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

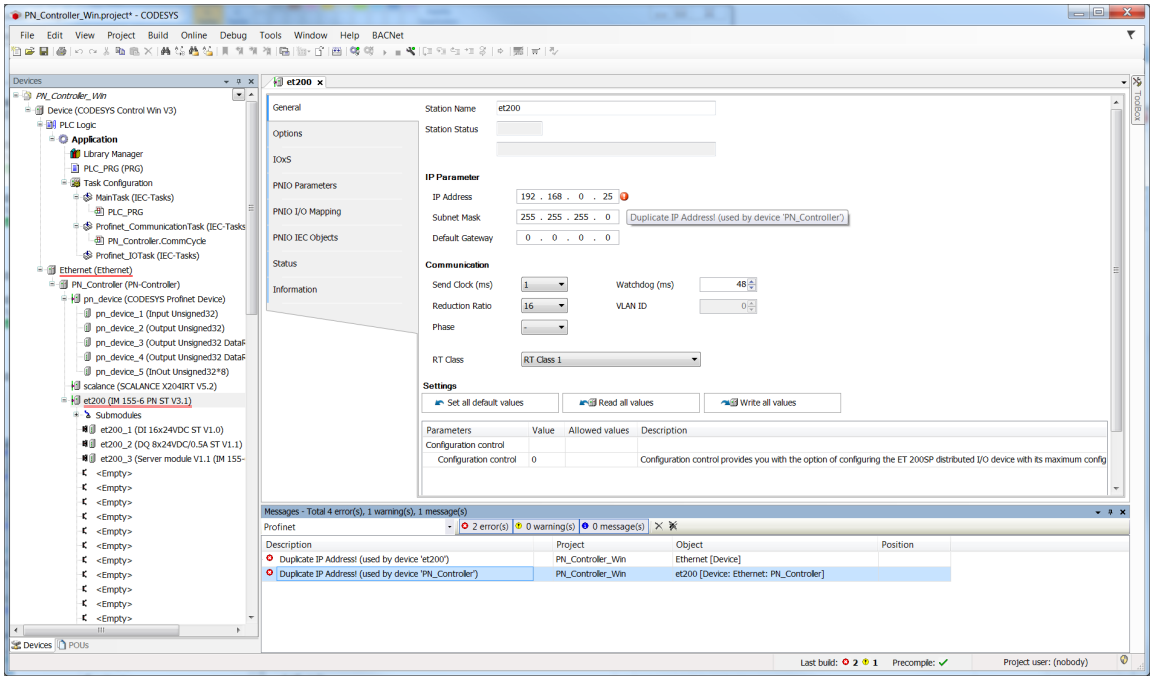
PROFINET (Process Field Network) is an open standard for realtime industrial Ethernet systems in automation technology. It is promoted by the user organization PI (PROFIBUS & PROFINET International as an umbrella group of the PROFIBUS user organization PNO) and is regarded as the successor of PROFIBUS. 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:

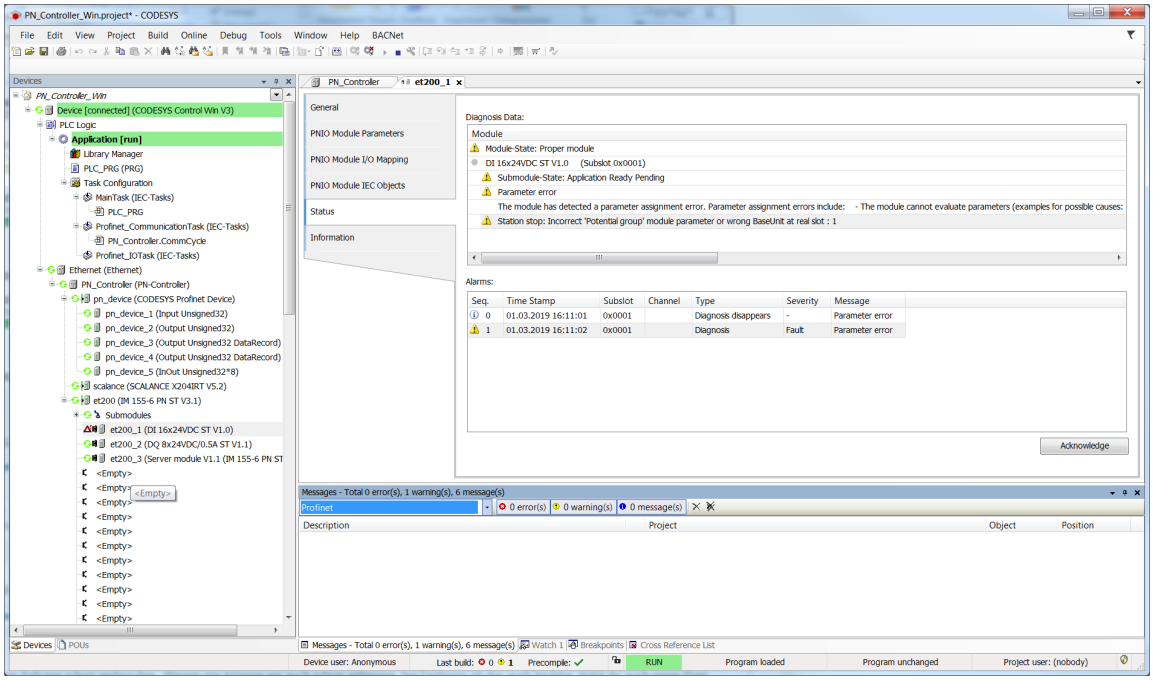
- CODESYS PROFINET Controller (IEC)
  Protocol stack in the form of a CODESYS library (in IEC 61131-3 code), operates on standard network interface cards.
  For CODESYS Control RTE high performance ethernet adapter drivers are available (see requirements).
  The ethernet adapter is not used exclusively, it’s still available for all other applications using TCP/IP on this adapter (e.g. CODESYS Visualisation, Web Browser).

CODESYS PROFINET Configurator

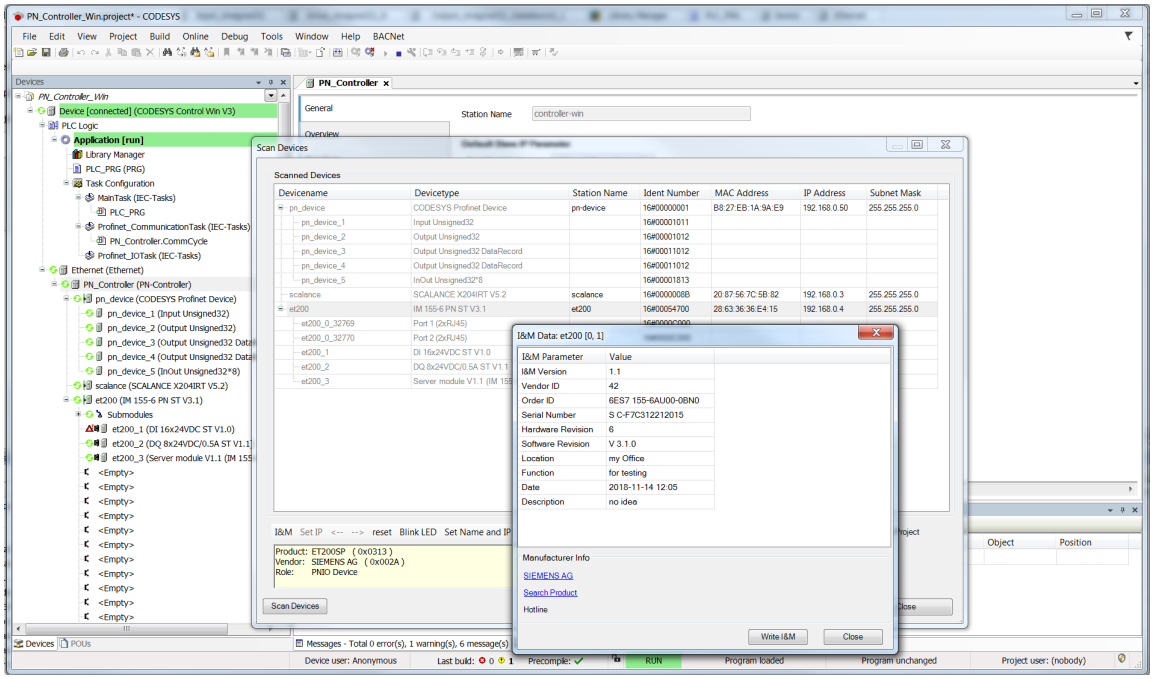
- configurator for settings of PROFINET Controller
- configuration of as slaves (single AR to PROFINET field device) with communications settings
- configuration of device/module specific parameters, in- and output-mapping
- status page with detailed view of currently pendig diagnostics and previously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



Picture 1: Configuration with validation



Picture 2: Diagnosis in Status Page



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	V2.42
Conformance Class	B
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 Exchange)	yes
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.

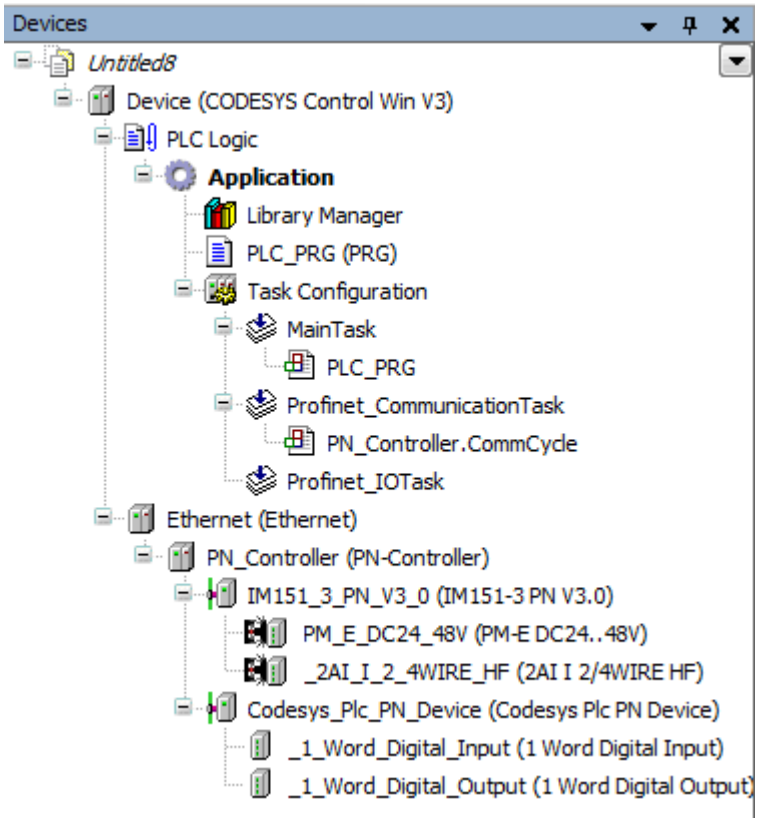
Function	**Description**
DCP-Identify (Bus-Scan)	Function block ProfinetCommon.DCP_Identify
DCP-Set/Get	Function block ProfinetCommon.DCP_Set / DCP_Get set / get IP-Address or Stationname
Factory Reset	Function block ProfinetCommon.DCP_Reset
IO-Link	- Read / Write IO-Link Parameters with Function block 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-configuration	Function block 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 IoDrvProfinetBase.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:


Devices
Untitled8
Device (CODESYS Control Win V3)
PLC Logic
Application
Library Manager
PLC_PRG (PRG)
Task Configuration
MainTask
PLC_PRG
Profinet_CommunicationTask
PN_Controller.CommCycle
Profinet_IOTask
Ethernet (Ethernet)
PN_Controller (PN-Controller)
IM151_3_PN_V3_0 (IM151-3 PN V3.0)
PM_E_DC24_48V (PM-E DC24..48V)
_2AI_I_2_4WIRE_HF (2AI I 2/4WIRE HF)
Codesys_Plc_PN_Device (Codesys Plc PN Device)
_1_Word_Digital_Input (1 Word Digital Input)
_1_Word_Digital_Output (1 Word Digital Output)

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 *Device Reader* to find out the supported features of your device. *Device Reader* is available for free in the CODESYS Store.
Additional Requirements	**Technical requirements** * Ethernet Adapter (for Control RTE with Intel or Realtek chip) **Legal requirements**

	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/
Restrictions	Certification is currently possible for * Control RTE > V3.5.18.30 * Linux based runtimes > V3.5.17.30
Licensing	 Single device license: The license can be used on the target device/PLC on which the CODESYS runtime system is installed. Licenses are activated on a software-based license 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 controller.
Required Accessories	Optional: CODESYS Key

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

Creation date: 2023-07-20