# BECKHOFF New Automation Technology

# TwinSAFE Tutorial 15 | EN SafeMotion Wizard

# SafeMotion Wizard for Gantry Axes (SLS)



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# 1 Introduction

TwinSAFE includes several innovations that bring more functionality and performance to your safety controller. A major innovation is that the functionality of the safety controller is integrated in each TwinSAFE component. This means that you can, for example, use a TwinSAFE input component both as an input component and the safety control integrated on it to use application-specific pre-processing.

This is tutorial 15 of a tutorial series.

The aim of this tutorial series is to familiarize you with the TwinSAFE innovations using individual examples.

This tutorial is about the realization of a SLS functionality for gantry axes using the SafeMotion Wizard.

#### 1.1 Edition status

Edition	Comment
1.0.0	First released edition
0.0.1	First draft

#### 1.2 Requirements

Meet the following requirements for this tutorial:

- TwinCAT 3 version ≥ 3.1.4024.11
- TwinCAT Safety Editor TE9000 ≥ 1.2.1.1
- TwinSAFE firmware ≥ 03
- AX8000 firmware  $\geq$  0104; with default module ID active

### 1.3 Starting point

At the starting point of the tutorial

- a standard PLC project exists,
- an EL6910 project exists.

### 1.4 Demo system

#### 1.4.1 Hardware

The demo system of this tutorial consists of the following hardware:

- CX for EtherCAT communication and the standard PLC controller
- EL6910 as master TwinSAFE Logic
- EL1918 with safe inputs for reading light barrier signals
- Light barrier
- AX8000-x2xx

#### 1.4.2 Desired safety functionality

This tutorial describes the realization of the following functionality:

Safe speed for counter-rotating axes

# 2 Demonstration

### 2.1 Create Safe Motion project

Starting point of the tutorial is an existing TwinCAT3 project with an existing I/O configuration and the corresponding Safe Motion entries.

Start FW Update Wizard...

Proceed as follows to create a Safe Motion project with the SafeMotion Wizard:

SAFETY	
1. Select project	
TwinSAFE PLC Team Scope	Tools
✓ Verify Safety Project	
🐶 Verify Complete Safety Project	
2. Select "TwinSAFE" tab	
Safety Library Repository	
Wizards	<ul> <li>Start SafeMotion Wizard</li> </ul>

#### 3. Select "Start SafeMotion Wizard..." via the wizard field

SafeMotion Wizard						×
Steps			Select Pro	oject Targe	ets	
Select Project Targets	Target Type:	AX891x	Y6	v		Show Hidden Devices
Select Motors	4 Gantry S	SLS Demo lable				
Select Safety Function		Right TIID^Devic	e 1 (EtherCAT) ^ Term 1 (EtherCAT) ^ Term 1	1 (EK1200) ^ Term 4 (E (EK1200) ^ Term 4 (EK	K1122) ^ PowerSup 11221 ^ PowerSuppl	oly^Right v^Left
Configure TwinSAFE Projects	▶ For a	in untargeted Safe	Motion project			
Assignment of master target logics						
Safe Address Selection						
c >						
				Back	Next	Cancel

The "Select Project Targets" window opens and shows you an overview of all existing and virtual axes.

- 4. Select Safe-Motion component
- 5. Confirm selection with "Next"

SafeMotion Wizard	×
Steps	Select Motors
Select Project Targets	Select the attached motor per channel:
Select Motors	Right
Select Safety Function	ChA AM8xxx-xxHx-xxxx (OCT 24Bit Multiturn)
Configure TwinSAFE Projects	ChB Other motors
Assignment of master target logics	Cha AM8xxx-xxHx-xxxx (OCT 24Bit Multiturn)
Safe Address Selection	Ch8 Other motors

In the "Select Motors" window, you configure the feedback for the individual axes.

- 6. Select "AM8xxx-xxHx-xxx (OCT 24Bit Multiturn)" for ChA
- 7. Select "Other Motors" for ChB
- 8. Confirm selection with "Next"

SafeMotion Wizard	
Steps	Select Safety Function
Select Project Targets	tput
Select Motors	n n n n n n n n n n n n n n n n n n n
Select Safety Function	nnect M M 1 M 2 L S 2 M M 2 M 2 M 2 S 2 S 3 S 3 S 3 S 3 S 3 S 3 S 3 S 3 S 3 S 3
Configure TwinSAFE Projects	
Assignment of master target logics	Gantry SLS Demo
Safe Address Selection	
	ChB ✓ No sate motion based function
	ChB V No sare motion based function
	4
	Back Next Cancel

In the "Select Safety Function" window, select the desired safety functions.

9. Select the safety functions SLS1 for ChA

The STO safety function is active as a default setting for all channels.

#### 10. Confirm selection with "Next"

SafeMotion Wizard		×
Steps		Configure TwinSAFE Projects
Select Project Targets	The following project	s will be created:
Select Motors	Gantry SLS Demo	
Select Safety Function	Project Name:	SafeMotion SAFETY^Gantry SLS Demo
Configure TwinSAFF Projects	Safety Functions:	(v) ChA: 2 selected   ChB: 1 selected
Assignment of master target logics	Devices:	RightTIID^Device 1 (EtherCAT)^Term 1 (EK1200)^Term 4 (EK1122)^PowerSupply^Right Left TIID^Device 1 (EtherCAT)^Term 1 (EK1200)^Term 4 (EK1122)^PowerSupply^Left
Safe Address Selection		
c		
a. 6	L	Back Next Cancel

The "Configure TwinSAFE Projects" window opens. Here you have the option of renaming your safety project, which is generated for your safe motion component.

You also get an overview of the safety settings that have been made.

- 11. Rename project as desired
- 12. Check settings

#### 13. Confirm selection with "Next"

Assignment of master tary ster logic devices are available. The individual safe m projects will be created or already assigned safety p abled for each safemotion project. Device: Term 3 (EL6910)^SAFETY^Gantry SLS Den t Name: MotionControl ^SAFETY^Gantry SLS Den	get logics notion devices can be assigned to these projects will be extended. Backup &
ster logic devices are available. The individual safe m r projects will be created or already assigned safety p tabled for each safemotion project. Device: Term 3 (EL6910)^SAFETY^Gantry SLS Den t Name: MotionControl ^SAFETY^Gantry SLS Den	no
abled for each safemotion project.  Device: Term 3 (EL6910)^SAFETY^Gantry SLS Den  t Name: MotionControl ^SAFETY^Gantry SLS Den	no
Term 3 (EL6910)^SAFETY^Gantry SLS Den     MotionControl ^SAFETY^Gantry SLS Den	no
Device: Term 3 (EL6910)^SAFETY^Gantry SLS Der t Name: MotionControl ^SAFETY^Gantry SLS Den	no
t Name: MotionControl ^SAFETY^Gantry SLS Den	no
estore All e not assigned to a master project.	
îx Re are	k Restore All are not assigned to a master project. Back

In the next window "Assignment of master target logics" the connection to the EL6910 project is closed so that your Safe Motion component can communicate with the EL6910 project. The EL6910 project is automatically found and displayed.

14. Click the button " ... "

	e 1 (EtherCAT)^	Term 1 (EK1200	0)^Term 4 (Ek	(1122) ^ Power	Supply^Right
✓Left TIID^Devic	e 1 (EtherCAT)^	Term 1 (EK120)	0)^Term 4 (Ek	(1122) ^ Power	Supply^Left

15. Select safe motion components that you want to connect to the EL6910 project

#### 16. Confirm selection with "OK"

SafeMotion Wizard								×
Steps		Ass	signmer	nt of ma	aster	target l	ogics	
Select Project Targets	The following	master logic	devices are av	vailable. The ir	ndividua	l safe motion de	vices can be	e assigned to these
Select Motors	Restore can be	e enabled for	each safemot	tion project.	signed	salety projects	and be extern	ocu. backap ce
Select Safety Function	Gantry SLS D	emo						
Configure TwinSAEE Designets	Master Lo	gic Device:	Term 3 (EL6	910) ^ SAFETY	^Gantry	SLS Demo		
Assignment of master target logi	Devices:		Backup & Restore	Project	Name			
Cula Address Calastian				SafeMotion	Right	TIID^Device 1	(EtherCAT)^	Term 1 (EK1200)^1
Sale Address Selection				SafeMotion	Left	TIID^Device 1	(EtherCAT)^	Term 1 (EK1200)^1
	Master Pro	oject Name:	MotionCon	ntrol ^SAFETY	Gantry	SLS Demo		
	4							,
	D Professor	Destant All						
<pre></pre>	0/2 Devices	are not assi	gned to a ma	ster project.				
						Back	Next	Cancel
							HUM	Cancer

17. Confirm window with "Next"

SafeMotion Wizard					×
Steps		Safe	Address Selection	on	
Select Project Targets	Set the safe addresses	of all involved log	ic devices:		
Select Motors	Gantry SLS Demo		1		
Select Safety Function	Right -	59 +	Define FSoE connection a	address in project	
Configure TwinSAFE Projects	Left	3 +	Define FSoE connection a	address in project	
Assignment of master target logics	Term 3 (EL6910)	7 +			
Safe Address Selection	-				
2 ×					
			Back	Finish	Cancel

The "Safe Address Selection" window opens. Here the safe addresses are read out automatically. For virtual axes or axes that cannot be reached, you have the option of configuring the addresses yourself.

18. Close window with "Finish"

The SafeMotion Wizard configures the project.

Microso	oft Visual Studio	×
i	SafeMotion project(s) successfully created: - SafeMotion	
j	Master project(s) successfully created or updated: - MotionControl	
		ОК

19. Close window with "OK"

# 2.2 Link ErrAck and Run signal

SafeMotion Project
Multi Setting.sms
References
Target System
GVLs
📴 User FBs
ChA_ChB_Connection_Input
Alias Devices
ERR_ACK FSoE Connection.sds
RUN FSoE Connection.sds
SAFEMOTION FSoE Connection.sds
Target System.sds
B ChA_ChB_Connection_Input.sal
ChA_SLS_1
ChA_STO_SS1_ErrorHandling
ChB_STO_SS1_ErrorHandling
ChA_ChB_Connection_Output
SafeMotion Instance

1. Open file "ERR\_ACK FSoE Connection.sds"

Linking	Process Image		
	Linking Mode:	Manual Y	
Full Name:	TIID^Device 1 (EtherCAT)^Term 1 (EK1200)^Te	rm 4 (EK1122)^Pc	
Linked to:			🚰 🗇

#### 2. Click the link icon in the linking tab

earch:	×	Show Variables
CamCouplingState[6] CamCouplingState[7] Axis 4 ToPlc StateDWord Flags CamCouplingState CamCouplingState[0] CamCouplingState[1] CamCouplingState[1] CamCouplingState[2] CamCouplingState[3] CamCouplingState[5] CamCouplingState[6] CamCouplingState[7] PLC PLC		<ul> <li>Only Unused</li> <li>Exclude disabled</li> <li>Exclude other Devices</li> <li>Exclude same Image</li> <li>Show Toollips</li> <li>Sort by Address</li> <li>Show Variable Groups</li> <li>Collapse last Level</li> <li>Show Variable Types</li> <li>Matching Type</li> <li>Matching Size</li> <li>All Types</li> <li>Array Mode</li> <li>Offsets</li> <li>Continuous</li> <li>Ignore Gaps</li> <li>Show Dialog</li> <li>Variable Name / Comment</li> <li>Variable Name / Comment</li> </ul>
PLC Instance		/ Take over

- 3. Select "MAIN.ErrorAack"
- 4. Confirm selection with "OK"

SafeMotion Project
Multi Setting.sms
References
Target System
👂 🦕 GVLs
🚰 User FBs
ChA_ChB_Connection_Input
<ul> <li>Alias Devices</li> </ul>
ERR_ACK FSoE Connection.sds
🚻 RUN FSoE Connection.sds
SAFEMOTION FSoE Connection.sds
Target System.sds
哈里 ChA_ChB_Connection_Input.sal
ChA_SLS_1
ChA_STO_SS1_ErrorHandling
ChB_STO_SS1_ErrorHandling
ChA_ChB_Connection_Output
SafeMotion Instance

- 5. Open file "Run FSoE Connection.sds"
- 6. Run through steps 2 to 4. Select "MAIN.Run" as the signal.
- 7. Click "Save all" in the menu bar to save the settings

### 2.3 Link Multisettings



- 1. Open file "Multi Settings.sms"
- 2. Scroll to Run-FSoE-Connection

Multi Setting.sms 😐 🗙				
💠 🗕 💠 🛁 🤹 🚔 🖶 🛈	w 2			<b>T</b> .
	FilterCh8_Connection_Input RUN FSoE Connection Linked to	ChA_C ERR_AC Linked	hB_Connection_Input CK FSoE Connection to	Filter ChA_ChB_Connection_Output SS1_To_NC_ChA Linked to
72	TIPC^PLC^PLC Instance^PlcTask Outputs^MAIN.Run	n TIP	C^PLC^PLC Instance^PlcTask Outputs^MAIN.Error	<u>-</u>
4				
3. " " click				
III Attach Variable Standar	d In Var 2 (Output)		×	
Search:	<ul> <li>CamCouplingState[6]</li> <li>CamCouplingState[7]</li> <li>CamCouplingState[7]</li> <li>StateDWord</li> <li>StateDWord2</li> <li>Flags</li> <li>StateDWord3</li> <li>Flags</li> <li>CamCouplingState[0]</li> <li>CamCouplingState[1]</li> <li>CamCouplingState[2]</li> <li>CamCouplingState[3]</li> <li>CamCouplingState[4]</li> <li>CamCouplingState[5]</li> <li>CamCouplingState[6]</li> <li>CamCouplingState[6]</li> <li>CamCouplingState[7]</li> </ul>	×	Show Variables Only Unused Exclude disabled Exclude other Devices Exclude same Image Show Tooltips Sort by Address Show Variable Groups Collapse last Level Show Variable Types Matching Type Matching Size All Types Array Mode Offsets Continuous Ignore Gaps Show Dialog Variable Name / Comment / Hand over / Take over	

- 4. Select signal for Run
- 5. Confirm selection with "OK"
- 6. Repeat steps 3 to 5 for ErrAck
- 7. Click "Save all" in the menu bar to save the settings

## 2.4 Link projects

This chapter describes the linking of the SafeMotion project with the EL6910 Safety project via the EL6910 parameters.

The SafeMotion Wizard has already created the connections via the Alias Devices.

Proceed as follows:



- 1. Open the "TwinSafeGroup1.sal" file in your EL6910 project
- 2. Open the "Variable Mapping" tab

In the following you have to link the individual signals and variables in the "Variable Mapping" tab. The procedure is identical for all variables and is shown here as an example using the screenshots for one variable.

Variable Ma	pping ⇔ ×	Safety	Project Online Vi	ew Error List	- Open Documents	Output	
Variables	Group Ports	Repla	cement Values	Max Start Deviation	1		
🔶 🗕 🖣	Group						
Variable		Scope	Assignment			Usages	
Local							
AX_Ack		Local	TwinSafeG	iroup1.Network1.FB	And1.AndOut		

3. Click the button " ... " at the desired variable

Search:	Search all levels
<ul> <li>MotionControl</li> <li>G TwinSafeGroup1</li> <li>Alias Devices</li> </ul>	Usage     Unused only     Used and unused
<ul> <li>Connection to Left</li> <li>Channel 1</li> <li>Error_Ack_ChA</li> <li>SIS 1 ChA</li> </ul>	Type: BOOL, Size: 1 Bit PROOL Size: 1 Bit © Out
Error Ack ChB (     Connection to Left_1     Channel 1	Type: BOOL, Size: 1 Bit]       Show Variable Types         Image: White the second
<ul> <li>STO_ChA (Type:</li> <li>SS1 ChA (Type:</li> <li>Error_Ack_ChA (</li> <li>SIS 1 ChA (Type:</li> </ul>	BOOL, Size: 1 Bit) SOOL,
◆ STO_ChB (Type: ◆ SS1 ChB (Type: ◆ SS1 ChB (Type: ◆ Error_Ack_ChB (	BOOL, Size: 1 Bit)     Group ports       BOOL, Size: 1 Bit)     ✓ Local group       Vpe: BOOL, Size: 1 Bit)     ✓ Other groups
<ul> <li>Connection to Right</li> <li>Channel 1</li> <li>Error_Ack_ChA (</li> <li>SIS 1 ChA (Type)</li> </ul>	Safe I/Os       Type: BOOL, Size: 1 Bit)       BOOL Size: 1 Bit)       Other groups
Error_Ack_ChB (     Connection to Picht 1	Standard I/Os

- 4. Select the signal for your Safe Motion component
- 5. Confirm selection with "OK"

The following links result for the variables:

# • Verknüpfung

The cells with " / " are already filled in and do not need to be linked.

Variable	Assignment	Usages
AX_Ack	/	Connection to Left:
		Error_Ack_ChA
		Error_Ack_ChB
		Connection to Right:
		Error_Ack_ChA
		Error_Ack_ChB
AX1_ChA_AckReq	Connection to Left:	/
	<ul> <li>Error_AckReq_ChA</li> </ul>	
AX1_ChB_AckReq	Connection to Left:	/
	<ul> <li>Error_AckReq_ChB</li> </ul>	
AX2_ChA_AckReq	Connection to Right:	/
	<ul> <li>Error_AckReq_ChA</li> </ul>	
AX2_ChB_AckReq	Connection to Right:	/
	<ul> <li>Error_AckReq_ChB</li> </ul>	
Enable_Global	/	Connection to Left:
		• STO_ChA
		• SS1_ChA
		• STO_ChB
		• SS1_ChB
		Connection to Right:
		• STO_ChA
		• SS1_ChA
		• STO_ChB
		• SS1 ChB

6. Click on "Save all" in the menu bar to save the settings

#### **Configure SLS functionality** 2.5 SafeMotion Project Multi Setting.sms References Target System GVLs D User FBs ChA\_ChB\_Connection\_Input ChA\_SLS\_1 Alias Devices 뭠 ChA\_SLS\_1.sal ChA\_STO\_SS1\_ErrorHandling Þ ChB\_STO\_SS1\_ErrorHandling Þ ChA\_ChB\_Connection\_Output Þ SafeMotion Instance 1. Open file "ChA\_SLS\_1.sal"



- 2. Enter the maximum value and the minimum value for FB safeLimit according to the illustration
- 3. Click "Save all" in the menu bar to save the settings

Multi S	etting.sms 🔹 🗙 TwinSafeGro	oup1.sal Multi Setting.: 🕎 🥩	sms ChA <u>-</u>	_SLS_1.sal*		Υ.
Dutput	Filter ChA_ChB_Connection_Output SS1_To_NC_ChB Linked to	Filter ChA_STO_SS1_ErrorHandling SS1_ChA Delay Time (ms)	Filter ChA_SLS_1 SLS_1_Limit Minimum Value	Filter ChA_SLS_1 SLS_1_Limit Maximum Value	Filter ChB_STO_SS1_ErrorHandling SS1_ChB Delay Time (ms)	Filter
	-	2000	-10000000	2000000	2000	Base Project Configuration
	-	2000	-2000000	10000000	2000	

- 4. Open Multi Settings
- 5. Enter the maximum value and the minimum value
- 6. Click on "Save all" in the menu bar to save the settings

### 2.6 Download Safety projects

11à	ß		$\bigotimes$	66	€	▶	311	Ö	÷ 0
		M	ulti-D	ownlo	ad Sa	fet	y Pro	oject	(s)

1. Click on "Multi-Download Safety Project(s)"

Multi-Download							×
Steps				Select Valid Project(	s)		
Select Valid Project(s)	Download	Project Name	Physical Device	CRCs	Target System	Backup/Restore master	Backup/Restr
General Download Settings		MotionControl	Term 3 (EL6910)	0x0000   0x27BB   0x27BB   0x27BB	EL6910	🕑 0 Dependencies	🕑 0 Deper
		SafeMotion	Right	0x0000   0x9091   0x9091   0x9091	AX891x	🕑 0 Dependencies	🕑 0 Depei
		SafeMotion	(MS_2) Left	0x0000   0x0000   0xE749   0xE749	AX891x	🕑 0 Dependencies	🕑 0 Depei
	¢						>
						Vext	Cancel

The "Select Valid Project(s)" window opens. Here you can see which safety projects you can download.

- 2. Select the safety projects that you want to download
- 3. Confirm selection with "Next"

Chama	Consul Download Settings	and and
Steps	General Download Settings	
Select Valid Project(s)	Complete Download	^
General Download Settings	Download complete project data with default group customization settings (customization is possible after the download) and use these login credentials for each project: Username: Password:	
	Please verify the Serial Number of each project:	ĩ
	Please verify the Serial Number of each project:         Verified       Project Name       Physical Device       Serial Number Target System Backup/Restore masters       Backup/Restore slaves         Image: Control Term 3 (EL6910)       99999       EL6910       Image: Object Name       0 Dependencies	1
	Please verify the Serial Number of each project:         Verified       Project Name       Physical Device       Serial Number Target System Backup/Restore masters       Backup/Restore slaves         Image: Constrained System Structure       MotionControl       Term 3 (EL6910)       99999       EL6910       Image: Object Structure       Image: Object	

4. Enter the username and password in the "General Download Settings" window

Default username: Administrator

Default password: TwinSAFE

- 5. Select the safety projects that you want to download
- 6. Confirm selection with "Next"

Steps			F	inal Ver	ificatio	n			
Select Valid Project(s)	Project Name	Physical Device		Download	Result		Target Sy	Backup/Restore maste	Bac
General Download Settings			Configured	Online	Offline	Verification Result			
Final Verification	MotionControl	Term 3 (EL6910)	Safe Logic Data	0xD4E3	0xD4E3	0	EL6910	0 Dependencies	a
Activation			Mapping Data	0x387F	0x387F	0		_ · · · · · · · · · · · · · · · · · · ·	
			Parameter Data	0xEDEA	0xEDEA	0			
Multi-Download Kesult			Configured Datasets	Online CRC	Offline CRC	Verification Result			
	SafeMotion	Right	Safe Logic Data	0x4329	0x4329	0	AX891x	O Dependencies	
	1000000320032834210	1076.000	Mapping Data	0x1913	0x1913	0			~
	<		10			d			>

- 7. Check the CRCs in the "Final Verification" window
- 8. If the CRCs match, click on the box to confirm the verification
- 9. Confirm window with "Next"

					Activation		
ielect Valid Project(s)	Login Cre	edentials					
Seneral Download Settings	Usern	ame:	Administrator				
inal Verification	Passw	ord:					
Activation						lene neeroona	
Iulti-Download Result	Activate A	Project Name NotionControl	Physical Device Term 3 (EL6910)	Target System	<ul> <li>Backup/Restore masters</li> <li>O Dependencies</li> </ul>	Backup/Restore slaves     O Dependencies	
	✓ s	afeMotion	Right	AX891x	O Dependencies	O Dependencies	
	🗹 s	afeMotion	(MS_2) Left	AX891x	🕑 0 Dependencies	🕑 0 Dependencies	

The "Activation" window opens, in which you activate the safety projects.

- 10. Enter the default password
- 11. Check if the safety projects are selected
- 12. Confirm selection with "Next"

Multi-Download							
Steps			Mult	i-Dowr	nload Resu	ılt	
Select Valid Project(s)	Activated Downloade	d Project Name	Physical Device	Target Syste	em Backup/Restore	Settings Backup/Restore masters	Backup/Restore sla
General Download Settings	00	MotionControl	Term 3 (EL6910)	EL6910	0	🕑 0 Dependencies	📀 0 Dependenc
Final Verification	00	SafeMotion	Right	AX891x	0	♥ 0 Dependencies	📀 0 Dependenc
Activation	00	SafeMotion	(MS_2) Left	AX891x	0	🕑 0 Dependencies	🕑 0 Dependenc
Multi-Download Result							
	<						>
						Finjsh	Cancel

13. Close the window "Multi-Download Result" with "Finish"

### 2.7 Activate configuration

Since the process images have been changed, it is necessary to reactivate the configuration. To do this, proceed as follows:



1. Click on "Activate Configuration" in the menu bar

Project	Gantry SLS Demo
roject.	
Target:	CX-35D5DA
	Autostart PLC Boot Project(s)

2. Confirm the "Activate Configuration" window with "OK"

TcXaeShe	11	×
?	Restart TwinCAT System in Run Mod	de
	OK Abbrech	ien

3. Confirm the "Restart TwinCAT System in Run Mode" window with "OK"

#### Couple axes 2.8

1. Open	NC-Task NC-Task NC-Task Imag Table Action A A A A A A A A A A A A A A A A A A A	1 SAF ask 1 SVB e ss cts xis 1 xis 2 xis 2 xis 3 xis 4						
General	Settings	Parameter	Dynamics	Online	Functio	ons Cou	pling Co	mpensation
				0.0	000		Setpoint	Pos.: m 0.0000
Maste	er/Slave Co	upling	10					
Mast	er Axis:		Axis 3		~		Couple	N
Coup	ling Mode:		Linear		~		Decoupl	e
Coup	ling Factor:		-1			[mm/mm]	Change	Factor
Para	meter 2:		0				Stop	
Para	meter 3:		0					

Coupling Factor:	-1	[mm/mm]	Change Factor
Parameter 2:	0		Stop
Parameter 3:	0		
Parameter 4:	0		
Table Id:	0		
Interpolation Type:	Linear $\vee$		
Slave Offset:	0		🖌 Absolute
Master Offset:	0		✓ Absolute

- 2. Open tab "Coupling"
- 3. Select axis 3 in the drop-down menu of "Master Axis"
- 4. Enter Coupling Factor as shown
- 5. Click on "Couple"

#### Demonstration

# BECKHOFF

General	Settings	Parameter	Dynam	iics Onlin	e Fund	ctions	Coupling	Comp	ensation
				(	0.00	00	Setpoint F	osition	i: [mm] 0.0000
Lag Dista	ance (min.	/max): [mm	Actu	al Velocity	: [	mm/s]	Setpoint \	/elocity	: [mm/s]
	0.0000	(0.000, 0.000			0.	.0000			0.0000
Override:		[%	] Tota	/ Control	Output:	[%]	Error:		
		0.0000 %	6		0.00/0	.00 %			0 (0x0)
Status	(log.) dy rated Job	NOT Mo	ving Fw Bw	Status ( Coup In Ta In Po	ohys.) Ied Mode Irget Pos. Is. Range	e	Enabling Contr Feed Feed	oller Fw Bw	Se
Controller	r Kv-Facto	or: [r	nm/s/m	m]	Referen 360.41	ce Vel 5	ocity:		[mm/s
Target Po 0	osition:		[m	m] ↓	Target \ 0	/elocity	<i>r</i> :		[mm/s
 F1	- F2	+ F3	+ F	+ . 4 _ F	\$5	<b>⊘</b> F6		® F8	→• F9

- 6. Open tab "Online"
- 7. Click on "Set"

Set Enabling	×
	OK
Feed Bw	Cancel
0verride [%]:	
0	All

8. Click "All" in the "Set Enabling" window

### 2.9 Let drive traverse



- 1. Open axis 3
- 2. Open tab "Online"
- 3. Click on "Set"
- 4. Close window "Set Enabling" with "All"

General	Settings	Parameter	Dynamics	Online	Functions	Coupling	Compensat	tion
				66.	1417	Setpoint P	osition: 66	[mm] .1417
Lag Dis	tance (min 0.0000	/max): [mm (0.000, 0.000	] Actual V	elocity:	[mm/s] 0.0000	Setpoint V	/elocity: [r 0	mm/s] .0000
Override	e:	% <mark>]</mark> ۱۵۵.0000 %	5] Total / C	Control Ou 0.0	ntput: [%] 00 / 0.00 %	Error:	17056 (0x	42a0)
Status Real Call Has	s (log.) ady ibrated s Job	NOT Mo	ving C Fw C Bw C	tatus (phy Coupled In Targe In Pos.	vs.) I Mode et Pos. Range	Enabling Contro Feed Feed	) oller Se Fw Bw	et
Controll	er Kv-Fact	or: [r	nm/s/mm] ↓	R 7	eference Vel 4.206	ocity:	[	mm/s] ↓
Target 0	Position:		[mm] ↓	T.	arget Velocit;	y:	[	mm/s]
F1	F2	+ F3	++ F4	♦ F5	F6		<b>®</b> ∑∞ ∣	<b>→</b> • F9

An error message appears.

5. Click on F8 to reset the error



6. Move the drive with F1, F2, F3 and F4 until a speed violation occurs

An error message appears and the drive is set to the STO state due to the SLS functionality.

More Information: www.beckhoff.com/twinsafe/

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