CODESYS STORE

Data Sheet CODESYS PROFINET Controller

CODESYS PROFINET Controller 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.

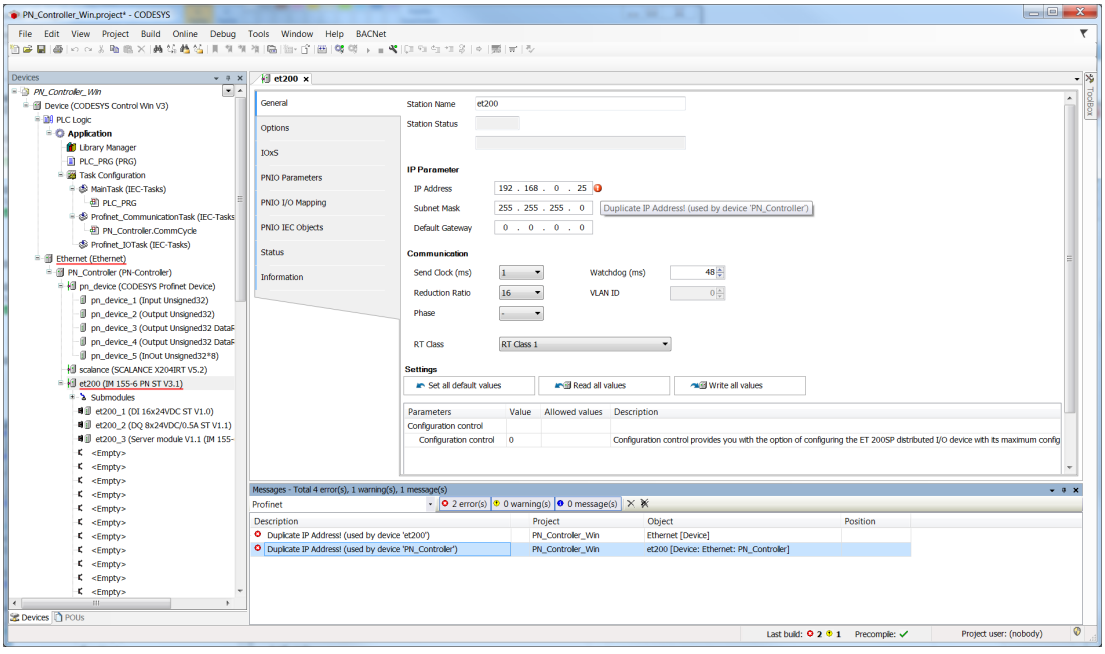
The fully integrated CODESYS PROFINET Solution provides a uniform configurator for different variants of underlying PROFINET Controller communication stacks:

- 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).

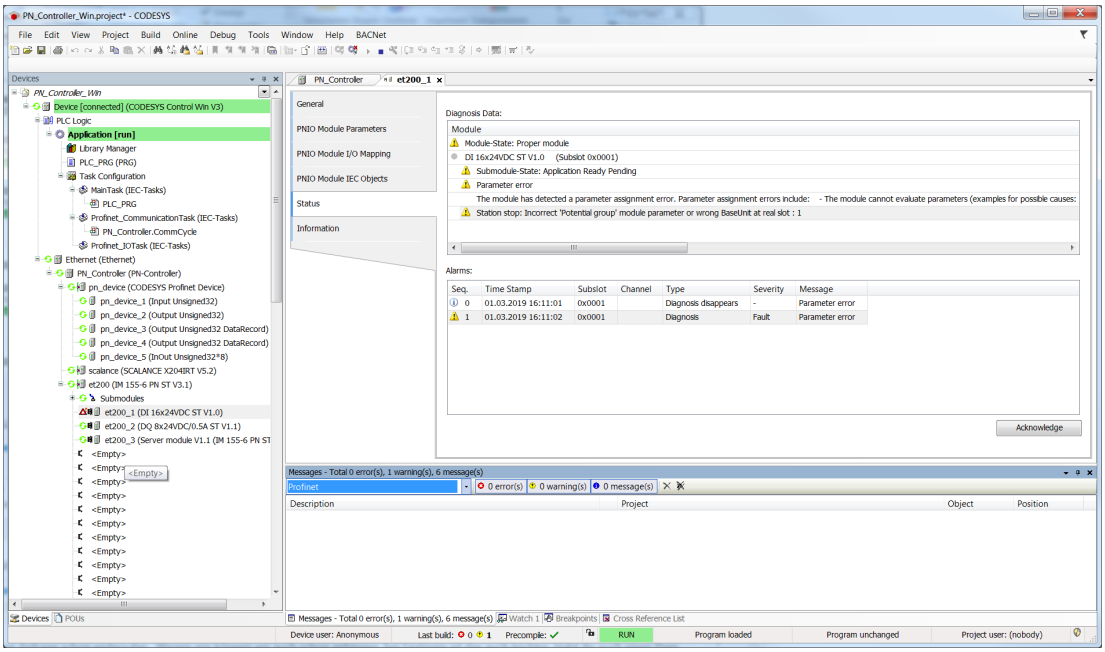
- CODESYS PROFINET Controller (CIFX)
  Driver for Hilscher netX hardware with PROFINET Controller stack and Runtime system component for direct access to Hilscher CIFX card.
  Supports IRT communication (Isochronous Real Time).

CODESYS PROFINET Configurator

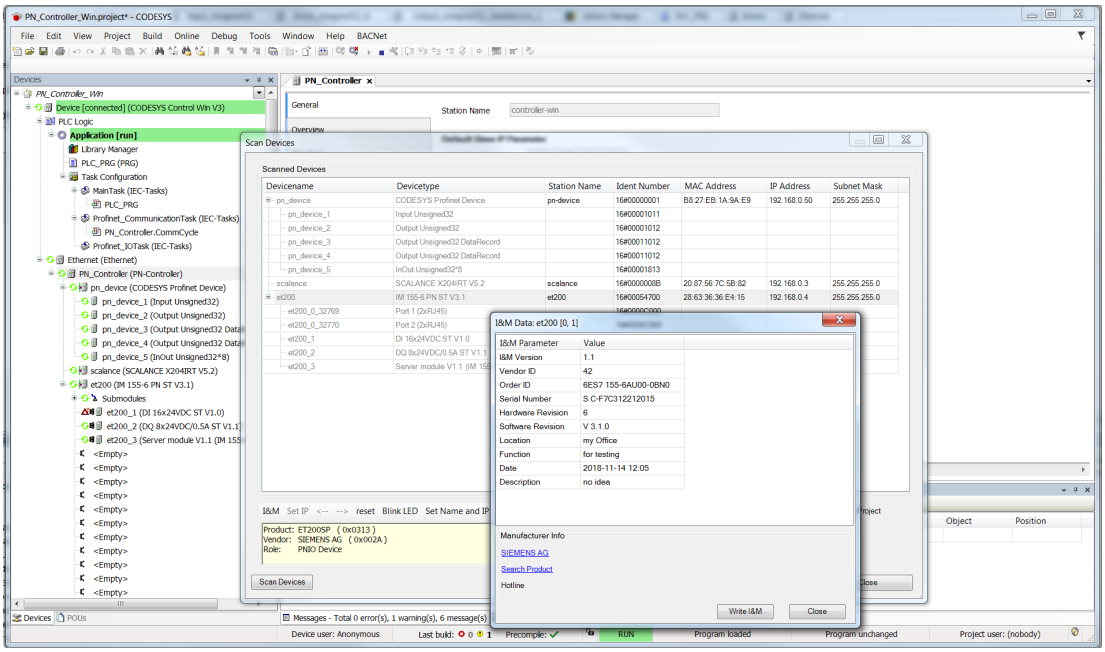
- configurator for settings of PROFINET Controller
- configuration of as slaves (single AR to PROFINET field device) with communications settings
- configuration of device/module specific parameters, in- and output-mapping
- status page with detailed view of currently pendig diagnostics and previously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



Picture 1: Configuration with validation



Picture 2: Diagnosis in Status Page



Picture 3: Scan Dialog with I&M Functions

Profinet-Stack (IEC and CIFX V3)

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/)

For Details on CIFX variant refer to Hilscher Documentation for your specifc firmware version. This documents refers to Firmware Version V3.3.x.x. The CIFX variant is not available for Big-Endian systems !

Feature	CODESYS	CIFX
PROFINET Specification	V2.42	V2.3
Conformance Class	B	B, C

Max. Number of connections	64 (default) - 1024	128 64 for IRT
Max. IO-Data (total)	no limit	5652 byte input and 5700 byte output
Max. IO-Data (per slave)	1440 input and 1440 byte output	1440 input and 1440 byte output
Max. acyclic data	16 KB	64 KB
Plattforms / OS (see restrictions)	Windows, Linux, VxWorks, WinCE	Windows, Linux, VxWorks
CPU	32/64 Bit Little-/Big-Endian	32/64 Bit Little-Endian only !
Provider-/Consumer-Status	yes	yes
Automatic Name Assignment (Device Exchange)	yes	yes
Topology-Config	yes	yes
MRP-Configuration	yes	yes
MRP-Role	none, just configuration of MRP devices	Client Manager (additional Licence required)
Shared Device	yes	yes
Device Access AR	yes	yes
Performance	depends on Plattform (** see below) tested with 64 frames / ms	max 64 frames / ms

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.
For technical reasons, some functions are not available for CIFX variant.

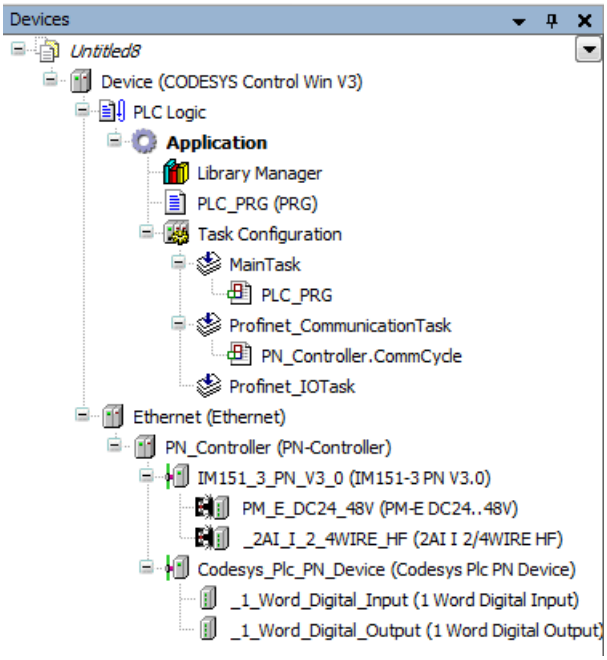
Function	**Description**
DCP-Identify (Bus-Scan)	Function block ProfinetCommon.DCP_Identify
DCP-Set/Get	Function block ProfinetCommon.DCP_Set / DCP_Get set / get IP-Address or Stationname
Factory Reset	Function block ProfinetCommon.DCP_Reset
IO-Link	- Read / Write IO-Link Parameters with Function block ProfinetCommon.IOL_CALL - Smart Sensor Profile Support with Function Blocks in ProfinetCommon library
Status Outputs	Implicit Profinet slave function block: xRunning: Connection established xError: Connection aborted / failed xDiagnosis: diagnosis available xModuleDiff: module configuration not matching (wrong or missing).

Function	Description
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 (not CIFX)	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:



Functionality of the configurator:

- Import of PROFINET GSDML configuration files (PROFINET XML Format)
- Network scan: Recognize and insert connected slaves
- Configuration of PROFINET parameters on the I/O slave modules, I/O devices and their I/Os
- Bus diagnostics: in the configurator and by the PLC application

- User-friendly variable mapping with separate access to bit channels
- Call of PROFINET services directly from the configurator such as reading I&M data, setting of station names and IP configuration and “Reset to Factory”

System requirements:

- System with implemented IP communication stack
- Alternative: Hilscher netX-based PROFINET master with an integrated protocol stack

General information

Supplier:
CODESYS GmbH
Memminger Strasse 151
87439 Kempten
Germany

Support:
https://support.codesys.com

Item:
CODESYS PROFINET Controller
Item number:
1103000032 (IEC) 1103000019 (CIFX)
Sales:
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 V3.5.6.0 or higher
Supported Platforms/ Devices	CODESYS runtime system with these components * SysEthernet * SysSocket * alternative: CmpHilscherCIFX 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) * alternative: Hilscher netX **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 > V3.5.16.10 * Linux based runtimes > V3.5.14.0
Licensing	License activation optional on CODESYS Key or Soft Key (Soft Key: free of charge component of CODESYS Controls)
Required Accessories	Optional: CODESYS Key

Note: Not all CODESYS features are available in all territories. For more information on geographic restrictions, please contact sales@codesys.com.
Note: Technical specifications are subject to change. Errors and omissions excepted. The content of the current online version of this document applies.