



Hauptwerk Prerequisites



Hauptwerk prerequisites

This section lists the platforms and hardware supported for use with Hauptwerk. Please see also the computer specs website page if you are considering buying a new computer to run Hauptwerk and are looking for specific recommendations.

Computer platforms

The current version of Hauptwerk is supported on Apple Macs (*) (Intel and PowerPC) running Mac OS X, and on PCs running Windows.

If you are buying a new computer to run Hauptwerk, we particularly recommend the current (Intel) range of Apple Macs (*), especially the Mac Pro, since we have found them to perform outstandingly well with Hauptwerk, to be very simple to set up and use, and also to be very reliable and robust for use with audio and MIDI in general, while being reasonably-priced for their performance. Above all, because there are only a few models of Macs, there are far less variables than with PCs, so you can be much more confident that you are buying a computer that corresponds very closely to one that we have used for testing, benchmarking and developing Hauptwerk, and should thus perform the same for you as it does for us. It also means that you shouldn't have to spend time ironing out compatibility, driver or performance problems.

However, we support Windows platforms equally, as we have since Hauptwerk's was first launched. Buying a PC that has been specifically built and tested by a specialist vendor for optimum Hauptwerk compatibility and performance can be an equally good choice.

() Important note: the current version of Hauptwerk for Mac OS X has the following two limitations compared to Windows platforms, which we plan to address in later versions soon:*

1. *This version of the Hauptwerk installer currently only includes a 32-bit version of Hauptwerk for the Mac, thus a maximum of about 3.5 GB of RAM can be used for Hauptwerk and the sample set being loaded. Please see the Hauptwerk website to obtain a 64-bit version (which allows almost unlimited memory to be used).*
2. *There is not yet an AudioUnit/VST plug-in version of Hauptwerk for the Mac. However, [Audio Hijack Pro](#) can be used to apply reverb/convolver plug-ins very easily to Hauptwerk's audio output in real-time.*

Processors

On the Mac platform all Intel Macs are supported, as well as any of the older PowerPC Macs with G4 or G5 processors. The latest Macs are recommended for their extremely high performance with Hauptwerk, especially the Mac Pro and MacBook Pro ranges. To use 64-bit Hauptwerk for OS X you need a 64-bit capable Intel Mac (all Mac Pros and all Macs made after about November 2006 have 64-bit capability).

On the PC platform, Intel Pentium II and later processors are supported, along with compatible AMD models. The Intel i7, i5, 'Core 2' dual and quad-core ranges of processors, along with the corresponding 5100-series and later Xeon ranges, are strongly recommended since they perform so well with Hauptwerk. The AMD dual and quad-core models are also good, but the recent Intel processors out-perform them for Hauptwerk by a substantial margin at the time of writing. Hauptwerk has native support for 64-bit Windows on 64-bit processors (such as the Intel 'Core 2' and AMD Athlon 64 and Opteron ranges), which gives the highest performance on the PC platform.

Hauptwerk is also fully optimized for multi-core/multi-processor systems on both Macs and PCs. Very roughly speaking, the more CPU cores, the faster the processor and the more level 2 (L2) cache, the larger the number of pipes that will be able to sound at once in Hauptwerk.

Although fast modern processors enable very large sample sets to be used, they are not requirements, and even a PC with a 1 GHz Pentium III processor will give perfectly sufficient performance for many smaller instruments with all of Hauptwerk's features enabled, or larger instruments if some realism features are disabled (such as interpolation and per-pipe filters).

Memory

An absolute minimum of 512 MB of memory is required to use Hauptwerk, and sufficient free memory is required to load any sample sets you intend to use into memory; Hauptwerk deliberately does not stream samples from disk in order to achieve the high polyphony necessary for a pipe organ. Most sample sets state the memory they require as a prerequisite. In order to be able to use a reasonable selection of sample sets, 2 GB or more of memory is recommended. If you are buying a new computer specifically to run Hauptwerk, we would normally recommend 4 GB or 8 GB if the computer can accept it, which would be sufficient for most current sample sets.

Note that you can choose to load only some ranks of pipes into memory. Other per-rank memory-saving options are also available.

Hard disks

An absolute minimum of 4 GB of free disk space is required to use Hauptwerk with the standard St. Anne's, Moseley organ sample set installed by default. Other sample sets will require additional disk space. We recommend ensuring that you have at least 40-200 GB free if you wish to use a number of different sample sets.

The speed of your hard disk(s) only determines the time it will take Hauptwerk to load a sample set; the performance should not be affected once the sample set is loaded into memory. RAID 1 or RAID 5 disk arrays can be used if you want sample sets to load quickly and also to make your system more resilient to the failure of a hard disk.

If you are installing Apple Mac OS X from scratch (not usually required), we recommend using the default file system during installation, and avoiding the 'case sensitive' file system (a custom installation option) since some Hauptwerk sample sets may not be compatible with it. On Windows PCs we strongly recommend using the NTFS file system (the default for Windows 7, Vista and XP) instead of the older FAT32. FAT32 does not support files larger than 4 GB, which can cause problems for some very large sample sets.

Operating systems

On the Apple Mac platform, Hauptwerk is fully supported on OS X 10.6 'Snow Leopard' (versions 10.6.1 and above), OS X 10.5 'Leopard' (versions 10.5.8 and above) and 10.4 'Tiger' (versions 10.4.11 and above). Hauptwerk might not work on earlier versions and some earlier OS X versions had serious bugs that affected Hauptwerk. We recommend OS X 10.6 since 10.6 and 10.5 each had significant performance and stability improvements internally that are relevant to Hauptwerk and only 10.5+ can support 64-bit Hauptwerk. (1)

This version of the Hauptwerk installer only includes a 32-bit version of Hauptwerk for the Mac, thus a maximum of about 3.5 GB of RAM can be used for Hauptwerk and the sample set being loaded. Please see the Hauptwerk website to obtain a 64-bit version (which allows almost unlimited memory to be used).

OS X 10.6 and 10.5 each have simultaneous 64-bit and 32-bit support built natively into them. Unlike Windows, there are not separate 64-bit and 32-bit versions of OS X, and no separate 64-bit drivers are needed for 64-bit Hauptwerk if the default OS X installation and boot options are used. OS X 10.6 has a (non-default) boot option to boot the kernel in 64-bit mode, which can optionally be used, but not all third-party hardware drivers are compatible with it, and it is not needed to run 64-bit Hauptwerk.

On the PC platform, Hauptwerk is fully supported on the following versions/editions of Microsoft Windows:

- Windows 7 Home Premium Edition (32-bit and 64-bit).
- Windows 7 Ultimate Edition (32-bit and 64-bit).
- Windows 7 Professional Edition (32-bit and 64-bit).
- Windows Vista Home Basic Edition (32-bit and 64-bit).
- Windows Vista Home Premium Edition (32-bit and 64-bit).
- Windows Vista Ultimate Edition (32-bit and 64-bit).
- Windows Vista Business Edition (32-bit and 64-bit).
- Windows XP Professional x64 Edition (64-bit).
- Windows XP Professional Edition (32-bit).
- Windows XP Home Edition (32-bit).

Effective memory limits for use with Hauptwerk are as follows:

- 64-bit Windows 7 Home Premium Edition: 16 GB.
- 64-bit Windows 7 Ultimate Edition: 192 GB.
- 64-bit Windows 7 Professional Edition: 192 GB.
- 64-bit Windows Vista Home Basic Edition: 8 GB.
- 64-bit Windows Vista Home Premium Edition: 16 GB.
- 64-bit Windows Vista Ultimate Edition: 128+ GB.
- 64-bit Windows Vista Business Edition: 128+ GB.
- 64-bit Windows XP Professional x64 Edition: 128+ GB.
- 32-bit versions of Windows 7, Vista and XP: about 2.7 GB, following modification to the Windows boot parameters, otherwise 2 GB (2).

All editions of Windows 7, Vista and XP support multi-core processors. However, support for two separate physical processors is only included in Windows 7 Professional, Windows 7 Ultimate, Vista Business and Vista Ultimate editions and XP Professional editions. Earlier Windows versions might work with Hauptwerk, but have limitations and we do not test with them. If you wish to use such operating systems, we will endeavor to provide support provided that a problem can be reproduced on one of our fully supported platforms.

64-bit versions of Windows are strongly recommended for PCs that support them. Hauptwerk's installer includes a native optimized 64-bit edition of the Hauptwerk software, which is able to perform significantly better than the 32-bit editions, allowing larger sample sets to be used, and with better performance.

Please ensure that drivers are available for all of your hardware on the operating system you wish to use.

(1) The only notable disadvantage of OS X 10.6 and 10.5 is that they do not allow an application (such as Hauptwerk) to fill the memory as full as was possible with OS X 10.4 when 4 GB or less of physical memory is installed, so Hauptwerk might not be able to use quite as much memory on computers with 4 GB or less. OS X 10.6 and 10.5 typically allow Hauptwerk to use a maximum of about 65 percent of the physical memory before audio glitches become a risk (due to 'swapping').

(2) 32-bit editions of Windows normally only allow any one program to access up to 2 GB of memory. To enable Hauptwerk to use up to about 2.7 GB of memory on 32-bit Windows XP, the Windows boot.ini file (usually c:\boot.ini) must be modified manually, adding the /3GB /UserVA=2900 switches in a text editor. On 32-bit Windows 7 or Vista the BCDEdit utility must be used to set the IncreaseUserVA value. Either should only be attempted by experienced computer users, since it is very easy to render Windows unable to boot if any mistake is made. [Microsoft Knowledge Base article 833721](#) describes the /3GB switch, and [Microsoft Knowledge Base article 289022](#) explains how to modify the Windows boot.ini file in general. This [Microsoft MSDN page](#) also describes

parameters for increasing the 2 GB per-application memory limit on XP and Vista. Any such modifications are attempted at your own risk.

Operating system patches

All current operating system updates and service packs should be applied when they are available. **Important:** Hauptwerk's installer might not work properly on Windows XP unless the latest version of DirectX is installed. You can check the version of DirectX by selecting *Start / Run* and typing *dxdiag*. You can download the latest version of the 'DirectX End-User Runtime' from [Microsoft's downloads website](#). On Windows PCs, also make sure that the latest drivers are installed for your motherboard and graphics card and that the latest BIOS is installed for the motherboard.

Audio/sound interfaces

In principle, any audio or sound interface which is supported by the manufacturer on your operating system and hardware, and has good drivers should work. Mac OS X has high-performance, low latency audio and MIDI support built in, and there is usually less dependence on driver quality than on the PC, so less risk of driver/compatibility problems. On PC platforms either ASIO or DirectSound drivers can be used, with good quality native ASIO drivers usually giving by far the best performance.

Any audio interface you use must natively support the sample rates used by the organs you wish to load into Hauptwerk (typically 44.1 kHz, 48 kHz and 96 kHz). Note that the default built-in sound output found on many computers, only supports 44.1 kHz and so cannot be used with sample sets requiring other sample rates, such as 48 kHz. The sound quality from most computers' built-in outputs is also not usually especially high.

Since it is impossible for us to test with all products, and some interfaces do have problems with some types of drivers on some platforms, we would either recommend using one of the following interfaces, which we test with and fully support, or we would recommend testing an evaluation version of Hauptwerk with your system before purchasing a license.

On Mac OS X 10.6 'Snow Leopard' our recommendations are:

- Echo Audiofire 12 (firewire), which has 12 analogue (mono) outputs.
- Echo Audiofire 8 (firewire), which has 8 analogue (mono) outputs.
- PreSonus FP-10 (firewire), which has 8 analogue (mono) outputs.
- RME FireFace 800 (firewire), which has 8 analogue (mono) outputs.

On Mac OS X 10.5 'Leopard' our recommendations are:

- Echo Audiofire 12 (firewire), which has 12 analogue (mono) outputs.
- Echo Audiofire 8 (firewire), which has 8 analogue (mono) outputs.
- MOTU 24 I/O (PCIe version), which has 24 analogue (mono) outputs. Mac Pro only.
- PreSonus FP-10 (firewire), which has 8 analogue (mono) outputs.
- RME FireFace 800 (firewire), which has 8 analogue (mono) outputs.
- M-Audio FireWire Audiophile (firewire), which has 2 analogue (mono) outputs.
- M-Audio FireWire 410 (firewire), which has 8 analogue (mono) outputs.
- M-Audio Audiophile 2496 (PCI card), which has 2 analogue (mono) outputs. G4/G5 Macs only.
- M-Audio Audiophile 1010/1010LT (PCI card), which has 8 analogue (mono) outputs. G4/G5 Macs only.

On Mac OS X 10.4 'Tiger' our recommendations are:

- Echo Audiofire 12 (firewire), which has 12 analogue (mono) outputs.
- Echo Audiofire 8 (firewire), which has 8 analogue (mono) outputs.
- MOTU 24 I/O (PCIe version), which has 24 analogue (mono) outputs. Mac Pro only.
- PreSonus FP-10 (firewire), which has 8 analogue (mono) outputs.
- RME FireFace 800 (firewire), which has 8 analogue (mono) outputs.
- M-Audio FireWire Audiophile (firewire), which has 2 analogue (mono) outputs.
- M-Audio FireWire 410 (firewire), which has 8 analogue (mono) outputs.
- M-Audio Audiophile 2496 (PCI card), which has 2 analogue (mono) outputs. G4/G5 Macs only.
- M-Audio Audiophile 1010/1010LT (PCI card), which has 8 analogue (mono) outputs. G4/G5 Macs only.

On 64-bit and 32-bit Windows 7 our recommendations are:

- Echo Audiofire 12 (firewire), which has 12 analogue (mono) outputs. (1) (3)
- Echo Audiofire 8 (firewire), which has 8 analogue (mono) outputs. (1) (3)
- MOTU 24 I/O (PCIe version), which has 24 analogue (mono) outputs.
- RME FireFace 800 (firewire), which has 8 analogue (mono) outputs.
- E-MU 1212M (PCI card), which has 2 analogue (mono) outputs and built-in reverb. (3)
- E-MU 1820/1820M (PCI card), which has 8 analogue (mono) outputs and built-in reverb. (3)
- E-MU 0404 (PCI card), which has 2 analogue (mono) outputs and built-in reverb. (3)
- M-Audio FireWire Audiophile (firewire), which has 2 analogue (mono) outputs. (3)
- M-Audio FireWire 410 (firewire), which has 8 analogue (mono) outputs. (3)
- M-Audio Audiophile 2496 (PCI card), which has 2 analogue (mono) outputs. (3)
- M-Audio 1010/1010LT (PCI card), which has 8 analogue (mono) outputs. (3)

On 64-bit or 32-bit Windows Vista our recommendations are:

- Echo Audiofire 12 (firewire), which has 12 analogue (mono) outputs. (1)
- Echo Audiofire 8 (firewire), which has 8 analogue (mono) outputs. (1)
- MOTU 24 I/O (PCIe version), which has 24 analogue (mono) outputs.
- PreSonus FP-10 (firewire), which has 8 analogue (mono) outputs.
- RME FireFace 800 (firewire), which has 8 analogue (mono) outputs.
- E-MU 1212M (PCI card), which has 2 analogue (mono) outputs and built-in reverb.
- E-MU 1820/1820M (PCI card), which has 8 analogue (mono) outputs and built-in reverb.
- E-MU 0404 (PCI card), which has 2 analogue (mono) outputs and built-in reverb.
- M-Audio FireWire Audiophile (firewire), which has 2 analogue (mono) outputs.
- M-Audio FireWire 410 (firewire), which has 8 analogue (mono) outputs.
- M-Audio Audiophile 2496 (PCI card), which has 2 analogue (mono) outputs.
- M-Audio 1010/1010LT (PCI card), which has 8 analogue (mono) outputs.

On 64-bit or 32-bit Windows XP our recommendations are:

- Echo Audiofire 12 (firewire), which has 12 analogue (mono) outputs. (1)
- Echo Audiofire 8 (firewire), which has 8 analogue (mono) outputs. (1)
- MOTU 24 I/O (PCIe version), which has 24 analogue (mono) outputs.
- PreSonus FP-10 (firewire), which has 8 analogue (mono) outputs.
- RME FireFace 800 (firewire), which has 8 analogue (mono) outputs.
- E-MU 1212M (PCI card), which has 2 analogue (mono) outputs and built-in reverb.
- E-MU 1616M (PCI card), which has 6 analogue (mono) outputs and built-in reverb.
- E-MU 0404 (PCI card), which has 2 analogue (mono) outputs and built-in reverb.
- M-Audio FireWire Audiophile (firewire), which has 2 analogue (mono) outputs. (2) (3)
- M-Audio FireWire 410 (firewire), which has 8 analogue (mono) outputs. (2) (3)
- M-Audio Audiophile 2496 (PCI card), which has 2 analogue (mono) outputs. (2) (3)
- M-Audio 1010/1010LT (PCI card), which has 8 analogue (mono) outputs. (2) (3)

(1) We found that performance of the onboard MIDI ports was sluggish with the current Echo drivers for 64-bit Windows (only). Hence we would currently recommend using a separate MIDI interface with the Echo Audiofire interfaces on 64-bit Windows platforms.

(2) The current M-Audio 64-bit ASIO drivers only work with 32-bit Hauptwerk, limiting usable memory to 4 GB.

(3) The current 64-bit drivers for this interface are beta and/or not fully supported by the manufacturer. We found them to work but you might not be able get support from the manufacturer if you have a problem.

On both Mac and Windows platforms, the Echo, MOTU and M-Audio (1010/1010LT and 2496 only) drivers allow several units to be connected to the computer at the same time to give more outputs.

The [Echo](#), [MOTU](#), [PreSonus](#), [RME](#), [E-MU](#) and [M-Audio](#) websites have their full specifications.

Professional or semi-professional audio interfaces with high-quality DACs and drivers are strongly recommended above consumer-level sound cards. Apart from audio quality, the quality of the audio interface and its drivers can have an enormous effect on performance, as much as halving or doubling the number of pipes that your computer will be able to sound simultaneously, and determining the delay between pressing a key and hearing the sound ('latency').

Unless specifically advised to do otherwise, it is usually best to ensure that the latest versions of the manufacturers' drivers and firmware are installed.

Please note that the Creative Audigy 2 interfaces, commonly-used in PCs, do have ASIO drivers, but those drivers do not fully support multiple sample rates, and thus cannot be used with some Hauptwerk sample sets in ASIO mode. However, the Creative Audigy 2 interfaces do have fairly low-latency DirectSound drivers on both 32 and 64-bit editions of Windows. In general, we do not recommend the Creative interfaces for use with Hauptwerk because of their restrictive ASIO drivers, although they can instead be used with DirectSound drivers.

Notes about audio interface compatibility with 64-bit Windows: If you intend to use Hauptwerk on 64-bit Windows, please check the website of your intended audio interface's manufacturer for genuine 64-bit ASIO driver support, and, if possible, test the interface with Hauptwerk first, since some 64-bit Windows drivers do not fully work with native 64-bit audio/MIDI software.

MIDI interfaces

Similarly, any MIDI interface supported by the manufacturer on your system should work with Hauptwerk. For maximum compatibility with our testing we would recommend using one of the following.

Please note that we do not recommend very small 'micro' USB-MIDI interface, such as the M-Audio MIDISPORT UNO, since we have found some such interfaces to have insufficient hardware buffering and to lose occasional MIDI messages when the computer's processor is heavily loaded, causing stuck notes in Hauptwerk. That should never occur if using a good quality MIDI interface with plenty of buffering, such as any of those we recommend here.

On Mac OS X 10.6 'Snow Leopard' our recommendations are:

- MOTU Micro Lite (USB): 5 MIDI input ports, 5 MIDI output ports.
- MOTU Express 128 (USB): 8 MIDI input ports, 8 MIDI output ports.
- M-Audio MIDISPORT 2x2 Anniversary Edition (USB): 2 MIDI input ports, 2 MIDI output ports. (2)
- M-Audio MIDISPORT 4x4 Anniversary Edition (USB): 4 MIDI input ports, 4 MIDI output ports. (2)
- Echo Audiofire 12 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- Echo Audiofire 8 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- PreSonus FP-10 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- RME FireFace 800 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.

On Mac OS X 10.5 'Leopard' our recommendations are:

- MOTU Micro Lite (USB): 5 MIDI input ports, 5 MIDI output ports.
- MOTU Express 128 (USB): 8 MIDI input ports, 8 MIDI output ports.
- M-Audio MIDISPORT 2x2 Anniversary Edition (USB): 2 MIDI input ports, 2 MIDI output ports.
- M-Audio MIDISPORT 4x4 Anniversary Edition (USB): 4 MIDI input ports, 4 MIDI output ports.
- Echo Audiofire 12 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- Echo Audiofire 8 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- PreSonus FP-10 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- RME FireFace 800 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- M-Audio FireWire Audiophile audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- M-Audio FireWire 410 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- M-Audio Audiophile 2496 audio interface (PCI card): 1 MIDI input port, 1 MIDI output port. G4/G5 Macs only.
- M-Audio 1010/1010LT audio interface (PCI card): 1 MIDI input port, 1 MIDI output port. G4/G5 Macs only.

On Mac OS X 10.4 'Tiger' our recommendations are:

- MOTU Micro Lite (USB): 5 MIDI input ports, 5 MIDI output ports.
- MOTU Express 128 (USB): 8 MIDI input ports, 8 MIDI output ports.
- M-Audio MIDISPORT 2x2 Anniversary Edition (USB): 2 MIDI input ports, 2 MIDI output ports.
- M-Audio MIDISPORT 4x4 Anniversary Edition (USB): 4 MIDI input ports, 4 MIDI output ports.
- Echo Audiofire 12 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- Echo Audiofire 8 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- PreSonus FP-10 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- RME FireFace 800 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- M-Audio FireWire Audiophile audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
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- M-Audio Audiophile 2496 audio interface (PCI card): 1 MIDI input port, 1 MIDI output port. G4/G5 Macs only.
- M-Audio 1010/1010LT audio interface (PCI card): 1 MIDI input port, 1 MIDI output port. G4/G5 Macs only.

On 64-bit or 32-bit Windows 7 our recommendations are:

- MOTU Micro Lite (USB): 5 MIDI input ports, 5 MIDI output ports.
- MOTU Express 128 (USB): 8 MIDI input ports, 8 MIDI output ports.
- M-Audio MIDISPORT 2x2 Anniversary Edition (USB): 2 MIDI input ports, 2 MIDI output ports. (2)
- M-Audio MIDISPORT 4x4 Anniversary Edition (USB): 4 MIDI input ports, 4 MIDI output ports. (2)
- Echo Audiofire 12 audio interface (firewire): 1 MIDI input port, 1 MIDI output port. (1) (2)
- Echo Audiofire 8 audio interface (firewire): 1 MIDI input port, 1 MIDI output port. (1) (2)
- RME FireFace 800 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- E-MU 1212M audio interface (PCI card): 1 MIDI input port, 1 MIDI output port. (2)
- E-MU 1616M audio interface (PCI card): 2 MIDI input ports, 2 MIDI output ports. (2)
- E-MU 0404 audio interface (PCI card): 1 MIDI input port, 1 MIDI output port. (2)
- M-Audio FireWire Audiophile audio interface (firewire): 1 MIDI input port, 1 MIDI output port. (2)
- M-Audio FireWire 410 audio interface (firewire): 1 MIDI input port, 1 MIDI output port. (2)
- M-Audio Audiophile 2496 audio interface (PCI card): 1 MIDI input port, 1 MIDI output port. (2)
- M-Audio 1010/1010LT audio interface (PCI card): 1 MIDI input port, 1 MIDI output port. (2)

On 64-bit or 32-bit Windows Vista our recommendations are:

- MOTU Micro Lite (USB): 5 MIDI input ports, 5 MIDI output ports.
- MOTU Express 128 (USB): 8 MIDI input ports, 8 MIDI output ports.
- M-Audio MIDISPORT 2x2 Anniversary Edition (USB): 2 MIDI input ports, 2 MIDI output ports.
- M-Audio MIDISPORT 4x4 Anniversary Edition (USB): 4 MIDI input ports, 4 MIDI output ports.
- Echo Audiofire 12 audio interface (firewire): 1 MIDI input port, 1 MIDI output port. (1)
- Echo Audiofire 8 audio interface (firewire): 1 MIDI input port, 1 MIDI output port. (1)
- PreSonus FP-10 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- RME FireFace 800 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- E-MU 1212M audio interface (PCI card): 1 MIDI input port, 1 MIDI output port.
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- M-Audio Audiophile 2496 audio interface (PCI card): 1 MIDI input port, 1 MIDI output port.
- M-Audio 1010/1010LT audio interface (PCI card): 1 MIDI input port, 1 MIDI output port.

On 64-bit or 32-bit Windows XP our recommendations are:

- MOTU Micro Lite (USB): 5 MIDI input ports, 5 MIDI output ports.
- MOTU Express 128 (USB): 8 MIDI input ports, 8 MIDI output ports.
- Echo Audiofire 12 audio interface (firewire): 1 MIDI input port, 1 MIDI output port. (1)
- Echo Audiofire 8 audio interface (firewire): 1 MIDI input port, 1 MIDI output port. (1)
- PreSonus FP-10 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- RME FireFace 800 audio interface (firewire): 1 MIDI input port, 1 MIDI output port.
- E-MU 1212M audio interface (PCI card): 1 MIDI input port, 1 MIDI output port.
- E-MU 1616M audio interface (PCI card): 2 MIDI input ports, 2 MIDI output ports.
- E-MU 0404 audio interface (PCI card): 1 MIDI input port, 1 MIDI output port.
- M-Audio FireWire Audiophile audio interface (firewire): 1 MIDI input port, 1 MIDI output port. (2)
- M-Audio FireWire 410 audio interface (firewire): 1 MIDI input port, 1 MIDI output port. (2)
- M-Audio Audiophile 2496 audio interface (PCI card): 1 MIDI input port, 1 MIDI output port. (2)
- M-Audio 1010/1010LT audio interface (PCI card): 1 MIDI input port, 1 MIDI output port. (2)

(1) We found that performance of the onboard MIDI ports was sluggish with the current Echo drivers for 64-bit Windows (only). Hence we would currently recommend using a separate MIDI interface with the Echo Audiofire interfaces on 64-bit Windows platforms.

(2) The current drivers for this interface are beta and/or not fully supported by the manufacturer. We found them to work but you might not be able get support from the manufacturer if you have a problem.

Details of the interfaces can be found on the [Echo](#), [MOTU](#), [PreSonus](#), [RME](#), [E-MU](#) and [M-Audio](#) websites.

Unless specifically advised to do otherwise, it is usually best to ensure that the latest versions of the manufacturers' drivers and firmware are installed.

Monitors and graphics cards

Hauptwerk requires a minimum display resolution of 1024 x 768 pixels with 16, 24 or 32-bit color depth. Some sample sets may require higher resolutions in order to be able to display larger organ consoles. Note that Hauptwerk's console display can be disabled for use without a monitor.

On Windows PCs, when using Hauptwerk and the St. Anne's sample set with a screen resolution of 1024 x 768 we recommend using *Start | Settings | Control Panel | Display*, selecting the *Appearance* tab, changing the *Windows and buttons* setting to *Windows Classic* style and clicking *OK*. Then right-click on the Windows task bar and select *Properties*, tick *Auto-hide the task bar* and click *OK*. This should enable the console to fit fully on the screen.

Touch-screens are very popular for use with Hauptwerk, since they provide a simple and effective interface to control Hauptwerk's stops, avoiding the need for MIDI draw-knobs/tabs, etc. or any complex MIDI configuration. Many Hauptwerk users use MIDI piston buttons to trigger Hauptwerk's combinations and a touch-screen to program those combinations, which is very simple to configure but convenient for performance.

The Advanced Edition of Hauptwerk has native support for up to four monitors, including touch-screens, allowing different virtual console windows to be shown on separate physical monitors. For example you could display stop jams on either side of your MIDI keyboards using two monitors.

VST hosts

The 32-bit VSTi plug-in version of Hauptwerk is currently fully supported and tested with the following VST hosts on 32 or 64-bit Windows platforms (only):

- Steinberg Cubase 4
- Steinberg Cubase SE 3
- Steinberg V-Stack 1.2 (3)
- Cakewalk Sonar 6.2 and above (both 64-bit and 32-bit)
- Sibelius 5 (2)
- GenieSoft Overture 4 (2)
- Brainspawn Forte 1.6 (1) (2)
- Image-Line FL Studio 7
- Magix Samplitude 9 (1)
- VSTHost 1.40 (freeware)(2)

The 64-bit VSTi plug-in version of Hauptwerk, running on 64-bit Windows is currently supported on the following:

- Cakewalk Sonar 6.2 and above (64-bit)

(1) This host does not allow a plug-in to re-size its 'editor' window, which is necessary when a sample set is loaded or unloaded in Hauptwerk, or Hauptwerk is activated or deactivated. With the majority of such hosts closing and re-opening the window will force the host to redraw the window at the correct size.

(2) This host does not support multiple audio outputs with Hauptwerk, so only a single mixed stereo output is possible.

(3) This host does not support multiple sample rates natively. To use sample sets which require rates other than 44.1 kHz you need an audio interface that allows the sample rate to be adjusted and locked to force the host to run at that sample rate.

The Hauptwerk VSTi plug-in should be compatible with the majority of other VST hosts on the PC platform. Although we cannot test on all hosts, as much as possible we will endeavor to support Hauptwerk on any current host provided that we can obtain a testing copy from the manufacturer and that any compatibility issues prove to be due to Hauptwerk and not the host itself.

In this release there is no plug-in version of Hauptwerk for the Apple Mac platform, but we plan to add one in the future. However, [Audio Hijack Pro](#) can be used to apply reverb/convolver plug-ins very easily to Hauptwerk's audio output in real-time. Note that it is also possible to use the third-party freeware [Jack OS X](#) utility to route audio output from Hauptwerk into an audio sequencer or software effects processor in real-time. However, it is quite technical and we think some less-experienced computer users might find it complex to configure.

Other MIDI sequencer software

In principle any MIDI sequencer software should be compatible with Hauptwerk. A 'virtual MIDI cable' is required to connect Hauptwerk to a non-VSTi MIDI sequencer running on the same computer.

Mac OS X includes one natively, called the 'IAC Driver', but it is disabled by default. On an Apple Mac please run /Applications/Utilities/Audio MIDI Setup, click on the MIDI Devices tab, double-click on the IAC Driver icon and then make sure that the Device is online option is ticked. It is preferable (but not essential) to do this before running Hauptwerk, since Hauptwerk will then automatically default to using the driver for its 'MIDI sequencer' configuration when it is run for the first time.

On Windows platforms a third-party program is required, such as [MIDI Yoke](#).

On 64-bit Windows, MIDI Yoke works with 32-bit Hauptwerk but not with 64-bit Hauptwerk. [LoopBe](#) is compatible with native 64-bit software.

MIDI keyboards and organ consoles

To play Hauptwerk 'live' you need at least one MIDI keyboard, or a MIDI organ console, plus leads to connect it to the computer's MIDI interface. Hauptwerk is designed to be compatible with the MIDI implementations found in the majority of digital and electronic organs, so that MIDI draw-knobs, pistons, swell shoes and so forth can control Hauptwerk and be controlled by Hauptwerk where the hardware allows it (1). Please see the MIDI implementation section of the user guide for details of the MIDI implementations supported by Hauptwerk.

As noted above, touch-screens are very popular for use with Hauptwerk, since they provide a simple and effective interface to control Hauptwerk's stops, avoiding the need for MIDI draw-knobs/tabs, etc. or any complex MIDI configuration. Many Hauptwerk users use MIDI piston buttons to trigger Hauptwerk's combinations and a touch-screen to program those combinations, which is very simple to configure but convenient for performance. Hauptwerk has native support for up to four monitors (1), including touch-screens, allowing different virtual console windows to be shown on separate physical monitors. For example you could display stop jams on either side of your MIDI keyboards using two monitors.

(1) MIDI output facilities and multi-monitor support are only available in the Advanced Edition of Hauptwerk.

Amplifier, speakers or headphones

Hauptwerk produces audio output signals through the computer's audio interface(s). Amplifiers and loudspeakers or headphones will then be required to turn those signals into sound.

The quality of the audio amplifiers and speakers is critical; there is no point spending a lot of money on a computer and audio interface and then using PC speakers - the results will almost certainly be terrible. At the very least, a good quality stereo hi-fi amplifier and pair of speakers should be used, or good quality hi-fi headphones. Recording studio monitor speakers are usually good alternatives. For amplification in large buildings, it is often better to have many smaller high-quality amplifiers and speakers than a few high-powered ones.

Hauptwerk fully supports multi-channel audio output (1), so you can amplify different organ ranks, or parts of ranks, separately if you wish and have a multi-output audio interface. You can also distribute pipes within groups of available channels. This enables a three-dimensional sound to be created and minimizes some types of distortion inherent in loudspeakers. It is usually the preferred method of amplification with dry sample sets used in reverberant spaces.

(1) Multi-channel audio output is only available with the Advanced Edition of Hauptwerk.

Spare USB port

Hauptwerk is licensed by means of the Hauptwerk USB key. To use a licensed version of Hauptwerk you will need a spare USB port to connect it. If your computer does not have sufficient ports then you will need to get a USB hub and cable to add more. We recommend only using good quality USB hubs with separate power supplies to ensure that the dongle functions reliably.

Important note 1: Since it is not possible for us to test with all hardware and third-party software, we would recommend testing an evaluation version of Hauptwerk with your system before purchasing a license.

Important note 2: Milan Digital Audio does not make or sell computer hardware. We hope you find any recommendations we give useful as reference but we cannot guarantee that any given combination of PC parts or drivers will work or perform well together, regardless of whether some of them follow our recommendations. We are sorry we cannot provide a significant level of help or advice for computer hardware, beyond the recommendations made in the user guide and on our website. If you need help or support with building PCs, using computers, or buying, installing or using PC components, please make sure that you have a support contract with a company that can provide that support. If you are considering buying a computer to run Hauptwerk and you do not have much experience with building computers, diagnosing driver and hardware compatibilities, and so forth, we would recommend either buying an Apple Mac (Apple Macs give superb performance 'out of the box') or buying a PC from a company that offers ready-made high-performance PCs designed and tested for use with Hauptwerk. The MIDI hardware section on our website lists several such companies.