. A Siemens standard message frame must be used for this purpose (e.g. 105). Open the SINAMICS_Integrated configuration.</p>	

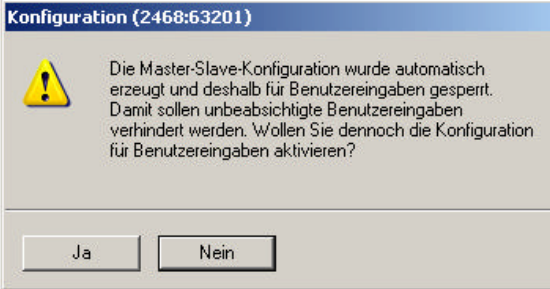

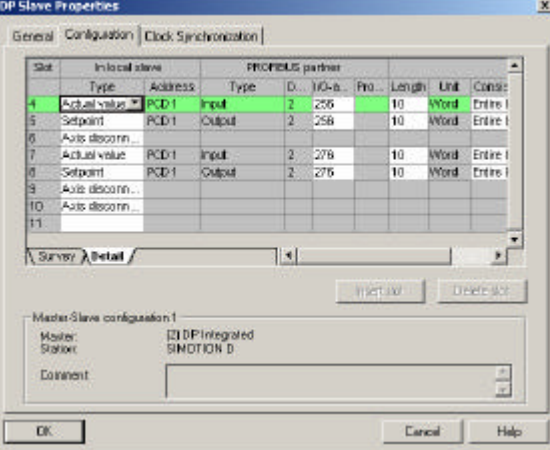
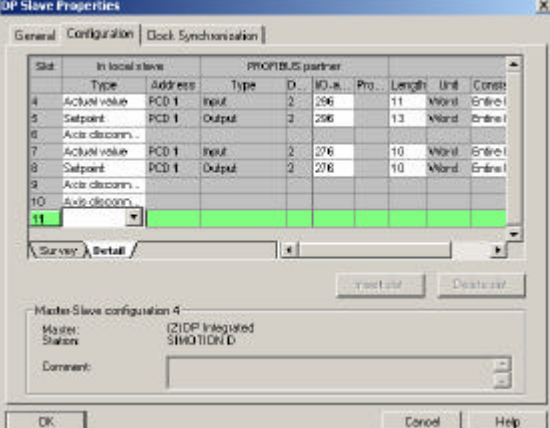
The “SINAMICS_Integrated - Configuration” **window must be closed afterwards.**



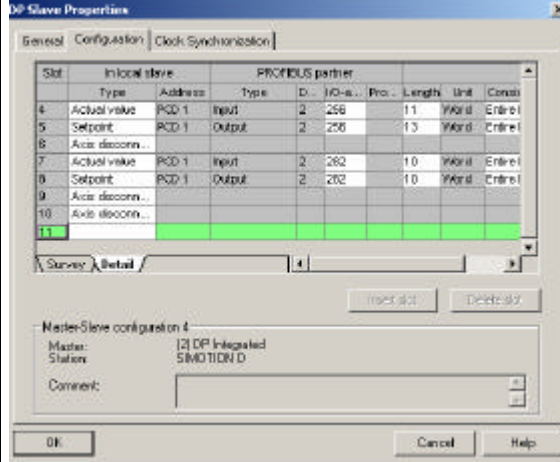
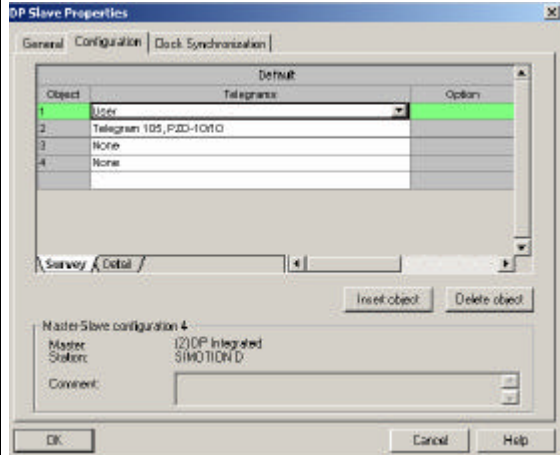
(Object 1)





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5	<p>Click the "Activate" button to check whether the master-slave configuration has been automatically created. The corresponding message pops up. Click on Yes to confirm that you actually want to activate the user settings and then click on "Detail" to open the corresponding menu.</p>	 
6	<p>Since Object 1 is shown in the uppermost table line and is assigned to physical addresses starting with 256, this object refers to Slots 4 and 5.</p> <p>The length of the actual-value message frame must be extended by one word.</p> <p>The length of the setpoint message frame is extended by three words.</p>	
7	<p>Due to the extended message frame length and the continuous address allocation, the HW Config moves the addresses to a free range.</p> <p>Here: Starting with 296.</p>	

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8	<p>The addresses can be modified with the other objects in such a way that a consecutive address allocation in ascending order is ensured once more.</p> <p>In this example, an address range of 13 words I/O respectively has been reserved for Drive_RED.</p>	 <p>DP Slave Properties</p> <p>General Configuration Clock Synchronization</p> <table border="1"> <thead> <tr> <th>Slot</th> <th>In local slave</th> <th>PROFINET partner</th> </tr> <tr> <th>Type</th> <th>Address</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>Actual value</td> <td>POD 1 Input</td> </tr> <tr> <td>5</td> <td>Setpoint</td> <td>POD 1 Output</td> </tr> <tr> <td>6</td> <td>Axis disconn...</td> <td></td> </tr> <tr> <td>7</td> <td>Actual value</td> <td>POD 1 Input</td> </tr> <tr> <td>8</td> <td>Setpoint</td> <td>POD 1 Output</td> </tr> <tr> <td>9</td> <td>Axis disconn...</td> <td></td> </tr> <tr> <td>10</td> <td>Axis disconn...</td> <td></td> </tr> <tr> <td>11</td> <td></td> <td></td> </tr> <tr> <td>12</td> <td></td> <td></td> </tr> <tr> <td>13</td> <td></td> <td></td> </tr> <tr> <td>14</td> <td></td> <td></td> </tr> <tr> <td>15</td> <td></td> <td></td> </tr> </tbody> </table> <p>Survey Detail</p> <p>Master-Slave configuration 4</p> <p>Master Station: (2) DP Integrated SIMOTION D</p> <p>Comment:</p> <p>OK Cancel Help</p>	Slot	In local slave	PROFINET partner	Type	Address	Type	4	Actual value	POD 1 Input	5	Setpoint	POD 1 Output	6	Axis disconn...		7	Actual value	POD 1 Input	8	Setpoint	POD 1 Output	9	Axis disconn...		10	Axis disconn...		11			12			13			14			15		
Slot	In local slave	PROFINET partner																																										
Type	Address	Type																																										
4	Actual value	POD 1 Input																																										
5	Setpoint	POD 1 Output																																										
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8	Setpoint	POD 1 Output																																										
9	Axis disconn...																																											
10	Axis disconn...																																											
11																																												
12																																												
13																																												
14																																												
15																																												
9	<p>After the changes to Object 1, the message frame type has been changed to "User-Defined" in the "Survey" menu.</p> <p>Click on OK to apply the settings.</p>	 <p>DP Slave Properties</p> <p>General Configuration Clock Synchronization</p> <table border="1"> <thead> <tr> <th>Object</th> <th>Telegram</th> <th>Option</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User</td> <td></td> </tr> <tr> <td>2</td> <td>Telegram 105, PZD-1010</td> <td></td> </tr> <tr> <td>3</td> <td>None</td> <td></td> </tr> <tr> <td>4</td> <td>None</td> <td></td> </tr> </tbody> </table> <p>Survey Detail</p> <p>Master-Slave configuration 4</p> <p>Master Station: (2) DP Integrated SIMOTION D</p> <p>Comment:</p> <p>OK Cancel Help</p>	Object	Telegram	Option	1	User		2	Telegram 105, PZD-1010		3	None		4	None																												
Object	Telegram	Option																																										
1	User																																											
2	Telegram 105, PZD-1010																																											
3	None																																											
4	None																																											

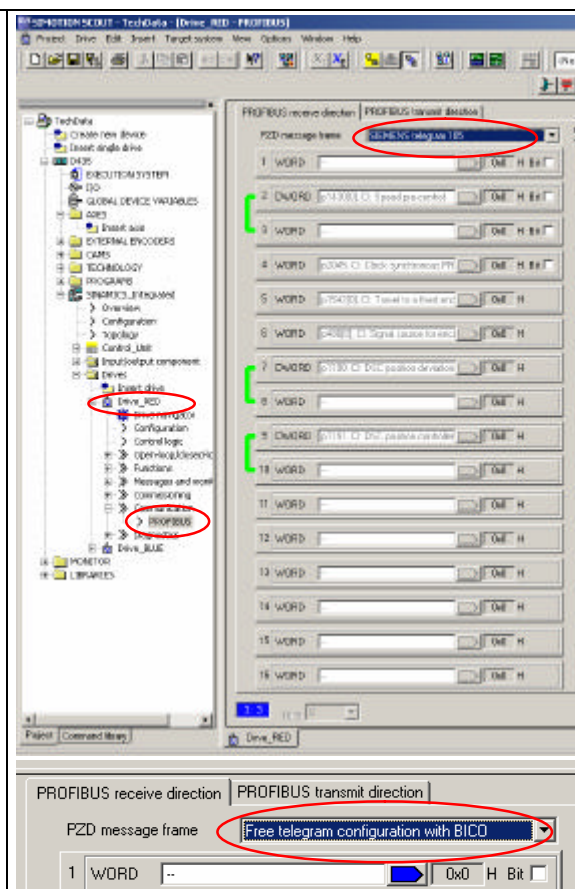
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10	<p>A message in SIMOTION informs the user that changes can only become effective after an "Adjustment to the HW Config" in the SINAMICS_Integrated configuration menu.</p> <p>Click on OK to confirm this message and then click on "Save and compile" to save the changes in the HW Config.</p>	<div data-bbox="810 340 1375 739"> <p>Konfiguration (2468:63215)</p>  <p>Achtung! Wurde das Telegramm verändert, so müssen Sie im SCOUT/STARTER des SINAMICS "SINAMICS_Integrated" die Konfiguration PROFIBUS-Telegramm öffnen und den Button "Abgleichen mit HW Konfig" betätigen. Erst dadurch wird der SCOUT/STARTER mit HW Konfig abgeglichen.</p> <p><input type="checkbox"/> Diese Meldung in Zukunft nicht mehr anzeigen.</p> <p>OK</p> </div> <div data-bbox="810 739 1375 1137"> <p>Configuration (4184:63215)</p>  <p>Notice! If the telegram has been changed, you have to open the PROFIBUS telegram configuration in SCOUT/STARTER of SINAMICS "SINAMICS_Integrated" and press the "Adjust to HW config" button. Only then will SCOUT/STARTER be adjusted to HW config.</p> <p><input type="checkbox"/> Do not display this message again.</p> <p>OK</p> </div>
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- 11 Click on "Drive..., Communication, PROFIBUS" in SIMOTION SCOUT.
Change the message frame type from SIEMENS message frame 105 to "Free message frame configuration with BICO".

This change is automatically applied in the receive and transmit directions.



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- 12 The required process data must now be linked with the PROFIBUS message frame in the drive.
- The parameters are assigned by clicking on the newly created words in the "Communication, PROFIBUS" drive sub-menu.
- In the example, this is the receive direction:
- WORD 11: P1511 additional torque 1
 WORD 12: P1522 upper torque limit
 WORD 13: P1523 lower torque limit
- When entering the P1522 and P1523 parameters, a message pops up to inform the user that these parameters are interconnected with the P1520 and P1521 parameters.
- Click on "Yes" to cancel the existing interconnection.
- Torque limits via the PROFIBUS are now possible.

PROFIBUS receive direction | PROFIBUS transmit direction

P2D message frame: Free telegram configuration with BICO

1	WORD	--	0x0	H	Bit
2	DWORD	p1430[0], CI: Speed pre-control	0x0	H	Bit
3	WORD	--	0x0	H	Bit
4	WORD	p2045, CI: Clock synchronous PR	0x0	H	Bit
5	WORD	p1542[0], CI: Travel to a fixed enc	0x0	H	
6	WORD	p480[0], CI: Signal source for enc	0x0	H	
7	DWORD	p1190, CI: DSC position deviation	0x0	H	
8	WORD	--	0x0	H	
9	DWORD	p1191, CI: DSC position controller	0x0	H	
10	WORD	--	0x0	H	
11	WORD	p1511[0], CI: Supplementary torqu	0x0	H	
12	WORD	p1522[0], CI: Torque limit, upper/r	0x0	H	
13	WORD	p1523[0], CI: Torque limit, lower/rc	0x0	H	
14	WORD	--	0x0	H	
15	WORD	--	0x0	H	
16	WORD	--	0x0	H	

Existing interconnection

Existing interconnection will be cancelled!

"p1522[0], CI: Torque limit, upper/motoring" is already interconnected to "Drive_ROT, p1520[0], CO: Torque limit, upper/motoring".
 Do you want to cancel the existing interconnection?

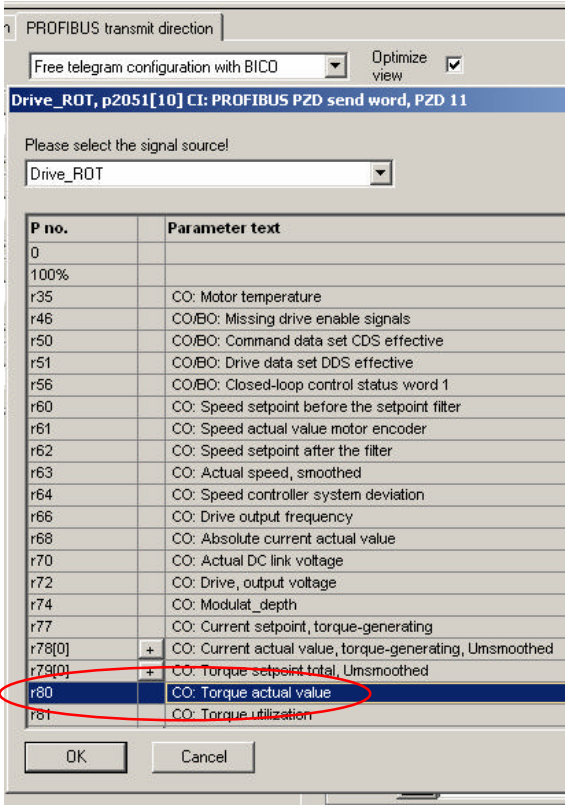
Yes No

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In the example, the unsmoothed actual torque value of the r80 parameter is transmitted to WORD 11.

Since this parameter is not available by default, it must be searched for in “..Further Interconnections”.

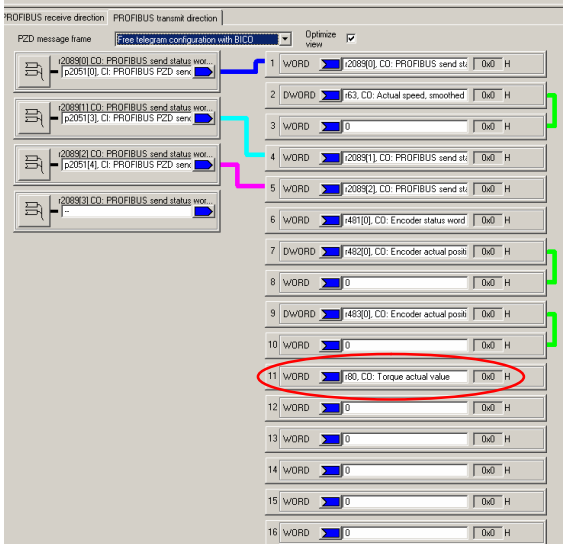


14

WORD 11 shows r80, Torque actual value

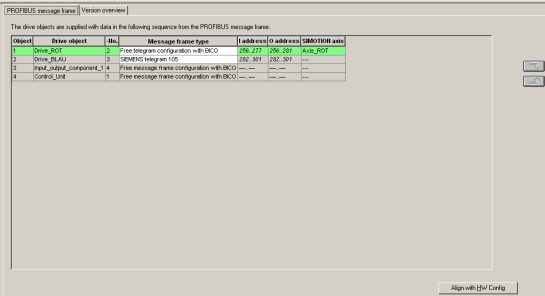
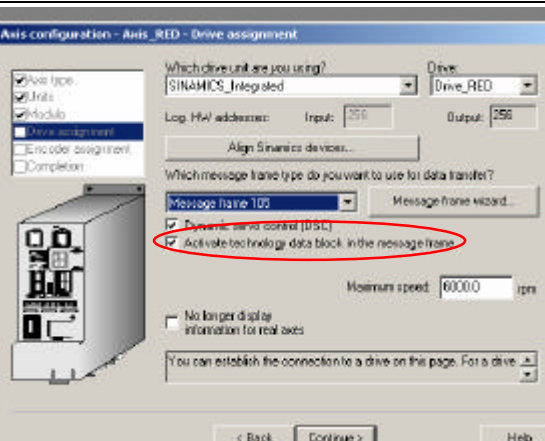
Close the window.

Save and compile the settings.



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15	<p>Perform an adjustment to the HW Config in the “SINAMICS_Integrated – Configuration” window.</p>	
16	<p>Create a TO axis under D435. Also use the standard message frame (in this case: Message frame 105) and tick the “Activate technology data block in the message frame” checkbox. “Save and compile” the configuration. Next, go online and download the project.</p>	

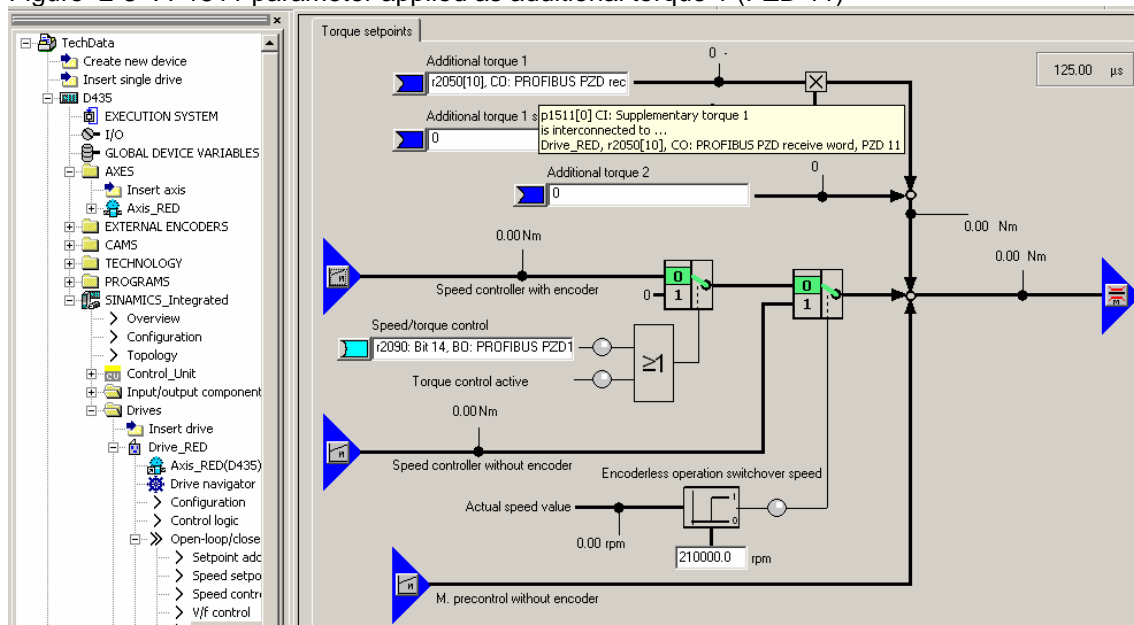
3.4 Other Settings in the SINAMICS_Integrated Drive

Based on the parameters defined so far, certain settings have been performed automatically for the drive.

However, the scaling and the selection of the torque limitation type still need to be adjusted.

These settings must be performed online on the drive. After performing the changes, the user can go offline again. Next, RAM must be copied to ROM and the changes must be loaded into the PG. The project must be saved and compiled in offline mode. Afterwards, it is possible to go online again.

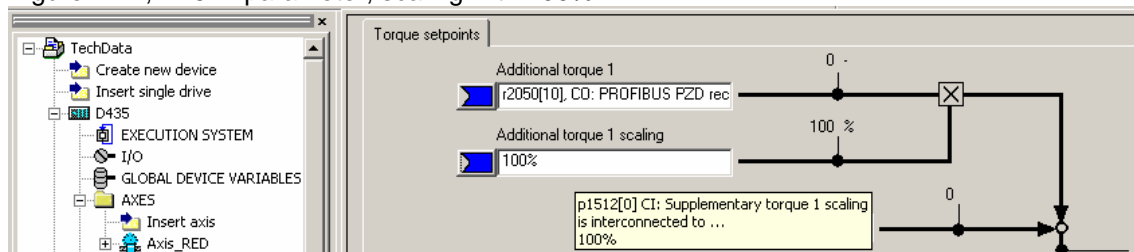
Figure 2-3 : P1511 parameter applied as additional torque 1 (PZD 11)



The factor assigned to Additional torque 1 is a scaling with the value 0. Afterwards, Additional torque 1 becomes ineffective.

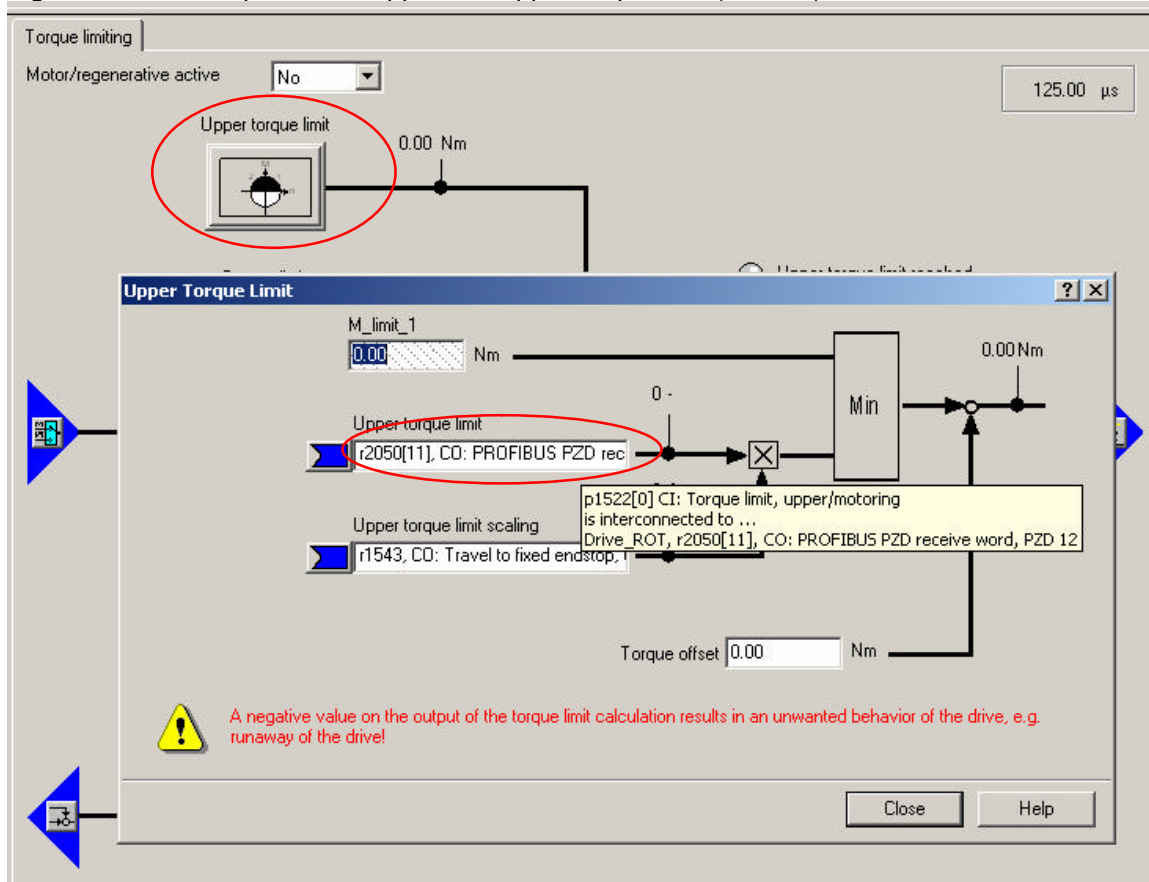
100% or another desired value can be selected instead.

Figure 2-4 , P1512 parameter, scaling with 100%



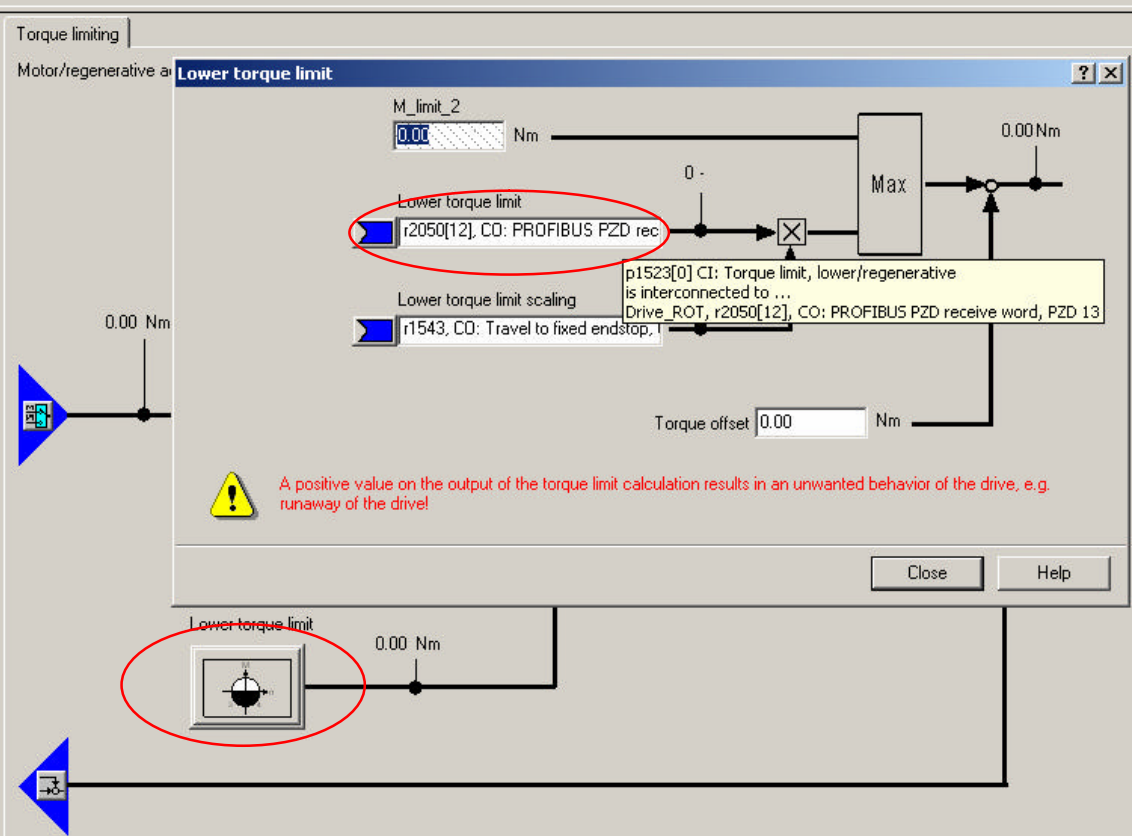
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Figure 2-5 , P1522 parameter applied as upper torque limit (PZD 12)



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Figure 2-6 , P1523 parameter applied as lower torque limit (PZD 13)



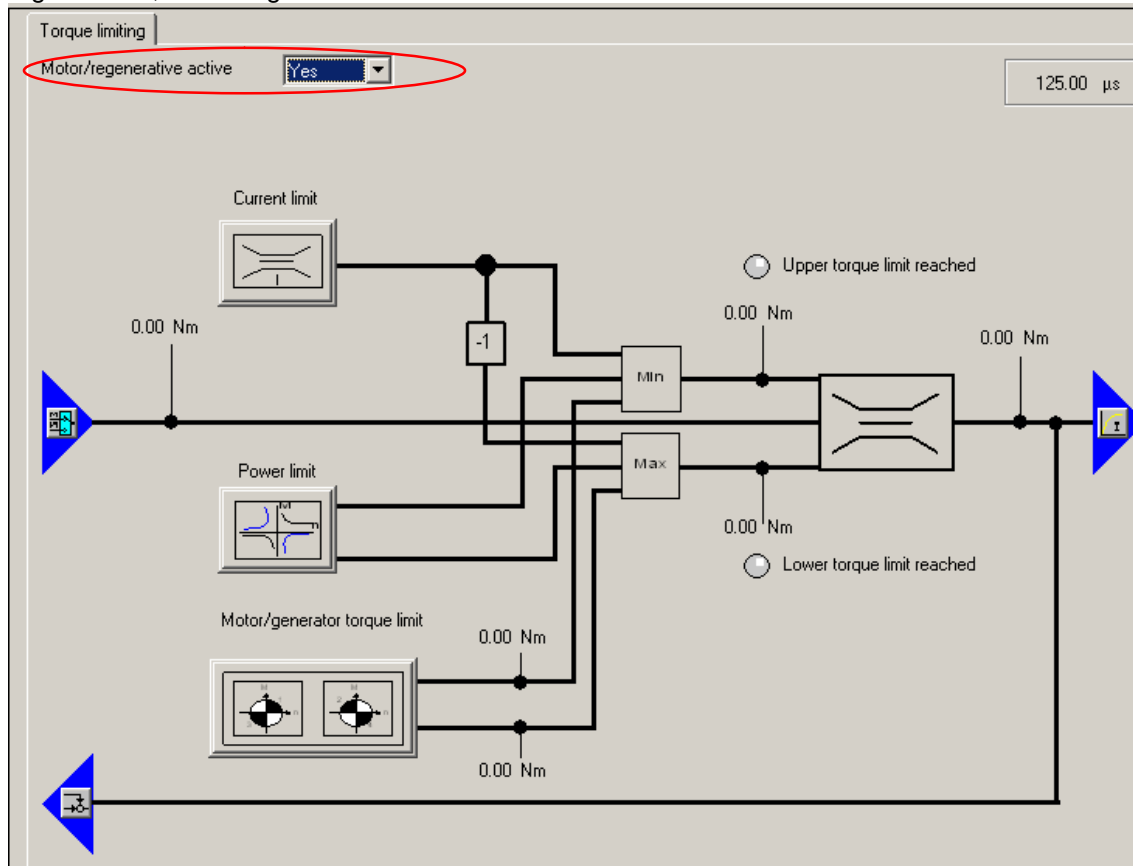
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The setting "Motor/regenerative active = No" corresponds to the behavior of a MASTERDRIVE or MICROMASTER. The motor/regenerative torque is therefore limited to the highest permissible value.

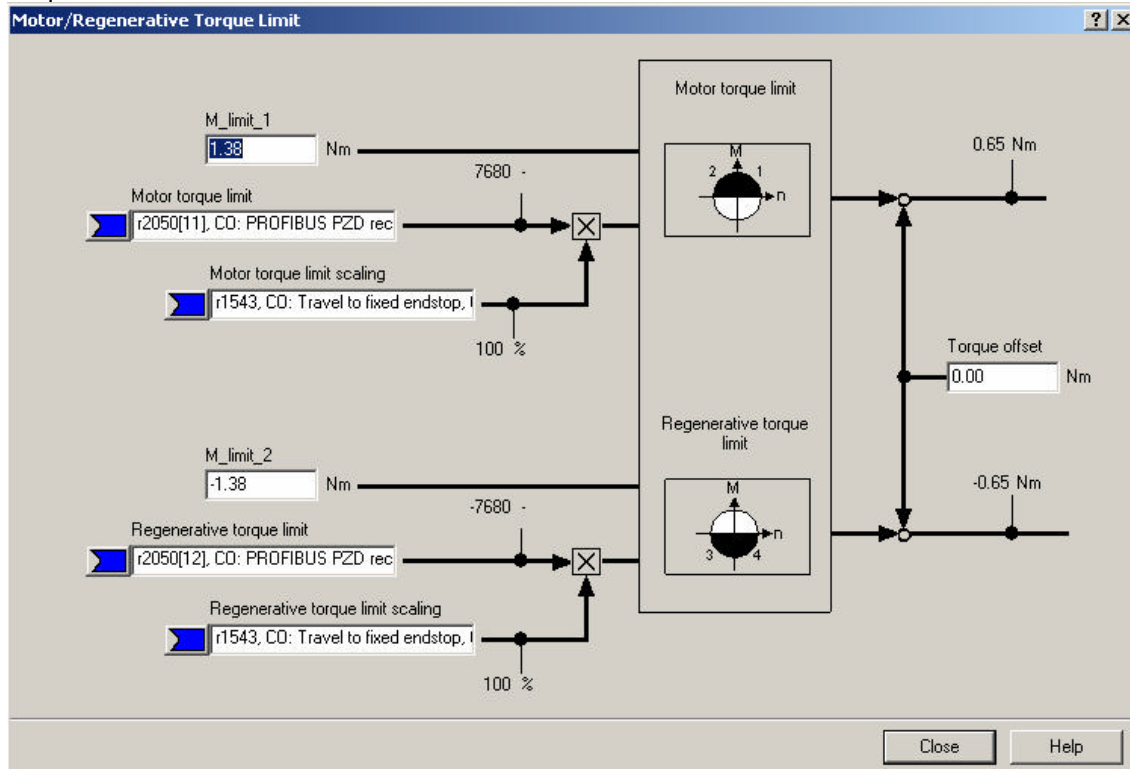
Besides the motor torque limitation upon traversing in the forward direction and acceleration, a regenerative torque limitation becomes active upon traversing in the reverse direction and deceleration. To avoid this behavior, the user can select "Yes" for the setting "Motor/regenerative active".

Figure 2-7 , Motor/regenerative active = Yes



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Figure 2-8 , P1522 and P1523 parameters and scaling with 100% with motor/regenerative torque limit



Different torque limits refer to acceleration and deceleration processes, independently of the traversing direction.

The M_limit_1 and M_limit_2 values are updated when going online.

The limit values are indicated in P1520 and P1521. These values depend on the selection of the technological application of the axis in P500.

A feed drive with limit current limitation is defined for default setting P500 = 101. The maximum value for the drive is selected in this context (1.38 Nm).

Figure 2-9 , P500 parameter, change of the technological application

r487[0]	+	+	Diagnostic encoder control word Gn_ST	0H	-
p488[0]	+		Measuring probe 1 input terminal, Encode	No probe (0)	-
p489[0]	+		Measuring probe 2 input terminal, Encode	No probe (0)	-
p491			Motor encoder fault response: ENCODER	Encoder fault results in OFF2 (0)	-
p492			Maximum speed difference for each sam	0.0	rpm
p495[0]	+		Equivalent zero mark, input terminal, Enco	No equivalent zero mark (evaluation of	-
p500			Technology application	Feed drive (limit current limitation) (10	-
p578[0]	D		Calculate parameters that are dependent	Standard drive (SERVO) (100)	
p580			Measuring probe, input terminal	Feed drive (limit current limitation) (101)	
p581			Meas probe, edge	Spindle drive (rated current limitation) (102)	
p582			Measuring probe, pulses per revolution	1	-
p583			Measuring probe, maximum measuring tim	10	s

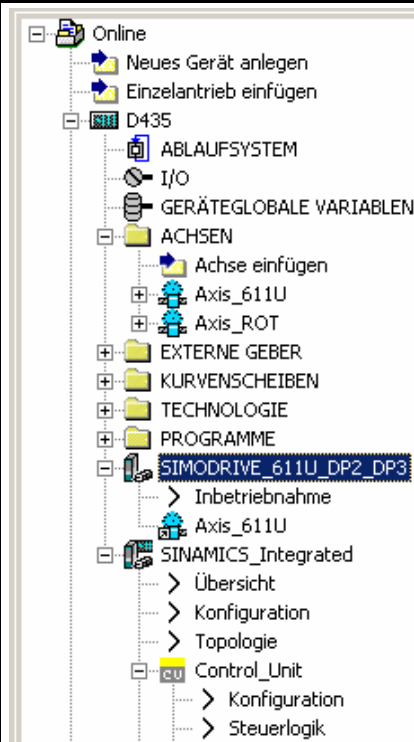
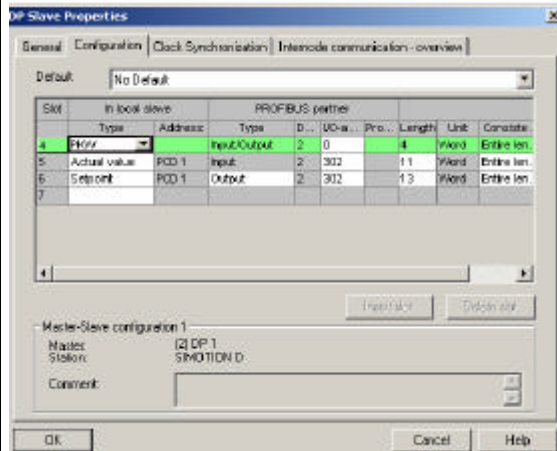
The calculation of P1520, P1521 and other important parameters relevant for controlling changes through the selection of "Standard drive (SERVO)(100)".

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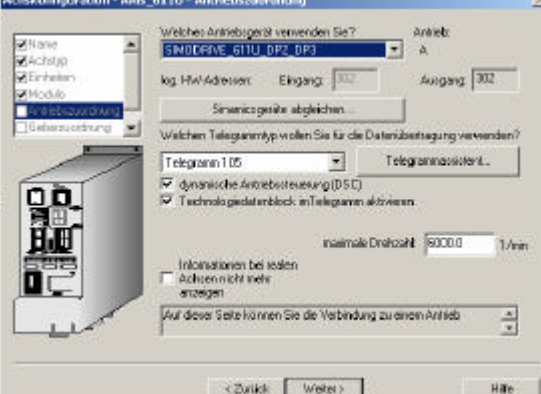
The P578[0] parameter must be set to 1 to perform the recalculation.
P1520/P1521 changes to the nominal torque (0.6 Nm) defined in the P312 parameter.
This change does not affect the scaling of the transmission via Profibus. Only the P2003 parameter is relevant in this context.

3.5 Creating Technological Data for SIMODRIVE 611U Drive

Table 2-5 Manual extension of the Profibus message frame in the hardware configuration – example of a project with SIMOTION D435 and SIMODRIVE 611U and the “611U” axis.

No.	Action	Remark
1	Create the relevant prerequisites: Create the project with D435 and SIMODRIVE 611U.	
2	<p>The desired message frame can be selected first from the hardware configuration in the properties of SIMODRIVE 611U, Configuration. A defined address range can be reserved in this way.</p> <p>For Message frame 105, respectively 10Words I/O can be defined.</p> <p>Afterwards, the number of additional words must be entered into the length, i.e. + 1 word for the actual value and + 3 words for the setpoints.</p> <p>The message frame type changes automatically to “No Default”.</p>	

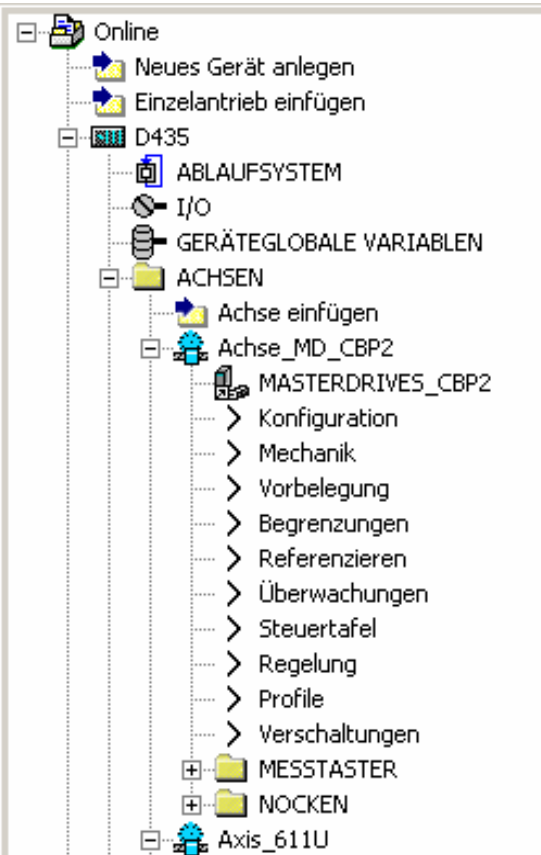
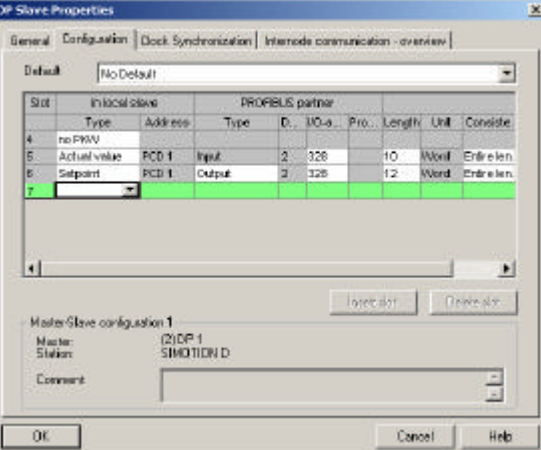
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3	<p>With SimoCom U, the parameters indicated in the list on the right-hand side must be adapted in the expert list of parameters.</p> <p>Parameter 922 = 0 allows free message frame configuration.</p> <p>The parameters used in the standard message frame (here: 105) must be entered into the 915 and 916 parameters.</p> <p>The 50113 identifier can be entered as an additional setpoint in the 915:11 parameter.</p> <p>This is the external torque setpoint (MsetExt) (n-setpoint-operation, Software Version 4.1 or later)</p> <p>The 50114 identifier can be entered into the 916:11 parameter as an additional actual value.</p> <p>This is the smoothed torque setpoint controlling the motor torque (Mset).</p>	<table border="1"> <tbody> <tr><td>915:0</td><td>PZD setpoint value assignment PROFIBUS</td><td>0</td></tr> <tr><td>915:1</td><td>PZD setpoint value assignment PROFIBUS</td><td>50001</td></tr> <tr><td>915:2</td><td>PZD setpoint value assignment PROFIBUS</td><td>50007</td></tr> 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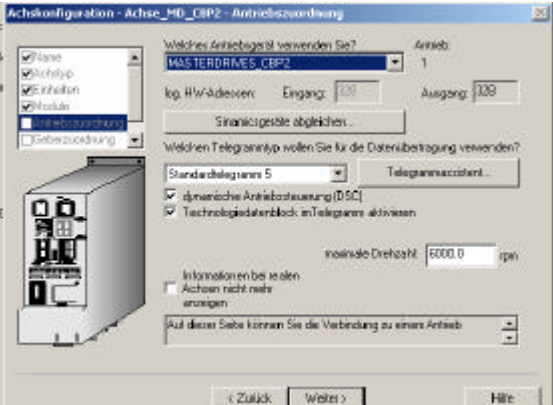
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3.6 Creating Technological Data for SIMOVERT MASTERDRIVES Drive

Table 2-6 Manual extension of the Profibus message frame in the hardware configuration – example of a project with SIMOTION D435 and SIMOVERT MASTERDRIVES CBP2 and the “MD_CBP2” axis

No.	Action	Remark
1	Create all relevant prerequisites: Create a project with D435 and SIMOVERT MASTERDRIVES CBP2.	
2	<p>The desired message frame should be selected first from the hardware configuration, properties of the SIMOVERT MASTERDRIVES, Configuration. A defined address range is reserved in this way.</p> <p>For standard message frame 5, respectively 9Words I/O are defined.</p> <p>If more words are required, the number of additional words must be entered into the length, i.e. + 1 word for the actual value and + 3 words for the setpoints.</p> <p>The message frame type then changes automatically to “No Default”.</p>	

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3	<p>With DriveMon, the parameters must be adapted via free parameterization.</p> <p>Parameter 922 = 999 allows free message frame configuration</p>	
4	<p>Create a TO axis under D435.</p> <p>Use standard message frame (here: message frame 105) and tick the "Activate technology data block in the message frame" checkbox.</p> <p>Next, "Save and Compile" the configuration.</p>	

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3.7 Checking SCOUT Settings

The user can check in the expert menu of the axis whether settings for the use of the technological data block exist and have been correctly defined. This check can be performed by means of a repeated run of the axis configuration.

Table 2-7 Checking the settings required for using technological data

No.	Action	Remark																																												
1	<p>Technological data is attached as INT to the In/Out drives log. This is defined in the technologicalData.enable configuration data. This data is set to YES by ticking the “Activate technology data block in the message frame” checkbox.</p> <p>The logical addresses for the technological data are shown in the technologicalDataOutInfo and technologicalDataInInfo configuration data.</p> <p>They start after the standard message frame.</p>	<table><tr><td>+</td><td>StandStillSignal</td><td>Standstill signal</td><td></td></tr><tr><td>+</td><td>SwLimit</td><td>Software limit switch</td><td></td></tr><tr><td>+</td><td>SystemDeadTimeData</td><td>System-related dead times</td><td></td></tr><tr><td>-</td><td>TechnologicalData</td><td>Drive interface for specific paramete</td><td></td></tr><tr><td>-</td><td>TechnologicalDataInInfo</td><td>Drive interface for specific actual va</td><td></td></tr><tr><td>-</td><td>LogAddress</td><td>Logical address</td><td>276</td></tr><tr><td>-</td><td>TechnologicalDataOutInfo</td><td>Drive interface for specific setpoints</td><td></td></tr><tr><td>-</td><td>LogAddress</td><td>Logical address</td><td>276</td></tr><tr><td>-</td><td>enable</td><td>Activation of the technology data</td><td>YES (173)</td></tr><tr><td>+</td><td>VelocityPositionProfile</td><td>Profile end identification</td><td></td></tr><tr><td>-</td><td>TypeOfAxis</td><td>Axis type</td><td>REAL_AXIS (0)</td></tr></table>	+	StandStillSignal	Standstill signal		+	SwLimit	Software limit switch		+	SystemDeadTimeData	System-related dead times		-	TechnologicalData	Drive interface for specific paramete		-	TechnologicalDataInInfo	Drive interface for specific actual va		-	LogAddress	Logical address	276	-	TechnologicalDataOutInfo	Drive interface for specific setpoints		-	LogAddress	Logical address	276	-	enable	Activation of the technology data	YES (173)	+	VelocityPositionProfile	Profile end identification		-	TypeOfAxis	Axis type	REAL_AXIS (0)
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4 Application

4.1 Introduction

The example is based on the use of a sample case with SIMOTION-D435.

When configuring the drive, the P210 parameter must be set to the reduced mains voltage: $1.5 \times 230V = 345V$

After configuring the data traffic via the extended PROFIBUS message frame on the drives and SIMOTION side, technological data is available for the user program.

The program example is executed in Motion tasks and programmed in MCC.

The TORQUE unit includes the global variables required for controlling the program.

This unit also includes the following programs:

TORQUE The additional torque and the torque limits are enabled and disabled here.

POS For starting and stopping Axis_RED.

N_M_SOLL For switching the operating mode of the drive from speed control with encoder (21) to torque control with encoder (23)

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The ERROR unit includes the empty ERROR program which has been integrated into the TechnologicalFault task and the PeripheralFault task to avoid CPU stops. The user must expand these programs to be able to respond specifically to errors.

In Motion Tasks, programs with an endless while loop programmed through WAIT 0ms conditions at the end of the while loop must be suspended in the Round Robin task. In this way, the user can avoid this MT blocking the processing of other Motion Tasks during two servo cycles.

An additional torque is used in this example.

Notice! No speed control is possible if the torque control option is enabled (SINAMICS_Integrated P1300 = 23, torque control (with encoder)). If the load torque is too low, the motor will accelerate up to excess speeds.

If the drive is traversed in speed-controlled mode and the additional torque option is used, this torque will only occur during acceleration and deceleration. (feedforward control). This feedforward control option allows acceleration at a constantly defined torque. For example, this application is useful for winders which have to accelerate significant masses (rollers) in a defined time.

The additional torque is no longer effective as soon as the speed setpoint has been reached. A change provokes a brief jerk and the speed controller compensates the required torque to ensure that the speed can be maintained.

4.2 Control Variables

Start	Starts the Axis_RED axis with a Move motion.
Stop	Stops the Axis_RED axis with a speed-controlled stop with abort
Velocity	Speed in °/s
boAdditiveTorque	1 = activates additional torque, 0 = deactivates additional torque
rAdditiveTorque	Additional torque in Nm
boTorqueLimitPositive	1 = activates positive torque limitation 0 = deactivates positive torque limitation
rTorqueLimitPositive	Positive torque limit
boTorqueLimitNegative	1 = activates negative torque limitation 0 = deactivates negative torque limitation
rTorqueLimitNegative	Negative torque limit
boErrorTorque	1= indicates if the activation/deactivation of a torque command persists for more than 3 seconds and thus causes an error. Must be reset by the user to execute the function again.

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boReadDriveParameter	1 = after the start of CPU 1, parameter 1300 is read. If the operating mode is changed, this variable is set to 1 to verify the parameter change.
eActMode	Actual mode N – Speed control M – Torque control
eSetMode	Desired mode N – Speed control M – Torque control

4.3 TORQUE Program

This program is started with Motion Task 1 after startup and continuously runs after a delay of 5 seconds for the start-up of the TO in a while loop. It is continuously checked whether an activation or deactivation of the additional torque or of the torque limits shall be performed. In this case, the function is executed once. An error message pops up if the corresponding function cannot be successfully completed within 3 seconds (i.e. the state variable still shows the former state). This error must be reset to execute the function again.

The activation is performed via AdditiveTorqueType and TorqueLimitType with DEFAULT_VALUE. The value transferred via the system variables of the axis thus becomes effective in the IPO cycle. This transfer is performed upon the program start.

```
Axis_RED.DefaultAdditiveTorque      := rAdditiveTorque
Axis_RED.DefaultTorqueLimitNegative := rTorqueLimitNegative
Axis_RED.DefaultTorqueLimitPositive := rTorqueLimitPositive
```

The system functions mentioned below are used for activation and deactivation.

These functions are performed only once upon a change from Activate to Deactivate and vice-versa.

```
_enableAxisAdditiveTorque, _disableAxisAdditiveTorque,
_enableAxisTorqueLimitPositive, _disableAxisTorqueLimitPositive,
_enableAxisTorqueLimitNegative, _disableAxisTorqueLimitNegative
```

4.4 POS Program

Cancels the axis enable in OFF state.

Errors occurring after the start are acknowledged.

As soon as all errors have been acknowledged, the axis enable is switched. The axis is started at the predefined speed by issuing the Move command.

Afterwards, the system waits for a stop. Further switching actions also take place if a TO error occurs.

The axis is stopped if a stop command has been issued.

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The axis is also stopped if an error occurs upon the axis enable or when the Move command is issued.

The start and stop commands are automatically reset.

4.5 N_M_SETPOINT Program

The drive reads this parameter again upon the start of the CPU and after a change of the P1300 parameter in the drive.

The user can switch between speed-controlled mode with encoder (21) and torque-controlled mode with encoder (23).

This option shall allow testing of the additional torque under the corresponding control conditions.