IXO

Operation Manual
&
Installation Guide

Manual Version 1.0
Module Version 1.0

xo
xo
modular

INTRODUCTION

IXO is a simple, functional utility module that can help you access the MIDI and I2C capabilities of other Eurorack modules, using 3.5mm TRS cables.

IXO is a cousin of our popular **MIDIXO** TRS MIDI breakout module.

Like **MIDIXO**, it can serve as a TRS MIDI breakout for lots of Expert Sleepers modules (like *disting mk4, disting EX, FH-2, ES-9*, and *General CV*) and some other modules as well (like the SDS *Accord Melisma* and SDS *Sequarallel*). Unlike its cousin, **IXO** also includes a separate port that gives you access to the I2C protocol on modules like *ER-301, disting EX*, and *Teletype*. It makes a great interface between those modules and controllers like the *16n faderbank* as well, giving you access to all those parameters through physical faders – using either MIDI or I2C or even both at the same time.

FUNCTIONS

This module has two main functions:

1. By using the included 4-pin ribbon cable, **IXO** can extend modules like *disting mk4, disting EX, FH-2, General CV, ES-9,* and some others – essentially adding MIDI input and MIDI output jacks to those modules. The polarity on the input and output MIDI jacks are each independently switchable to allow maximum compatibility with your other gear.
2. By using included 3-pin ribbon cable, **IXO** adds an I2C jack to modules that use that protocol, such as *disting EX, ER-301*, and *Teletype*.

You might connect all three of the ports to one module (eg: *disting EX)* to allow access to both MIDI and I2C simultaneously. Or you could decide to use one **IXO** with multiple modules. For example, by placing it between your *disting mk4* and your *disting EX,* you could use the **IXO** MIDI ports with the *disting mk4* and the I2C port with the *disting EX!*

MIDI TRS

For as long as we can remember, MIDI has travelled over 5-pin DIN cables. Recently, manufacturers of Eurorack-compatible gear have wanted to move to the slimmer, more familiar, 3.5 mm cabling that we all know and love. But without a standard to guide them, two kinds of MIDI over 3.5 mm TRS cables have appeared: MIDI TRS A and MIDI TRS B. If you've got gear from Make Noise, Akai, or Korg, it works one way. Novation and Arturia do it the other way. By using the polarity switches near the MIDI jacks on **IXO**, you can essentially ignore this A vs B issue: if your module doesn't seem to be sending or receiving MIDI, you can just flip the appropriate switch! (Having the switch in the wrong orientation will not cause any damage.)

I2C

I2C is a protocol that some modules use for communication – in addition to, or instead of, MIDI. There is an excellent description of I2C [on the lines forum](#), including a list of modules that use the protocol and information about how to configure them. As you read that page, keep in mind that **IXO** does not provide a powered bus – it is totally passive. A powered bus may be needed for more complicated I2C networks that include several modules communicating with each other. See the [Example Configurations](#)section for some I2C use cases.

INSTALLATION

For MIDI Breakout Capabilities

1. Connect the included 4-pin ribbon cable to the 4-pin header on **IXO**
2. Connect the other end to a compatible module – ie: one with an optically isolated 4-pin header for MIDI in/out. Whichever module you are using, check its manual to verify that you're connecting the cable to the correct 4-pin header, since there may be more than one. For Expert Sleepers modules, you will be likely be connecting the cable to a header labeled GT2, GT3, or GT4. Note which color is connected to pin 1 on **IXO** and make sure that same color is connected to pin 1 on your Expert Sleepers module. If you connect it backwards, the MIDI input and output jacks on **IXO** will be swapped – no damage will occur. If you have a module that requires a different pin arrangement than Expert Sleepers uses, get in touch with us so we can either help you modify the 4-pin cable accordingly or send you a cable to fit your needs. (The SDS *Accord Melisma* and SDS *Sequarallel* fall into this category.)

For I2C Breakout Capabilities

1. Connect the included 3-pin ribbon cable to the 3-pin header on **IXO**
2. Connect the other end to a compatible module – ie: one with a 3-pin header for SDA, SCL, and GND. While there isn't really a standard for the order of the pins on a module's 3-pin I2C header looks like, everyone generally uses the same order. You can verify that the pins match by looking at the SDA, SCL, and GND labels where the 3-pin cable connects on both **IXO** and your other module. Again, if you find that you need a different pin arrangement on the cable, please let us know.

OPERATION

MIDI Operation

Once **IXO** is installed as described above, the attached module will be able to send and receive MIDI using the top two jacks on **IXO**.

1. Check your module's manual to see what its capabilities are, with respect to sending and receiving MIDI.
2. To send MIDI to the attached module, plug a *stereo audio cable* from a device that sends MIDI to **IXO**'s input jack (the top one).
3. To get MIDI out of your attached module, plug a *stereo audio cable* from **IXO**'s output jack to the MIDI input of a device that can receive MIDI.

If MIDI messages don't seem to be making it through, flip the polarity switch near the appropriate jack on **IXO**.

Some Expert Sleepers modules have a helpful "MIDI Thru" option. See the Example Configurations section below for more information.

I2C Operation

Once **IXO** is installed as described in the previous section, the attached module will be able to send and receive I2C messages using the bottom jack on **IXO**.

1. Check your module's manual to see what its capabilities are, with respect to sending and receiving I2C messages.
2. To allow I2C messages to be sent and received, plug a *stereo audio cable* from **IXO**'s bottom jack to another I2C device.

I2C can be fussy. Here are some tips:

- Use cables that are not excessively long.
- If you have an I2C network with several devices on it, you may need a powered bus. **IXO** is designed to allow communication between the module it's attached to and another I2C device.
- Check the Frequently Asked Questions section below for more help getting I2C to work.
- Watch this 16n AtoVProject build video to see an example of **IXO** providing a path for I2C communication between a *16n faderbank* and a *disting EX.*

PANEL LAYOUT

MIDI In

MIDI In
A/B
Switch
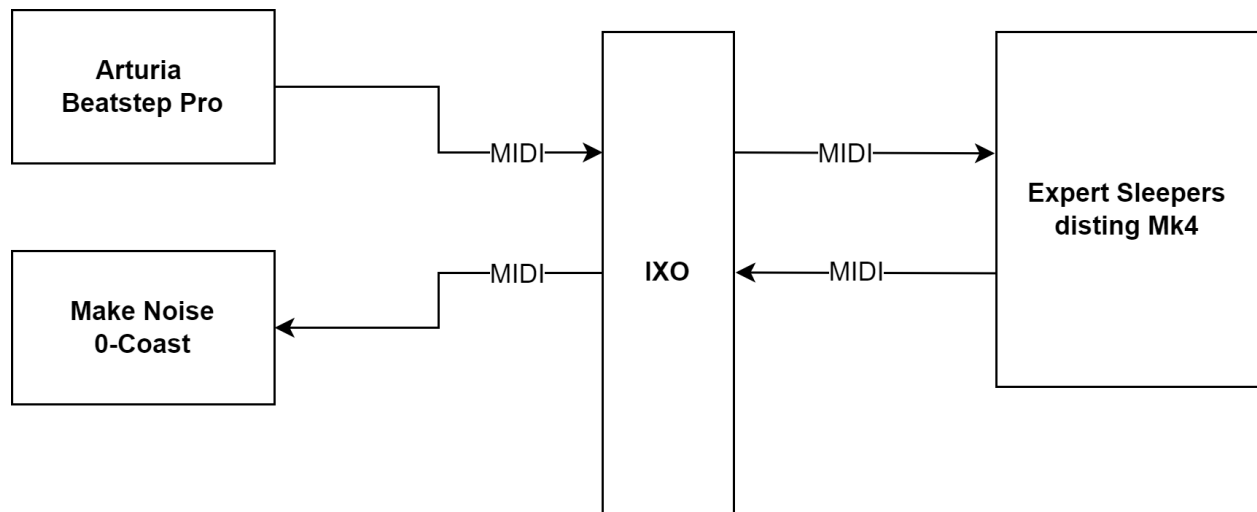
MIDI Out
A/B
Switch

MIDI Out

I2C
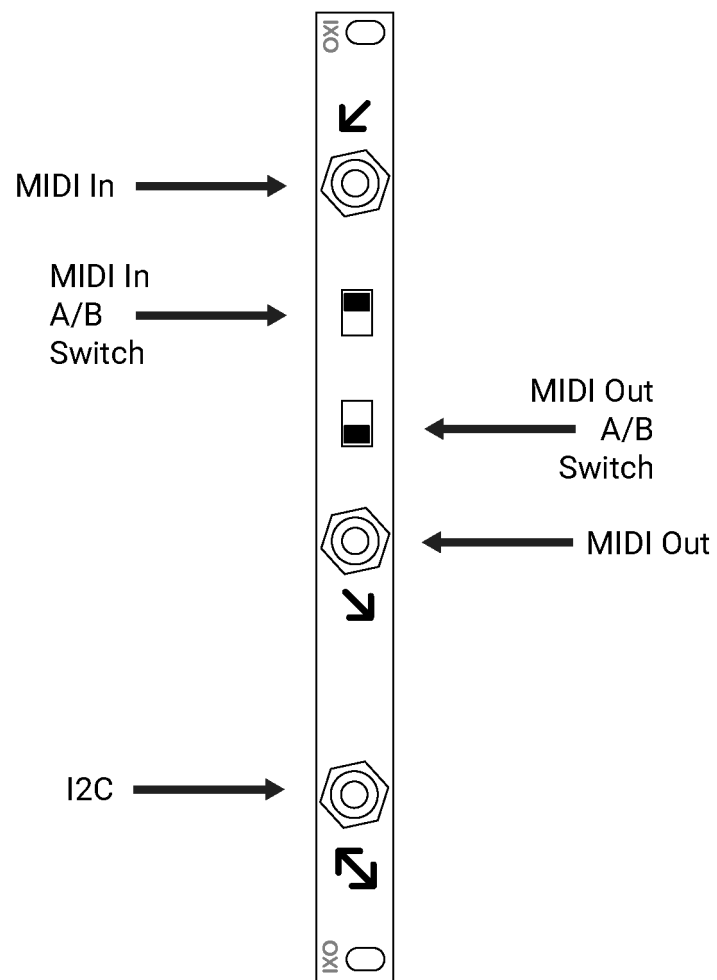
EXAMPLE CONFIGURATIONS

**Example 1: Expert Sleepers *disting Mk4* with MIDI thru**

This example uses the **IXO** MIDI jacks exclusively, to serve as a MIDI breakout for an Expert Sleepers *disting Mk4*. The TRS MIDI output from a *Beatstep Pro* MIDI controller is connected to the MIDI input jack on **IXO**, allowing it to send MIDI note and CC data to *disting*. MIDI data sent from *disting* (eg: from algorithm H-5 Dual Euclidean Patterns) will be sent to the connected *O-Coast*.

Note: If "MIDI Thru" is enabled in the *disting* settings, messages will be forwarded from the *Beatstep Pro* to the *0-Coast*, independent of what *disting* is doing at the time!

Example 2: *Accord Melisma*

Despite the fact that the *Accord Melisma* by SDS Digital has a TRS MIDI output jack on its front panel, **IXO** can serve as a separate set of MIDI input *and* output jacks for the module. This adds the ability to merge MIDI messages as well (see the *Accord Melisma* documentation for more information.) In the example below, a *16n faderbank* is sending MIDI CC's to the *Accord Melisma* through **IXO**. The *Accord Melisma* is sending MIDI data, through **IXO**, to an M-Audio MIDI interface and a computer running Ableton Live. Separately, the *Accord Melisma* is able to send MIDI notes to a MIDI synth via the MIDI output jack on its front panel.
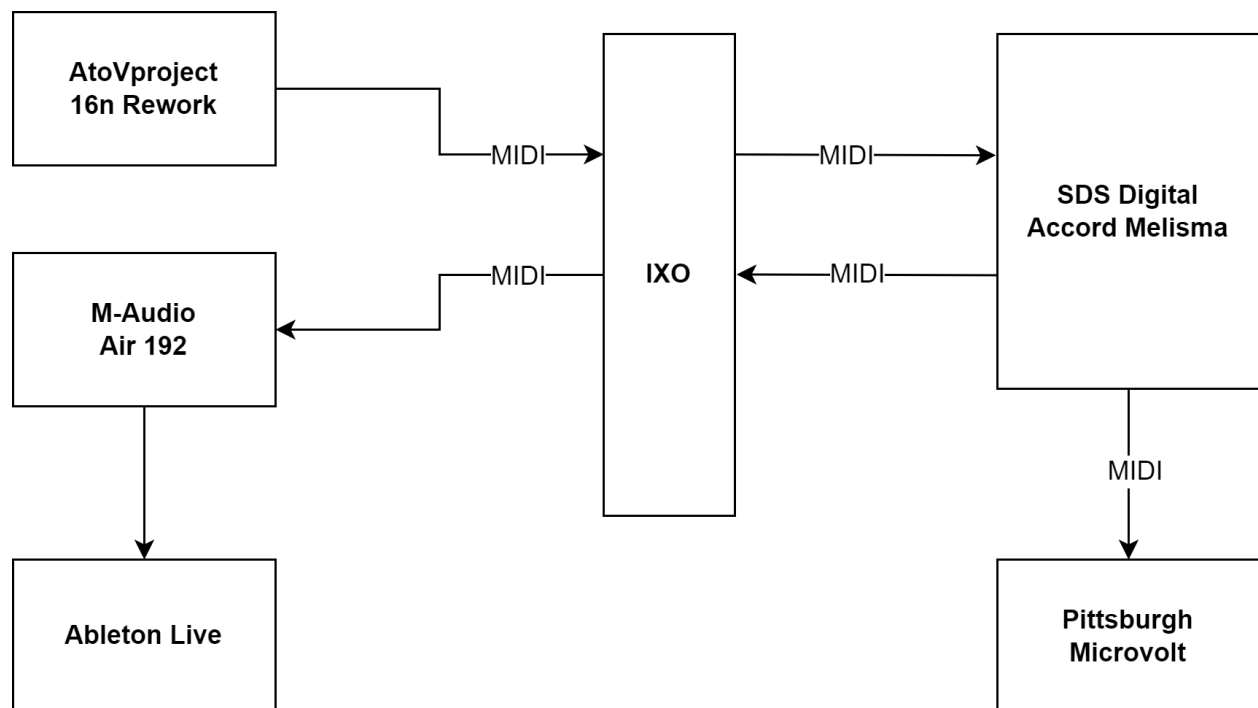
Example 3: _disting EX_ via MIDI & I2C

This example takes full advantage of _disting EX_'s MIDI and I2C capabilities. **IXO** provides TRS jacks for MIDI input, MIDI output, and I2C. All functions can be used at the same time. The ability to map controls from the _Keystep Pro_ and the _16n faderbank_ to parameters in _disting EX_, means that complex algorithms can be used and controlled with knobs, sliders, and switches instead of relying solely on disting's on-screen menus.

Again, if "MIDI Thru" is turned on in the _disting EX_ settings, MIDI data will be passed from the _Keystep Pro_ to the _Microvolt_, regardless of what _disting_ is up to.
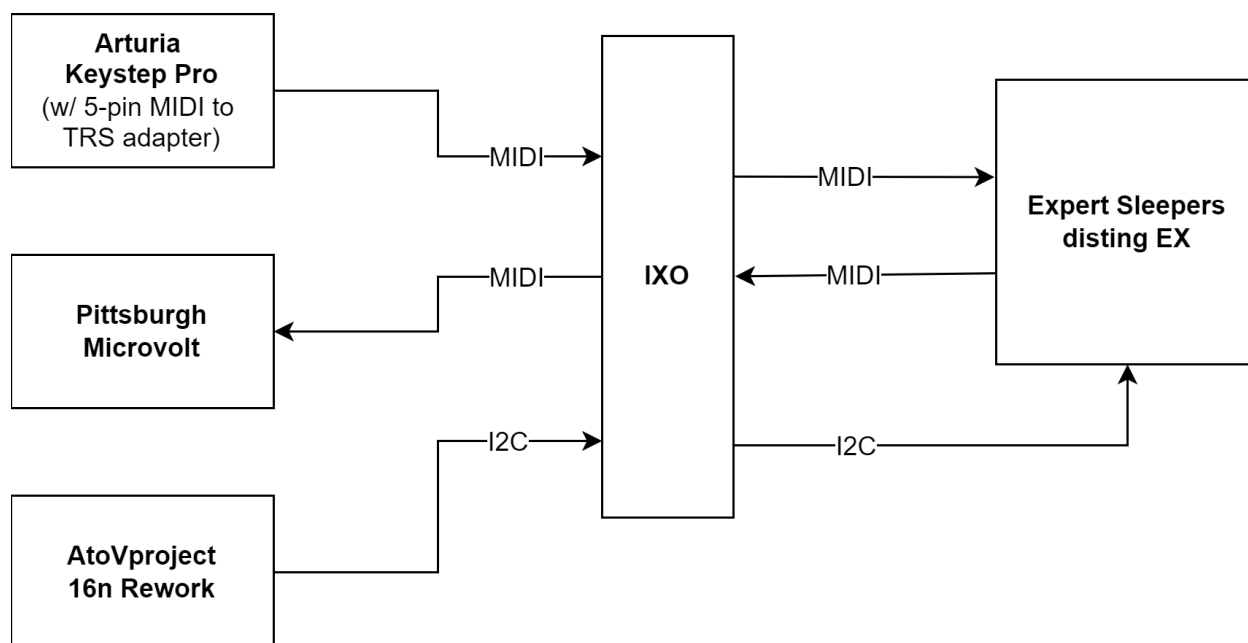
Example 4: IXO serving two separate modules

In this example, IXO has its MIDI jacks connected to *disting EX* and its I2C jack connected to a separate module entirely (eg: *teletype* or *ER-301*.)

In the diagram below, *disting EX* is being used to record multisamples from an analog synth, as described in Expert Sleepers' Autosampling via MIDI tutorial. Separately, scripts on the monome *teletype* are able to read the positions of the faders on the *16n faderbank* via I2C.
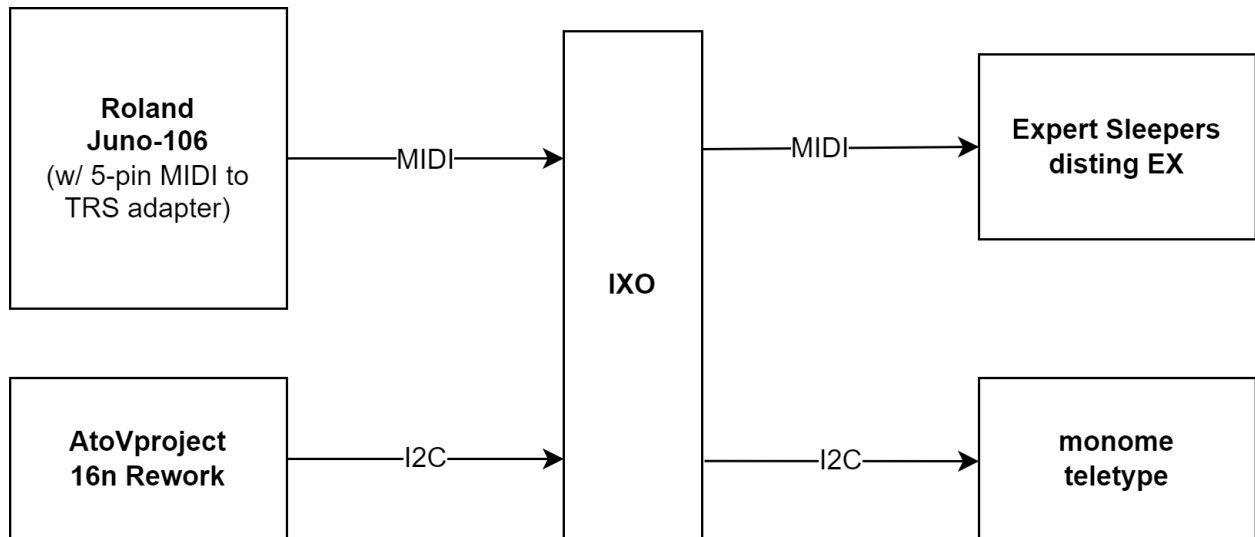
FREQUENTLY ASKED QUESTIONS

Q: The Internet says that there *is* a standard for the use of TRS connectors with MIDI

A: Yes, the MIDI Manufacturers Association approved a standard in 2018. Unfortunately, we all have gear that was made before the standard, which is why **MIDIXO** and **IXO** exist. It's worth noting that the specification says that 2.5 mm connectors are preferred over 3.5 mm. It also says that standard stereo audio cables should not be used because the wires are not in twisted pairs, and are individually shielded. In practice, people use regular audio cables (as we've suggested) without problems. Keeping the length of the cables as short as possible is not a bad idea.

Q: Is there a list of which manufacturers' devices use MIDI TRS A vs MIDI TRS B?

A: This crowd-sourced list of which manufacturers use which standards is pretty comprehensive: https://muffwiggler.com/forum/viewtopic.php?p=2620781

Q: No MIDI or I2C messages seem to be making it through. What should I check first?

A: Make sure you're using a *stereo* cable. Your regular mono patch cables won't work. Make sure the cable ends look like the one on the left, not the one on the right.

When trying to see if communication is working, see if there's a simple way to view the raw messages that the device is seeing. Expert Sleepers' *disting EX* has "Show MIDI History" and "Show I2C History" options in its Miscellaneous menu for just this purpose.

MIDI-specific issues:

Just because your module has the right header for MIDI doesn't mean that it does what you think it does with incoming MIDI. Check the manual for your module to make sure it's actually making use of MIDI messages in the way you're expecting.

If MIDI is still not working, try connecting a different device. If you find that the problem is related to a particular piece of gear, it may be that it's configured wrong, that it uses strange voltages on its MIDI ports, or that it's the rare, rumored unicorn that corresponds to neither MIDI TRS A nor TRS B.

I2C-specific issues:

Getting two I2C devices to communicate can be tricky. It may take a bit of trial and error to get it right. Check that you have configured a master and slave, according to the documentation for your I2C devices. Make sure each device has a unique address. Finally, verify that one of your devices is supplying the "pullup resistors" that the I2C bus requires.

Q: What's the difference between IXO and MIDIXO?

A: **MIDIXO** can be used as a MIDI breakout for other modules. It can also be configured, using its jumpers, to perform some useful MIDI TRS related functions without being attached to another module.

IXO functions *only* as a breakout. It doesn't do anything unless it's connected to another module. In addition to MIDI input and output jacks, it also has an I2C jack.

Both **IXO** and **MIDIXO** have polarity switches for the two MIDI jacks.

TECHNICAL SPECIFICATIONS

IXO is designed to be used in a Eurorack-compatible case. It is a passive module and does not require a Eurorack power supply or a connection to your bus board.

Width	2hp
Depth	17 mm
Current Draw	Zero

Included with **IXO** are: two M3 x 0.5 mm stainless steel pan-head screws, one 4-pin ribbon cable, and one 3-pin ribbon cable (each 4 in. length)

Solder, printed circuit board and all its attached electronic components are certified RoHS compliant. Packaging for everything we sell is made of 100% recycled and reclaimed materials. All of the design and assembly that we do uses 100% solar power.

SUPPORT & ACKNOWLEDGMENTS

Thanks to [Expert Sleepers](), [SDS Digital](), and [AtoVproject]() for making some great gear and providing some help along the way. Neither company, nor other companies that make compatible gear ([Orthogonal Devices](), [Whimsical Raps](), [monome](), etc.), provide technical support for **IXO**. Get in touch with us at http://xoxomodular.com or email info@xoxomodular.com with any questions or feedback.

LIMITED WARRANTY

From the date of manufacture this device is guaranteed for a period of 1 year against any manufacturing or material defects. Any such defects will be repaired or replaced at the discretion of XOXO Modular. This does not apply to damage caused by misuse or physical mistreatment.

No responsibility or liability is implied or accepted for harm to person or apparatus caused through operation of this product, or for any errors or inaccuracies that may appear in this document.

By using this product you agree to these terms.