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Basic Controller SIMATIC S7-1200

Be flexible thanks to networking possibilities

SIMATIC controllers set new automation scale

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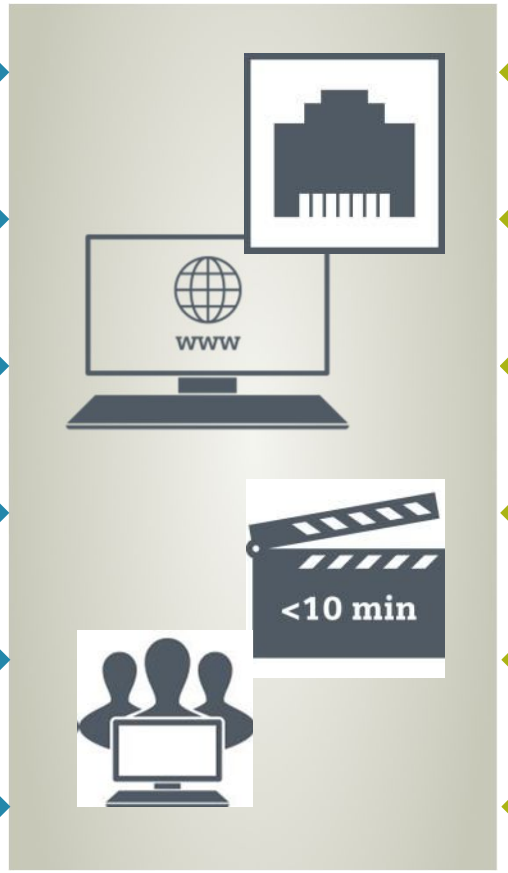
Trends	Solutions…
Ethernet-based field bus	PROFINET I/O as a standard at all PLCs
IT functionality	e.g. web server on-board all PLCs
Increased functionality and design flexibility	For the same price More interfaces, higher performance, memory …
Increased Integrated functionality	e.g. motion control functions / PID controller / Trace / high speed counters
Optimized usability	e.g. integrated system diagnostics, project upload Simplified commissioning (serial machine building)
Easy to manage, reduced complexity	Reduced, optimized portfolio Increase of system functionality



SIMATIC S7-1200 configured in TIA Portal
Highlight performance

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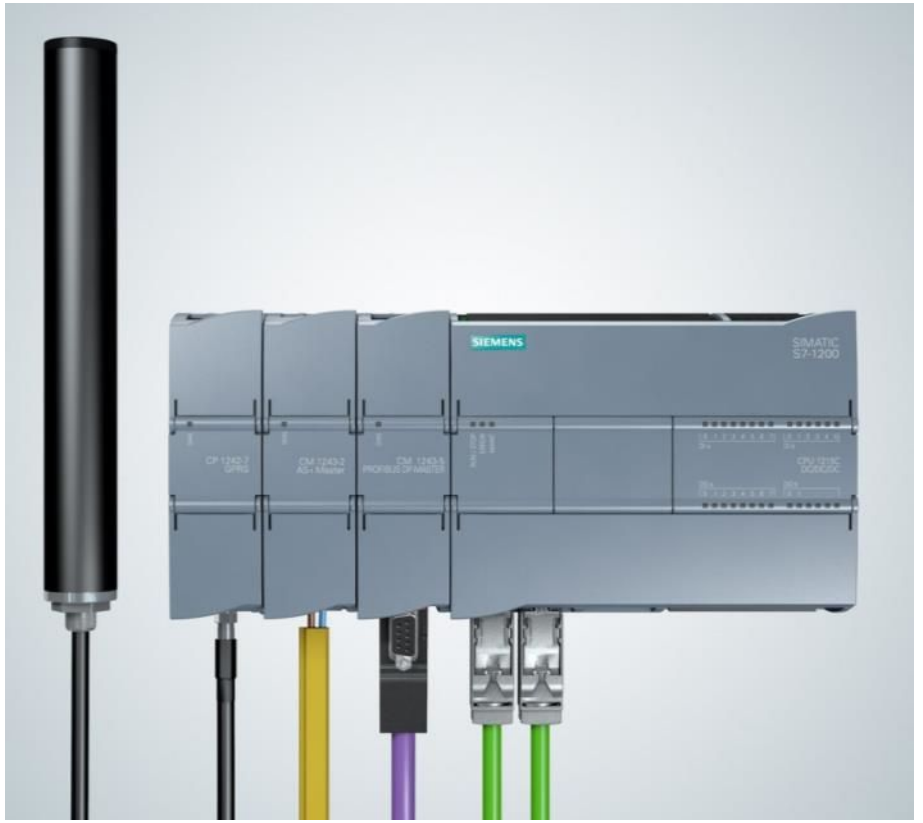
Comprehensive network options for SIMATIC S7-1200

- PROFINET Master – decentralized Profinet architectures possible for I/O, HMI, drives, and other Profinet field devices. NO communication module required!
- PROFIBUS Master & Slave – decentralized Profinet architectures possible for I/O, drives, and other Profinet devices, including integration into existing system networks.
- AS-i Master – The new AS-i-Master is configured in full in the TIA Portal and a new AS-i network can be created very easily with just a few clicks. AS-i networks do not therefore require separate software!
- CANopen Master – Enables connection with CANopen devices, as well as with devices running Transparent CAN 2.0A.



Comprehensive network options to meet your requirements!

SIMATIC S7-1200 configured in TIA Portal
Highlight performance

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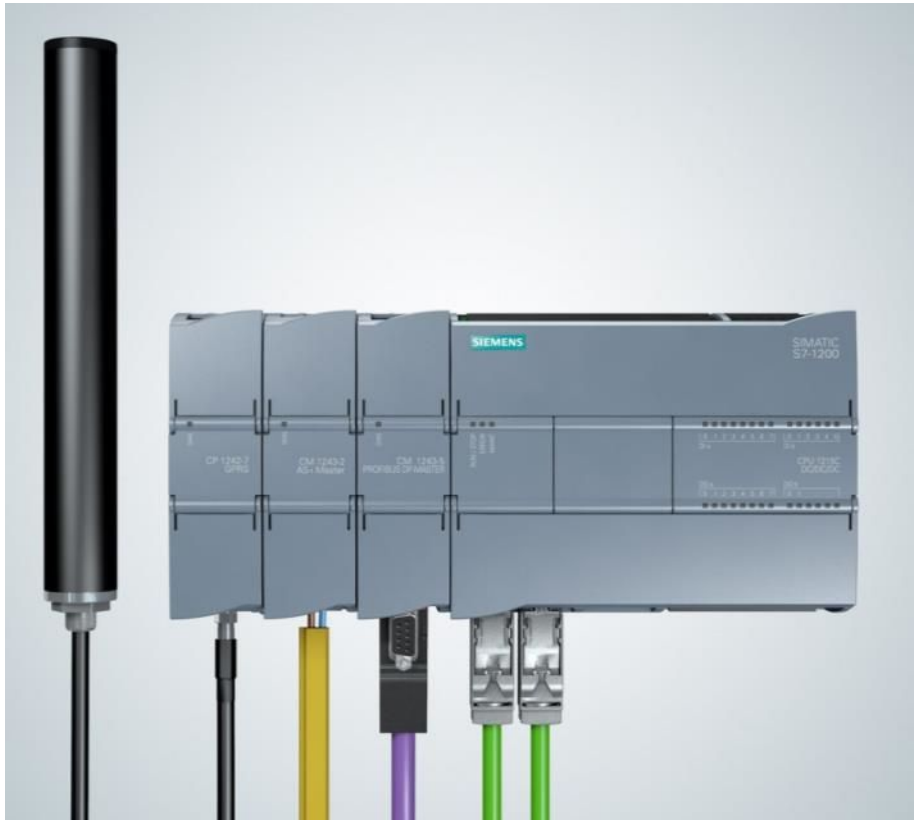
Comprehensive network options for SIMATIC S7-1200

- Modbus TCP – Enables communication with devices as Modbus master or slave. Only one TCP function block is required for this.
- IO-Link Master – Fast and easy integration of the SIRIUS compact starter, M200D starter and SIRIUS soft starter for simple starter control.
- GPRS/LTE module – Easy implementation for data recording and control of decentralized computer.
- TCP/IP – Via the instructions for open communication you can communicate with other CPUs, other PCs and with devices that use TCP/IP communication protocols as standard. NO communication module required!



Comprehensive network options to meet your requirements!

SIMATIC S7-1200 in the TIA Portal
Highlight performance

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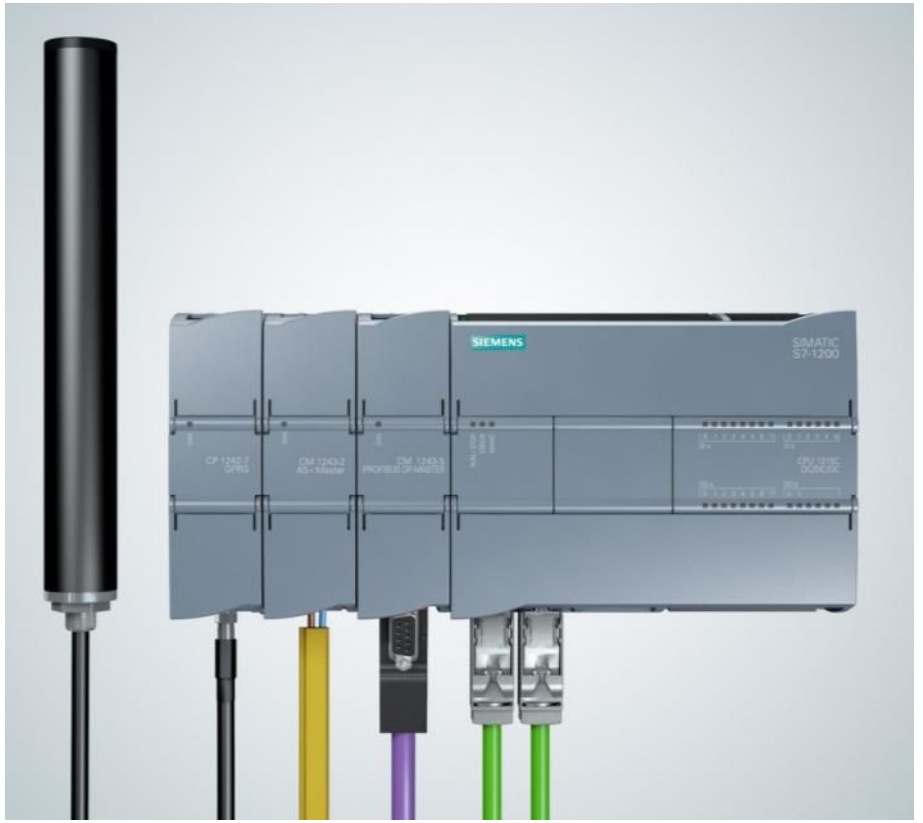
Comprehensive network options for SIMATIC S7-1200

- RS-485, RS-422 & RS-232 – The S7-1200 CPU supports point-to-point (PtP) communication for character-based serial protocols, and this provides maximum freedom and flexibility for the use of PtP communication instructions in the user program.
- Modbus RTU – Using the Modbus instructions the Modbus master or slave is able to communicate with devices that use the Modbus RTU protocol.
- USS – Using simple USS instructions you can control the operation of drives that support the USS (Universal Serial Interface) protocol



Comprehensive network options to meet your requirements!

Communication
S7-1200

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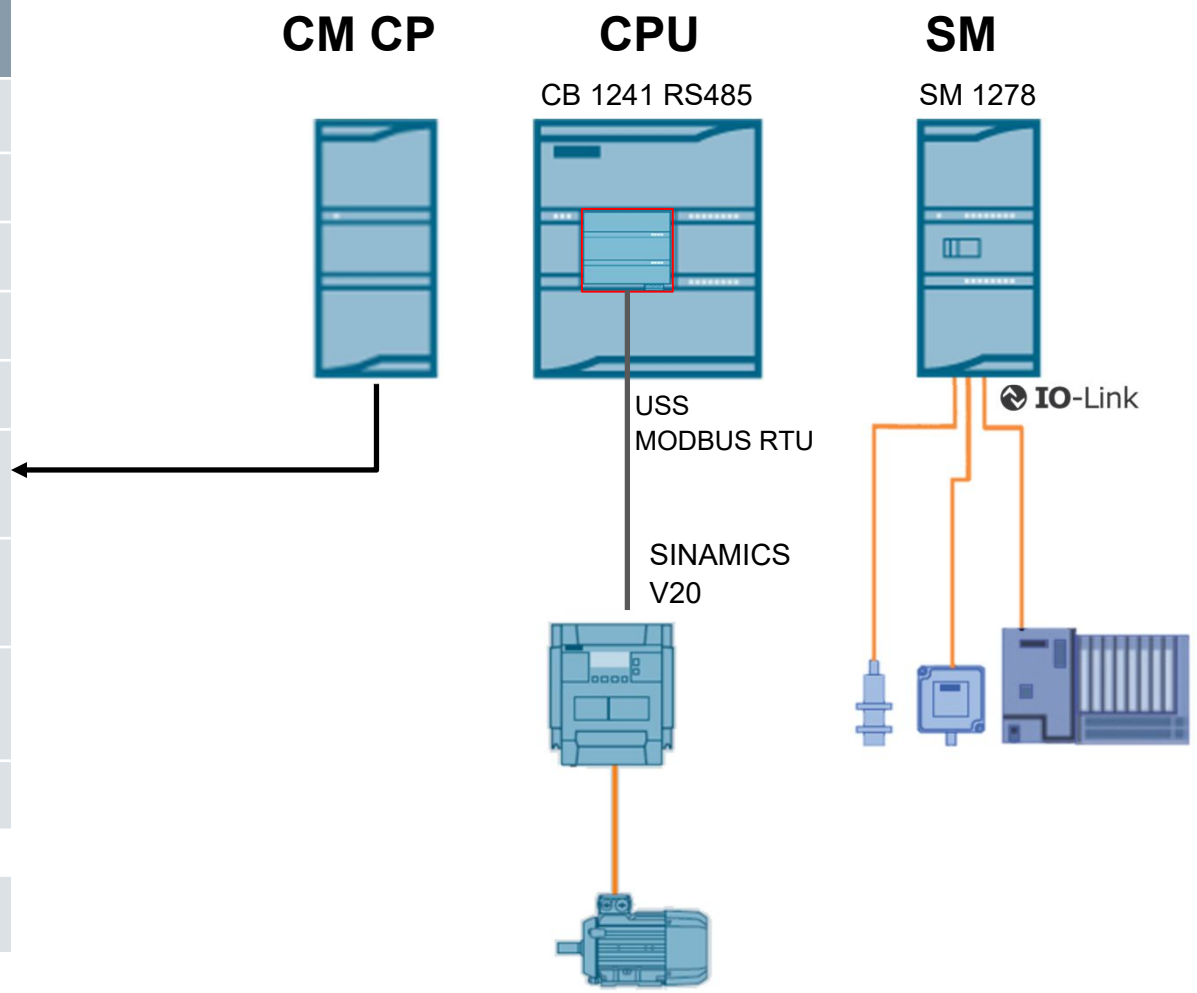
Module	Communication	
CM 1241	RS232	serial
CM 1241	RS422/485	serial
CM 1243-2	AS-i master	
CM 1242-5	PROFIBUS	DP slave
CM 1243-5	PROFIBUS	DP master
CP 1242-7	GPRS	Mobile communications telecontrol
CP 1243-7	LTE	Mobile communications telecontrol
CP1243-1	Ethernet	VPN/Firewall, Telecontrol Ethernet (DNP3, IEC 60870)
RF120C	RFID	1 Reader port; RS422
CM CANopen	CANopen	3rd party: HMS 021620-B



Communication
S7-1200 integrated PROFINET (Ethernet) interface

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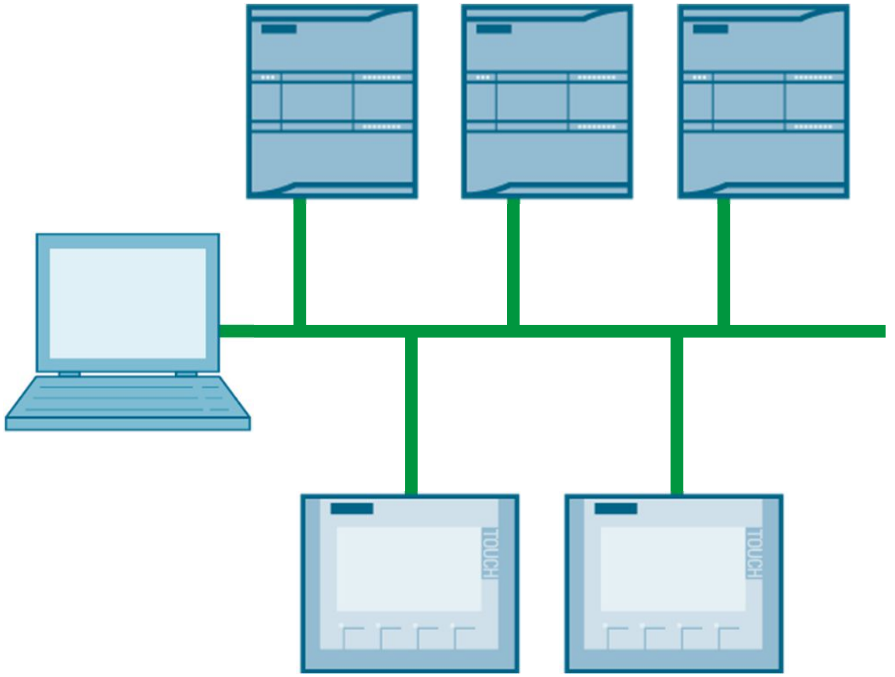
Communication ...

… with the STEP 7 software
- CPU hardware configuration
- Loading a project
- Monitoring/amending runtime tags
- Set runtime I/O statuses
- Diagnostics information

... with HMI panels
- Data from or to the CPU
- System diagnostics

... from CPU to CPU
- Open communication with T-block instructions
- Supported protocols: TCP/IP, ISO on TCP, UDP, S7 Com. (PUT/GET)



S7-1200 CPUs use PROFINET connections to STEP 7, S7-1200 CPUs and HMI panels

Communication
MRP - Media redundancy protocol

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S7-1200 ✓ S7-1500 ✓

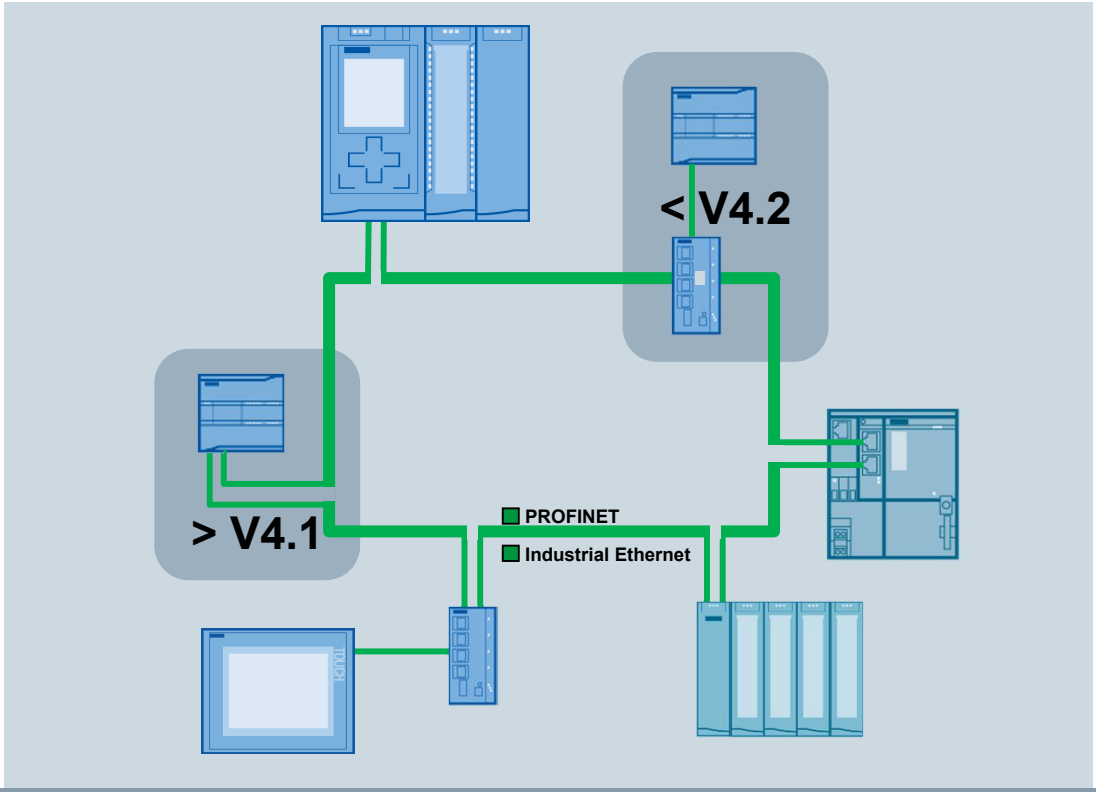
Based on ring topology (IEC 61158-5-10)

Max. 50 nodes in the ring
- PROFINET IO-Controller
- PROFINET IO-Devices
- Components of the network infrastructure (IE switches)

200 ms reconfiguration time

CPU 1215/17 as MRP Client at least FW V4.1

Configuration and diagnostics in STEP7



- **Improved plant availability**
- **More flexibility**
- **Lower costs since less equipment required**

Communication
S7 routing

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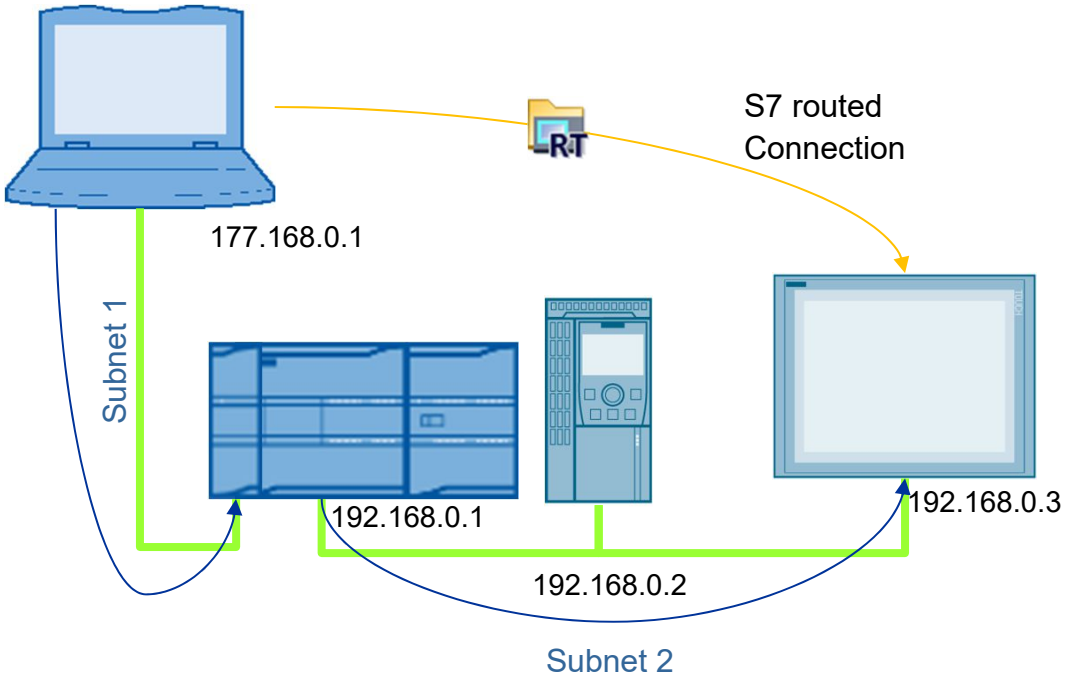
S7-1200 ✓ S7-1500 ✓

- Enables a connection between different subnets
- A SIMATIC S7-1200 station acts as an S7 router
- Based on PROFINET
- Actually only with CP 1243-1 at least V2.0 (6GK7243-1BX30-0XE0) and CPU FW V4.2



Routing between the CPU and a CP, e.g. for transfer an HMI project from ES to panel

Communication
Webserver

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Communication ...

Integrated Web server
- Access to system and process reports as well as identification data
- System diagnostics for all configured assemblies centrally and decentralized
- Communication diagnostics on parameters, statistics, connection status
- Access to process data via tag tables and freely definable tag lists
- Pages to be defined by the user
- Firmware update

Archive
- Access via Webserver using Filebrowser for reciprocal exchanges of data in .csv format
- Logging of user-defined tags

Simple location-independent information recording for process variables and system status

Communication
Station webserver

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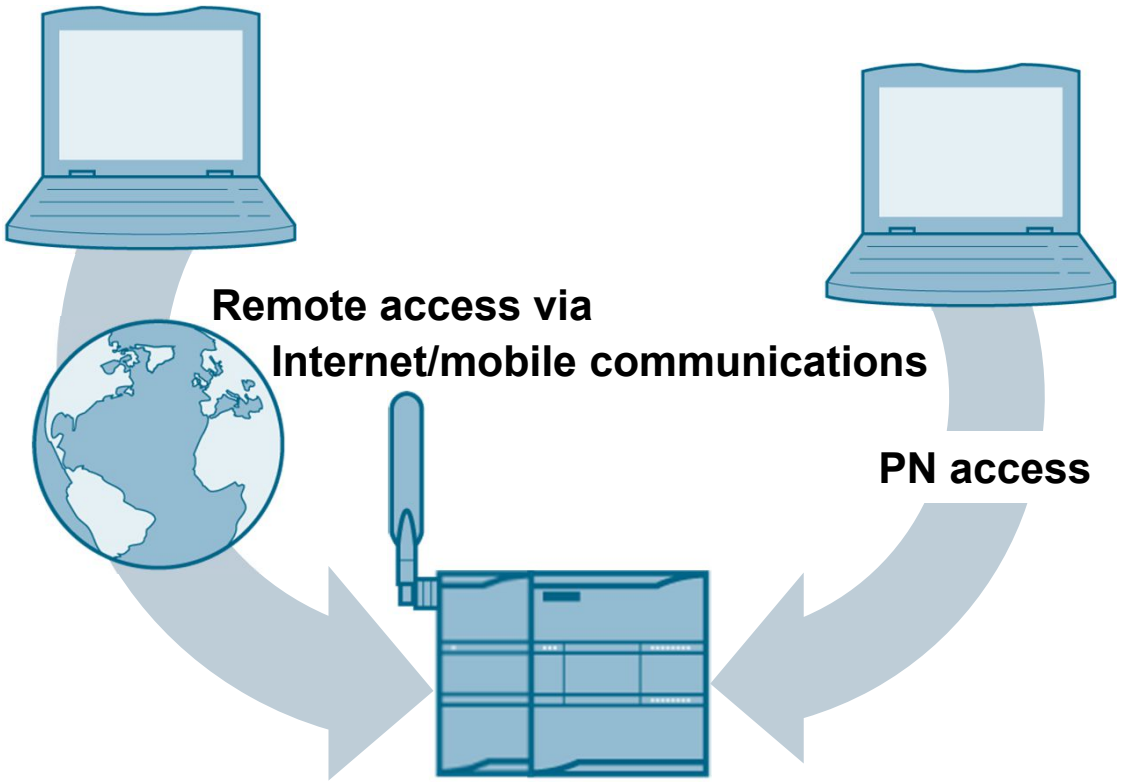
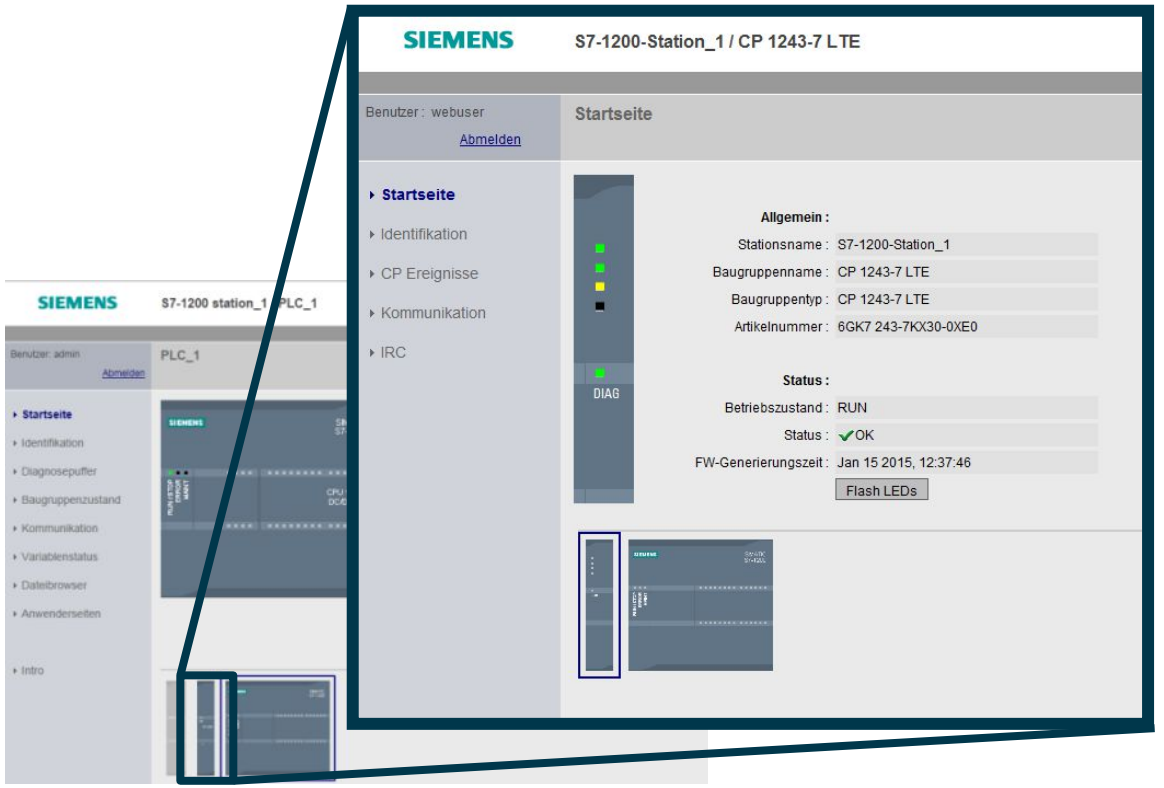
Ingenuity for life





Various types of communication access:
CPU PN interface, CP 1243-7 LTE,
CP1242-7 V2

- Central access via CPU page independently of the interface
- User is then able to browse to the CP-specific webpages from there

uniform, consistent webserver
for entire
S7-1200 station

Communication
PROFINET i-Device

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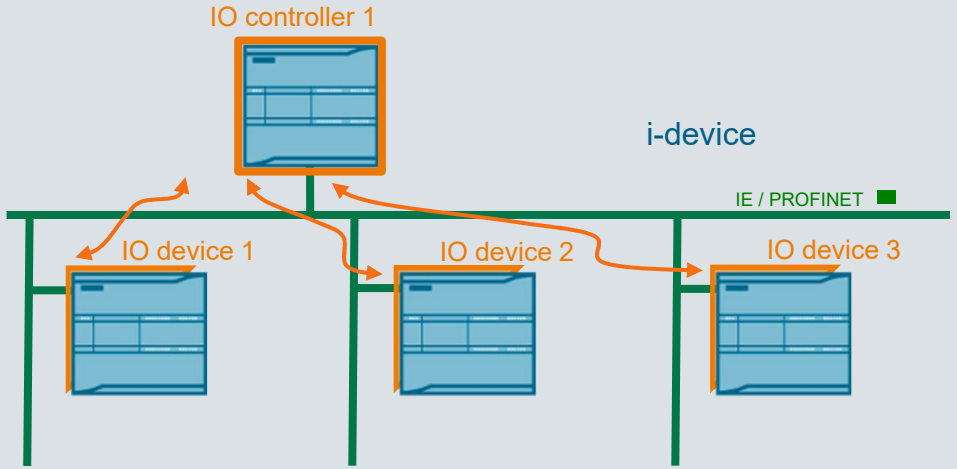
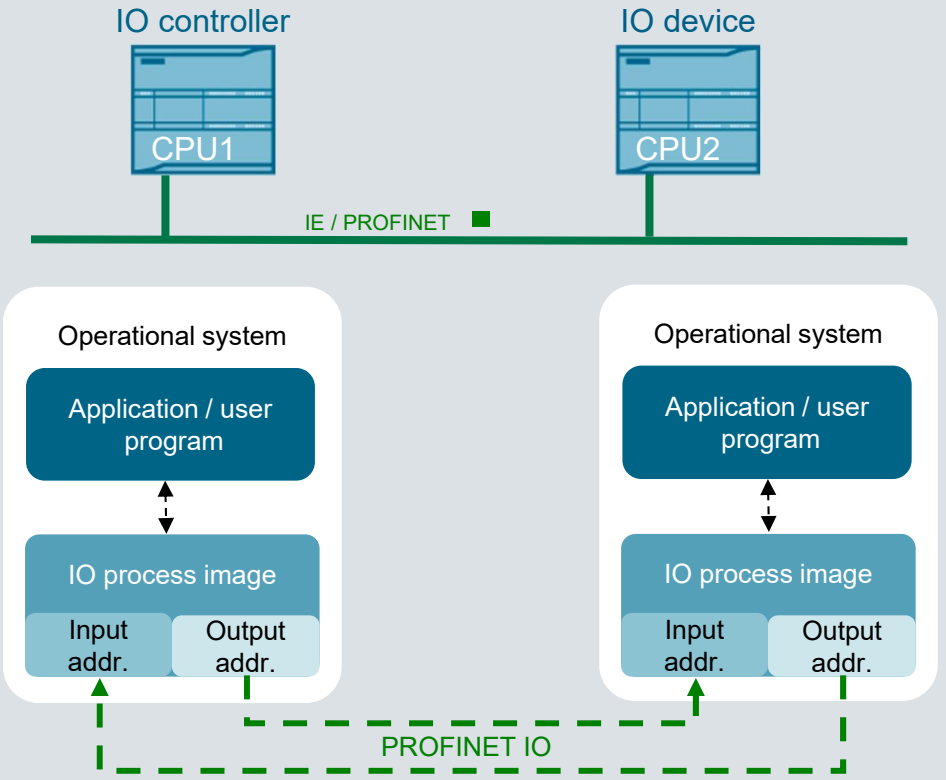
- Simple configuration of S7-1200 CPUs in a master/slave architecture through reading and writing the reciprocal I/O images
- Connection of CPUs in different projects
- NO PN-PN coupler required (transparent network)





Savings with costs / installation / wiring of additional hardware

Communication
Shared I-Device

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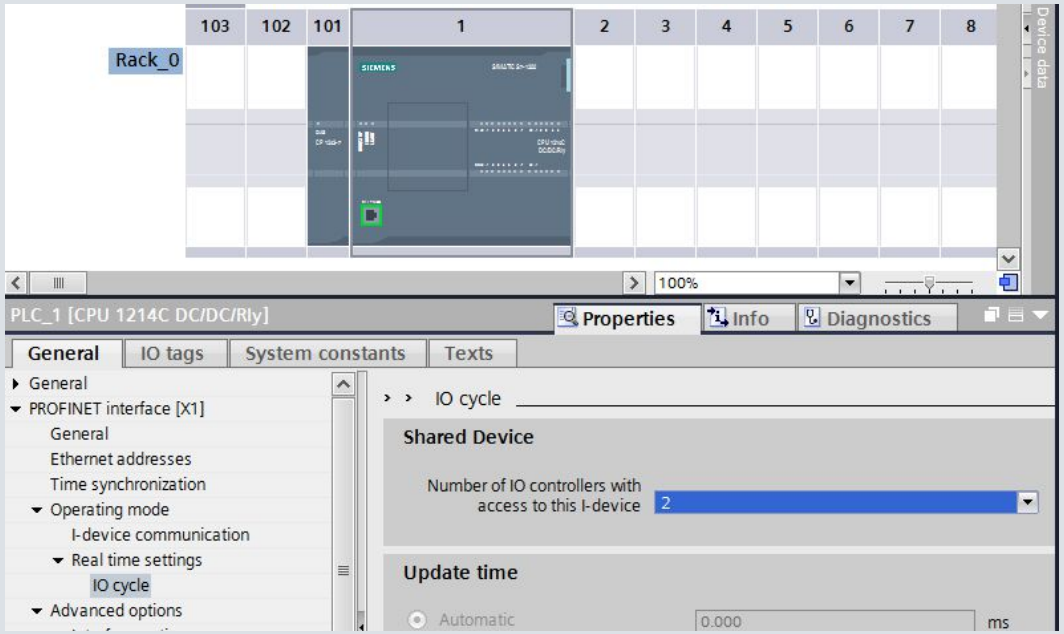
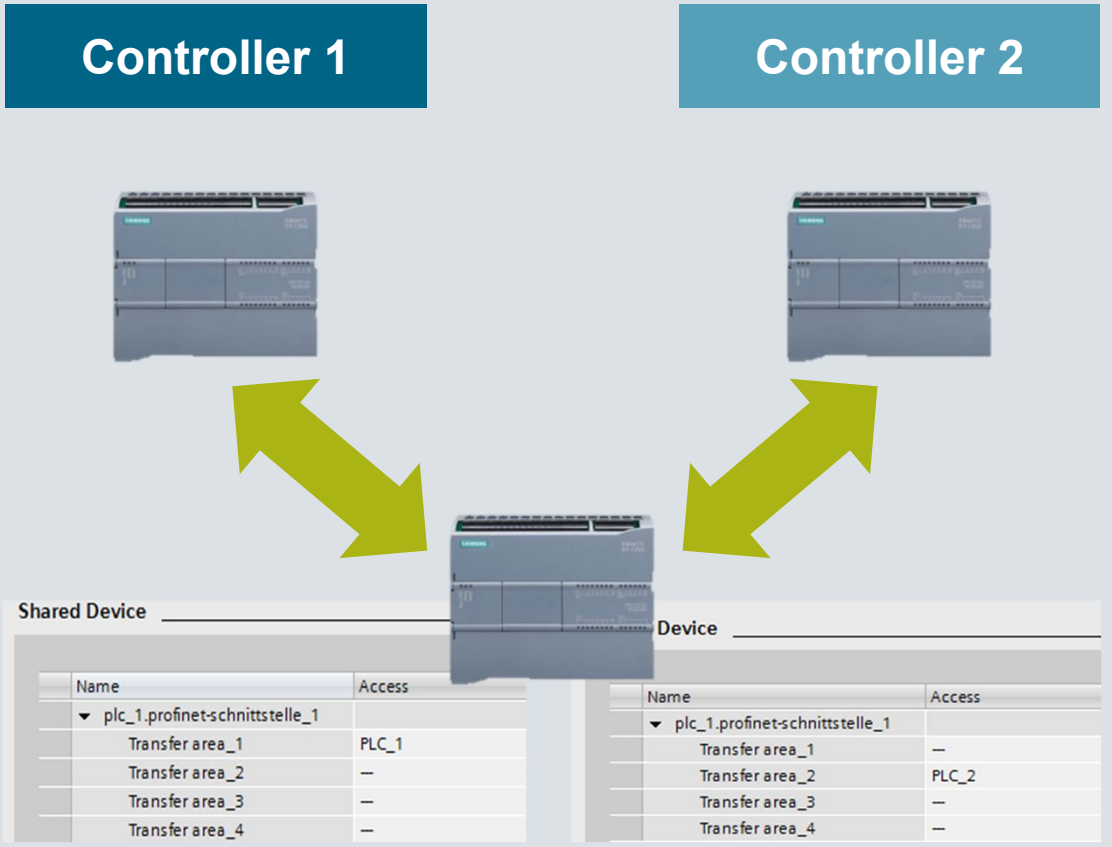
Shared I-device

- Access for up to 2 controllers on S7-1200 as i-device
- Rapid exchange of data in real time between S7-1x00 CPUs

As of V4.1

- Incorporation of 3rd party controllers under PROFINET





Communication
Serial communication

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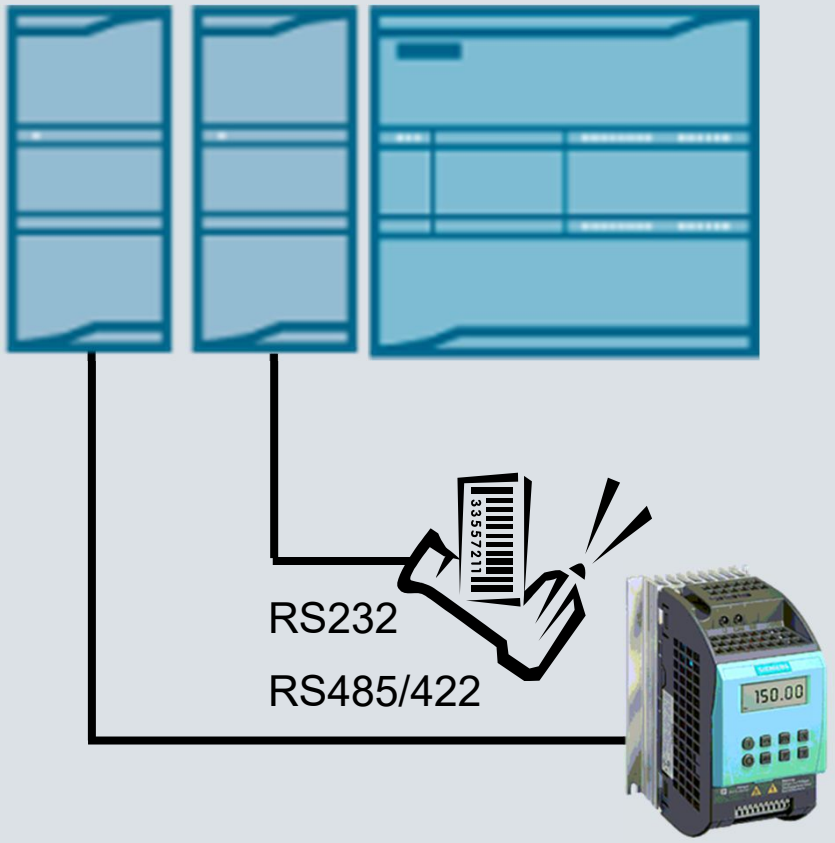
S7-1200 CPU communication via RS232 and RS485 connections

- ASCII protocol (character-based serial communication) uses STEP 7 PtP instructions
- USS Drive protocol is programmed with STEP 7 USS library instructions
- MODBUS protocol is programmed with STEP 7 MODBUS library instructions
- 3964R Protokoll

Use of RS232 and RS485/422 modules CM1241 or RS485 Signalboard CB1241 for PtP communication



Communication
USS drives

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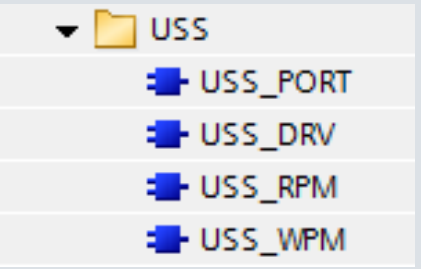
PZD parameters – Up to eight user-defined PZD parameters for control and speed

Update rate

- Fixed update rate (as fast as possible)
- Enable instructions in an interrupt alarm OB in order to set a user-defined update rate.



Support for drives

- Maximum 15 drives per CM (communication module) supported
- Non support:
  - MM3 drives
  - Deregistration of missing drives

Communication
IO-Link support

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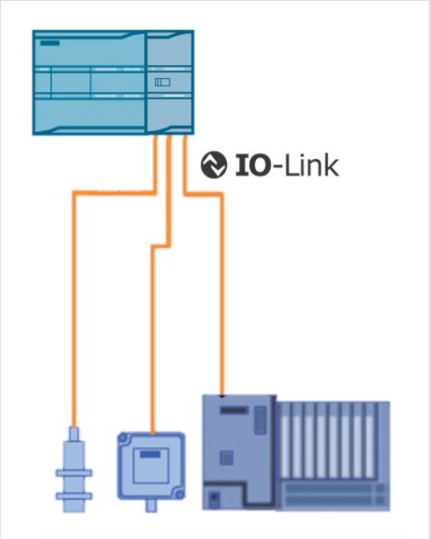
IO link master specification V1.1

- S7-1200 CPU up to 8 IO-Link master modules - centralized
- Data rate COM1 (4.8 kbaud), COM2 (38.4 kbaud), COM3 (230.4 kbaud)
- Standard IO Mode (SIO Mode)
- up to 4 IO-Link devices (3 wire)
  or 4 standard actuators
- Diagnostics configurable for each port
- I&M identification
- IO-Link parameter allocation with S7-PCT (Port Configuration Tool) V3.2



Communication
SM 1278 4xIO-Link master (6ES7 274-1XK30-0XA0)

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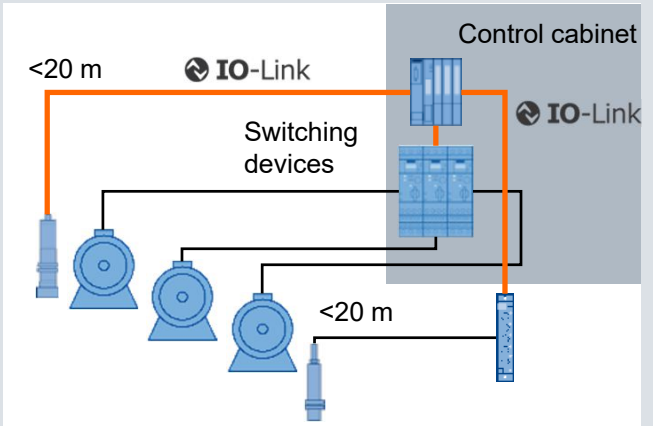
- Point-to-point connection, no bus system
  - Existing wiring topologies are retained
- Standard sensor/actuator cable (three wires with one signal wire), unshielded, 20 m in length, no special-purpose cable / connector
- Manufacturer-independent communication standard for the PNO
- Non-stop consistent communication
  - Cyclical, bidirectional process data communication (typ. 2 ms cycle)
  - Non-cyclical service data transmission between sensors/actuators and the controller as required
- Integrated differentiated diagnostics alarms
- → Link



3UG4
monitoring relays

3RW40
soft starters

3RA27
function modules for feeders

3RA6
compact starters

Communication
SIMATIC RF120C – Fast communication module for S7-1200

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RF120C	
Interface to the application	Internal S7 bus
Connection technology	S7-1200 setup technology; screw terminals for 24 V supply
Interface to the reader	RS422 incl. 24 Volt; up to 115.2 KBaud
Connection technology	Submin-D connector
RFID system	RF200, RF300, RF600, MOBY D/U, MV400
FB, driver	Instructions: Read, Write, Read_EPC-Mem, Write_EPC-Mem, Set_Ant_RF300, Set_Ant_RF600, Reset_Reader; based on FB101
Number of readers	1 per RF120C; 3 per S7-1200
Degree of protection	IP 20
Dimensions (W x H x D)	30 x 100 x 75

SIMATIC S7-1200
SIWAREX WP231 – Basic applications

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Ingenuity for life

Supported S7-1200 CPU:

- CPU 1212C → up to two SIWAREX modules
- CPU 1214C or higher
  → up to eight SIWAREX modules
- Full parameter access from the CPU via free downloadable function block
  → Complete commissioning and calibration via CPU/HMI

Applications:

- Level measurement in silos and bunkers
- Plattform scales
- Force and tension measurements
- Typical industries: Food & Beverage, Chemicals, Cement, Aggregate
- Legal for trade certificate according OIML-R76

Connection options:

- Up to eight parallel connected analog 350 Ohm load cells per SIWAREX (1mV/V, 2mV/V, 3mV/V or 4mV/V)
- 1 SIWAREX = 1 scale
- 4 digital inputs / 4 digital outputs
- 1 analog output
- Ethernet (Modbus TCP & SIWATOOL)
- RS485 (Modbus RTU)

SIMATIC S7-1200
SIWAREX WP241 – Belt weigher applications

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Supported S7-1200 CPU:

- CPU 1212C → up to two SIWAREX modules
- CPU 1214C or higher
  → up to eight SIWAREX modules
- Full parameter access from the CPU via free downloadable function block
  → Complete commissioning and calibration via CPU/HMI

Applications:

- Belt scales (Cement-, Aggragate plants, Mines, Food & Beverage plants)
- Weigh feeder applications (Food & Beverage, Chemical, Steel)

Connection options:

- Up to eight parallel connected analog 350 Ohm load cells per SIWAREX (1mV/V, 2mV/V, 3mV/V or 4mV/V)
- 1 SIWAREX = 1 scale
- 3 digital inputs / 4 digital outputs / 1 speed sensor input
- 1 analog output
- Ethernet (Modbus TCP & SIWATOOL)
- RS485 (Modbus RTU)

SIMATIC S7-1200
SIWAREX WP251 – Dosing , Batching and Bagging applications

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Supported S7-1200 CPU:

- CPU 1212C → up to two SIWAREX modules
- CPU 1214C or higher
  → up to eight SIWAREX modules
- Full parameter access from the CPU via free downloadable function block
  → Complete commissioning and calibration via CPU/HMI

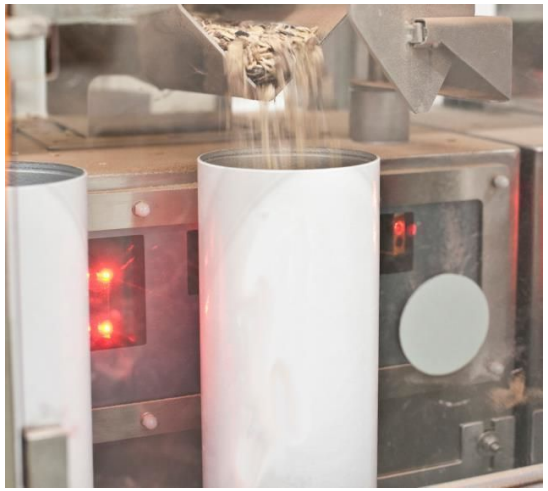
Applications:

- Dosing and batching scales (Chemical-, Food-, Pharma, Packaging industries)
- Bagging machines (Bulk solids industries)
- Eichfähig gemäß OIML-R51, R61 und R76

Connection options:

- Up to eight parallel connected analog 350 Ohm load cells per SIWAREX (1mV/V, 2mV/V, 3mV/V or 4mV/V)
- 1 SIWAREX = 1 scale
- 4 digital inputs / 4 digital outputs
- 1 analog output
- Ethernet (Modbus TCP & SIV
- RS485 (Modbus RTU)

- RS485 (Modbus RTU)



Communication
Controller Area Network CANopen 021620-B

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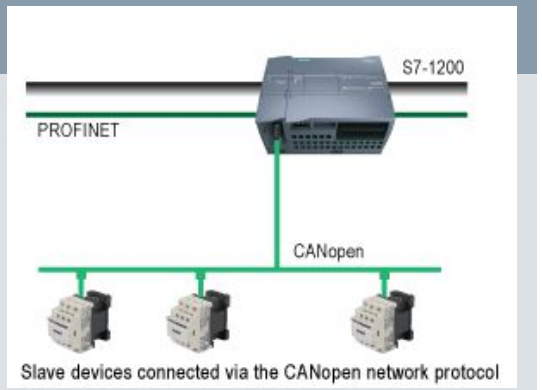
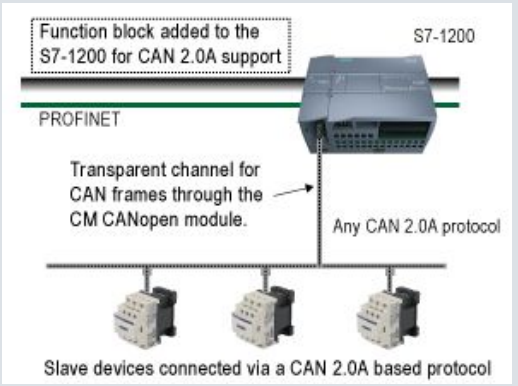
SIMATIC S7-1200C CANopen master/slave

- A CANopen connection to a S7-1200 system enables integration between devices and the S7-1200 system
- **Up to 3 CANopen modules per S7-1200 CPU**
  - Connection type to the CAN: 9-pin DSUB (male)
- **Up to 16 CANopen nodes per module**
- **256 bytes each for inputs and outputs with the CANopen module**
- **Can be integrated in the hardware catalog of the TIA Portal configuration suite**
- Ready-made function blocks for simple PLC programming available in the TIA Portal
- → Link





Easy integration in CANopen applications

Communication
MODBUS communication

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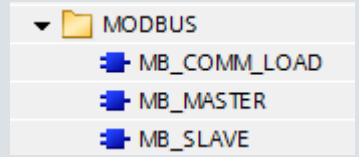
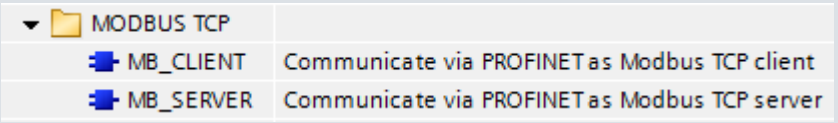
MODBUS RTU protocol

- Use of a CM or CB 1241 module for serial communication
- MODBUS instructions of the communication module for simplified MODBUS RTU operation.
  - MB_COMM_LOAD for basic initialization of the master and slave operation
  - MB_MASTER and MB_SLAVE for controlling the report and connection allocations
- Modbus addressing supports a maximum of 247 slaves (slave numbers 1 to 247).
- Maximum of 32 devices per segment in the Modbus network depending on the loading and drive functions of the RS485 interface
- Repeater required if using more than 32 devices to extend to the next segment



MODBUS TCP protocol

- Open User Communication MODBUS TCP instructions use the PROFINET port integrated in the CPU



Communication
Overview of CP 1243-1 product features

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CP1243-1 (6GK7243-1BX30-0XE0)

- Single-width S7-1200 enclosure (30 x 110 x 75)
- Temperature range in operation: -20°C to +70°C
- Standard rail mounting
- Diagnostic LEDs (overall status and detail)
- Power supply using backplane bus
- 1 x Ethernet Port RJ45 (10/100 Mbit/s) for connecting a modem/router such as SCALANCE M
- Integrated security functions (VPN and Firewall)
- Integration to Scada Systems via Telecontrol Protokolls (DNP3, IEC 60870)

Communication Processor for connecting S7-1200 to Ethernet network with additional Interface and security features firewall and VPN. Integration to Scada Systems via Telecontrol Protokolls (DNP3, IEC 60870, Telecontrol Basic).

Communication
Overview of CP 1243-7 product features

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Ingenuity for life

CP1243-7 (6GK7243-7KX30-0XE0 – EU version
6GK7243-7SX30-0XE0 – US version)

- 1 connection to LTE (4G) mobile network (different versions for EU and North America)
- Single-width S7-1200 enclosure (30 x 110 x 75)
- Temperature range in operation from -20ºC to +70ºC
- Standard rail mounting
- Diagnostic LEDs (overall status and detail)
- Integrated security functions (VPN and Firewall)
- Access to the CPU Webserver
- Email and SMS Alarms
- Process Monitoring and Control via Cellular network

Communication processor to connect SIMATIC S7-1200 via LTE (4G) mobile network to control point system with TeleControl Server Basic

SIMATIC S7-1200 PROFIBUS communication
DP master CM 1243-5 and DP slave CM 1242-5

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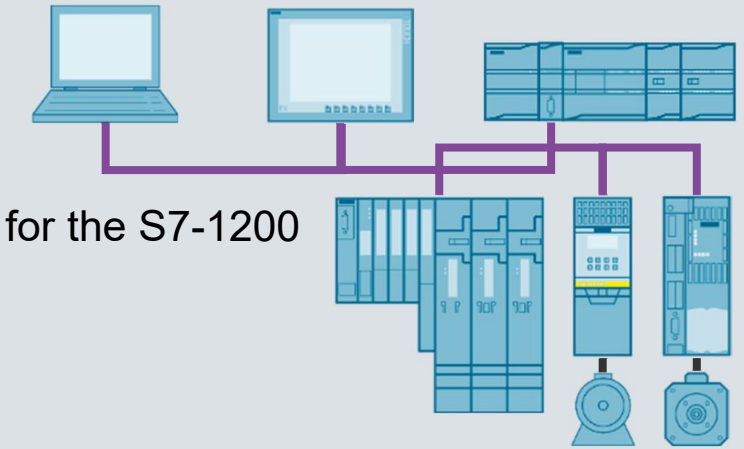
Communication for S7-1200 CPUs according to PROFIBUS standard IEC61158/61784

PROFIBUS DP-Master CM 1243-5

- Connection for up to 16 DP slaves
- PG/OP communication:
  up to 4 connection for HMI and 1 connection for PG
- S7 communication:
  4 S7 connections to other S7 stations with PUT/GET



PROFIBUS DP-Slave CM 1242-5

- as an intelligent DP slave for communication for the S7-1200 with any other DP master

Challenges need innovative answers

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Individualization

Production

- Customized mass production
- Top quality at a competitive price

Globalization

Production Logistics

- Global alliance of production and suppliers
- New business models

Time to Market

New Technology

- Critical to success in highly competitive industries
- Pressure on productivity increases, shortening time for new development

Sustainability

Energy Consumption

- The efficient use of energy and environmentally safe materials

Always the appropriate controller with comprehensive functionalities!

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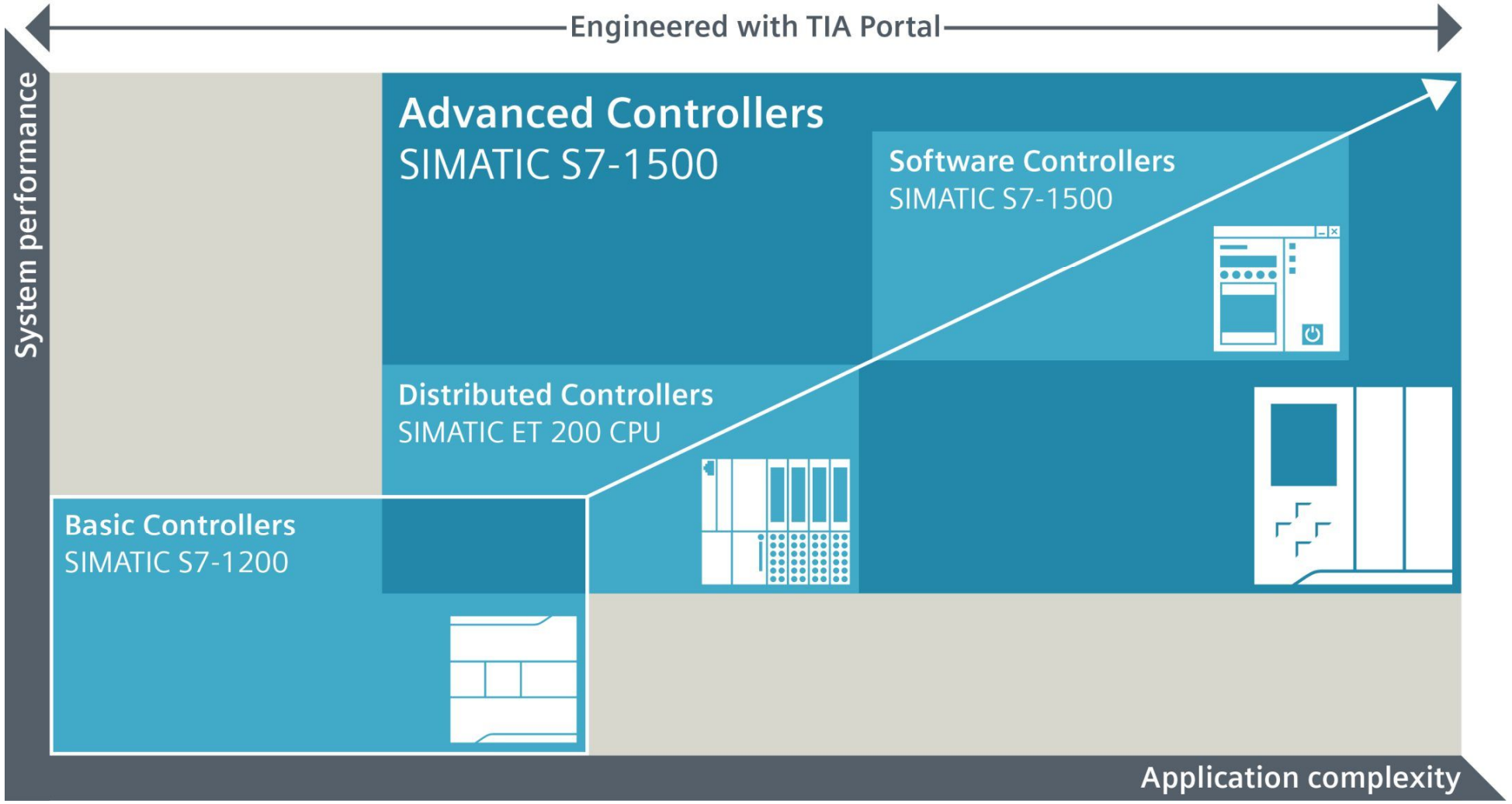
Ingenuity for life



Innovations across the entire automation life cycle!

SIEMENS
Ingenuity for life

Engineered in TIA Portal +

Security Integrated +

Integrated system diagnosis +

Technology Integrated +

Safety Integrated +

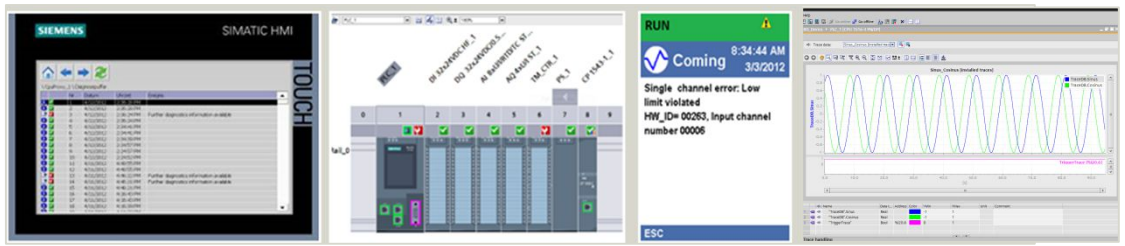
Design and Handling +

Innovative system functions for more productivity!

SIEMENS
Ingenuity for life

Security integrated

Protecting intellectual property and investment
Protecting against unauthorized project changes



System Diagnostics

For Efficient fault analysis, Uniform display concept and reducing plant downtimes

```
IF...
// Example CASE
CASE #trigger OF
  1:  // Statement section case 1
  #trigger := 2;
  2..4:  // Statement section case 2 to 4
  #trigger:= #trigger + 1  ;
ELSE
  // Statement section ELSE
  #trigger:=0;
END_CASE;
"Speed_Control" := #trigger
(*...
IF #trigger = 0 THEN
  // Statement section IF
  #trigger := 1;
END_IF;
```

Scalability

Investment protection while replacing S7-1200 with S7-1500 thanks to compatibility of programs

User-friendly products, high efficiency and a scalable product portfolio

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Feature / Function	Benefit
Integrated PROFINET	Web server for service- and diagnostic information
Technology Integrated	perfect integration of drives through motion control functionalities and PROFIdrive
Integrated Trace functionality	Program- and application diagnostics at real-time for recognizing even sporadic problems
Use of all TIA Portal advantages	Efficient programming, commissioning and service tools highest engineering requirements

Easily adapted to suit your needs

Feature / Function	Benefit
System Modularity Modular board concept is integrated customization	Adding I/O without increasing the CPU footprint
Extensive built-in hardware capabilities Ethernet, analog in/out-puts, MC I/O, HSC I/O, SD memory	Reduced need for additional specialty modules, smaller footprint and lower cost
One Engineering Software One user program for logic, HMI, networking & drives.	Reduced engineering time/cost, easier to maintain, easier to reuse
Safety Integrated One Controller for fail-safe and standard-automation	reduction of types- and components by single automation system for Standard and Safety

One Controller for Standard and Safety

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Feature / Function	Benefit
• Basic Controller with Safety Integrated • Connecting ext. devices via PROFIsafe • CPU 1212CF	• One Controller, one Network and one Engineering for standard and fail-safe automation tasks
• Energy Meter Module SM1238 AI	• Central Measurement and Handling of energy data
• MRP at 2 Port CPUs 1215 / 17 as client (FW 4.2) • S7-Routing (FW 4.2)	• Higher flexibility in network set-up (flexible topology) and higher network availability
• Userdefined web pages as start pages (FW 4.2)	• Individual and easy adaption of (CPU) web pages to applications
• Backup / Restore with retain data (FW 4.2)	• Protection of data loss (incl actual process values)

Easy PLC selection thanks to an optimized Portfolio

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Switch-module	Power-module	Communication-modules	CPUs	Signal-modules	Technology-modules	Signal-boards
						
CSM	PM	13x CM / CP	CPU 1211C-1PN CPU 1212C-1PN CPU 1214C-1PN CPU 1215C-2PN CPU 1217C-2PN CPU 1212FC CPU 1214FC CPU 1215FC	22x I/Q SM 1226 F-DO 2x Relay SM 1226F-DO 4 x 24 V DC SM 1226 F-DI 16 x 24 V DC	2xTM	11x SB 1x CB 1x BB

Marienhöher Milchproduktion Agro Waldkirchen GmbH / Waldkirchen, Germany - S7-1200 and Energy Meter Module

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Project information

Energy data acquisition of direct marketing (butcher shop, diary, cheese factory, sales room), transparency and internal balancing in an agricultural enterprise

End customer / F&B	Waldkirchen/ Germany

Products used

Previously	Now
-	CPU 1212C
Janitza UMG96	SM 1238 Energy Meter
-	Basic Panel, KTP 400
	TIA Portal Basic

Challenge

1 Allow internal balancing during operation without high effort and cost

2 Efficient operation and cost optimization

3 Reliable System Protection

Customer benefits

Transparency in energy consumption

... through the acquisition of energy data in a compact solution

Increase of energy efficiency

... through analysis of the reactive power consumption

Guaranteeing plant availability

... by monitoring the current peaks

Products/solution

CPU 1212C with SM1238 Energy Meter Module

CPU 1212C with SM1238 and visualization via KTP 400

CPU 1212C with SM1238 and visualization via KTP 400

SIMATIC Controller
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Getting Started

Easy Introduction to the new SIMATIC controller generation!

- Learn about the new possibilities and get to know the new Hardware
  even better

www.siemens.com/automation-tasks

References Center

From customer to customer!

- Customers gives account to there experiences using our Products for their applications

https://webservices.siemens.com/referenzen/#language=en

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