

SIRIUS ACT PROFINET

Ethernet for your push buttons, indicator lights and switches

When it comes to communication, SIRIUS ACT is a strong performer. Besides the standard wiring, you can also connect these push buttons, indicator lights and switches directly to the controller –via AS-Interface or with IO-Link. With our new SIRIUS ACT PROFINET technology, you can now directly interface to PROFINET and bring all the features of Ethernet down to the field level.

Reduced wiring time and effort, minimized error source and flexibility for future modifications are the main drivers that push industrial communication systems down towards the sensors and actuators in the field. SIRIUS ACT PROFINET is the easy way to connect your push buttons and pilot devices to the TCP/IP world. Learn how to use PROFINET in your application in this paper.



PROFINET introduction

PROFINET is the open, Ethernet-based communication solution for the superior control level. With its decisive advantages of flexibility, efficiency and performance, PROFINET opens up new ways for you to increase productivity.

Flexibility

Industrial Wireless LAN

PROFINET supports wireless communication with Industrial Wireless LAN, thus opening up new application fields for your push buttons and signaling devices. For example, technology that is susceptible to wear, such as contact wires, can be replaced. Furthermore, the use of automated guided vehicle systems and mobile HMI devices becomes possible. In addition to data exchange with PROFINET, the IWLAN connection can also be used for additional communication via standard services such as TCP/IP. Thus, moving machine parts can be wirelessly integrated in a plant just like transport systems. The reliability of wireless communication is essential for this. To ensure that this can be guaranteed even in harsh industrial environments, Siemens offers a broad portfolio of wireless components for a wide variety of applications, including support in calculating radio fields in the planning phase.

Safety

PROFINET supports the proven PROFIsafe safety profile and it also allows wireless safety-related communication. The PROFIsafe profile, which has been tried and tested with PROFIBUS and which permits the transmission of standard and safety-related data on a single bus cable, can also be used with PROFINET. No special network components are required for fail-safe communication, standard switches and standard routers can be used without restrictions. In addition, fail-safe communication is equally possible via Industrial Wireless LAN (IWLAN).

Flexibility	Efficiency	Performance		
Industrial Wireless LAN	• Device / network diagnostics	• Speed		
• Safety	• Easy cabling	• High precision		
 Flexible topologies 	• Fast device replacement	 Large quantity structures 		
• Web tools	 Ruggedness / stability 	High transmission rate		
• Expandability		Media redundancy		
		• Fast start-up		



PROFINET is the open, Ethernet-based communication solution for the superior control level.



Flexible topologies

PROFINET permits flexible network topologies and optimum machine and plant planning. PROFINET also enables the use of star, tree, and ring topologies in addition to the linear topology characterized by the established fieldbuses. This results in a high degree of flexibility in the planning of machines and plants. The PROFINET network can be installed without specialist knowledge and meets all requirements relevant to the industrial environment.

Open standard

Due to its openness, PROFINET provides the basis for a uniform automation network and allows the easy integration of existing systems. PROFINET, the open vendor-independent standard (IEC 61158/61784), is supported by PROFIBUS and PROFINET International (PI). It stands for maximum transparency, open IT communication, network security and simultaneous real-time communication. Due to its openness, PROFINET creates the basis for a uniform automation network in the plant to which all of the machines and devices can be connected. The integration of existing parts of the plant, using PROFIBUS for example, can also be achieved without any problems through the use of gateways

Web tools

Since PROFINET supports TCP/IP, it permits the use of standard web services such as web servers in the field device.

Regardless of the tool used, information from the field level can be accessed at any time and from nearly anywhere using a commercially available Internet browser. This facilitates commissioning and diagnostics considerably. Users can decide for themselves how much openness to the IT world they will permit for their machine or plant.

Efficiency

Device / network diagnostics

PROFINET provides an exceptionally powerful means of diagnosing faults in machines and plants. By retaining the proven device model of PROFIBUS, the same diagnostics information is also available on PROFINET. In addition, Siemens offers useful tools for structuring machine and plant architecture, suitable for each project phase.

Easy cabling

In industrial environments, high demands are placed on the installation of the cabling. In addition, industrial-grade networks must also be set up without special knowledge, without errors, in the shortest possible time. Siemens offers FastConnect, a system that meets all these demands. The time spent for connecting the terminal devices is minimized thanks to the easy installation using only a single tool. Furthermore, installation errors are avoided by a practical color coding. Both copper cables and glass fiber-optic cables can be assembled on-site in this way.

Fast device replacement

PROFINET devices are identified via a name that is assigned in the configuration. When replacing a defective device, a new device can be recognized by the IO controller by means of topology information and have a name automatically assigned to it. An engineering tool is therefore not required when replacing devices. This mechanism can also be used during the initial commissioning of a complete plant. Quick commissioning is possible for series of machines.

Ruggedness / stability

An automation network must be able to withstand most external sources of interference. The use of switched Ethernet prevents faults in one section of the network from influencing the entire plant network. PROFINET enables the use of fiber-optic cables especially for areas that are critically sensitive to EMI.

Performance

Speed

Fast motion control applications need precise and deterministic data exchange. This is implemented thanks to isochronous drive controls using Isochronous Real-Time (IRT). With IRT and isochronous mode, PROFINET supports high-speed, deterministic communication in which the different cycles of a system (input, network, CPU processing and output) are synchronized, even with TCP/IP communication operating in parallel. PROFINET's short cycle times make it possible to increase the productivity of machines and plants, and to ensure product quality through high precision.

High precision

PROFINET stands for maximum precision with significantly increased performance – not only in communication, but integrated in the entire system thanks to isochronous mode. Machines with several axes are a challenge and are becoming increasingly important. To increase throughput, it is necessary to integrate more drives in a machine. At the same time, these must always work in perfect coordination with each other. PROFINET with IRT provides the basis for fast and precisely synchronized communication for motion control systems.

Large quantity structures

Previous limitations in the scope of the machines and systems to be implemented can be easily overcome through the use of PROFINET. With PROFINET, up to 256 field devices can now be managed by one SIMATIC controller. In a network, several controllers can interact with their assigned field devices. Mechanisms such as I-Device allow the simple set up of hierarchical controller structures. The number of field devices per PROFINET network is practically unlimited, the entire band of IP addresses is available.

High transmission rate

By using Ethernet in full duplex mode, PROFINET achieves a significantly higher transmission rate than previous fieldbuses. Thanks to this, both the process data and other plant data can be transferred via TCP/IP without any problems. PROFINET easily comes up to industrial requirements such as simultaneous transmission of fast IO data and large volumes of data for other parts of the application. Due to PROFINET mechanisms, even the transfer of large volumes of data that are common for video-data does not compromise speed and precision of IO data transfer.

Media redundancy

Higher plant availability can be achieved by means of a redundant installation (ring topology). The media redundancy can be implemented both with the help of external switches and direct via integral PROFINET interfaces. Reconfiguration times of 200 ms can be achieved with the Media Redundancy Protocol (MRP). In the case of an interruption to the communication in only one part of the ring installation, this means that a plant standstill is prevented and the necessary servicing and repair work can be carried out without time pressure.

Fast start-up

The Fast Start-Up function allows rapid start-up of PROFINET devices that are connected to SIMATIC controllers. The communication connection between the controller and the device is established in less than a second. Thus, in modular plants, individual parts of the plant can be coupled and decoupled in minimal time.

PROFINET for SIRIUS ACT

The new SIRIUS ACT PROFINET system brings the features of PROFINET to your pilot device applications. The system consists of a gateway that is assembled to the standard holder of the SIRIUS ACT line, and one safe slot connected to 20 standard slots via a flat cable.

The standard SIRIUS ACT actuators can easily be snapped onto the SIRIUS ACT PROFINET slots without the need of addressing and without the need for any special tools. As a result the system can be assembled quickly and actuators can be replaced easily.





Device test without PLC is no problem

The SIRIUS ACT PROFINET devices can be tested without PLC or software knowledge. Just push the button on the front side of the device slot and a LED on the backside indicates if everything is assembled correctly.





How to change modules in the field?



Wiring failures and defect devices can also be identified by the indicating LEDs on the back side of the device.

The system set-up is saved on an EEPROM in the gateway that can be replaced manually. Consequently defect gateways can be replaced simply by a new gateway using the old EEPROM and the existing system set-up. There is no specific software know-how needed, therefore this task can be done by everyone.



Siemens Offers You the Right Solution for Your Application

AS-Interface, IO-Link and PROFINET coexist in the Totally Integrated Automation (TIA) world of Siemens. Depending on your application, you can select and combine the communication system according to your individual needs.

For applications with a low information volume per device, for example, digital sensors and actuators such as push buttons and a medium or high number of network participants in the switching cabinet or in the field, the AS-Interface bus system is the system of choice.

Applications that require higher information volume per device for small quantities, for example, SIRIUS ACT ID key-operated switch in the switching cabinet or in the field, the point-to-point connection system IO-Link suits the best.

For highly demanding applications, Siemens also offers you the Ethernet-based PROFINET system.





TIA Totally Integrated Automation

AS-Interface, IO-Link and PROFINET coexist in the Totally Integrated Automation (TIA) world of Siemens.

	SI		Kind of the system	Data volume	Dimension	Infrastructure cabling	Safety	Supply of devices	SIRIUS ACT
	Field bus / Network System	PROFINET	 Network system Max. 256 devices (w/o router) Any topology Real-time Synchronous 	 Max 1440 bytes I Max 1140 bytes O Parameters Diagnosis date Generic data (TCP/IP) 	 Copper/segment: max. 100m Optical/segment > 15 km 	Fiber opticCoaxTwisted pairIWLAN	Yes	Typically No, but possible with PoE (power over Ethernet)	~
		AS-Interface	• Field bus • Max. 62 devices • Any topology	• 4 I / 4 O • Parameters • Diagnosis data	100m (standard), up to 600m	Power supply2-core data cableUnshielded	Yes	Power supply via data cable resp. via sensor/actuator connection	~
	Wiring	IO-Link 😵 IO-Link	Intelligent point- to-point wiring system	 32 bytes I/O Parameters and diagnosis data 	20m	 3-core data cable Unshielded 	No	Power supply via cable resp. sensor/actuator connection	\checkmark
		Conventional wiring	• Point-to-point	•11/10	600m	 1-3 core data cable Unshielded (digital) Shielded (analog) 	No (add. wiring)	Ext. supply	~

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