

# Data Sheet CODESYS PROFINET Controller SL

CODESYS PROFINET Controller SL is a product that end users can use to implement a PROFINET network with a CODESYS compatible controller.

# **Product description**

PROFINET (Process Field Network) is an open standard for realtime industrial Ethernet systems in automation technology. It is promoted by the user organization PI (PROFIBUS & PROFINET International as an umbrella group of the PROFIBUS user organization PNO) and is regarded as the successor of PROFIBUS. PROFINET uses IEEE 802.3 (Standard Ethernet) based Profinet RT protocol for realtime cyclic IO data exchange and UDP/IP for acyclic services.

The fully integrated CODESYS PROFINET Solution provides a uniform configurator for different variants of underlying PROFINET Controller communication stacks:

CODESYS PROFINET Controller (IEC)

Protocol stack in the form of a CODESYS library (in IEC 61131-3 code), operates on standard network interface cards.

For CODESYS Control RTE high performance ethernet adapter drivers are available (see requirements).

The ethernet adapter is not used exclusively, it's still available for all other applications using TCP/IP on this adapter (e.g. CODESYS Visualisation, Web Browser).

# **CODESYS PROFINET Configurator**

- configurator for settings of PROFINET Controller
- configuration of as slaves (single AR to PROFINET field device) with communications settings
- configuration of device/module specific parameters, in- and output-mapping
- status page with detailed view of currently pendig diagnostics and previously received alarms
- scan dialog with device-import function, online/offline compare, I&M data
- topology configurator (for device exchange, IRT-planning)
- TCI support

PN_Controller_Win.project* - CODESYS		
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PN_Controller_Win		
B B Device (CODESYS Control Win V3)	General	Station Name et200
🖷 🛐 PLC Logic	0-F	Station Status
Application	Options	
💼 Library Manager	IOxS	
PLC_PRG (PRG)		19 December
a 😹 Task Configuration	PNIO Parameters	
MainTask (IEC-Tasks)		IP Address 192 . 168 . 0 . 25 0
- 웹 PLC_PRG	PNIO I/O Mapping	Subnet Mask 255 . 255 . 0 Duplicate IP Address! (used by device 'PN_Controller')
Profinet_CommunicationTask (IEC-Tasks	PNIO IEC Objects	
셴 PN_Controller.CommCycle	The lice objects	
Profinet_IOTask (IEC-Tasks)	Status	Communication _
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kil scalance (SCALANCE X204IRT V5.2)		Settings
et200 (IM 155-6 PN ST V3.1)		es et all default values
Submodules		
-# (] et200_1 (DI 16x24VDC ST V1.0)		Parameters Value Allowed values Description
-# et200_2 (DQ 8x24VDC/0.5A ST V1.1)		Configuration control
-N 🗊 et200_3 (Server module V1.1 (IM 155-		Configuration control 0 Configuration control provides you with the option of configuring the ET 200SP distributed I/O device with its maximum config
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Picture 1: Configuration with validation

PN_Controller_Winproject* - CODESYS	_ D X
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⇒ <sup>(</sup> ) PH_Controller_Win	
Solution	
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Application [run]     ModifiesState Braner module     ModifiesState Braner module	
- 10 Library Manager PNIO Module I/O Mapping DI Lisc24/DE STULO (Subsict 0x0001)	
PIC_PRG (PRG)     Submodule State: Application Ready Pending	
gel task Computation     PNIO Module IEC Objects     Parameter error	
All ner once E statue The module has detected a parameter assignment error. Parameter assignment errors include: • The module cannot evaluate parameters (examples for	possible causes:
Station stop: Incorrect 'Potential group' module parameter or wrong BaseUnt at real stot : 1	
all PN Crother Communication and Lectures Information	
S Profiner 10Task (FC-Tasks)	
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Alarms:	
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Picture 2: Diagnosis in Status Page

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PLC Logic				Station Name	controle									
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1 Library Manager	can Devio	es									~			
PLC_PRG (PRG)	-													
Task Configuration	Scanne	ed Devices												
🖶 🥪 MainTask (IEC-Tasks)	Devic	ename	Devicety	pe		Station Name	Ident Number	MAC Address	IP Address	Subnet Mask				
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Profinet_CommunicationTask (IEC-Tasks)		pn_device_1	Input Unsig	gned32			16#00001011							
④ PN_Controller.CommCycle		pn_device_2	Output Uns	signed32			16#00001012							
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9 9 PN_Controller (PN-Controller)		pn_device_5	InOut Unsi	gned32*8			16#00001813							
- 😔 🗐 pn_device (CODESYS Profinet Device)	- SCG	slance	SCALANC	E X204IRT V5.2		scalance	16#0000088	20:87:56:7C:5B:82	192.168.0.3	255.255.255.0				
- 😔 🗊 pn_device_1 (Input Unsigned32)	8- et2	100	IM 155-6 P	N ST V3.1		et200	16#00054700	28:63:36:36:E4:15	192.168.0.4	255.255.255.0				
- 😳 🗐 pn_device_2 (Output Unsigned32)		et200_0_32769	Port 1 (2xR	U45)	(mun .		16#00000000							
- 😔 🗊 pn_device_3 (Output Unsigned32 Data		et200_0_32770	Port 2 (2xR	U45)	18:M Data: e	t200 [0, 1]	100000000000							
- 😳 🗊 pn_device_4 (Output Unsigned32 Data		et200_1	DI 16x24VI	DC ST V1.0	I&M Param	neter Valu	e							
I pn_device_5 (InOut Unsigned32*8)		et200_2	DQ 8x24V0	DC/0.5A ST V1.1	18M Version	1.1								
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Picture 3: Scan Dialog with I&M Functions

# **Profinet-Stack (IEC)**

CODESYS PROFINET Controller Stack in principle can run on any standard ethernet adapter hardware (see requirements and restrictions). This ethernet adapter is still be used for other services like CODESYS Communication (with IDE), Web-Server, or other CODESYS Fieldbuses (except EtherCAT). The CODESYS Runtime and the operating system (e.g. firewall) have to be configured correctly. For details, see CODESYS Online Help / Fieldbus Support (https:// help.codesys.com/)

Feature	CODESYS PROFINET Controller (IEC)
PROFINET Specification	V2.45
Conformance Class	В
Max. Number of connections	64 (default) - 1024
Max. IO-Data (total)	no limit
Max. IO-Data (per slave)	1440 input and 1440 byte output
Max. acyclic data	16 KB
Plattforms / OS (see restrictions)	Windows, Linux, VxWorks, WinCE
CPU	32/64 Bit
	Little-/Big-Endian
Provider-/Consumer-Status	yes
Automatic Name Assignment (Device	yes
Exchange)	
Topology-Config	yes
Fast Startup	yes
MRP-Configuration	yes

MRP-Role	Client, see Dual Port
Dual Port	yes, see below
Shared Device	yes
Device Access AR	yes
System Redundancy	S2
Performance	depends on Plattform (** see below) tested with 64 frames / ms

CODESYS PROFINET Controller (IEC) and Dual-Port Interface:

With standard Ethernet Adapter hardware only single port devices are possible, i.e. each PROFINET Controller can handle just one port. (The system itself may have more than one Ethernet adapter, maybe running a PROFINET Device on it).

A Dual-Port Controller (e.g. for MRP support or a 'daisy-chain') may be implemented with special dual-port (bridge) Ethernet chipsets, but this requires some runtime adaptions by the OEM.

Performance CODESYS PROFINET Controller (IEC):

The IO performance, i.e. the possible transmitted ethernet frames / ms differs between outstanding (CODESYS Control RTE) and weak (out of the box Win CE). This depends nearly solely on the CODESYS Runtime's SysEthernet implementation. Of course a system that manages only 8 frames / ms can handle for example 32 slaves - but 'only' with an update interval of 4 ms.

Examples with 1 ms update rate:

Plattform	Frames / ms
CODESYS Control RTE	64
CODESYS Raspberry Pi SL	8

## Programming Interface (API for IEC application)

The PROFINET Controller provides a rich API for Profinet related functions and utilities that can be used by the application at runtime.

Function	Description
DCP-Identify (Bus-Scan)	Function block ProfinetCommon.DCP_Identify
DCP-Set/Get	Function block ProfinetCommon.DCP_Set /
	DCP_Get
	set / get IP-Address or Stationname
Factory Reset	Function block ProfinetCommon.DCP_Reset
IO-Link	- Read / Write IO-Link Parameters with
	Function block ProfinetCommon.IOL_CALL
	- Smart Sensor Profile Support with Function
	Blocks in ProfinetCommon library
Status Outputs	Implicit Profinet slave function block:
	xRunning: Connection established

Function	Description
	xError: Connection aborted / failed
	xDiagnosis: diagnosis available
	xModuleDiff: module configuration not
	matching (wrong or missing).
Status Outputs Controller	Implicit Profinet Controller function block:
	xOnline: Profinet Controller is online
	xBusy: Controller is in startup phase
	xError: Profinet Controller is in error state
	xDataValid: All IO-Data of the configured
	Profinet devices is valid.
Dynamic connect/abort	Implicit Profinet Controller or slave function
	block, method SetCommunicationState()
Generic access on device- and module-	Function block
configuration	ProfinetCommon.DeviceIterator and
	SubmoduleIterator
	Generic API for iterating Slave- or Module
	Configuration and Status
Diagnosis Shadowing	Function block
	ProfinetCommon.DiagnosisBuffer
	All Diagnosis Data is locally buffered
Receive Alarms	Function block CommFB.RALARM
Acyclic Read/Write	Function block CommFB.RDREC / WRREC
Direct IO-Data access	Function block CommFB.SETIO_PART /
	GETIO_PART
Device-Access AR	Function block CommFB.CNCT
Reconfigure	Function block DED.Reconfigure
	Enable/Disable modules, slaves or the
	complete Profinet stack
	Function block
	loDrvProfinetBase.ControllerConfigUtil:
	Change configured Stationname, Slot /
	Subslot oder device-settings in application.

A device description and editor for the PROFINET Controller allows integration into an appropriate CODESYS project according to the physical configuration of the hardware.

# Architecture

Typical structure in the CODESYS device tree:



## **General information**

#### Supplier:

CODESYS GmbH Memminger Strasse 151 87439 Kempten Germany

#### Support:

Technical support is not included with this product. To receive technical support, please purchase a CODESYS Support Ticket.

https://support.codesys.com

Item:

CODESYS PROFINET Controller SL

Item number:

2303000015

Sales/Source of supply:

CODESYS Store https://store.codesys.com

#### Included in delivery:

License key

### System requirements and restrictions

Programming System	CODESYS Development System V3.5.17.0 or higher
Runtime System	CODESYS Control V3.5.17.0 or higher
Supported Platforms/ Devices	CODESYS runtime system with these components * SysEthernet * SysSocket
	Note: Use the project <i>Device Reader</i> to find out the supported features of your device. <i>Device Reader</i> is available for free in the CODESYS Store.
Additional Requirements	Technical requirements * Ethernet Adapter (for Control RTE with Intel or Realtek chip) Legal requirements

	controller.
	container (soft container), which is permanently connected to the controller. Alternatively, the license can be stored on a CODESYS Key (USB dongle). By replugging the CODESYS Key, the license can be used on any other
	Single device license: The license can be used on the target device/PLC on which the CODESYS runtime system is installed.
Licensing	DEVICE
Restrictions	Certification is currently possible for * Control RTE > V3.5.18.30 * Linux based runtimes > V3.5.17.30
	A certification by a PI Test Lab is mandatory for every PROFINET Controller or Device that is sold to end-users. Details on certification can be found here: www.profibus.com/products/product-certification/

Note: Technical specifications are subject to change. Errors and omissions excepted. The content of the current online version of this document applies.

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