

## PROFINET switch FAQ

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### Why do you need a PROFINET switch for a PROFINET network?

A PROFINET switch handles PROFINET frames with the highest priority and ensures that frame loss doesn't occur and that jitter in the transmission remains minor. That secures the PROFINET transmission and allows precise regulating in PROFINET systems.

A PROFINET switch supports mechanisms for neighborhood detection (LLDP protocol) in order to detect and check the topology of the network. This ensures that the setup and the network wiring of the system are correct.

A PROFINET switch enables the replacement of PROFINET components during running operations. If a PROFINET participant malfunctions while in operation, a replacement device is detected following installation on the basis of its position in the topology (by the PROFINET neighbors) and is automatically provided with its IP address and its PROFINET name. The CPU can then configure the replacement device and restart.

Because many different devices are often installed into automation systems, the "Finding devices via LED display" function supports the easy search for a participant.

In order to improve the reliability of networks, PROFINET switches support the ring redundancy technology MRP (Media Redundancy Protocol).

However, the operation of a PROFINET network is also possible with unmanaged switches.

### Is the PROFINET switch "real time-compatible"?

The PROFINET switch is "real time-compatible" and supports the PROFINET real time class 2 for cyclical data exchange. PROFINET is generally differentiated into two main real time classes: RT and IRT.

The "real time capability" of an industrial bus system generally involves the chronological precision of the cyclical IO transmission. For complex and distributed automation tasks, especially in the drive control area, it is important that the cyclical data transmission always takes place consistently. Longer interruptions due to other Ethernet traffic, for example, video cameras or project transmissions, should not influence the PROFINET IO cycle where possible.

PROFINET RT (real time) uses the standard technologies of managed switches (e.g. QoS) to always prioritize important Ethernet frames of bus communication in relation to chronologically non-critical frames.

PROFINET IRT (isochronous real time) uses special PROFINET switches to keep the jitter and the rhythm of the IO cycle as exact as possible in the network and to ensure a synchronous rhythm and the best transmission possible.

The Helmholz PROFINET switch supports PROFINET RT, but not IRT.

### What do the LEDs BF and SF mean?

The "BF" LED shows logical "bus errors", for example, that the device has not received a configuration, the configuration is defective, or no PROFINET communication is possible at all (network error).

The "SF" LED shows "collective errors". This can include, for example, an existing PROFINET diagnosis.

### What is "Device exchange during operation", and what role does the PROFINET switch play here?

If a PROFINET participant malfunctions while in operation, a replacement device is detected following installation on the basis of its position in the topology (by the PROFINET neighbors) and is automatically provided with its IP address and its PROFINET name. The CPU can then configure the replacement device and restart. The neighboring PROFINET devices, for example, the switch, must to this purpose support PROFINET in order to enable this function.

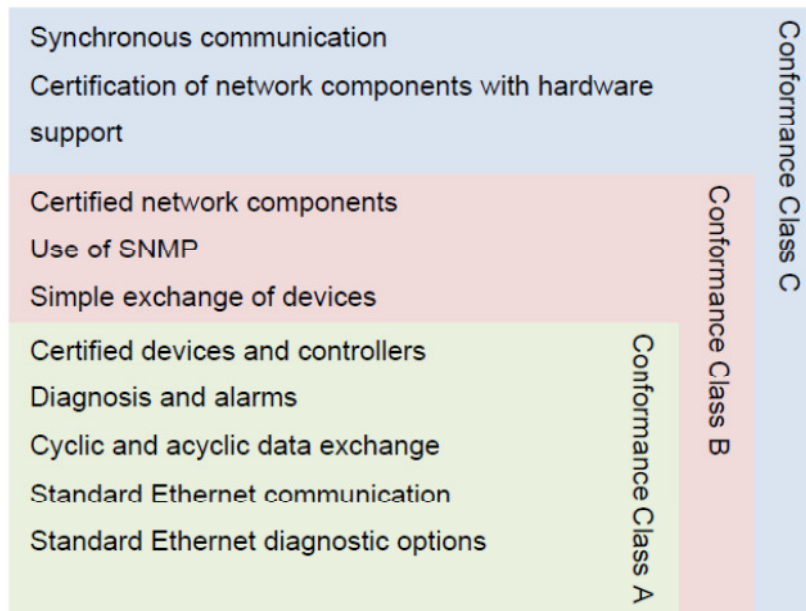
### Why should PROFINET devices have PROFINET certification?

The PNO certification is carried out by accredited testing labs and is standardized by the PNO. PROFINET certification should ensure both the function of the PROFINET components in accordance with standards and the interoperability of various manufacturers in a PROFINET network.

### What is behind the PROFINET conformance classes A, B, C?

PROFINET is divided into conformance classes (CC). The conformance classes define sensible function scopes and are thus decision-making criteria for system operators when using PROFINET components.

With prior definition of an application in a CC, the user can make a selection of components with clearly defined minimum properties.



*From the PNO document "PROFINET Planning Guideline (Order no.: 8.061)"*

You can find more information on the conformance classes in the PNO document "The PROFINET IO Conformance Classes - Guidelines for PROFINET IO (Order no.: 7.041)".

### **Can the PROFINET switch also transmit 1 GBit?**

No, because the PROFINET protocol is currently only specified for 100 Mbit.

### **Can the PROFINET switch also be operated with 10 Mbit?**

Yes, but 100 Mbit is the prerequisite for performance and real time-compatible applications.

### **Which Ethernet cable types can be used for PROFINET?**

The conformance classes B and C presume Ethernet cable in accordance with IEC61784-5-3. In conformance class A, other cables (see PNO document "CC-A Cabling Guide") and wireless connections can also be used.

### **Can PROFI-safe be transmitted via the PROFINET switch?**

Yes, the PROFI-safe protocol treats all components between the PROFI-safe Controller (CPU) and the PROFI-safe device as "black channel", which means that any network participants and components can be used in the route. If transmission disruptions should occur, the PROFI-safe components switch to a secure status.

### **Why does the PROFINET switch have its own IP address and a PROFINET name?**

The PROFINET switch is a managed switch. The IP address is necessary to be able to address the switch as an active infrastructure component. The website of the PROFINET switch can be reached via the IP address and PROFINET participants (e.g. a CPU or a programming device) can configure the switch and read out information from the switch.

For the purposes of simplifying the IP address in the PROFINET, a device name can be used that is then synonymous in a project for the IP address.

### **What are I&M data?**

For PROFINET and PROFIBUS, I&M stands for "Identification and Maintenance". The I&M data contain information about the PROFINET participants. These are in some cases from the manufacturer (order number, serial number, etc.), but can also be described by the user (location, service contact, etc.).

The I&M data of all PROFINET participants can be read out and evaluated in the automation network with standard functions.

The PROFINET switch has appropriate I&M data records.

### **Can I also use the PROFINET switch in other industrial networks?**

PROFINET is based on the Ethernet standard and the PROFINET switch can be used in normal TCP/IP networks, especially in industrial networks, as a managed switch. In the process, the PROFINET-specific functions of the PROFINET switch are not addressed.

General Ethernet functions can be read out and configured through the PROFINET website.

## What is MRP (Media Redundancy Protocol) required for?

### What happens with a PROFINET participant when the power supply fails?

PROFINET participants mostly have 2 ports for the PROFINET cabling. The two ports are connected with one another by an internal 2-port switch component. If the power supply of a PROFINET participant fails, the communication is interrupted at this point in a network line. One can get around this problem with ring cabling using MRP technology.

If the power supply of a PROFINET switch fails, the communication with all participants connected to this switch is no longer possible.

This behavior is clearly different from that of PROFIBUS networks!

### Why is "Port Mirroring" necessary?

PROFINET is a complex communication protocol. In some situations it may be necessary to read and interpret the frame traffic with a protocol analyzer.

In order to be able to read in an Ethernet network, because expensive coupling hardware is used, which is looped into the line or is configured or a free port is configured in a switch as a "mirror port". The mirror port transmits all frames of another port of the switch as a copy. A device or PC can then run on the mirror port with the corresponding analysis software.

### Further information

More information on PROFINET can be found in the documentation "PROFINET Planning Guideline (Order no.: 8.061)", "PROFINET Installation Guideline (Order no.: 8.071)" and the "PROFINET Commissioning Guideline (Order no.: 8.081)", which are available from PNO.

*Please contact our Support at [support@helmholz.de](mailto:support@helmholz.de) with any further questions.*

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