FERROFISH
advanced audio applications

PULSE 16
PULSE 16 MX
PULSE 16 DX

USERS GUIDE

Version 1.1

Ferrofish
Advanced Audio Applications
Brüderstr. 10, 53545 Linz am Rhein, Germany

www.ferrofish.de

Safety instructions and warnings

IMPORTANT SAFETY INSTRUCTIONS
Safety symbols used in this manual:

This symbol is an alert that there are important maintenance and operating instructions in the literature.

This symbol warns the user of uninsulated, potentially dangerous voltage inside the unit that can cause an electric shock.

This symbol warns the user that the output connectors of the power supply contain voltages that can cause dangerous, potentially lethal shocks.

- **Read these Instructions**
- **Heed all warnings**
- **Keep these instructions**
- **Follow all instructions**

1. Do not use this device near water.
2. Clean only with a dry cloth. Do not spray liquid cleaner onto the faceplate or into the ventilation slots. This may damage the front panel or cause a dangerous condition.
3. Only install in accordance with the manufacturer's instructions.
4. Do not install or operate near heat sources such as stoves, radiators or other devices that may produce heat.
5. NEVER compromise the functioning of the power plug's ground connection. When the provided plug doesn't fit into the outlet, please consult a qualified electrician for assistance.
6. Use power adaptors and accessories specified by the manufacturer only.
7. Protect the power cord from being pinched or stepped on.
8. Unplug this device during lightning storms, or when not in use for extended periods of time.
9. Refer all servicing to qualified service personnel only. Servicing is required when the device has been damaged in any way. For example when liquids have been spilled on the device, objects have fallen onto it, or the device itself has been dropped. Servicing is also essential when the device no longer functions normally or has been exposed to rain or moisture.
10. This unit generates heat during normal operation. Use it in a well ventilated environment with at least 1RU space between any other equipment.
11. This product in combination with headphones or other external amplifiers and speakers may produce sound levels that could lead to permanent hearing damage. Do not operate at high or uncomfortable volume levels for a long time. If you are experiencing ringing in your ears, a loss of high frequency sound information or other hearing loss, please contact an audiologist immediately.
12. WARNING: To reduce the risk of an electric shock or fire, do not expose the device to rain or moisture.
13. The power supply of this audio device may cause electronic interference to surrounding equipment. If you find that this or any nearby unit is malfunctioning, try resetting the device, relocating it, or getting an electrician to install a powerline conditioner.
14. Always use a stand, 19" rack or table designed for the use of pro audio equipment. In a permanent installation make sure that damage or even injury will not result from the mounting of the device or from cables pulling on the device. When using a cart, use caution when moving the device inside the cart to avoid injury from tipping-over.

Introduction

Dear Customer,

Thank you for purchasing our product. We are very pleased that you have chosen the PULSE16 series from our product range.

Using your PULSE16 you can simultaneously convert 16 analog channels to digital and 16 channels to analog. As digital interface, you can choose between ADAT, MADI (optional) and Dante (optional), and you can freely route between them in groups of 8 channels.
We also added a headphone output so you can monitor mono or stereo channels from an arbitrary source.
Two TFT screens show all analog input and output levels at a time. The intuitive one knob operation makes using the PULSE16 a breeze.
We sincerely hope that you will enjoy using your PULSE16 as much as we enjoyed developing it. Should you have any suggestions, praise or criticism for us, please visit us on Facebook or at www.ferrofish.de - a handwritten letter is of course also happily received.

Warm greetings from Linz near the river Rhine.
The Ferrofish Team

Symbols used in this manual:


This symbol indicated sections of detailed explanation.


Paragraphs showing this symbol require the readers attention.

Software and Updates

For more information, updates and support please visit our website: www.ferrofish.de

Scope of Delivery

This package includes:
1x PULSE16 device
1x Instructions (German & English)
1x Power supply 12V
1x MADI cable (PULSE16 MX and DX only)

Optional digital interfaces

The PULSE16 is shipped in three different versions, which differs by the installed digital interfaces:

Model	ADAT	MADI	DANTE
PULSE16	JA	optional	NEIN
PULSE16 MX	JA	JA	NEIN
PULSE16 DX	JA	JA	JA

Remark: To add MADI to your PULSE16, you need a Ferrofish MADI SFP module and an upgrade of the PULSE16 firmware to PULSE16 MX. Further information can be found in this manual.

Operation

The PULSE16 can be operated completely from the front panel by using the SELECT pot and the MENU button. The POWER button can be used as a "home button" and for switching the unit on and off. For switching it off, keep the button pressed for over 3 seconds. When you do, a countdown will be shown on the screen to prevent accidentally shutting down the unit. You can control the PULSE16 over the integrated 5-pin MIDI Port or via MIDI-over-MADI (MX or DX only) or Dante (DX only). The main screen shows the levels of all 16 analog inputs and outputs as well as important status information. Press POWER to get back into this screen from any point.

The status bar below the level I/O's show:

- Wordclock sync source and sample frequency
- MADI input (MX or DX only): grey = no connection, yellow = signal detected, green = locked on sample frequency
- ADAT inputs 1-4. Same color coding as MADI.
- BNC Wordclock Input
- Dante input (DX only). Same color coding as MADI.
- MIDI input indicator
- MIDI-over-MADI input (MX or DX only)
- Active preset number

The wordclock input (MADI, ADAT, Dante or BNC) is indicated by a flashing "square-wave" icon.

Headphones

When turning the SELECT pot inside the main screen the headphone menu is shown. You can select the volume of the headphone output now:

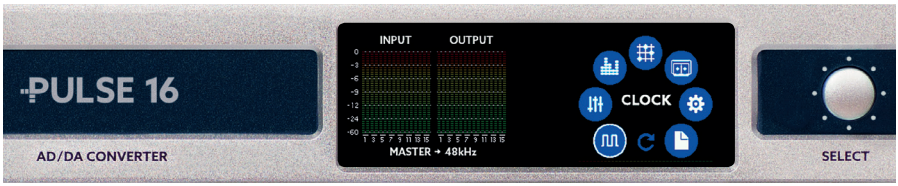
Press the MENU key to select:

- Source: You can choose between ANALOG IN / OUT, ADAT IN / OUT, MADI IN / OUT (MX or DX only) and Dante IN / OUT (DX only).
- Channel: Select the desired channel. The first cycle contains all available channels in mono, the second cycle lets you listen to the channels grouped in stereo pairs.

Please note that using headphones at high sound pressure levels for a longer time can result in permanent hearing loss or hearing damage. Take care of your ears – you only have this single pair.

Main Menu

By pressing the MENU button you engage the main menu. Use the SELECT pot to navigate to the desired menu point and press MENU to select it.



Inside the Main Menu you can choose between:

CLOCK
Here you select if the PULSE16 should generate the wordclock signal by itself (Master) or if it should listen to a wordclock signal (Slave) from an external source. If choosing Master you can also set the sample rate here.

GAINS
Here you can set the sensitivities of the 16 analog inputs individually.

LEVELS
Here you can set the levels of the 16 analog outputs individually.

ROUTING
In this menu you can configure the routing of the inputs and outputs.

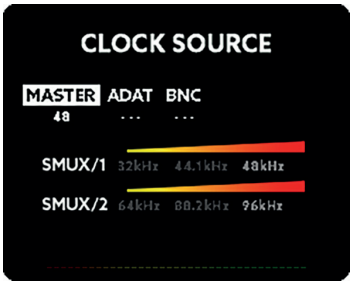
MADI SFP
Here you view the parameters of the SFP module. If the MADI version of the PULSE16 is not unlocked yet, you can do so by choosing this menu item.

SETUP
The setup menu lets you control various settings

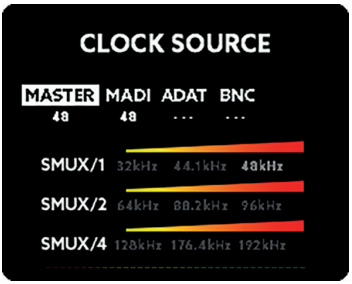
PRESET
You can load or save presets to one of a total six preset slots.

Main Menu – CLOCK

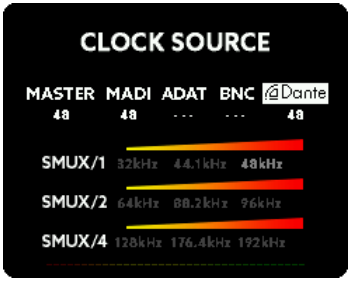
Inside this menu you can select the source of the wordclock and the sample frequency of the PULSE16 when running as Master:



Clock Screen PULSE16



Clock Screen PULSE16 MX



Clock Screen PULSE16 DX

The numbers below the labels show the internal generated clock frequency when set to MASTER or the measured external sample frequency. If no sample rate is detected "---" is shown.

If one of the external inputs (ADAT, MADI, BNC or Dante) is used as Wordclock source, the status screen shows a blinking rectangular icon at the corresponding port.

MASTER

If the clock source is set to MASTER, the internal wordclock generator of the PULSE16 is used. All other digital devices attached have to be set to Slave.

MADI (MX or DX only)

The wordclock is extracted and conditioned from the MADI input.

ADAT
The wordclock is extracted and conditioned from one of the four ADAT inputs. Always the first ADAT input with a valid signal is used.

BNC
When using an external wordclock on the BNC IN of the PULSE16, the wordclock signal will also be routed thru the jitter reduction stage and sent back to the BNC OUT.

Dante (DX only)
The wordclock is extracted and conditioned from the Dante network. Usually the Wordclock provided by Dante should be used, so choosing this source is recommended when using Dante.

Main Menu – CLOCK-SMUX mode

Although the PULSE16 always works using the 16 analog input and output channels, the number of ADAT, MADI and Dante channels is dependent on the sample frequency and the SMUX mode used:

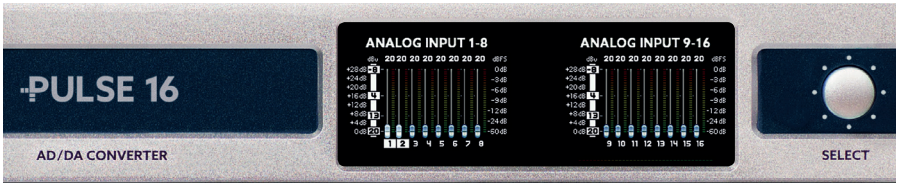
SMUX/1
The SMUX/1 mode allows sampling rates from 32kHz up to 48kHz.

SMUX/2
When using higher sampling rates in SMUX/2 mode (64kHz to 96kHz), the digital channels are being split into channel pairs (Signal MUltipleXing). For this reason, the number of channels is reduced by half. To overcome this limitation, the digital ADAT I/O's of the PULSE16 are available as a double configuration. So, you can run all 16 analog inputs and outputs at sample rated up to 96kHz in SMUX/2 mode.

SMUX/4 (MX or DX only)
At even higher sampling rates from 128kHz up to 192kHz the SMUX/4 mode is used. In this mode, an analog channel is being split up to four digital channels. Using the optional MADI interface all 64 x 64 digital channels are used for 16 analog inputs and 16 analog outputs. In other words: A single PULSE16 unit can handle all full 16 inputs and outputs at 192kHz without any limitation of the total channelcount.

Main Menu – GAINS

The analog inputs of the PULSE16 can be set to different sensitivities in the range from -8dBu up to +20dBu in single steps of 1dB.



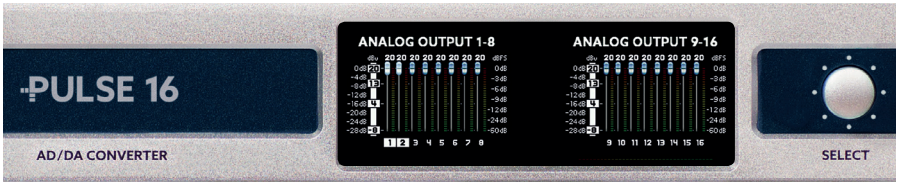
The number above the fader shows the maximum level in dBu, which the input can handle. When the fader is set to "20" like in the picture above the input can handle an maximum input level of +20dBu. Avoid exceeding this maximum level to prevent digital clipping.

In addition to the fader you see the input level meters of the analog inputs of the unit. This makes input setting easier. The dB scale on the right side shows the resolution of these level meters.

The value of -8dBu is chosen on purpose, because it's close to the level of analog consumer gear (-10dBV = -7.78dBu).

Main Menu – LEVELS

The LEVELS screen is similar to the GAINS screen described before. Same as with the inputs also the outputs can be adjusted in 1dB steps between -8dBu to +20dBu.

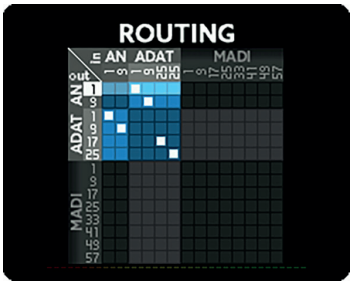


The dB scale on the right side shows the resolution of the metering levels.
This scale does not show the level value of the fader!

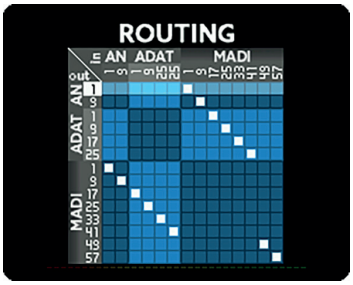
The number above the fader shows the maximum level in dBu, which the output is able to give out. When the fader is set to 20 like shown in the picture above, the output of a digital signal with 0dBFS will be +20dBu on the analog output.

Main Menu – ROUTING

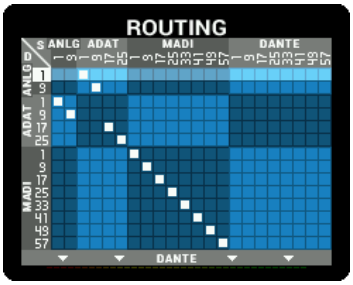
The PULSE16 offers an intuitive routing matrix. This matrix is shown as a grid in the ROUTING menu. The inputs are shown in the columns, while the rows represent the outputs. A solid square between these lines indicates a connection. The routing is done in channel blocks of eight channels.



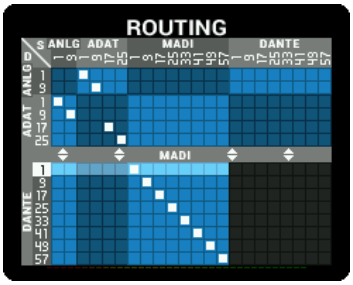
Routing Screen PULSE16



Routing Screen PULSE16 MX



Routing Screen PULSE16 DX
(upper part, analog+ADAT+MADI)



Routing Screen PULSE16 DX
(lower part, analog+ADAT+Dante)

To change the routing, please do the following:

- Choose an output: Use the SELECT pot to select one block of eight channels (one of the rows).
- Choose an input: now press MENU to assign an input for this output. Use SELECT to confirm (one of the columns).
- Repeat this process as desired.

Keep the MENU button pressed longer to exit this menu.

Main Menu – MADI SFP

The PULSE16 can be upgraded with an optical MADI SFP module, called "MADI SFP MX Option", and in fact turns your PULSE16 to a full featured PILSE16 MX. With this module equipped all 16 x 16 channels can be used with up to 192kHz.

The MADI-Upgrade from PULSE16 to PULSE16 MX consists of two parts:
a) the Ferrofish MADI SFP module (available at your dealer)
b) paid unlock code from the Ferrofish webshop.

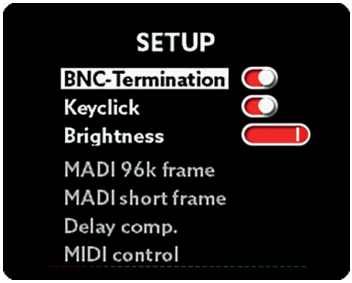
ONLY USE GENUINE FERROFISH MADI SFP MODULES.
MODULES FROM THIRD PARTY MANUFACTURERS ARE NOT SUPPORTED!

After installing the SFP module you need to purchase an upgrade license from the Ferrofish webshop. After entering the correct unlock code in the screen shown, the PULSE16 is permanently upgraded to an PULSE16 MX.

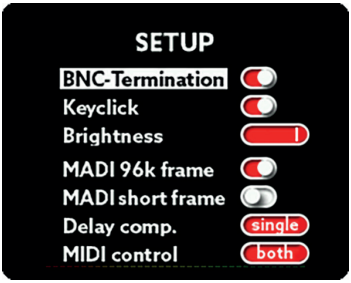
The MADI SFP module is available as a single-mode and a multi-mode version. Most devices on the market use the multi-mode standard. The single-mode version is used for distances longer then 2km. Please refer to the exact specifications of your other MADI devices for more information.

Main Menu – SETUP

In the SETUP menu the following settings can be done:



Setup Screen PULSE16



PULSE16 MX and PULSE16 DX

BNC Termination

The PULSE16 wordclock is terminated internally by default with a 75 ohms resistor. When daisy-chaining the wordclock of several units, you should leave this option set to ON. If you're using T-connectors for connecting several units, set this option to OFF.

Keyclick

Let's you switch the Keyclick sound on or off.

Brightness

Here you can set the brightness of the displays. In case the PULSE16 is not operated the display will be dimmed after some seconds.

MADI 96k frame (MX or DX only)

When using the SMUX/2 mode, there exist two transmission standards for MADI:

- 48k frame: Transmission is identical to the SMUX/1 mode, except two channels are grouped to one channel, resulting in 32 channels.
- 96k frame: Instead of grouping channels, the channels are sent directly, but using a shorter packet consisting of 32 channels.

Both modes transfer the same amount of channels (32), but the 96k frame mode has the advantage, that the receiver can distinguish the SMUX/1 and SMUX/2 modes, so it can switch automatically between 48kHz and 96kHz for example. 96k frame is the preferred setting if the receiver can recognize it.

MADI short frame (MX or DX only)

The most common MADI configuration is 64 channels (SMUX/2: 32 channels, SMUX/4:

16 channels). This uses the full bandwidth of the MADI interface. When enabling the short frame option, the PULSE16 will send only 56 channels (SMUX/2: 28 channels, SMUX/4: 14 channels) instead of 64 channels. This option corresponds to an older standard, where the bandwidth of the missing eight channels is used to be able to change the speed of the MADI signal within some percent up or down.

Delay Compensation (MX or DX only)

When connecting several PULSE16 units in daisy-chain the MADI data will be routed thru the first unit to the second unit and so on. This results in a small delay of the data on the second, third and fourth unit. To compensate this delay you have to tell the PULSE16 which order it is inside the MADI chain:

- Single: only one unit connected.
- 1 of 4: first device in the MADI chain
- 2 of 4: second device in the MADI chain
- 3 of 4: third device in the MADI chain
- 4 of 4: fourth device in the MADI chain

MIDI control (MX or DX only)

Here you can set from which port the PULSE16 should receive remote commands:
a) From the 5-pin-MIDI input only
b) From the MIDI-over-MADI input only.
c) From both sources.

Main Menu – PRESET

The PULSE16 parameters GAINS, LEVELS and the routing can be permanently stored in one of six preset slots. This lets you pre-configure the PULSE16 before the gig and save you time later. Inside the PRESET menu you can choose which preset you want to load:

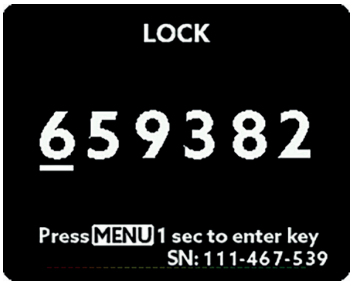
After selecting the desired preset by using the SELECT pot and MENU to load it a second screen appears. This screen lets you choose what should be loaded: The GAINS of the analog inputs, the LEVELS of the analog outputs, the routing – or all three items.

To store a current setting into a preset slot, enter the STORE menu:

Inside this menu you can permanently store the current settings at one of total six preset slots.

Locking the PULSE16

The front panel (except the headphone screen) can be locked to avoid maloperation or manipulation of the settings. To lock the PULSE16's front panel, enter the PIN that's printed on the downside of the unit.



After entering the correct PIN, keep the MENU button pressed for one second. The device is locked now. Follow the same procedure to unlock the device again.

The PIN of the PULSE16 is fixed and cannot be modified.

Important: Please keep the PIN-code in a safe place!

A lost PIN Code can can be restored by the manufacturer. This procedure is subject to a fee.

PULSE16 I/O's – analog inputs and outputs

All analog inputs and outputs are brought out as balanced ¼" (6.3mm) TRS jacks, and can be set independently to a level/sensivity between -8dBu and +20dBu.

Digital interfaces don't have a headroom. Therefore, never apply a signal stronger than the maximum allowed value, else digital clipping will occur.

The pinout of the TRS connections is:
Tip = hot, Ring = cold, Shield = ground.

When connecting the balanced input of the PULSE16 to an unbalanced device, please set the cold channel to ground. When connecting the balanced output of the PULSE16 to an unbalanced input, leave the cold pin unconnected.

PULSE16 I/O's – ADAT

ADAT® is a digital multichannel interface standard by Alesis®. It can transfer eight channels of audio data at 48kHz via an optical plastics fibre. The maximum length of an ADAT connection is limited to 10 meters.

The PULSE16 has four pairs of ADAT I/O ports. The ports with white doors are the outputs, the black ones are the inputs.

Each ADAT interface can transfer eight channels at SMUX/1. When using SMUX/2 the

channel count reduces to 4. Since the PULSE16 is equipped with four ADAT interface In/Out pairs, transfer of all analog 16 input and 16 output channels is still possible.
SMUX/4 (up to 192kHz) is only available if the MX or DX option is installed. In this case only two channels are transferred over a ADAT cable, resulting in 8 input and 8 output channels in total, unsing the four interface pairs.

Frequency	ADAT channels in+output
32kHz I 44,1kHz I 48kHz (SMUX/1)	32+32
64kHz I 88,2kHz I 96kHz (SMUX/2)	16+16
128kHz I 176.4kHz I 192kHz (SMUX/4)	8+8*

* SMUX/4 is only available for the MX and DX versions

PULSE16 I/O's – MADI (MX or DX only)

MADI is a professional audio interface format which can transfer 64 channels over up to 2 kilometers in multi-mode.

Connect several MADI devices in series by putting them in a daisy chain. This means that you connect the output of the first device to the input of the second device. The output of the second device will be connected to the input of the third device and so on. So, you can daisy-chain up to four units to transmit 64 analog inputs and 64 outputs at 48kHz.

The PULSE16 features an optical MADI-SFP connector. Use a LC–SC cable to connect to other MADI devices.

When using sample rates higher than 48kHz, channels are bundled to transport that higher data rate. As a result, the maximum number of transferrable channels is reduced. The following chart shows the amount of digital audio channels for a single MADI port:

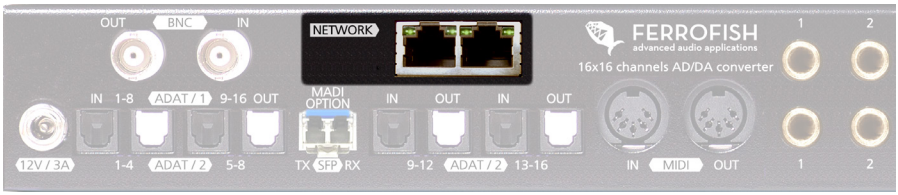
Frequency	MADI channels
32kHz I 44,1kHz I 48kHz (SMUX/1)	64 (56) channels
64kHz I 88,2kHz I 96kHz (SMUX/2)	32 (28) channels
128kHz I 176,4kHz I 192kHz (SMUX/4)	16 (14) channels

The original MADI standard utilized a maximum channel count of 56 channels for a single MADI connection. These 56 digital channels allow a sample rate variation of +/- 10%. These numbers are shown in brackets in the chart. Today, using 64 channels is preferred, since rate variations are not often used anymore.

Your PULSE16 automatically detects if 64 or 56 channels are received. Use the SETUP menu to switch, if either 64 or 56 channels should be sent.

Please note, that the MADI MX option consists of the Ferrofish MADI SFP hardware module and the MADI MX unlock code which must be purchased in addition in the Ferrofish webshop. Using just the SFP module will not work.

PULSE16 I/O's – Dante (DX only)



Dante is a common network audio protocol originated from Audinate. Using the PULSE16 DX you can route up to 64+64 Dante channels from/to analog, ADAT and MADI. Usually the wordclock is generated by the Dante-network itself, so it is recommended to select Dante as wordclock source in the CLOCK screen. You find more information regarding Dante, especially the software for configuring Dante channels (Dante Controller) and the Dante Virtual Soundcard (DVS) on the Audinate website.

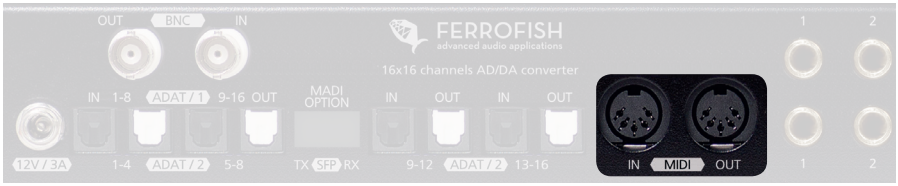
PULSE16 I/Os – BNC WORDCLOCK

Every digital system needs a clock frequency to work. This clock frequency can either be generated by the system itself (master mode) or it can be supplied externally (slave mode). There can be only one master clock in a digital system. The number of slave devices is not limited.

The PULSE16 can generate its own clock and share this clock with other external devices via the BNC OUT connector or it can receive an external clock from the BNC IN connector. Please use a coaxial cable with an impedance of 75 ohms.

Wether the PULSE16 runs in Master or Slave mode can be set inside the CLOCK settings menu.

PULSE16 I/O's – MIDI



The PULSE16 features a 5pin MIDI port for remote controlling the device.

The MIDI port uses an opto coupler, so it is galvanically isolated. To control multiple devices, you can daisy chain those using the MIDI port.

Another application is embedding/extracting of MIDI signals from the MADI port (MIDI-over-MADI, only PULSE16 MX or DX). Handling of the MIDI data can be configured in the SETTINGS screen.

Remote Software

You can control your PULSE16 from a computer using the remote software found on our website. To do so you can choose between the following connection methods:

MIDI Interface

Use a MIDI interface to connect your PULSE16 to your computer. Please make sure that the MIDI interface can transmit and receive system exclusice (sysex) data.

MIDI over MADI (MX or DX only)

You can also use the MADI connection with a MADI card, which supports the MIDI-over-MADI protocol. Please note, that not all MIDI expansion cards or MADI devices provide this feature. For further details please consult the manual of the MIDI card/device, or contact the manufacturer..

Dante (DX only)

Alternatively to MIDI the Dante network can be used to control the unit. Further information you find in the documentation of the remote software.

After starting the software, all connected MIDI devices will be scanned and presented in a list.

For further information about the remote software please visit our website www.ferrofish.de

Technical specifications

ADAT I/O:	4 + 4 optical ports 32 channels @32kHz, 44.1kHz, 48kHz 16 channels @64kHz, 88.2kHz, 96kHz 8 channels @128kHz, 176.4kHz, 192kHz (MADI MX option required) Latency: 2 samples
MADI I/O: (MX or DX only)	SFP cage for MADI single-mode or multi-mode SFP module 64 channels @32kHz, 44.1kHz, 48kHz 32 channels @64kHz, 88.2kHz, 96kHz 16 channels @128kHz, 176.4kHz, 192kHz MIDI-over-MADI implemented Latency: 2 samples
Dante I/O: (DX only)	2 network connectors 64 channels @32kHz, 44.1kHz, 48kHz 32 channels @64kHz, 88.2kHz, 96kHz 16 channels @128kHz, 176.4kHz, 192kHz MIDI-over-Dante implemented
Wordclock:	2 x BNC: In / Out Switchable input termination of 75 ohms
MIDI I/O:	MIDI Standard 1.0 / 1996 2 x 5pin I/O port for remote control Translation from MIDI to MIDI over MADI possible
A/D converter:	2 x CS5368 (Cirrus Logic)
outputs: (analog)	16 x TRS ¼" (6.3mm), female Digital gain: +20dBu...-8dBu in single steps of 1dB Latency: @48kHz: 12/fs, 0.25ms, @96kHz: 9/fs, 0.09ms, @192kHz: 5/fs, 0.03ms
D/A converter:	2 x CS4365 (Cirrus Logic)
inputs: (analog)	16 x TRS ¼" (6.3mm), female Digital sensitivity: +20dBu...-8dBu in single steps of 1dB Latency: @48kHz: 7.8/fs, 0.16ms, @96kHz: 5.4/fs, 0.06ms, @192kHz: 6.6/fs, 0.03ms

Op-Amps:	RC4580
Display:	2 x Color-TFT Display
Headphones:	1 x ¼" (6.3mm) TRS jack, stereo. Selectable mono or stereo source Digitally controlled volume level
PLL:	Digitally controlled PLL with active jitter reduction Output jitter: 50ps ... 100ps typ.
Int. Clock:	TCXO (temp. compensated oscillator) with high accuracy
Initial accuracy:	+/-1.5ppm
Temperature drift:	+/-2.5ppm
Aging:	+/- 1.0ppm
Fuse:	Polyfuse, internal, self-resetting
Power supply:	external PSU (12 Volts, 3 amps) included
Power required:	typ 15VA
Dimensions	Height: 1RU, depth: 19cm (7.5") (jack dimensions included)
Weight:	2 kg (4.4lbs)
Temperature:	+5° to +45° celsius
Humidity:	< 75%, non-condensing

CE conformity

EMC

This device fully complies to all harmonised standards for the approximation of laws of the member states for the electromechanical compatibility
(EMC:2014/30/EU) and European Low Voltage Directive 2014/35/EU.

RoHs II

This device has been produced with lead free solder according to the EU directive 2011/65/EU and therein contained maximum permissible values for hazardous substances found in electronic devices.

FCC-Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Responsible Party in USA: Synthax United States, 6600 NW 16th Street, Suite 10, Ft Lauderdale, FL 33313 T.:754.206.4220
Trade Name: Ferrofish, Model Number: PULSE16 / PULSE16 MX / PULSE16 DX

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING: Any modifications or other changes to this unit not approved by the party responsible for compliance could void the user's authority to operate this equipment.

Note on Disposal

According to common law of the EU states directive RL2002/96/EG (WEEE – Directive on Waste Electrical and Electronic Equipment) this product must be recycled after final use and/or end of its lifetime.
In case a disposal of electronic waste is not possible, the recycling can also be done by the manufacturer. For this the device has to be sent free to the door to: Ferrofish GmbH, Brüderstraße 10,
D-53545 Linz / Rhein, Germany. Not prepaid shippings will be rejected and returned on the sender's costs.

Service

No serviceable parts inside. Do not open this device.

Warranty

Every PULSE16 is thoroughly checked and tested. Ferrofish grants a warranty of two years after purchase thru an authorized dealer or distributor. The invoice is needed as a proof-of-purchase.

In case of an permanent malfunction or any other defect under warranty that can't be fixed by support, please contact your dealer and inquire a repair under warranty. Damages caused by improper installation or inappropriate usage are not covered by warranty. Fixing these damages will be liable to pay costs.

Claim for damages of any kind, in particular consequential damage or loss are not covered. A liability exceeding the merchandise value of an PULSE16(MX) is also not covered. We refer to the general terms and conditions of Ferrofish GmbH.

Exclusion of liability

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Product and documentation is subject to the terms and conditions of Ferrofish GmbH at the latest state.

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