



Power Class Information

Fohhn PoE Loudspeaker Platform

Introduction

Power over Ethernet (PoE) enables both data and electrical power to be transmitted over a single Ethernet cable. This allows active loudspeakers to be connected using only the network cable, eliminating the need for a separate power supply cable.

At Fohhn, all PoE-enabled loudspeakers are available as **Dante PoE** variants. Within the system, the Ethernet connection provides power, audio transmission, and control via **Fohhn Audio Soft** or third-party media control systems. This enables simple installation using standard Ethernet cabling. Power is supplied by a **PSE (Power Sourcing Equipment)**, which may be either a PoE-enabled network switch or a PoE injector.

Throughout this document, PoE-powered devices are referred to as **PDs (Powered Devices)**.

PoE Power Classes

	Type 1 802.3af			Type 2 802.3at	Type 3 802.3bt		Type 4 802.3bt	
Power Class	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
Power from PSE	4 W	7 W	15.4 W	30 W	45 W	60 W	75 W	90 W
Power delivered to PD	3.84 W	6.49 W	13 W	25.5 W	40 W	51 W	62 W	71.3 W

Power over Ethernet is standardized in the **IEEE 802.3** family of standards. Higher power classes were introduced through subsequent amendments to the standard. In practice, the following terminology is commonly used to refer to the different power levels:

Standard	Common Name	Type(s)	Class(es)	Maximum Power
IEEE 802.3af	PoE	1	1-3	15.4 W
IEEE 802.3at	PoE+	2	4	30 W
IEEE 802.3bt	PoE++	3 - 4	5-8	90 W

The actual output power available from a PSE depends on additional factors (e.g. the available maximum power, also referred to as the **PoE power budget**) and must be verified for the specific installation.

PoE Classification

The available and required power is determined during the **classification phase**, which takes place when a PoE system starts up or when a PoE-enabled network device is connected.

For the **PD (Powered Device)**, such as a loudspeaker, the classification process determines the maximum power that the **PSE (Power Sourcing Equipment)** can provide.

For the **PSE**, such as a network switch, classification determines the actual power required by the PD. If a PD does not require the full amount of power available at the port, the unused power can be allocated to other PDs, allowing a greater number of devices to be powered. See also **PoE Power Budget**.

The PSE enables power delivery only after successful classification. If the PD is not detected correctly or insufficient power is available within the PoE power budget, the port remains unpowered and the PD will not be supplied with power.

The **PSE** indicates the supported **PoE Type** (Type 1 to Type 4). Based on the available PoE Type, the **PD** requests the required **Power Class**, which determines the maximum power available to the device. If the PSE supports a lower PoE Type - and therefore provides less power than the PD requires - the PD initially requests the highest available Power Class within the supported PoE Type and starts in a reduced-performance mode. During the classification process, the PD detects the available Power Class and, where possible, adapts its power consumption accordingly. If operation is not possible with the available power, the device will remain disabled.

If the PSE supports a higher PoE Type than required, the PD requests only the Power Class it needs. The PSE recognizes the requested class and can allocate the remaining available power on that port to other PDs, allowing additional devices to be powered.

PoE Power Budget

The total power available from a **PSE**, such as a network switch, is limited.

A **Class 8** capable network switch can typically deliver **90 W** on only a limited number of ports simultaneously. The total available power is provided by the **PoE power budget**, which is shared among all connected **PDs**.

For example, a network switch can typically power approximately three times as many **Class 4 (30 W)** PDs as **Class 8 (90 W)** PDs.

A network switch powers connected PDs sequentially during startup. Once the available **PoE power budget** has been exhausted, no additional PDs can be powered.

Most switches provide various configuration options for limiting the power available on individual ports and assigning port priorities. Refer to the documentation of the respective **PSE** or network switch for details.

Behavior of Fohhn PoE Loudspeakers

Fohhn offers three series of PoE loudspeakers, each with different power requirements:

Series	Products	Compatible PoE Classes
PoE (15.4 W)	IG-104 PoE, IG-104 Free PoE	Class 3 (15.4 W)
PoE+ (30 W)	SL-20 PoE+, Scale-1 PoE+	Class 3 (15.4 W), Class 4 (30 W) Recommended: Class 4 (reduced performance on Class 3)
PoE++ (90 W)	Scale-2 PoE++, IGS-4 PoE++, FS-70 PoE++, AS-206 PoE++, AS-112 PoE++	Class 4 (30 W) (reduced performance) Class 6 (60 W) (reduced performance) Class 8 (90 W) (full performance)

Fohhn PoE loudspeakers always request the highest available **PoE Power Class** within the supported **PoE Type** to achieve the best possible audio performance.

The **PoE (15.4 W)** series always requests **Class 3**. Even when connected to a higher-power PSE, only **15.4 W** are reserved. This allows installations with a large number of loudspeakers using standard PoE network switches.

The **PoE+ (30 W)** series can operate from a **Type 1 PSE** in **Class 3 (15.4 W)**. However, full performance and reliability are only achieved when connected to a **Type 2 PSE** providing **Class 4 (30 W)**. Higher Power Classes are not supported. Fohhn PoE+ loudspeakers reserve a maximum of **30 W** per device.

The **PoE++ (90 W)** series is designed to operate with a wide range of PSEs. However, full audio performance is only achieved when connected to a **Class 8 PSE** providing **90 W**. During classification, PoE++ (90 W) loudspeakers always request the highest available Power Class within the supported PoE Type. As a result, **Classes 5 and 7** are not available because, according to the PoE standard, they cannot be explicitly signaled by the PSE.

If an **IEEE 802.3bt** compliant PSE has only **75 W** remaining in its **PoE power budget**, a newly connected PoE++ loudspeaker cannot be powered. Although the switch still indicates **PoE Type 4** (up to 90 W), it cannot provide the **90 W** requested by the loudspeaker through **Class 8**. In this case, the port can be configured to operate as **Type 3**. The loudspeaker will then start in **Class 6 (60 W)** with reduced performance.

For applications with lower SPL requirements, PoE++ loudspeakers can also be operated on existing infrastructure down to **Class 4 (30 W)**.

If a lower Power Class is available, the loudspeaker output is automatically disabled. Device configuration via **Fohhn Audio Soft** or the **Dante Controller**, for example from the installer's workstation, remains fully available.

Limiting

Fohhn PoE loudspeakers are designed to limit their power consumption to the maximum power available from the PoE connection. To achieve the best possible audio performance, energy is stored within the loudspeaker. This allows significantly higher peak power and therefore higher output levels and greater dynamic range than would otherwise be possible within the limits of the PoE standard.

The power limit is determined during the PoE classification process. This ensures that, even at high audio levels, the loudspeaker never exceeds the power available from the connected PSE. By adapting to the negotiated power level during classification, reliable operation is ensured across different PSE types.

If the average power required by the audio signal exceeds the available PoE power for an extended period, the internal energy storage can no longer compensate for the power deficit. In this case, the audio output is automatically limited to ensure reliable operation.

To achieve full audio performance, a Fohhn PoE++ loudspeaker must be connected to a PoE port providing the full **90 W (Class 8)**. The negotiated power level can typically be verified through the management interface of the PSE (for example, a network switch) or in **Fohhn Audio Soft**.

Requirements

To ensure reliable operation of a Fohhn PoE loudspeaker system, the following minimum requirements must be met:

- Ethernet cable rated at least **Category 5e**, with a maximum cable length of **100 m (328 ft)** from the PSE to the PD. To minimize power losses and improve efficiency, the cable should be as short as possible and use a larger conductor size, for example **Category 7 with AWG 23**.
- For the **PoE++** series, all four twisted pairs of the Ethernet cable are used for power transmission.
- A **PoE-enabled network switch** with a sufficient number of ports supporting the required IEEE standard (**IEEE 802.3af/at/bt**), the appropriate **PoE Type**, and an adequate **PoE power budget** for all connected devices.
- A **Dante-enabled network**, for example using a Dante profile or a network configuration in accordance with the recommendations provided by **Audinate**.