Manual
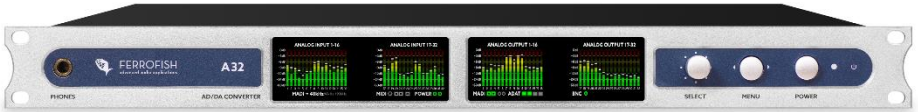
A32
Professional 32 x 32-channel AD/DA Converter

FERROFISH
advanced audio applications

Version 1.2

Introduction

Thank you for choosing the A32 as your new A/D D/A converter!

The A32 is an A/D-D/A converter with 32 analog inputs and outputs, 64x64 MADI and 32x32 ADAT digital channels.

Furthermore, it is possible to route internally between all I/O channels and even create submixes, which can be monitored using the headphones output on the front of the A32.

Four TFT screens show all analog input and output levels at the same time and allow perfect visualization of all the A32's settings.

The intuitive one knob operation together with the integrated help system makes using the A32 a breeze.

We're sure that our A32 will become a valuable part of your studio.

Software and Updates

For more information concerning updates and support please visit our website: www.ferrofish.com

A32 operation

The A32 can be fully controlled from the front panel by using the SELECT wheel and the MENU button. The POWER button can be used as a *home* button and for switching the unit on and off. It is also possible to control the A32 via USB, MIDI or MIDI-over-MADI.

The main screen shows the levels of all 32 analog inputs and outputs as well as other important status information, so that you always know what is happening. You can always return to this screen with a short press of the power button.
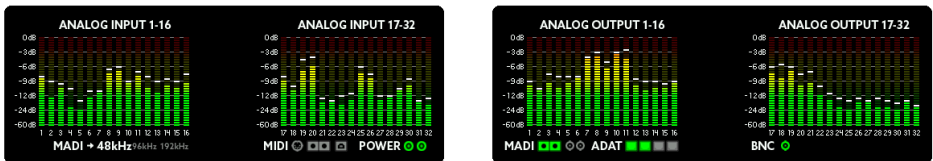
The status line beneath the meters shows the following (from left to right):

- The current synchronization source and sample frequency

- Whether there is MIDI input from the MIDI plugs, from MIDI-over-MADI and/or from USB

- If power is attached to the left and/or right mains input

- Any audio input present on optical MADI, coax MADI and/or ADAT 1-4. The symbol will be yellow if only audio is received and green if the input is also synchronous to the sample frequency

- If BNC wordclock input is present

When using an external wordclock source (MADI, ADAT, or BNC), the corresponding icon shows a blinking pulse symbol.

1

Headphones

Turning the SELECT knob whilst the main screen is visible on the display will make the headphones menu appear. You can now select the volume of the headphones output:
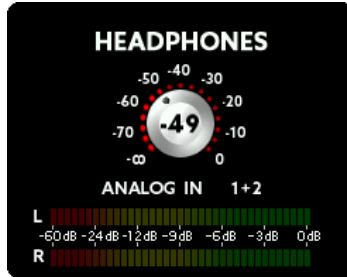

By pressing the MENU key, you can also select and then change the following:

- Source: You can choose between ANALOG IN / OUT, MADI IN / OUT, ADAT IN / OUT and MIX 1-7.
- Channel: Once you have chosen a source you can then select the specific channel(s) to be monitored. Cycling thru the channels will let you first select mono channels, followed by stereo channel pairs.

If you prefer to have a full mix of the channels, you can choose a mix preset. For further information regarding mix presets please see the MIX chapter.

main menu

Pressing the MENU key shows the main menu. Use the SELECT wheel to choose the desired menu option and press MENU to activate it.
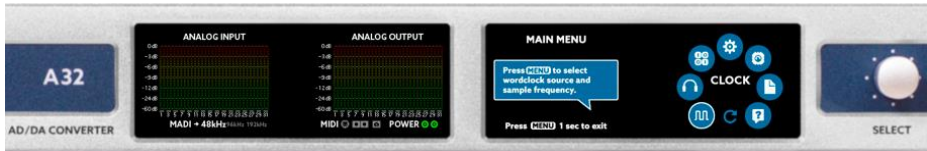
The main menu has the following functions:

CLOCK
Here you can set the A32 to generate the wordclock itself (master) or listen to a wordclock signal (slave) from an external source. If choosing Master you can also select the sample rate here.

MIX
You can select, load and edit one of seven mixer presets in this menu. The preset mixes can be used for the headphones output.

DIGITAL
Here you can see the analog I/O's as meters and all digital I/O's as LED dots. This means that every dot shows a digital channel, which changes color according to the level of the signal.

SETUP
Setup lets you change the gain-levels of the analog inputs and outputs. Additionally, you can define the routing of the A32, set the MIDI and MADI processing, change global settings or lock the front panel.

DSP
In the DSP menu optional DSP plugins can be loaded and edited.

PRESET
Levels, gains and the routing of the A32 can be saved and loaded in up to six different preset slots.

HELP
You can change the language of the help system here, get information about the schematic structure and lookup the firmware version.

🔵 main menu – CLOCK

The CLOCK SOURCE menu lets you select the wordclock source and the sample frequency of the A32 when running in Master Mode:

The numbers below the labels show the internally generated clock as Master or the measured external sample rate. If no sample rate is detected, „---" will be displayed.

MASTER

By selecting MASTER as the clock source, the internal clock generator will be used for the wordclock. This circuit consists of a high precision temperature compensated oscillator, which can be set to the desired frequency.

MADI, ADAT

If you set the clock source to MADI or ADAT, the A32 extracts the wordclock signal from these digital inputs, reduces jitter using the digital PLL circuit and routes it back to the BNC output. The A32 then uses this clock signal. When using higher sample frequencies, the MADI and ADAT interfaces employ SMUX modes, in this case you will need to set the desired SMUX frequency manually. Please see the SMUX chapter for more details.

BNC

When receiving an external wordclock via the BNC IN of the A32, the wordclock signal will also be routed thru the jitter reduction stage before using it.

SMUX operation

Internally the A32 always uses all 32 analog channels, but the number of digital MADI and ADAT channels is limited in relation to the SMUX mode currently in use.

SMUX/1

SMUX/1 offers frequencies from 32kHz up to 48kHz.

SMUX/2

When using higher frequencies (64kHz to 96kHz) SMUX/2 is used. This means that a single channel of audio is split across two consecutive channels of the digital stream when transmitted via ADAT or MADI (signal multiplexing). Consequently, the number of ADAT or MADI channels is halved. For example, when using a sample rate of 96kHz there will be 32 channels available via MADI as opposed to the usual 64 channels at 48kHz and below. Likewise, at 96kHz each ADAT cable will carry 4 channels as opposed to 8 at 48kHz and below.

SMUX/1 and SMUX/2 offer redundant MADI. This means, that when the MADI signal is lost, the A32 automatically switches to the other MADI input.

SMUX/4

The SMUX/4 operation (128kHz-192kHz) divides the information of each channel across four channels. This reduces the bandwidth of the digital channels by a factor of 4. ADAT is not supported at that speed and is switched off. The MADI cable only offers 16 channels at SMUX/4. In order to still be capable of transferring all 32 analog channels a special SMUX/4 mode will be activated. This mode uses both MADI coax and optical connections simultaneously to transfer all 32 channels:

- optical MADI: transmits and receives analog channels 1-16
- coax MADI: transmits and receives analog channels 17-32

Operation

🔵 main menu – MIX

Inside the MIX menu you can select one of seven mix presets. The A32 allows you to create a custom mix of all analog and digital I/O's which can then be sent to the stereo headphones output on the front panel.

You can choose between these mix presets within the headphones screen by selecting MIX 1 to 7 as the source.

In the MIX screen, after selecting the number of the MIX preset, press MENU to edit:
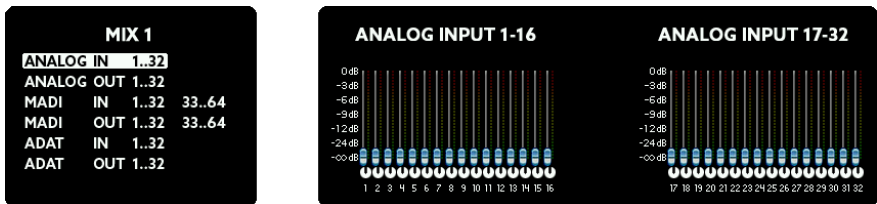
First, select one of the eight groups. The actual mix of channels from within this group will now be visible on the right screens. Press the MENU button to edit the mix in three steps:

- Select the channels: Scroll to select either a single channel or group of multiple channels (2, 4, or 8). Continue by pressing MENU.
- Now you can adjust the level. When it is set as desired, press MENU again.
- Finally set the pan. If you selected two or more channels, the even numbered pan knobs move in the opposite direction to the rotation of the SELECT wheel.

These steps you can repeat as desired. When finished, hold down the MENU button for a few seconds. All changes will be stored and won't get lost even when switching the unit off and on.

6

🔲 main menu – DIGITAL

The DIGITAL menu shows all analog and digital inputs and outputs. All digital inputs and outputs are shown as dots with a traffic light color code.

In this way, you have an overview of all channels at a glance.
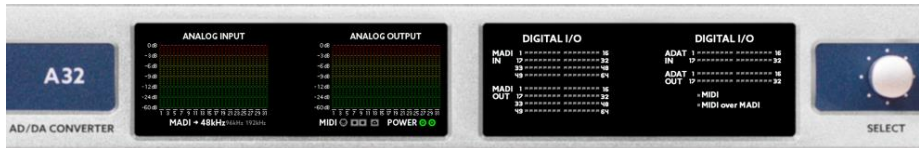
The traffic light LED colors have the following meaning:

Color	Range
red	-3dBFS to 0dBFS
yellow	-15dBFS to -4dBFS
green	-59dBFS to -16dBFS
grey	-inf to -60dBFS

Hold down the MENU button for a few seconds to get back to the previous screen.

Operation

⚙️ 🎚️ main menu – SETUP -> GAINS

The analog inputs of the A32 can be set to different sensitivities. You can choose between three reference levels: +4dBu, +13dBu and +20dBu. Using the DSP, you can additionally set the reference levels from -8dBu to +20dBu in 1 dB steps. The DSP always calculates the optimum configuration. For example, if you set +12dBu, the analog reference will be set to +13dBu and the signal will be amplified by 1dB, because it is only 12dBu.
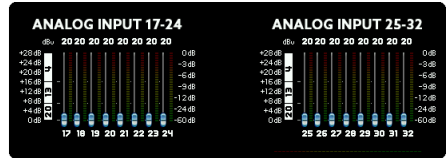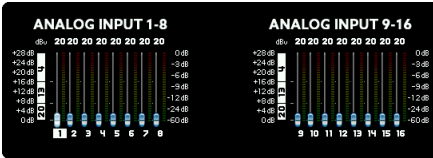
The number on top of the fader shows the maximum dBu level, which the input is able to handle. When the fader is set to 20, as in the picture above, the input can handle a maximum input level of +20dBu. Avoid exceeding this maximum level to prevent digital clipping.

In addition, you can see the levels of the analog inputs and so easily set the correct gain. The dB scale of these levels is found on the right hand side of the screens.

The minimum value -8dBu corresponds (approximately) to the reference level of -10dBV used by consumer devices, like CD-players for example.

⚙️ 📊 main menu – SETUP -> LEVELS

The LEVELS screen is similar to the GAINS screen described on the previous page and is responsible for the levels of the analog outputs. As with the inputs, you can set the level of each channel in 1dB steps from -8dBu to +20dBu. The A32 offers individual analog level switching of +4dBu, +13dBu and +20dBu. This means that this level is reached when the digital output reaches 0dBFS.
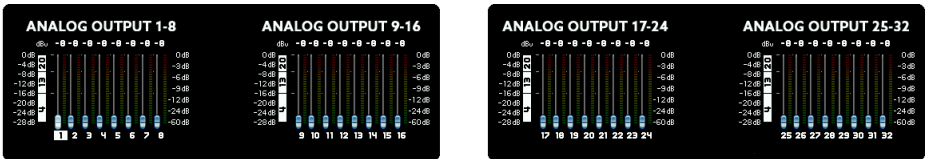
If you select one of the three reference levels exactly, the digital signal will be converted 1:1 to analog. However, if you select a value in between these reference levels, the DSP will calculate the optimal combination between analog and digital levelling. For example, if you select +12dBu the analog output will be switched to +13dBu and the digital signal will be attenuated by 1dB to reach the +12dBu output level.
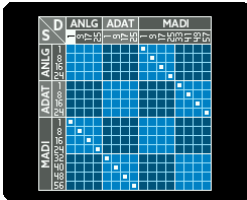
Just like the inputs you can also meter the levels of the channels here. Please note, the level of the outputs will **not** change when adjusting the amplification here, because you see the digital level before digital and analog amplification.

Operation

⚙️🌐 main menu – SETUP -> ROUTING

The A32 features a sophisticated routing matrix. In the ROUTING screen you can see a graphical representation on the left side and a list view on the right screen.

To change the routing, do the following:

- Choose the output: Turn the SELECT rotary to highlight a block of 8 outputs. It corresponds to a column on the graphical view and a line on the list view.
- Choose the input: Press MENU. You will now be able to connect an input to the chosen output by turning the SELECT rotary. The inputs are shown as rows in the graphical view or as text on the left hand side of the list view line.
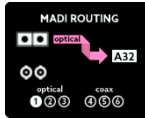
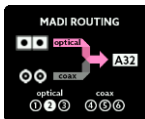Hold down the MENU button for a few seconds to leave the routing screen.

⚙️ 📟 main menu – SETUP -> MADI

The A32 has two MADI formats (one optical and one coaxial) which can be used in a very flexible way:
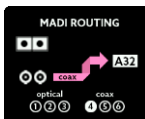
1 - optical

The A32 only uses the optical MADI input. No automatic switching between the formats will happen.

2 - optical

The A32 uses the optical MADI input. When the signal is lost, the A32 switches to coax MADI. It will only switch back to optical if the coax signal is subsequently removed.

3 - optical
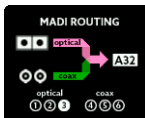
Same function as 2. In addition, both inputs are scanned constantly and if no signal is present on one a warning will be shown on the main screen.

4 – coax

The A32 only uses the coax MADI input. No automatic switching between the formats will happen.
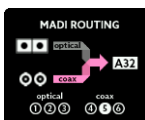
5 – coax

The A32 uses the coax MADI input. When the signal is lost, the A32 switches to optical MADI. It will only switch back to coax if the optical signal is subsequently removed.
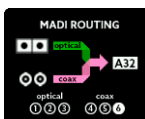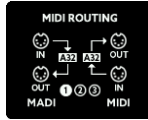
6 – coax

Same function as 5. In addition, both inputs are scanned constantly and if no signal is present on one a warning will be shown on the main screen.

⚙️😊 main menu – SETUP -> MIDI

The MIDI routing screen is intended to allow you to choose the way MIDI data is routed between MIDI and MIDI over MADI:

1 - separate

MIDI-over-MADI and MIDI are separated. Control messages for the A32 are scanned from both input ports and replies are sent back to the corresponding output port.

2 – MADI priority
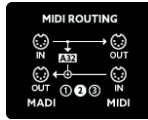
MIDI-over-MADI and MIDI are connected: Data from the MIDI-over-MADI port is sent to MIDI, and MIDI input is sent back to MIDI-over-MADI.

The A32 receives and sends control messages from/to the MIDI-over-MADI port.

This way you can convert between MIDI-over-MADI and MIDI while the A32 listens to the MIDI-over-MADI port.

3 – MIDI priority
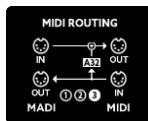
MIDI-over-MADI and MIDI are connected: Data from the MIDI-over-MADI port is sent to MIDI, and MIDI input is sent back to MIDI-over-MADI.

The A32 receives and sends control messages from/to the MIDI port.

This way you can convert between MIDI-over-MADI and MIDI while the A32 listens to the MIDI port.

⚙️🔧 main menu – SETUP -> SETTINGS

In the SETTINGS screen you can switch some global features:

BNC Termination

The wordclock of the A32 is terminated internally with a 75-ohm resistor by default. When daisy chaining wordclock of several units, you should leave this option set to ON. If you're using T-connectors for the connections set this option to OFF, because in this case only the last unit in the chain should be terminated.

MADI 96k Frame

There are two MADI transfer standards for the SMUX/2 mode (64kHz – 96kHz):

- 48k Frame: Identical to SMUX/1. The signal of 1 channel is split (multiplexed) across a pair of 2 channels in order to double the bandwidth. The usual 64 MADI channels are therefore reduced to 32 channels.
- 96k Frame: The MADI stream is natively reduced to 32 channels by increasing the frame size and allowing channels to be transmitted directly.

Both formats transfer the same number of channels (32). The advantage of the 96k frame mode is that the receiver can distinguish between SMUX/1 and SMUX/2 mode automatically and can switch appropriately. Please ensure both units have the same setting.

MADI short frame

Using the full bandwidth of MADI you can transfer 64 (SMUX/2: 32, SMUX/4: 16) channels. By setting MADI short frame, the A32 will only transfer 56 (SMUX/2: 28, SMUX/4: 14) channels. This setting corresponds to an early MADI specification, which is capable of using the remaining bandwidth for varispeed. Nowadays varispeed is not commonly used in favor of having the full 64 channels.

Redundant Power

When using two power supplies for redundancy reasons, please set this menu option to ON. If switched on, the A32 monitors both PSU inputs. In case of a failure of one power supply, the A32 will display a warning message on the main screen.

ADAT 4 as S/PDIF

The fourth ADAT I/O port can be configured as a stereo S/PDIF port. If the sample rate of the connected device differs from the sample rate of the A32, the external sample rate will be converted to that of the A32 using a sample rate converter (SRC). The stereo S/PDIF input will be distributed on the ADAT 4 channels, the stereo output is sourced by the first two ADAT 4 channels.

Keyclick

This setting switches the key click sound on or off.

Delay compensation

If you daisy-chain two A32 using MADI, MADI data for the second A32 needs to pass through the first A32 first. This introduces a small delay by design.

To compensate this delay, you should indicate the position of the A32 in the chain using this option:

- Single: only 1 unit attached to MADI
- 1 of 2:   first of two attached units
- 2 of 2:   second of two attached units.

🔧🔒 main menu – SETUP -> LOCK

To prevent accidental or forbidden operation of the A32, you can lock the front panel. The headphone screen is still accessible, but all other functions are locked. To lock the A32 front panel, enter the PIN number printed on the bottom of the unit:
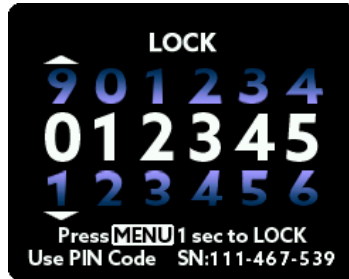
After entering the correct number, hold down the MENU button for a few seconds to activate the lock.

To unlock the A32, repeat the procedure: Enter the correct number and hold down the MENU button for a few seconds.

The PIN number of each A32 is fixed and can't be changed by the user.

IMPORTANT: Keep the PIN code in a safe place!

Reconstruction of a PIN code by the manufacturer is subject to a fee.

⊙ main menu – DSP

The Sharc DSP built into the A32 is used for routing, mixing and gain/level settings.

But the DSP can do much more audio processing:

Using the USB connection, you can install Ferrofish-DSP plugins, which are able to process audio effects with high accuracy and without latency.

You can find more information on our website: www.ferrofish.com

Remark: You can't use plugins from other manufacturers, esp. VST and Scope plugins.

Operation

⬤ main menu – PRESET

The A32's GAINS, LEVELS and the routing can be permanently stored in one of six preset slots. This lets you pre configure the A32 and saves you time later by just recalling the presets.

The PRESET Menu lets you choose which preset to load:

After selecting the number of the preset to load, you can choose which parts of the preset you want to load: Gains of the analog inputs and/or levels of the analog outputs and/or routing.

To store a preset, please use the store option ⬤ :

Here you can store the settings using one of the six preset slots.

ⓘ main menu – HELP

The HELP screen shows you the schematic structure of the A32, you can look up the firmware version and you can set the language of the help system.

The A32 provides a help system, which explains all key sections of the unit, to guide you through using the A32 without even consulting the manual.

A32 inputs and outputs – analog: D-Sub25

All analog inputs and outputs are fully balanced and can send or receive levels of +4dBu, +13dBu or +20dBu. Each channel can be set independently. You can also set levels between these three reference levels, which will be achieved digitall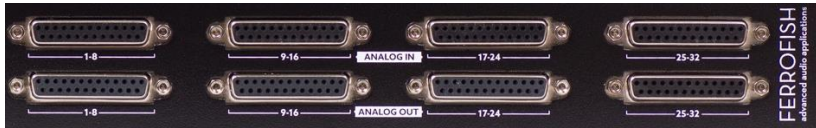y using the DSP. If setting the input and output levels exactly to one of the three reference levels, there is no digital gain calculation by the DSP.

Please note that unlike analog systems, digital systems do not have any soft clipping zone. When converting analog signals, leave sufficient headroom to avoid digital distortion.

D-Sub25 connectors are used for the analog inputs and outputs. The pin configuration corresponds to the TASCAM® standard.

When connecting an unbalanced device to the A32's input, please connect the inverting (cold) input channel to ground.

When connecting an unbalanced device to the A32's output, please leave the inverting (cold) output channel open (not connected).

A32 inputs and outputs – MADI

MADI is a professional audio format, which can transfer 64 channels over a distance of up to 2 kilometers.

When connecting several MADI devices in series you need to put them in a daisy chain. This means that you connect the output of the first device to the input of the second device and so on. This way you can connect two units to transfer 64 analog inputs and 64 outputs.

The A32 has an optical and a coaxial MADI port. Both ports can be used simultaneously for redundancy purposes. When using the SMUX/4 mode, each port transfers only 16 channels, so both ports will be used to transfer all 32 analog channels.

Use either optical fiber cables (SC connectors) or coaxial cable with an impedance of 75 ohms (BNC connectors) for MADI.

Both kinds of cabling have their own advantages and disadvantages.

Due to optical transmission, fiber cables cannot be influenced by electromagnetic crosstalk and can be used for distances up to 2 km.

Ferrofish also offers a **single mode MADI** version of the A32 on request, which lets you transfer audio signals up to 10km. Please contact us for more information.

Keep in mind that an optical fiber may break if bent too much.

Coaxial cables with an impedance of 75 ohms are widely used and easy to source. Unless using armored optical fiber they are more robust, but are limited to a length of 100 meters.

When using sample rates higher than 48kHz, channels have to be bundled to transport that higher data rate. As a result, the maximum amount of usable channels is reduced according to the following chart:

frequency	MADI channels
32kHz, 44.1kHz, 48kHz (SMUX/1)	64 (56) channels
64kHz, 88.2kHz, 96kHz (SMUX/2)	32 (28) channels
128kHz, 176.4kHz, 192kHz (SMUX/4)	16 (14) channels
128kHz, 176.4kHz, 192kHz (SMUX/4)	A32: 32 channels

The original MADI standard utilized a maximum channel count of 56 channels instead of 64 channels (numbers in brackets). This lower channel count allows the sample rate to vary by +/- 10%. Nowadays the variable sample rate is not commonly used anymore, in favor of having more usable channels.

In SMUX/4 Mode both MADI connections (optical and coax) will be used together to overcome the channel limitation of the MADI standard and transfer all 32 analog inputs and outputs at up to 192kHz. In this case the first 16 channels are transferred using the optical port and the remaining 16 channels via the coax port.

The A32 detects automatically if 64 or 56 channels are received. The number of channels it outputs can be set by using the **MADI short frame** switch.

A32 inputs and outputs – ADAT

ADAT is a very common digital multichannel interface standard invented by Alesis. It is capable of transferring eight channels of audio at up to 48kHz over an optical plastic fiber cable. The maximum length of an ADAT connection is limited to 10 meters.

When using ADAT with sample rates higher than 48kHz, the channel count halves in SMUX/2 mode.

frequency	A32 ADAT channels
32kHz, 44.1kHz, 48kHz (SMUX/1)	8 channels x 4 I/O
64kHz, 88.2kHz, 96kHz (SMUX/2)	4 channels x 4 I/O

The A32 has four ADAT pairs, capable of transferring 32 channels in SMUX/1 mode. The ports with the white door are the ADAT outputs, the ports with the black door are the inputs.

The ADAT ports are switched off when using the SMUX/4 mode.

A32 inputs and outputs – BNC WORDCLOCK

Every digital audio system needs a wordclock 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, all other connected devices must slave to this clock.

The A32 can generate its own clock or it can synchronize to an external clock.

For external synchronization the A32 can use the wordclock embedded in the MADI or ADAT data stream. Alternatively, you can connect an external wordclock directly using the BNC IN port.

Use the CLOCK screen to define where the wordclock should be obtained from, or if the A32 should generate the wordclock itself.

Please note, that the BNC-IN wordclock must be terminated by 75-ohms (see SETTINGS), except when you're using T-connectors for all units.

The BNC OUT port always outputs the refreshed wordclock used by the A32.

A32 inputs and outputs – USB and MIDI

USB

The USB port can be used to remote control the A32. When connecting to the PC, the A32 will appear as a USB-MIDI device.

Also, USB will be used to flash new firmware to the A32. Please visit our website to check for a new firmware version.

MIDI

It's also possible to use the MIDI input and MIDI output ports for remote control.

An advantage of the MIDI connection is the galvanic isolation, because the MIDI input has an opto coupler. Also, it's easy to daisy chain multiple A32 using MIDI to remote control more than one unit at the same time.

Another feature is that MIDI data from the MIDI port can be embedded into the MADI stream and vice versa. Use the MIDI screen to configure the routing of the MIDI data.

Remote Software

Please note: The remote software is not available at the time of printing this manual. Please visit our website for more information.

The A32 can be controlled from a computer via this software. To do so, select one option to connect the PC with the A32:

USB Interface

Connect the A32 using a USB cable with your PC. A USB-MIDI driver will be installed automatically, then the connection will be established.

MIDI Interface

Use a MIDI Interface to connect the A32 with your PC.

MADI Interface (MIDI over MADI)

You can also use the MADI connection to transfer MIDI. In this case, MIDI will be embedded in the MADI data stream. To use this feature, you need to have a MADI card which is capable of embedding MIDI data. Please check the documentation of your MADI card to find out if it supports this feature or contact the card manufacturer.

After starting the program, first select the input and output MIDI port of the A32 and press *connect*. All scanned A32's will then be shown in a list.

Now simply select an A32 to work with and you're ready to remote control it.

Please visit our website to download the software and for more information: www.ferrofish.com

technical specifications

MADI I/O:	optical + coaxial interface 64 channels @32kHz, 44.1kHz, 48kHz 32 channels @64kHz, 88.2kHz, 96kHz 32 channels @128kHz, 176.4kHz, 192kHz* * both interfaces work independent to achieve full 32+32 channels MIDI over MADI implemented latency: 3 samples automatic switching between optical <-> coax MADI when signal lost
ADAT I/O:	4+4 x optical interfaces 32 channels @32kHz, 44.1kHz, 48kHz 16 channels @64kHz, 88.2kHz, 96kHz n/a @128kHz, 176.4kHz, 192kHz latency: 3 samples
S/PDIF:	ADAT 4 I/O can be reconfigured as S/PDIF input has sample rate converter included (performance of SRC: -128dB) output follows A32 sample frequency
Wordclock:	BNC: 1 x input, 1 x output 75 Ohm Termination switchable for input
MIDI I/O:	two DIN5 jacks, for remote conversion MIDI <-> MIDI over MADI possible
A/D Converter:	4 x CS5368 (Cirrus Logic) 4 x DSub25 / Tascam analog switches: +20dBu, +13dBu, +4dBu digital gain: +20dBu...-8dBu, 1dB steps latency: @48kHz: 12/fs, 0.25ms, @96kHz: 9/fs, 0.09ms, @192kHz: 5/fs, 0.03ms OpAmps: RC4580 + OPA1664 level indicator: TFT screen, 28 levels
D/A Converter:	4 x CS4365 (Cirrus Logic) 4 x DSub25 / Tascam analog switches: +20dBu, +13dBu, +4dBu digital gain: +20dBu...-8dBu, 1dB steps latency: @48kHz: 7.8/fs, 0.16ms, @96kHz: 5.4/fs, 0.06ms, @192kHz: 6.6/fs, 0.03ms OpAmps: RC4580 + OPA1664 level indicator: TFT screen, 28 levels
USB:	USB 2.0 (remote, update)

Headphone:	independent stereo channel
	select any mono or stereo source
	select one of 5 mixes of all inputs and outputs
	digital volume control
audio processor:	Sharc DSP ADSP-21489 / 400MHz
	Routing of all 128+128 channels
	Mixing to headphone output
	DSP plugins
PLL:	digitally controlled PLL / Jitter reduction system
	output jitter: 50ps ... 100ps typ.
internal Clock:	temperature compensated oscillator, with high accuracy
	initial accuracy: +/-1.5ppm
	over temperature range: +/-2.5ppm
	aging: +/-1ppm
power supply:	2 x input jacks with screw lock for redundant power
	voltage supervision, warning message on screen when PSU input fails
	1 x power supply included, 12V, 3A
dimensions:	1HU, depth: 27cm (10.6") (including connectors)
weight:	4.1kg (9lbs)

CE / FCC Compliance

This device complies with the limits of the European Council Directive on the approximation of the laws of the member states relating to electromagnetic compatibility (2014/30/EU).

This device complies with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules.

RoHS

This device has been soldered lead free and fulfills the requirements of the RoHS directive.

Information about Disposal

According to the Directive on Waste Electrical and Electronic Equipment for electrical and electronic devices (WEEE - RL2002/96/EG) this device has to be reused or recycled after its usage.

Warranty

Each A32 is tested and all functions are checked extensively. Only high quality components are used, which enables us to give two years full warranty. As confirmation of the purchase date please keep the sales receipt.

In case of a defect please consult your dealer. Defects, which are caused by improper installation or use are not subject to the warranty. In this case the repair is chargeable.

Compensation of any kind, i.e. of secondary damages is excluded. Any liability beyond the merchandise value of the A32 is excluded. General terms and conditions of Ferrofish GmbH apply.

Disclaimer

This documentation describes the actual state of development. Ferrofish does not grant any warranty, neither explicit nor implicit, for the correctness of this documentation. I.e. Ferrofish isn't liable for loss of data in association with this product or this documentation. In particular, Ferrofish is not liable for consequential damage, which results from using the product or documentation.

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This product and documentation are subject to the current terms and conditions of Ferrofish GmbH.

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