KNX: Integrating a CODESYS Controller

(i)

The CODESYS controller supports only one IP-based link.

Hardware

- 1x ABB power supply: SV/S 30.640.5.1
 1x ABB IP interface: IPR/S 3.1.1
- 1x ABB switch actuator: SA/S 4.6.2.1
- 1x Gira button BA 2f 1 point: 5161 30

Requirements for ETS

The ETS is available in Version 5.6.5 Build 1109. (ii)

- Installation of the product files (*.knxprod) for the devices listed above
- Installation of the product file KNX_CDS_Gateway.knxprod for the CODESYS controller ٠
- The file is located in the CODESYS KNX-Package (<installation path>\CODESYS KNX\<version>\ETS5\KNX_CDS_Gateway.knxprod).

Catalog 🔻								
🛓 Import 🏦 Export 🖾 🖓 Dowr	load 🔝	I → 3S-Smar	t Software Solutions GmbH → Controlle	er 🕨 Controller				
🚖 Favorites		Security	Manufacturer *	Name	Order Numbe	Order Numbe Medium Type		
Device Templates	- II		3S-Smart Software Solutions GmbH	CODESYS KNX	23030000232	IP	PLC Application	
o Previously used								
Manufacturers	*							
SS-Smart Software Solutions GmbH						La .		
4 🔝 Controller						NB.		
📰 Controller								
P interface specified as	comm	unicat		Configured Interface	25			
			4	Discovered Interface	s			
				Intol/P) Ethornot (Connection (2) 1210	LM (22	4 0 22 1 2)	

		田田	Intel(R) Ethernet Connection (2) I219-LM (224.0.23.12)
Items: 1 in Building Parts 🔻	Ro	4	1.1.0 IPR/S3.1.1 IP-Router,REG (192.168.99.112:3671)
IPR/S3.1.1 IP-Router,REG (192.168.99.112:3671)		-	
		2	

- Installation and activation of the "DcaCodeSys" plug-in. ٠ The file is located in the CODESYS KNX Package (<installations path>\CODESYS KNX\<version>\ETS5\DcaCodeSys.etsapp).
- Installation and activation of the "Compatibility Mode App"

	Name	Hersteller	Version	Lizenz
*	Compatibility Mode App	KNX Association	5.6.1109.31179	Ū,
۰	DcaCodeSys	CodeSys	0.1.0.10	G.
9	Device Compare	KNX Association	5.6.1109.31179	•
G	Device Templates	KNX Association	5.6.1109.31179	•
	EIBlib/IP	KNX Association	5.6.1109.31179	۰
••	Extended Copy	KNX Association	5.6.1109.31179	۰
ø	Labels	KNX Association	5.6.1109.31179	•
:=	Project Tracing	KNX Association	5.6.1109.31179	•
0	Replace Device	KNX Association	5.6.1109.31179	•
8	Split and Merge	KNX Association	5.6.1109.31179	•

• A physical address has been assigned to the devices listed in hardware.

Switch actuators

Buildings	•	Number 1	Name	Object Function	Description	Group Address	Length	C R	w	τU	Data Type	Priority
Dynamic Folders	■ 2	0	General	In Operation			1 bit C	R	- T		boolean	Low
4 闘 MyBuilding		10	Output A	Switch	Switch Channel A Switch	0/0/1, 0/1/0	1 bit C	-	w -	-	switch, switch	Low
4 Eloor1	■2	29	Output A	Status Switch	Switch Channel A State	0/0/2	1 bit C	R	- T	-	switch	Low
	- - 2	30	Output B	Switch	Switch Channel B Switch	0/0/3, 0/1/0	1 bit C	1.1	w -	-	switch, switch	Low
4 💭 Room01.06		49	Output B	Status Switch	Switch Channel B State	0/0/4	1 bit C	R	- T	-	switch	Low
1.1.0 IPR/S3.1.1 IP Router, MDRC	• 2]	50	Output C	Switch	Switch Channel C Switch	0/0/5, 0/1/0	1 bit C		w .		switch, switch	Low
1.1.6 SV/S30.640.5.1 Power Supply, Diagnosis, MDRC	- 2	69	Output C	Status Switch	Switch Channel C State	0/0/6	1 bit C	R	- T	-	switch	Low
1.1.7 SA/S4.6.2.1 Switch Actuator 4f.6A M MDRC	■ #		Output D	Switch	Switch Channel D Switch	0/0/7, 0/1/0	1 bit C		w -	-	switch, switch	Low
1.1.8 2-g water-prot surf-mnt push-butn bus coup 1-pt op	■ ‡	89	Output D	Status Switch	Switch Channel D State	0/0/8	1 bit C	R	- T	1	switch	Low

Button

Buildings	*	Nu	umber *	Name	Object Function	Description	Group Address	Length	C I	e w	τu	Data Type	Priority
Dynamic Folders		■ Z 0		Button 1	Switching	Switch Channel A Switch	0/0/1	1 bit	C R	W	τu	1-bit, 1-bit	Low
🔺 📸 MyBuilding		1		Button 2	Switching	All Channels Off	0/1/0	1 bit	C R	W	τu	1-bit, 1-bit	Low
4 Te Floor1													
4 🕅 Room01.06													
I.1.0 IPR/S3.1.1 IP Router, MDRC													
I.1.6 SV/S30.640.5.1 Power Supply, Diagnosis, MDRC													
I.1.7 SA/S4.6.2.1 Switch Actuator;4f,6A,M,MDRC													
1.1.8 2-g water-prot surf-mnt push-butn bus coup 1-pt op													

Preparing the CODESYS controller

- Make sure that the controller supports KNX links.
- In Version 3.5 SP14 and later, the Control SL products support the KNX stack (no components have to be added). This does not apply to CODESYS Control WIN (the KNX component has to be added in CODESYSControl.cfg).
- Insert the components in the CODESYSControl.cfg file:

[ComponentManager] Component.X=CmpKNXStack.dll

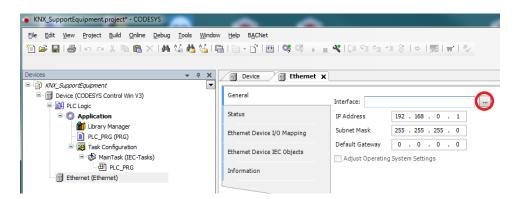
Preparation in the CODESYS project

- Create a "Standard project" and select CODESYS Control Win V3 as the device.
- Define the target system by means of the Network Scan.

KNX_SupportEquipment.project* - CODESYS		<u>^</u>	• •
Eile Edit View Project Build Online Debug Tools Window	Help BACNet		
🎦 📽 📓 巻 い つ 法 🖻 🛍 🗙 構 🌿 🍓 🌿 🎚	🖹 🛅 • 🗳 🛗 🛯 😂 🔍 🕞 👘	≪[[대학학학왕] 수 [憲] 봄 [장	
Devices 👻 🕂 🗙	Device X		
SupportEquipment		\frown	
Device (CODESYS Control Win V3)	Communication Settings	Scan network) Gateway • Device •	
E PLC Logic	Applications		
C Application Discourse Manager	Applications		
Library Manager IDrary Manager IDrary Manager IDrary Manager	Backup and Restore	·	
Task Configuration			
🗎 🎲 MainTask (IEC-Tasks)	Files		• •
PLC_PRG	Log	Gateway	•
		Gateway-1	[0301.A000.034A] (active)
	PLC Settings	IP-Address:	Device Name:
		localhost	KERNTPC
	PLC Shell	Ports	Device Address:
	Users and Groups	1217	0301.A000.034A
			Target ID: 0000 0001
	Symbol Rights		
	Task Deployment		Target Type: 4095
	lask Deployment		
	Status		Target Vendor: 35 - Smart Software Solutions GmbH
	Information		Target Version: 3.5.13.10
			3.5.13.10

• Insert an *Ethernet* adapter into the device tree and specify the interface to be used.

// If a target system has not been defined yet, then the error message "Gateway not configured" is displayed.



• Insert a KNX below the Ethernet adapter in the device tree.

KNX_SupportEquipment.project* - CODESYS				_
Ele Edit View Project Build Online Debug Tools Window 1 1 1 1 1 1 1 1 1 1		Help BACNet → 🔐 🧐 🐝 → 🔳	≪ 〔≣ 6≣ 4	I 8 4 11 11 1
Devices v 4 X		Device Ethernet X		
Process (CODESYS Control Win V3)		General	Interface: AN-Verb	oindung
Application		Status	IP Address Subnet Mask	192 . 168 . 99 . 74 255 . 255 . 248 . 0
PLC_PRG (PRG) Start Configuration		Ethernet Device I/O Mapping Ethernet Device IEC Objects	Default Gateway	192 . 168 . 100 . 1
iii- 🌮 MainTask (IEC-Tasks) □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □		Information	🔲 Adjust Operating	g System Settings
Ethernet (Ethernet)				

• On the General tab, you can define any number of inputs.

In the following, two input channels for receiving the telegrams of the button and one output channel for switching the actuator have been created:

KNX_SupportEquipment.project* - CODESYS		_						
Ele Edit View Project Build Online Debug Tools Window 1월 🗃 🖬 🚳 🗠 🗠 👌 🗈 💿 🗙 🏘 🕼 🍓 🏠 🎼		= ≪ 1(≡ ¢∃ ¢ <u>∃</u> →	=\$ ¢ ≋ ≢ ₹					
Devices v 4 X	Device Ethernet	KNX X						
E M Device (CODESYS Control Win V3)	General	🕂 Add 📝 Edit 🗙	Delete Export to ETS Im	port CSV Export CSV				
PLC Logic	KNX I/O Mapping	Channel Number	Group Object Name	Group Object Function	Туре	DPT		
Application		1	ReceiveOnOff	From the switch	Input	DPT 1.*		
Library Manager		2	ReceiveOffOnly	From the Switch	Input	DPT 1.*		
PLC_PRG (PRG) Section	· · · · ·	3	SendOnOff	To switch channel B	Output	DPT 1.*		
i≕ wintask (IEC-Tasks) 	Status							
🖹 🌐 Ethernet (Ethernet)	Information	Information						
(INX (KNX)								

The KNX connection is limited to a total of 1000 inputs and outputs.

• You export this configuration to an XML format that can be read by the ETS.

Device Ethernet KNX X												
General	🕂 Add 📝 Edit 🗙	Delete Export to ETS	ort CSV Export CSV									
KNX I/O Mapping	Channel Number	Group Object Name	Group Object Function	Туре	DPT							
	1	ReceiveOnOff	From the switch	Input	DPT 1.*							
KNX IEC Objects	2	ReceiveOffOnly	From the Switch	Input	DPT 1.*							
	3	SendOnOff	To switch channel B	Output	DPT 1.*							

In the I/O mapping, data areas are created automatically for each channel.

In addition, two data points have been created, allowing the physical address to be assigned from the ETS software:

General	Find		Filter Show all	- u	Add FB f	for IO chann	iel → Go to instar
KNX I/O Mapping	Variable	Mapping	Channel	Address	Type	Unit	Description
hint for happing	(*		Program LED Status	%IX0.0	BOOL		Program LED Status
KNX IEC Objects	*>		Program Button	%QX0.0	BOOL		Program Button
	😐 – 🍫		1 - ReceiveOnOff - From the switch	%IB1		DPT 1.*	
Status	😟 - 🍫		Control 1 - ReceiveOnOff - From the switch	%QB1	BYTE		
	🗎 🍫		2 - ReceiveOffOnly - From the Switch	%IB3		DPT 1.*	
Information	😐 - 🍫		Control 2 - ReceiveOffOnly - From the Switch	%QB2	BYTE		
			3 - SendOnOff - To switch channel B	%QB3		DPT 1.*	

Integrating the CODESYS device in the ETS

• The controller can be added to the ETS project by means of the catalog.

Assign a physical address to the device:

Buildings *									• • ×	Propert	ies	
🕂 Add Devices * 🗙 Delete 🔮 Download * 🌒 Info * 🕤 R	eset 🤌 Ur	load * (II) Print						Search	ρ	0		6
Buildings	v ^	Address *	Room	Description	Application Program	Adr Prg Par Grp Cfg	Manufacturer	Order Nurr Product		Settings	Comments	Information
Dynamic Folders		10.1	Room01.06		PLC Application		35-Smart Software Sol.			Name		
< Ba MyBuilding		110	Room01.06		IP Router/2.0	0 0	A98	2CDG 110 1IPR/S3.11 IP Rout	ecMDRC	CODESTS KN	x	
A Boorl		11.6	Room01.06			0 0	A88	2CDG 110 1SV/S30.640.5.1 P	ower Supply, Diag	to do not all all		
		117	Room01.06		Switch 4f 6M/3.2b	00000	A88	2CDG 110 1SA/S4.6.2.1 Switc	h Actuator,416A,1			1 Park
4 💭 Room01.06		118	Room01.06		Switching, dim, venet. blind, value, scene 10F.		GIRA Giersiepen	5161 30 2-g water-prot si	arf-mnt push-but		1.0 1	C Park
I.0.1 CODESYS KNX										Description		
I 1.1.0 IPR/S3.1.1 IP Router,MDRC												
I.1.6 SV/S30.640.5.1 Power Supply Diagnosis MDRC												
11.7 SA/S4.6.2.1 Switch Actuator,4(,6A,M,MDRC												

• On the DCA tab, the configuration previously exported in CODESYS can be read into the ETS.

Buildings 🔻		^ 🗆 🗡
🕂 Add Devices 🔹 🗙 Delete 🔮 Download 🍨 🕕 Info 🍨 🐔 Rese	ε ∲ Unload + mit Point	
Buildings	- ^	
Dynamic Folders		
🔺 🏙 MyBuilding		
4 📻 Floor1		
4 🛄 Room01.06	Load Configuration	
10.1 CODESYS KNIX	Last Comparation	
1.1.0 IPR/S3.1.1 IP Router, MDRC		
I 1.16 SV/S30.640.5.1 Power Supply, Diagnosis, MDRC		
I.1.7 SA/S4.6.2.1 Switch Actuator,4f,6A,M,MDRC		
🕒 🖺 1.1.8 2-g water-prot surf-mnt push-butn bus coup 1-pt op		Version 01033
X Trades	Group Objects / Paramiter / DCA	

• After the import, the inputs and outputs created in CODESYS can be connected with group addresses.

🕂 Add Devices 🔹 🗙 Delete 붗 Download 🔹 🕕 Info 💌 💋 Res	et 🌾 Unload	* @P	nnt										
Buildings	- ^ N	umber *	Name	Object Function	Description	Group Address	Lengt	h C	R	ΝT	U	Data Type	Priorit
Dynamic Folders	■Z 1	1	ReceiveOnOff	From the switch	Switch Channel A Switch	0/0/1	1 bit	C	- 1	ΙΤ.	U 1-	bit	Low
B MyBuilding	1 2		ReceiveOffOnly	From the Switch	All Channels Off	0/1/0	1 bit	С	- 1	ΙΤ.	U 1-	bit	Low
Floor1	1		SendOnOff	To switch channel B	Switch Channel B Switch	0/0/3	1 bit	C	R -	T	- 1-	bit	Low
4 💭 Room01.06													
🗉 🚹 1.0.1 CODESYS KNX													
I 1.1.0 IPR/S3.1.1 IP Router, MDRC							2						
I 1.1.6 SV/S30.640.5.1 Power Supply, Diagnosis, MDRC													
I.1.7 SA/S4.6.2.1 Switch Actuator,4f,6A,M,MDRC													
1.1.8 2-g water-prot surf-mnt push-butn bus coup 1-pt op													

Transferring the ETS configuration to the controller

• As with any other device, the physical address must also be assigned to the CODESYS controller.

Therefore the data point must be set after the request in the ETS:

Best Network Central Tech is in straining. The show rives are projection statul ■ Of Additionation Find Tech is instraining. The show rives are projection statul ■ Of Additionation Find Tech is instraining. The show rives are projection statul ■ Of Additionation Find Tech is instraining. Tech is instraining	Adr Prg Par Grp Clg	Search J	Properties P Find and Replace	
Conception of the second		_	La rioperaco	
P.C. PRG PRG KNX EEC Objects Variable Mapping Channel Address Type Current Value P Program LED Status Status Status Status		Search J	Find and Replace	
B 🙀 Task Configur 🔰 Program LED Status %200.0 BOOL TO 15				
	Adr Prg Par Grp Crg		Or Workspaces	
Rc.; briometion Annu Participanet Annu Participanet	0 0	ABB	201 Dending Operations	
▲ 👔 (20. (200) + 🧐 2 - ReceiveOffOnly - From the Switch 14003	00000	ABB	201	Histor
* V 3 - SendonOff - To switch channel 8 %Q83	me 10F O O O O O	GIRA Giersiepen	S16 Active	
			1.0.1 CODESYS KNX (Room01.06)	
			Please press programming button	-

If this is done promptly, then the assignment of the physical address is documented in the ETS.

Buildings	 Address * 	Room	Description	Application Program	Adr Prg Par Grp Cfg	Manufacturer	Or	Workspaces
Dynamic Folders	10.1	Room01.06		PLC Application	O O	35-Smart Software Sol	230	⑦ Todo Items
< MyBuilding	11.1.0	Room01.06		IP Router/2.0	0 0	A88	201	O Todo Items
4 Floor1	11.6	Room01.06		Power Supply, Diagnosis, 640mA/1.1	⊗ ⊗	A88	SCI	Pending Operations
	11.7	Room01.06		Switch 4f 6M/3.2b	00000	A88	201	Active
4 💭 Room01.06	11.8	Room01.06		Switching, dim, venet, blind, value, scene 10F.		GIRA Giersiepen	516	Active
I.0.1 CODESYS KNX								Clear History
I.1.0 IPR/S3.1.1 IP Router, MDRC								
I 1.1.6 SV/S30.640.5.1 Power Supply, Diagnosis, MDRC							0	1.0.1 CODESYS KNX Download (Phy. Addr.): Fin(sted)
Image: A state of the state							1	 Download(Phy: Addr.): Physical

Because the controller does not have a valid program yet, it must still be downloaded from the ETS.

1.0.1	Room01.06	PLC Application	00000	3S-Smart Software S	5ol 2
1.1.0	Room01.06	IP Router/2.0	⊘ ⊘	ABB	2
1.1.6	Room01.06	Power Supply, Diagnosis, 640mA/1.1	⊘ ⊘	ABB	2
1.1.7	Room01.06	Switch 4f 6M/3.2b	00000	ABB	2
1.1.8	Room01.06	Switching, dim., venet. blind, value, scene 10F	. • • • • • •	GIRA Giersiepen	5

Mill_SupportEpupment	Device 🔐 Ethernet	1 100X X									
O Device [connected] (CODESYS Control Win V3)	General	Find		Filter Show all	- 	Add FB for	10 channel. 👘	Go to instance			
RC Logic	KNX UO Mapping	Variable	Mapping	Channel	Address	Туре	Current Value	Prepared Value	Unit	Description	
	KNX to Happing	- *		Program LED Status	5600.0	8005	FALSE			Program LED Status	
Library Manager Library Manager PLC_FRIG (PRG)	KNX IEC Objects	- 14		Program Button	%Q00.0	8001	FALSE			Program Button	
PLC_MIG (MIG) Task Configuration		a b		1 - ReceiveOnOff - From the switch	5481		_		DPT L*		
gg Task Computation H 39 MainTask (250-Tasks)	Status	8. 🍫		Statusbyte	%81	BYTE	56			Status will be deared in the next cycle	
- dl PLC_PRG		- *		Updateflag	5001.3	500L	TRUE				
thernet (Cfremet)	Information	- 🍫		ValueChanged	%DX1.4	BOOL	TRUE				
				ValueValid	560(1.5	500L	TRUE				
- B we have		- *		Value	%0(2.0		TRUE	Received f	rom ti	he switch	
		÷ 🐪		Control 1 - ReceiveOnOff - From the switch	%Q81	DITE	-				
		÷-*		2 - ReceiveOffOnly - From the Switch	%/83				DPT 1.*		
		÷.**		Control 2 - ReceiveOffOnly - From the Switch	16Q82	SITE	0				
		8- 1 9		3 - SendOnOff - To switch channel B	%Q83				DPT L.*		
				De							
										Always update variable	E Chabled 2 (always in bus cycle task)
		🍫 – Create new variable	1 ∳ − Mi	p to existing variable							
		Bus cycle options Bus cycle task	nt bus cycle se	Hen v							

Likewise, the actuator (channel B) can be switched by means of I/O mapping.

Devices v 9 x	B Ethernet B Device	PLC_PRG MIX 🗙								
= 💮 KNC_SupportEquipment 📼			_							
Device (connected) (CODESYS Control Win V3)	General	Find		ilter Show all	· +	Add FB for	IO channel * Go to ins			
B D PLC Logic		Variable	Mapping	Channel	Address	Туре	Current Value	Prepared Value	Unit	Description
Application [run]	KNX I/O Mapping			Program LED Status	%DX0.0	BOOL	FALSE			Program LED Status
Library Manager										
PLC_PRG (PRG)	KNX IEC Objects	- ` *		Program Button	%QX0.0	BOOL	FALSE			Program Button
B Task Configuration		8-10		1 - ReceiveOnOff - From the switch	%881				DPT 1.*	
B SS MainTask (JEC-Tasks)	Status	- 1		Control 1 - ReceiveOnOff - Prom the switch	%Q81	BYTE	0			
- gp Harriask (JEC-Tasks) - dh PLC PRG		- *		2 - ReceiveOffOnly - From the Switch	%883				DPT 1.*	
= G fil Ethernet (Ethernet)	Information	- 1		Control 2 - ReceiveOffOnly - From the Switch	%Q82	BYTE	0			
G II rax (rax)		B-14		3 - SendOnOff - To switch channel 8	%Q83				DPT 1.*	
C III Not (Not)		÷-*•		Trigger/Disable Cyclic, send on change	%Q83	BYTE	0			false -> true send once/true disable object
		- 1 9		Value	%QX4.0	BOOL	TRUE			