Learning DigiShow

3

Signal Mapping

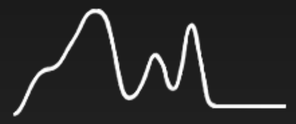
Robin Zhang and Labs 2025

Three Signal Types

Analog, Binary, Note

Three Signal Types

Various signals are transmitted between different devices and software. When they flow through DigiShow, they are all recognized as three basic types:



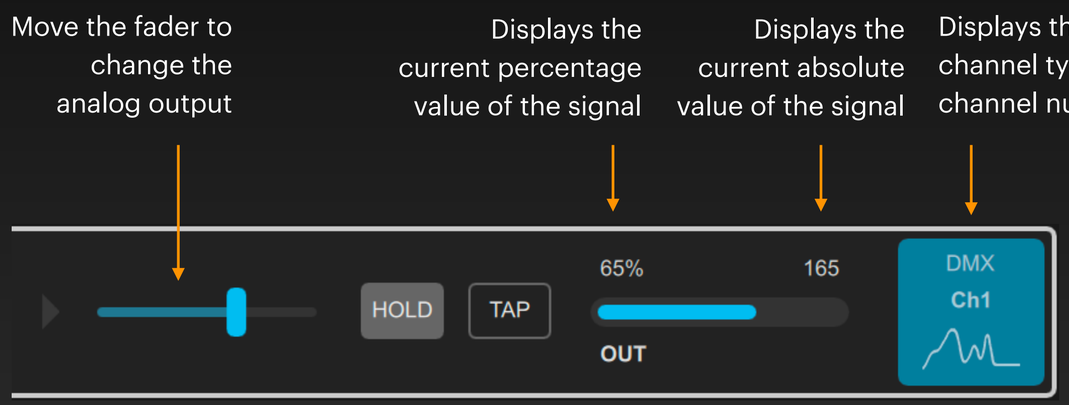
Analog signal, the signal quantity is a value that changes continuously between 0 and 100%

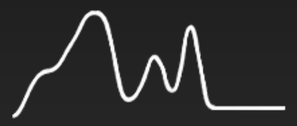
Binary signal, the signal quantity has only two states, ON or OFF

Note signal, the signal quantity also has two states, ON and OFF, but when Note is ON, it also has an intensity value between 0 and 100%

Analog Signal

- For example: the brightness of the light, the volume of the sound, the rotation angle of the servo, the value of the fader on the console





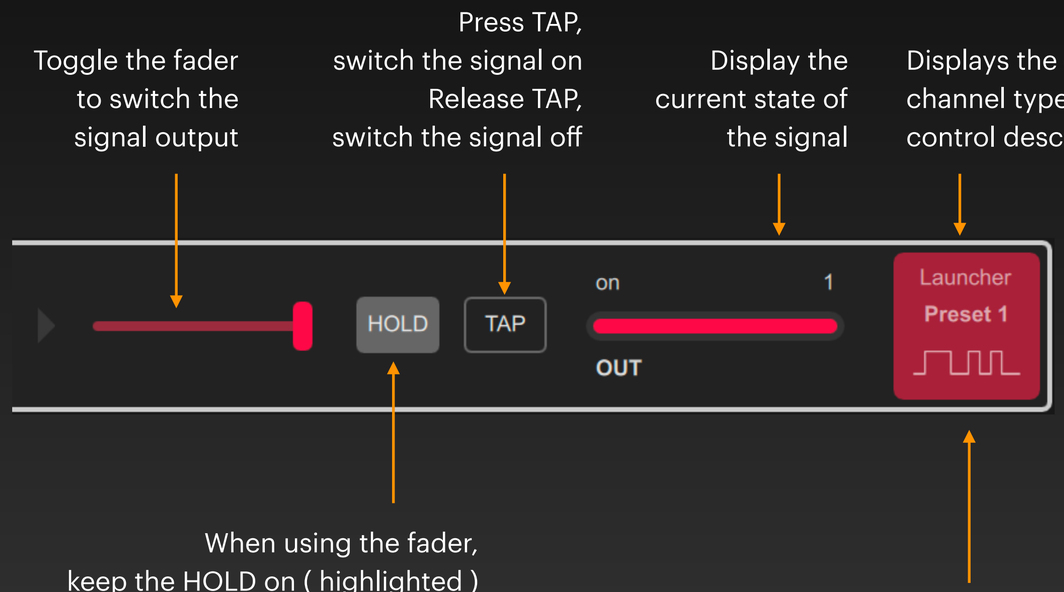
The analog signal can fluctuate over time, and the image on the oscilloscope is as shown on the left.

In the signal bar, analog signals are displayed in blue with this waveform icon

In the **DMX** dimming channel,
the absolute value range of the analog quantity is **0 ~ 255**
In the **MIDI** control channel,
the absolute value range of the analog quantity is **0 ~ 127**
In the **MODBUS** control channel,
the absolute value range of the analog quantity is **0 ~ 65535**
In different channels, the absolute value range of the analog quantity will be different, but they can all be expressed as a percentage value between 0 and 100%.

Binary Signal

- For example: the state of a button, the opening and closing of a relay, the trigger signal of a sensor

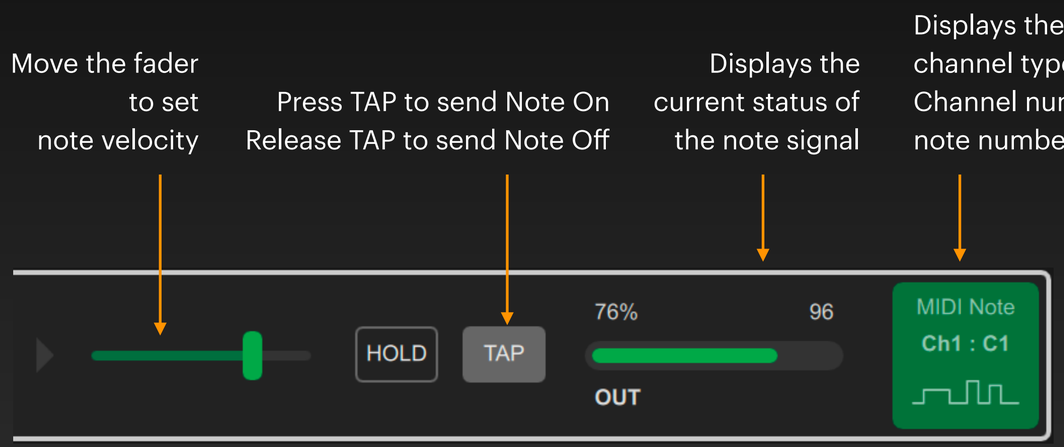


In this example, the binary value is used to control the launching of preset 1. When the binary value changes from off to on, the corresponding operation is triggered.

Binary signals are also commonly referred to as switching signals or digital signals. They can be switched between ON and OFF states. The image on the oscilloscope is as shown on the left.

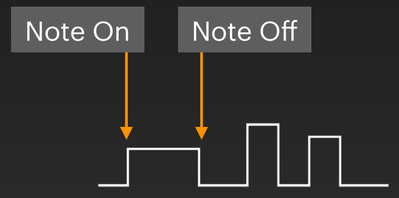
Note Signal

- Note is not just a music signal, it has many other uses (such as light expression, sensor signal packaging)



Note is a switch signal with intensity expression (known as note velocity).

When playing a musical instrument:
Note On refers to the moment when the key is pressed
Note Off refers to the moment when the key is released



The note signal can be switched between ON / OFF. When Note is ON, it will have an intensity value. The image on the oscilloscope is as shown on the left.

In this example the note signal is output to the MIDI bus on the computer.
A C1 note is sent to MIDI channel 1.

In the signal bar, the note signal will be displayed in green with this waveform icon

Signal Mapping

Signal Mapping Example

Signal mapping is to associate one or more pairs of input and output signals and automatically convert the input signal into the output signal at runtime. Let's make an example to map the Note signal input from the MIDI keyboard to the DMX dimming signal on the light:

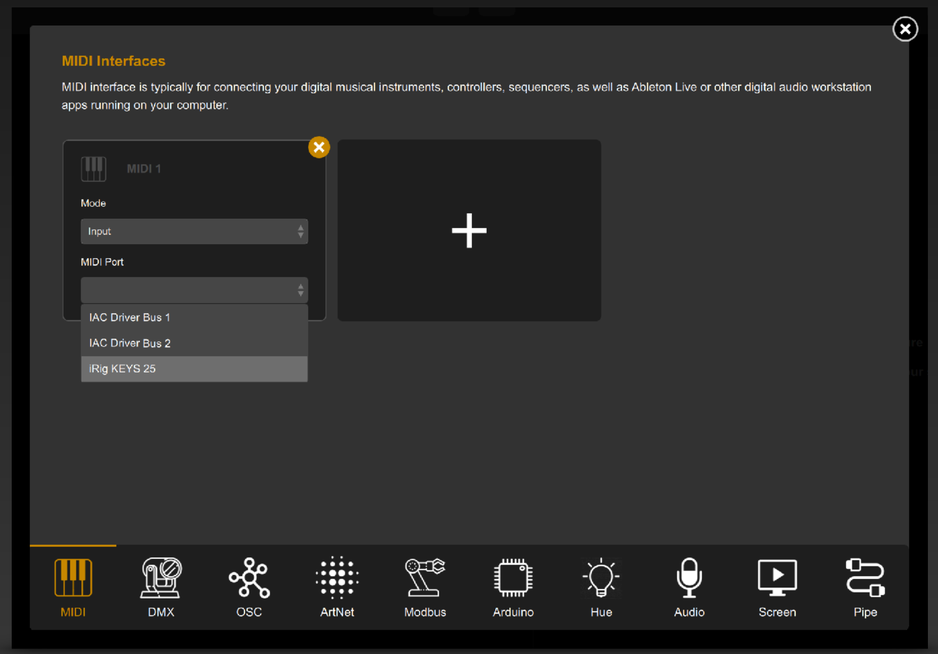
1. Connect a MIDI keyboard to a USB port on your computer, connect the ENTTEC DMX USB Pro adapter to another USB port on your computer, and connect the lighting fixture to the DMX OUT port of the ENTTEC adapter.

If you don't already have an ENTTEC DMX USB Pro, you can also use DigiShow to complete this example without actually connecting the adapter and DMX fixtures.

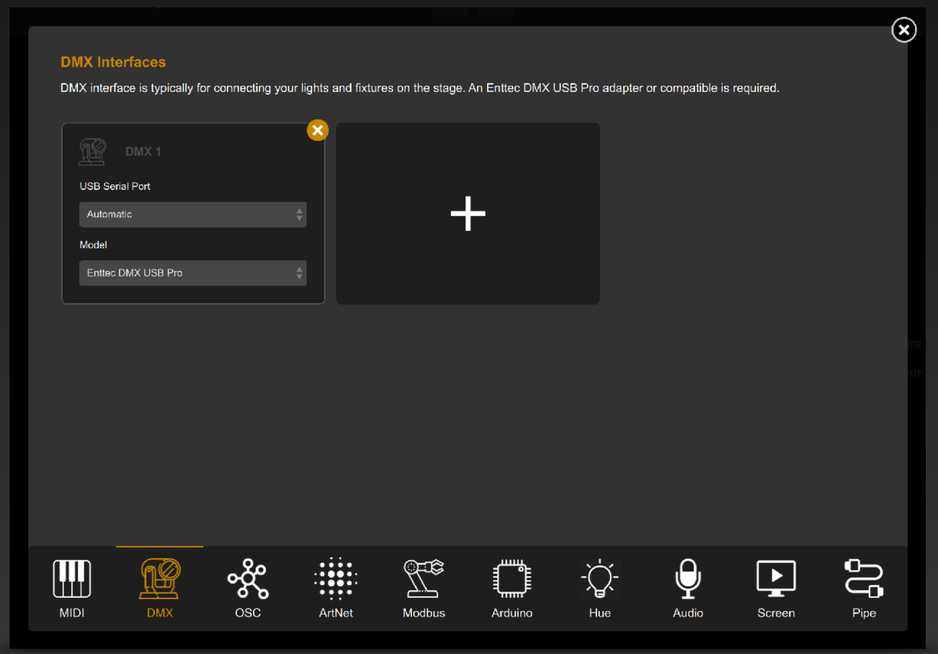
Signal Mapping Example

2 Launch the DigiShow LINK software and click the Interface Manager button in the upper right corner of the window.

3 In the Interface Manager dialog that appears, select the MIDI tab and click the + button to create a new interface labeled MIDI 1, where you select Input mode and your MIDI keyboard model.

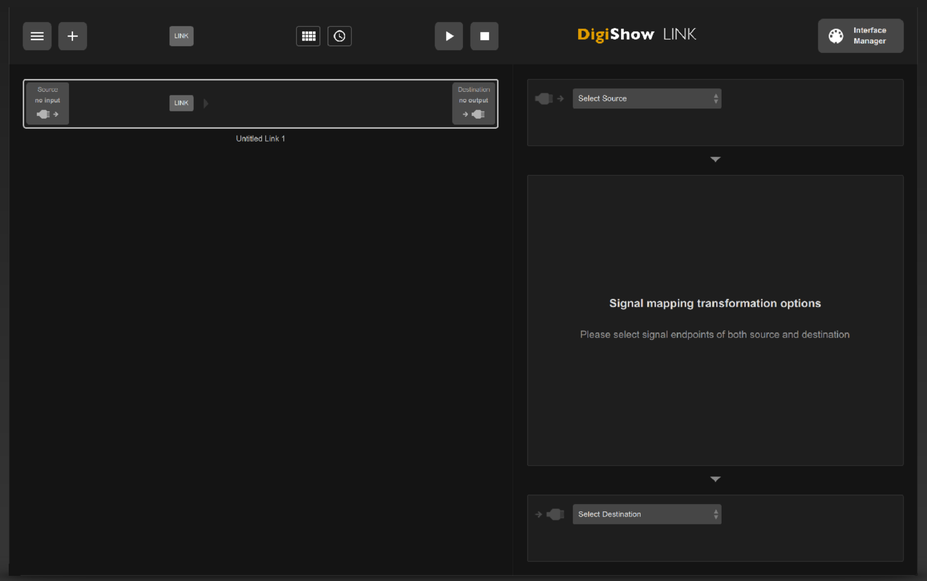


4 Select the DMX tab and click the + button to create a new interface labeled DMX 1.
Close the Interface Manager dialog when finished.

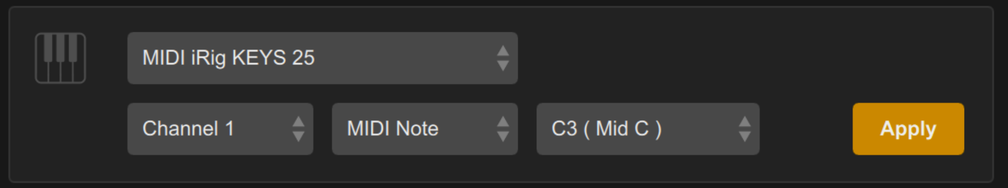


Signal Mapping Example

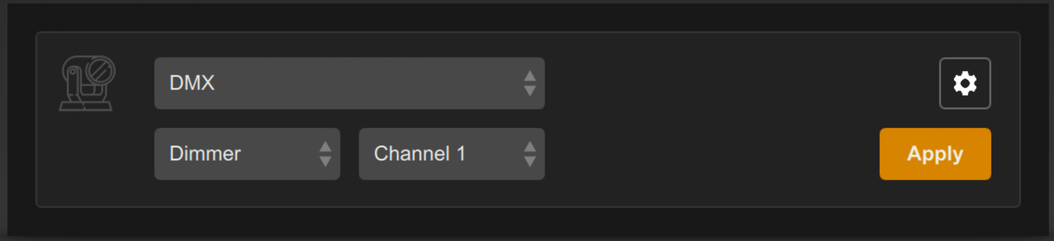
5 Now let's try to create a signal link to connect your MIDI keyboard input and DMX light output. Click the + button in the upper left corner of the window, and a blank signal bar will be added to the list on the left. To do this, you also need to select the source of the input signal and the destination of the output signal in the right area of the window, as well as the mapping conversion parameters between them.



6 Click the Select Source drop-down menu, select your MIDI keyboard, set the input parameters to “Channel 1” “MIDI Note” “C3”, and click the Apply button.



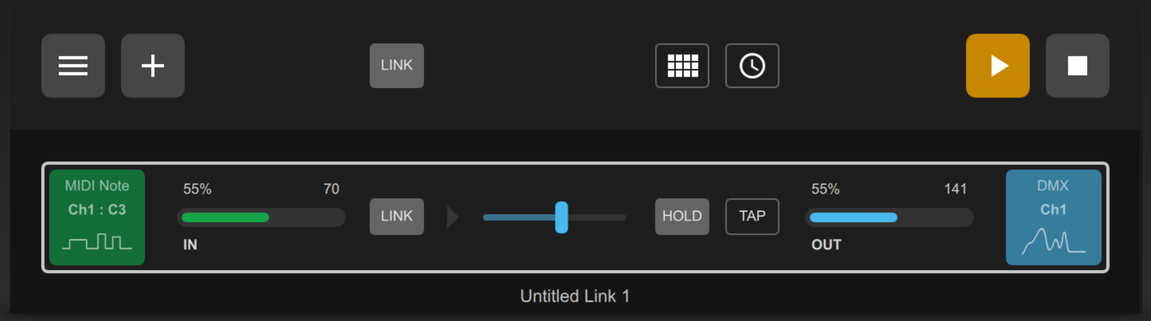
7 Click the Select Destination drop-down menu, select DMX, set the output parameters to “Dimmer” “Channel 1”, and click the Apply button.



Signal Mapping Example

8 After selected Input Source and Output Destination, the real-time status of the input and output signals will appear in the signal bar.

Click the ▶ Play button in the top bar of the window to start the device online and activate the signal mapping. At this time, when you press the C3 (middle C) key on the MIDI keyboard, the light changes of DMX channel 1 will be triggered synchronously.



In this way, more signal links can be added in DigiShow, and more mappings between input and output signals can be achieved.

9 By modifying the settings in Input-output Mapping and Output Envelop, you can change the effect of the mapping transformation in real time. For example, setting Attack to 300 milliseconds and Release to 700 milliseconds will make the lighting changes appear to fade in and out.

Signal Mapping Parameters

Signal Mapping Parameters

Signal mapping is to link one input signal to another output signal. Depending on the type of these two signals, users are usually allowed to set some specific signal mapping and conversion parameters.

Binary to Analog

Binary to Note

Binary to Binary

Analog to Binary

Analog to Note

Analog to Analog

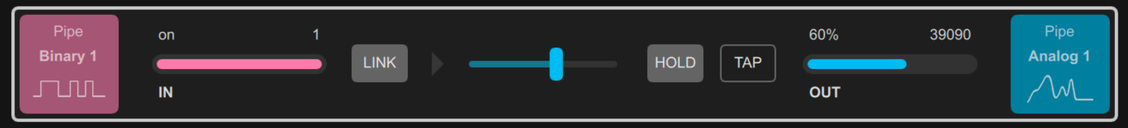
Note to Binary

Note to Analog

Note to Note

This section will list all the parameters for mapping between various signals. Please read according to your needs.

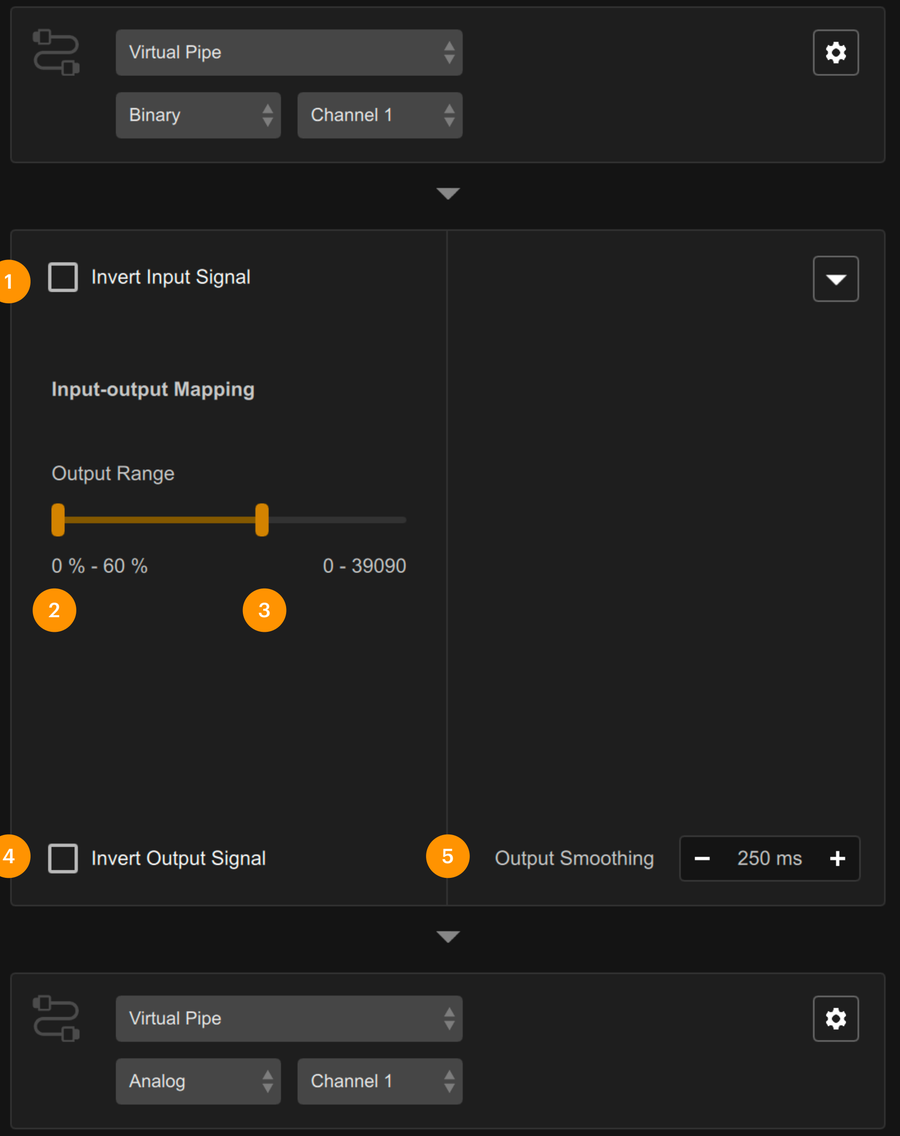
Binary to Analog



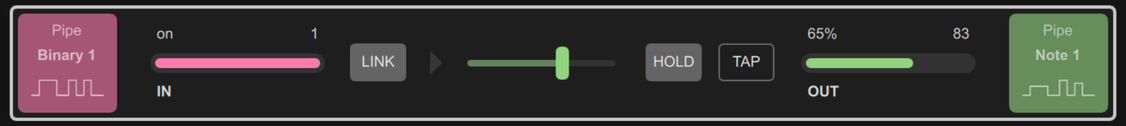
Binary to Analog

When linking a binary input signal to an analog output signal, the signal mapping and conversion parameters that can be set by the user include:

1. Invert Input Signal option: used to invert the value of the input signal, such as when the binary state is ON, it will be inverted to OFF.
2. Output Range lower limit setting: when the input binary state is OFF, the analog value is output according to the specified lower limit value.
3. Output Range upper limit setting: when the input binary state is ON, the analog value is output according to the specified upper limit value.
4. Invert Output Signal option: used to invert the value of the output signal, such as when the analog value is 20%, it will be inverted to 80%. After checking this option, the fader for manually controlling the signal output in the signal bar will also flip left and right.
5. Output Smoothing setting: used to make the output analog signal smoother to achieve the effect of fading in / fading out. This parameter is a millisecond value, which sets the time required for the output signal to reach the target output value.



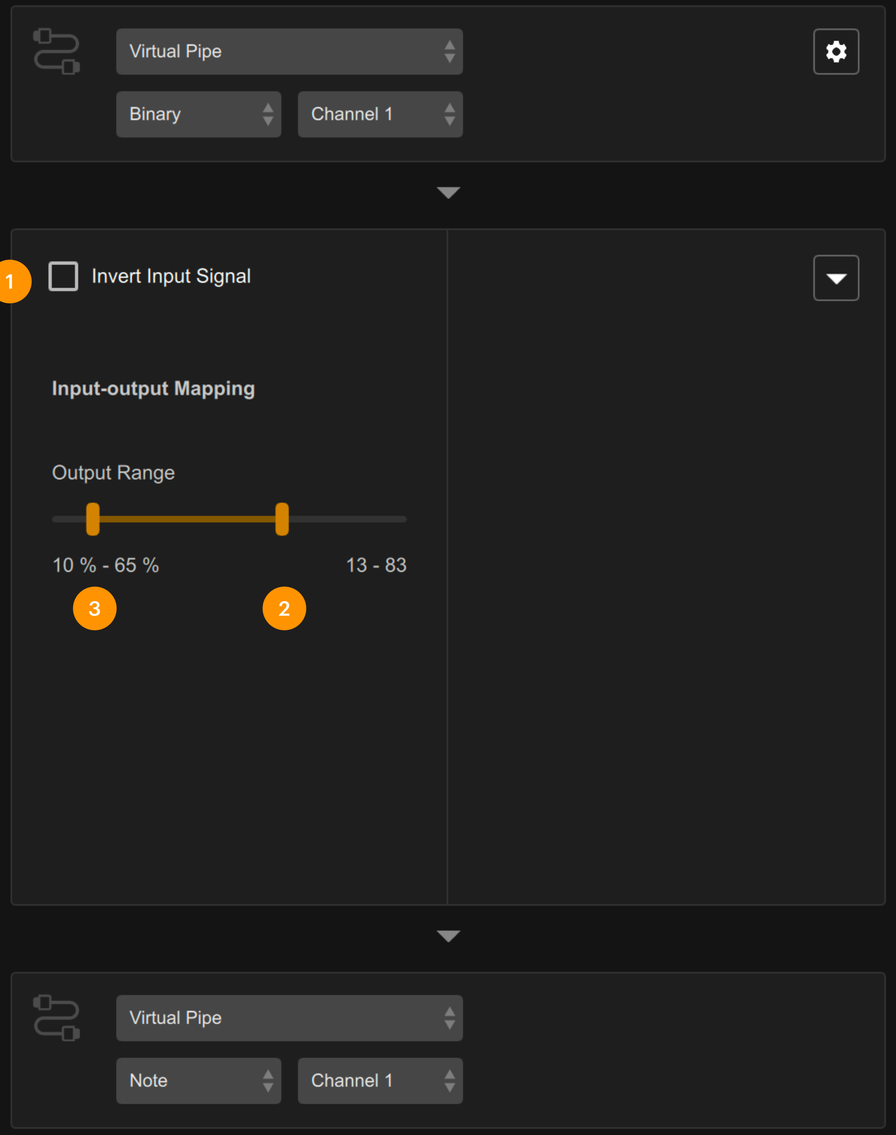
Binary to Note



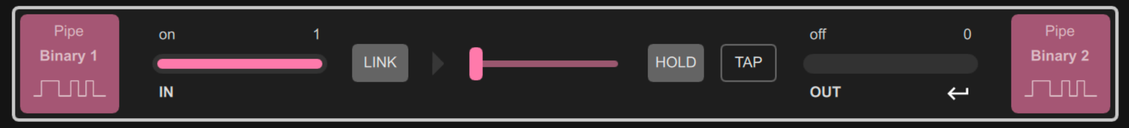
Binary to Note

When linking a binary input signal to a note output signal, the signal mapping and conversion parameters that can be set by the user include:

1. Invert Input Signal option: used to invert the value of the input signal, for example, when the binary state is ON, it will be inverted to OFF.
2. Output Range upper limit setting: when switch the input binary state to ON, the output Note On is triggered, and the specified upper limit value is used as the note velocity.
3. Output Range lower limit setting: when switch the input binary state to OFF, the output Note Off is triggered, and the specified lower limit value is used as the note velocity.



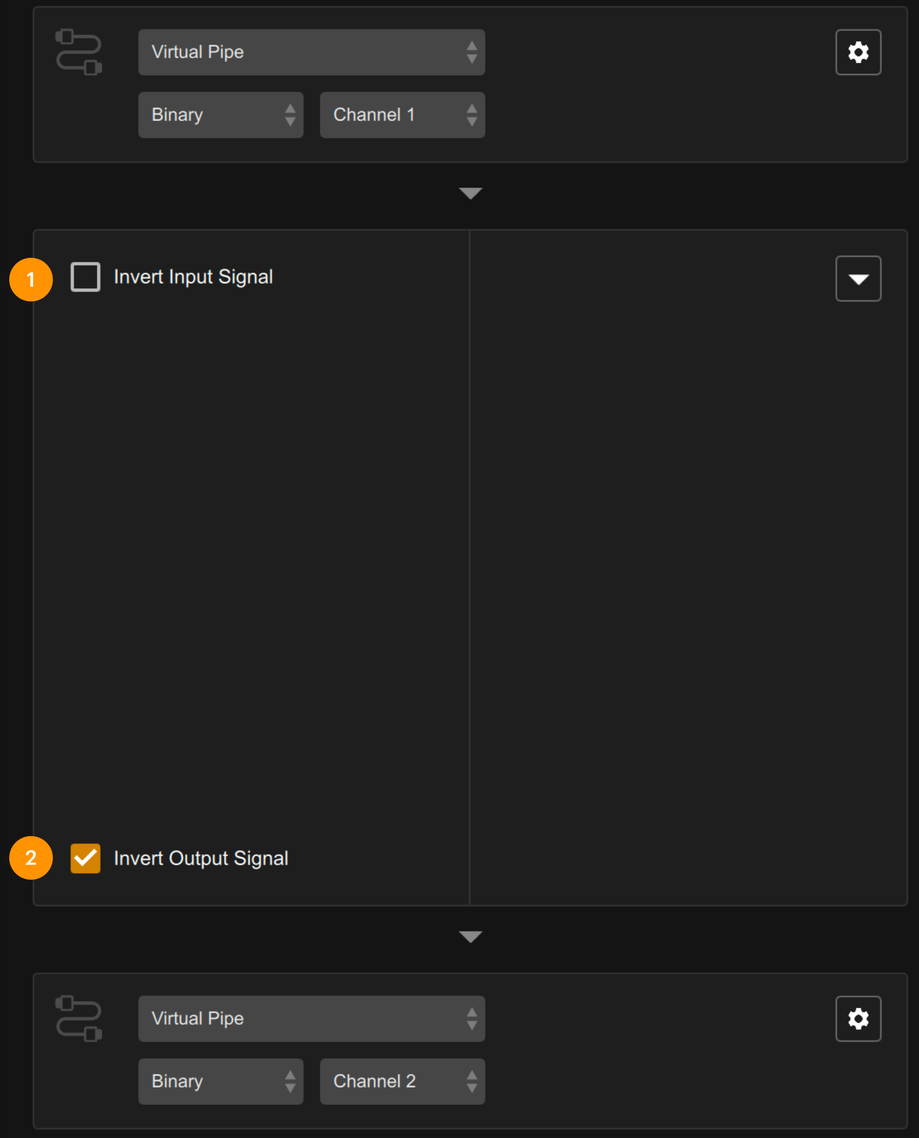
Binary to Binary



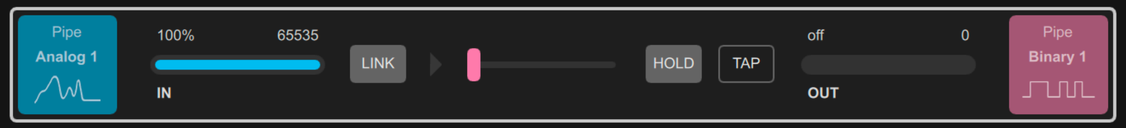
Binary to Binary

When linking a binary input signal to another binary output signal, the signal mapping and conversion parameters that can be set by the user include:

1. Invert Input Signal option: used to invert the value of the input signal, for example, when the binary state is ON, it will be inverted to OFF.
2. Invert Output Signal option: used to invert the value of the output signal, for example, when the binary state is ON, it will be inverted to OFF. After checking this option, the fader for manually controlling the signal output in the signal bar will also flip left and right.



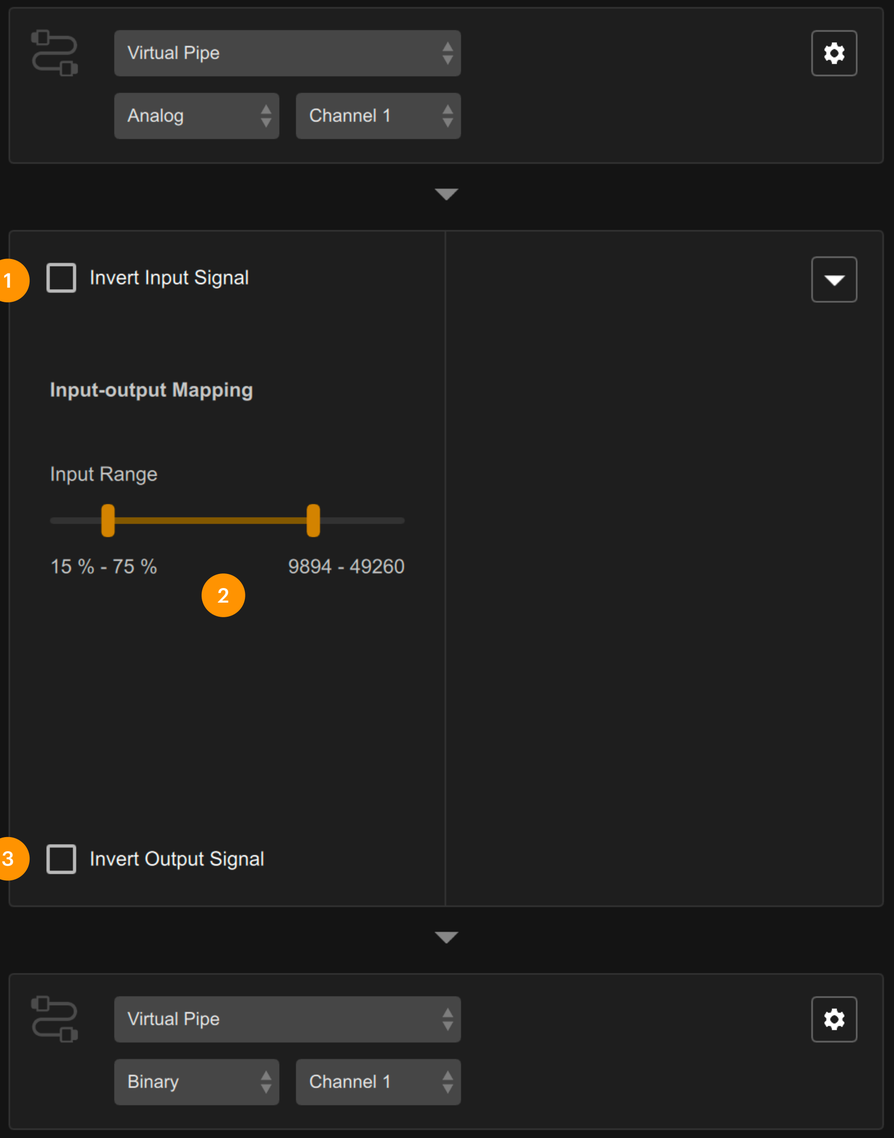
Analog to Binary



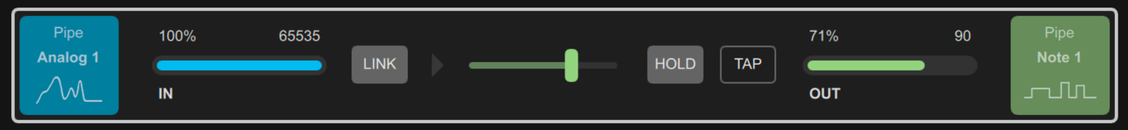
Analog to Binary

When linking an analog input signal to a digital output signal, the signal mapping and conversion parameters that can be set by the user include:

1. Invert Input Signal option: used to invert the value of the input signal, such as when the analog value is 20%, it will be inverted to 80%.
2. Output Range lower and upper limit settings: when the input analog value is less than the lower limit value or greater than the upper limit value, the output switch value is OFF; when the input analog value is between the lower and upper limits, the output switch value is ON.
3. Invert Output Signal option: used to invert the value of the output signal, such as when the switch value state is ON, it will be inverted to OFF. After checking this option, the fader for manually controlling the signal output in the signal bar will also flip left and right.



Analog to Note



Analog to Note

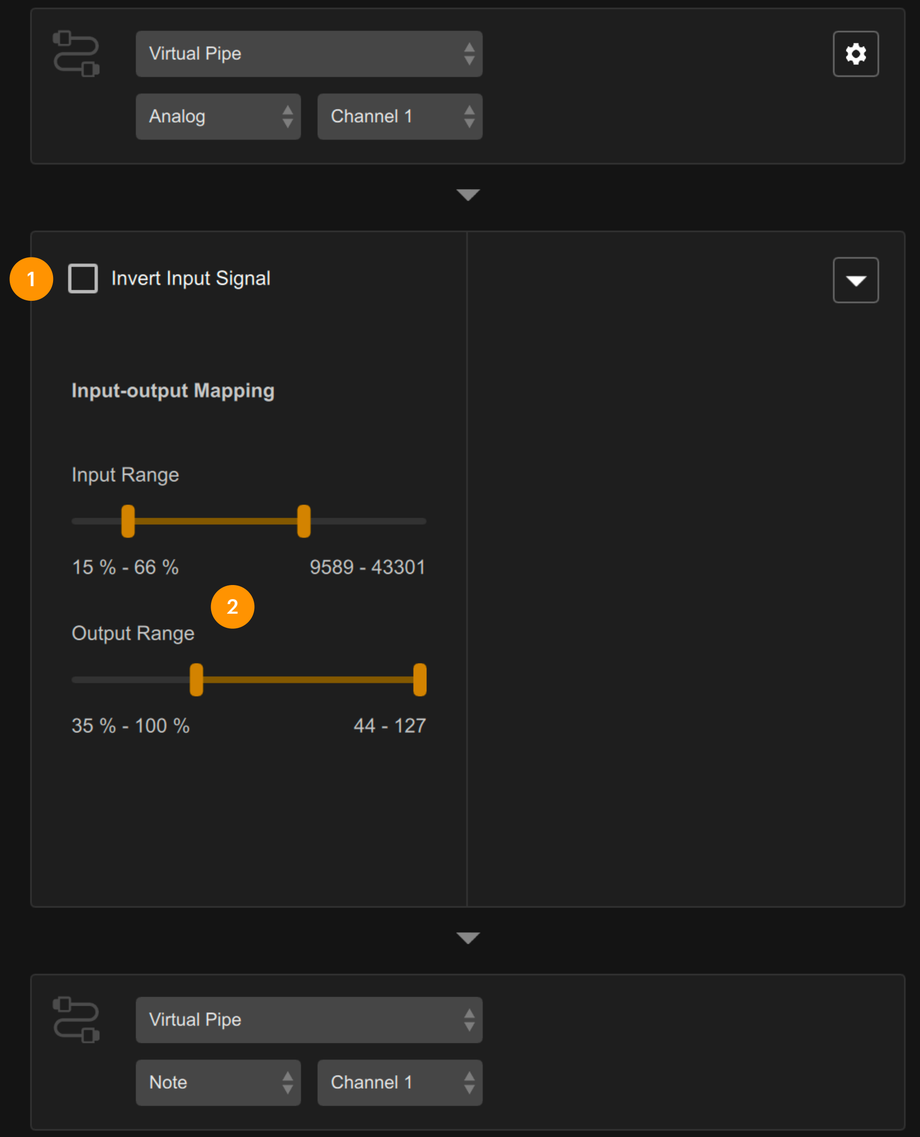
When linking an analog input signal to a note output signal, the signal mapping and conversion parameters that can be set by the user include:

1. Invert Input Signal option: used to invert the value of the input signal. For example, when the analog value is 20%, it will be inverted to 80%.

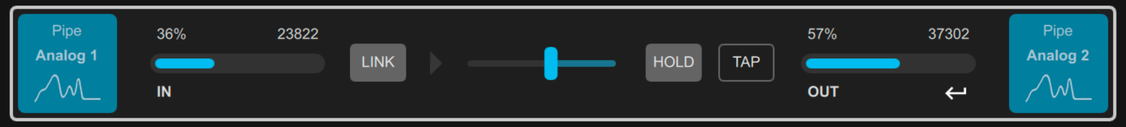
2. Input Range / Output Range lower and upper limits settings:
   When the input analog value changes from less than the input lower limit to greater than the input lower limit, a Note On signal will be generated and output; and the note velocity will depend on the input analog value at this time.

   When the analog input value is between the input lower and upper limits, the output note velocity will correspond to the value range defined in the output lower and upper limits. When the analog input value is greater than the input upper limit, the output note velocity will always maintain the set value of the output upper limit.

   When the input analog value falls back below the input lower limit again, a Note Off signal will be generated and output.



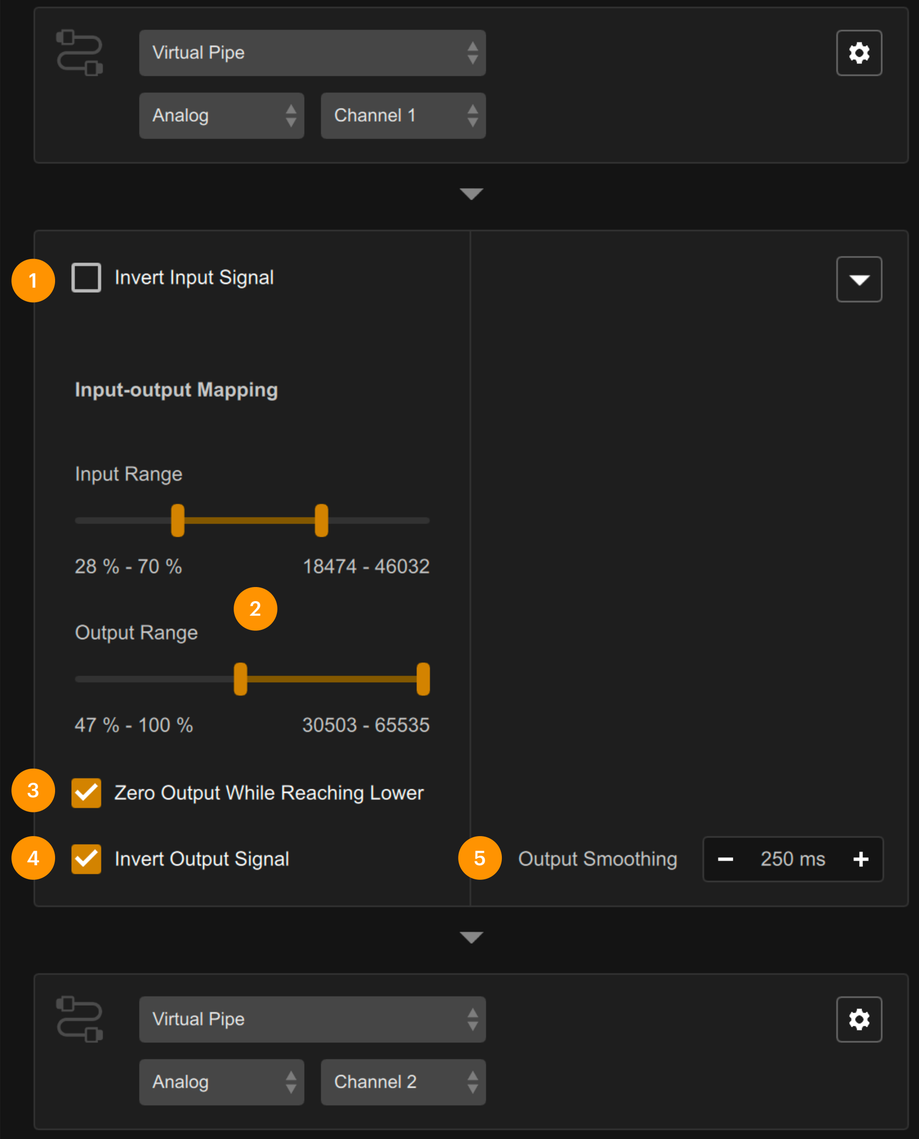
Analog to Analog



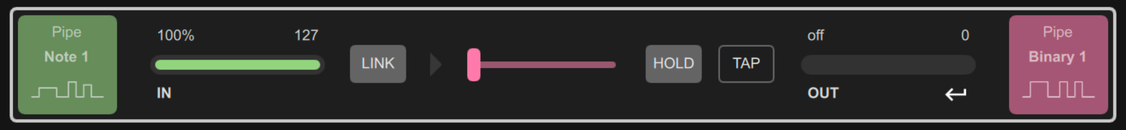
Analog to Analog

When linking an analog input signal to another analog output signal, the signal mapping and conversion parameters that can be set by the user include:

1. Invert Input Signal option: used to invert the value of the input signal, such as when the analog value is 20%, it will be inverted to 80%.
2. Input Range / Output Range lower and upper limits settings: when the input analog value is between the input lower and upper limits, the output analog value will correspond to the value range defined in the output lower and upper limits. When the input value is less than the input lower limit, the output lower limit value is output, and when the input value is greater than the input upper limit, the output upper limit value is output.
3. Zero Output While Reaching Lower option: after checking this option, when the input value is less than the input lower limit, the output value will not be the output lower limit value, but 0.
4. Invert Output Signal option: used to invert the value of the output signal, for example, when the analog value is 20%, it will be inverted to 80%. After checking this option, the fader for manually controlling the signal output in the signal bar will also flip left and right.
5. Output Smoothing setting: used to make the output analog value smoother to achieve the effect of fading in / fading out. This parameter is a millisecond value, which sets the time it takes for the output signal to reach the target output value.



Note to Binary

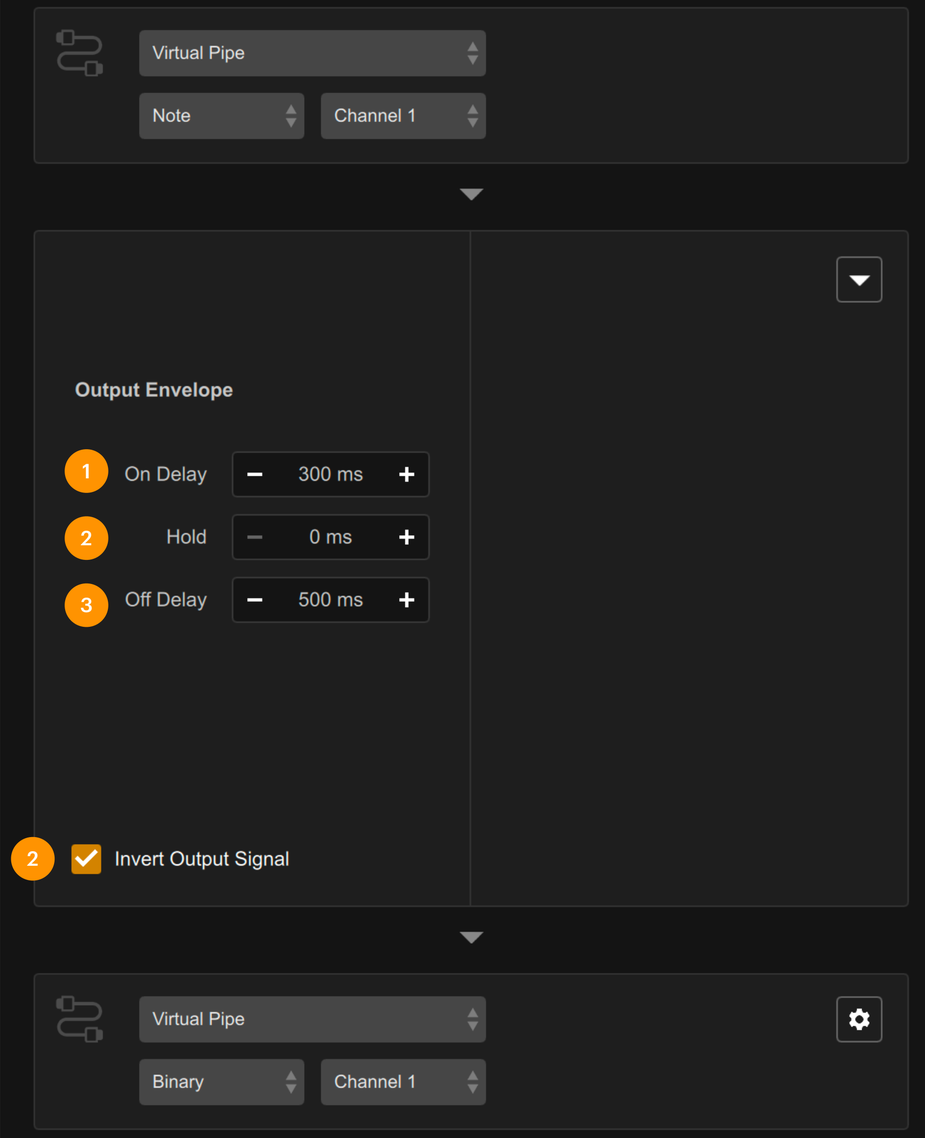


Note to Binary

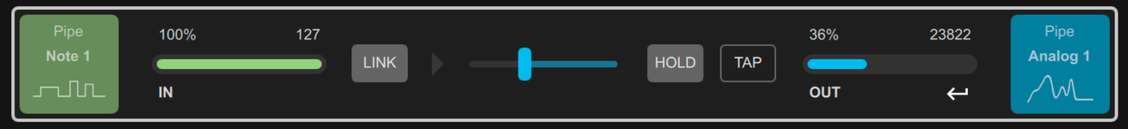
When linking a note input signal to a binary output signal, the signal mapping and conversion parameters that can be set by the user include:

When the note signal is inputted as Note On, the binary signal output is ON, and when the note signal is inputted as Note Off, the binary signal output is OFF.

1. On Delay setting: When Note On is inputted, the output will be triggered to turn ON after the set number of milliseconds
2. Hold setting: If this parameter is set, the binary output will remain in the ON state for several milliseconds and then automatically fall back to zero
3. Off Delay setting: When Note Off is inputted, the output will be triggered to turn OFF after the set number of milliseconds (Hold and Off Delay cannot usually be set to non-zero at the same time)
4. Invert Output Signal option: used to invert the value of the output signal, such as when the binary state is ON, it will be inverted to OFF. After checking this option, the fader for manually controlling the signal output in the signal bar will also flip left and right.



Note to Analog



Note to Analog

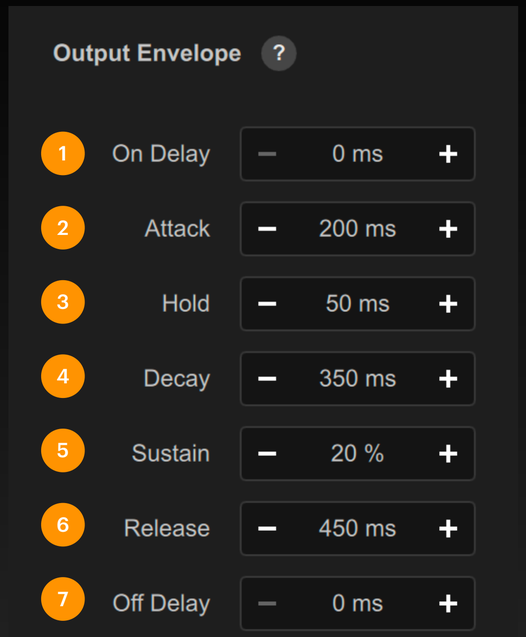
When linking a note input signal to an analog output signal, the signal mapping and conversion parameters that can be set by the user include:

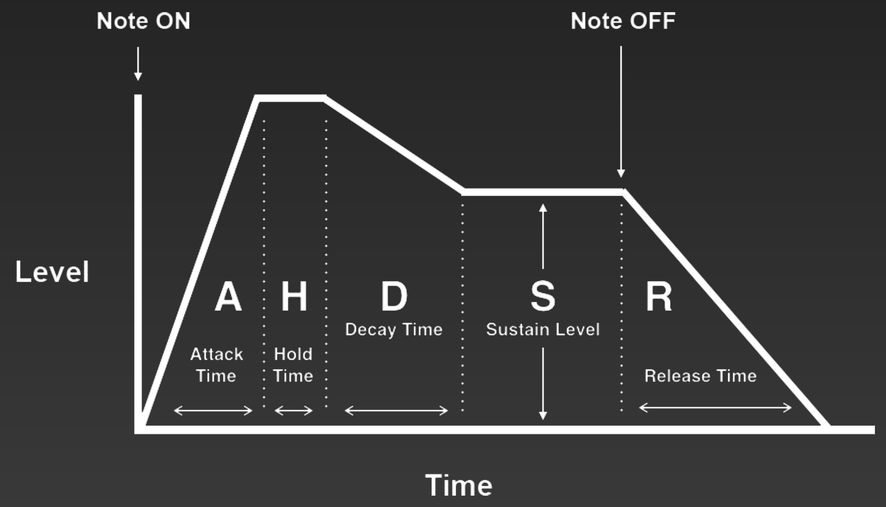
1. Input Range / Output Range lower and upper limits settings:
   When the input note velocity is between the input lower and upper limits, the output analog value will correspond to the value range defined in the output lower and upper limits. when the input note velocity is less than the input lower limit, the output lower limit value is outputted; when the input note velocity is greater than the input upper limit, the output upper limit value is outputted.

2. Zero Output While Reaching Lower option: After checking this option, when the input note velocity is less than the input lower limit, the output value will not be the output lower limit value, but 0.

3. Invert Output Signal option: used to invert the value of the output signal, such as when the analog value is 20%, it will be inverted to 80%. After checking this option, the fader for manually controlling the signal output in the signal bar will also flip left and right.

4. Output Envelope parameter: After the note is input, it will trigger the change of the output analog value and follow the AHDSR envelope settings.





Note to Analog

When a note is input, DigiShow will automatically trigger a change in the value of the linked analog output signal, following the AHDSR settings in the Output Envelope parameter:

1. On Delay setting:
   Set the delay time of Note On to trigger the response in milliseconds.

2. Attack setting:
   Set the number of milliseconds after which the output signal value will climb to the output upper limit when Note On is triggered.

3. Hold setting:
   Set the output signal value to remain at the output upper limit for a number of milliseconds before falling back.

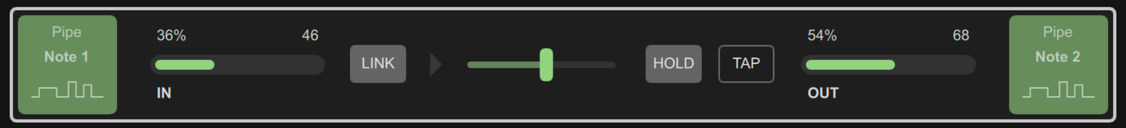
4. Decay setting:
   Set the number of milliseconds after which the output signal value falls back.

5. Sustain setting:
   After the output signal value falls back, it will continue to remain at a certain level until Note Off. This setting value is the percentage of the signal level value at the highest output.

6. Release setting:
   Set the number of milliseconds after which the output signal value will drop back to the lower limit (or zero) when Note Off is triggered.

7. Off Delay setting:
   Set the delay time of Note Off to trigger the response in milliseconds.

Note to Note



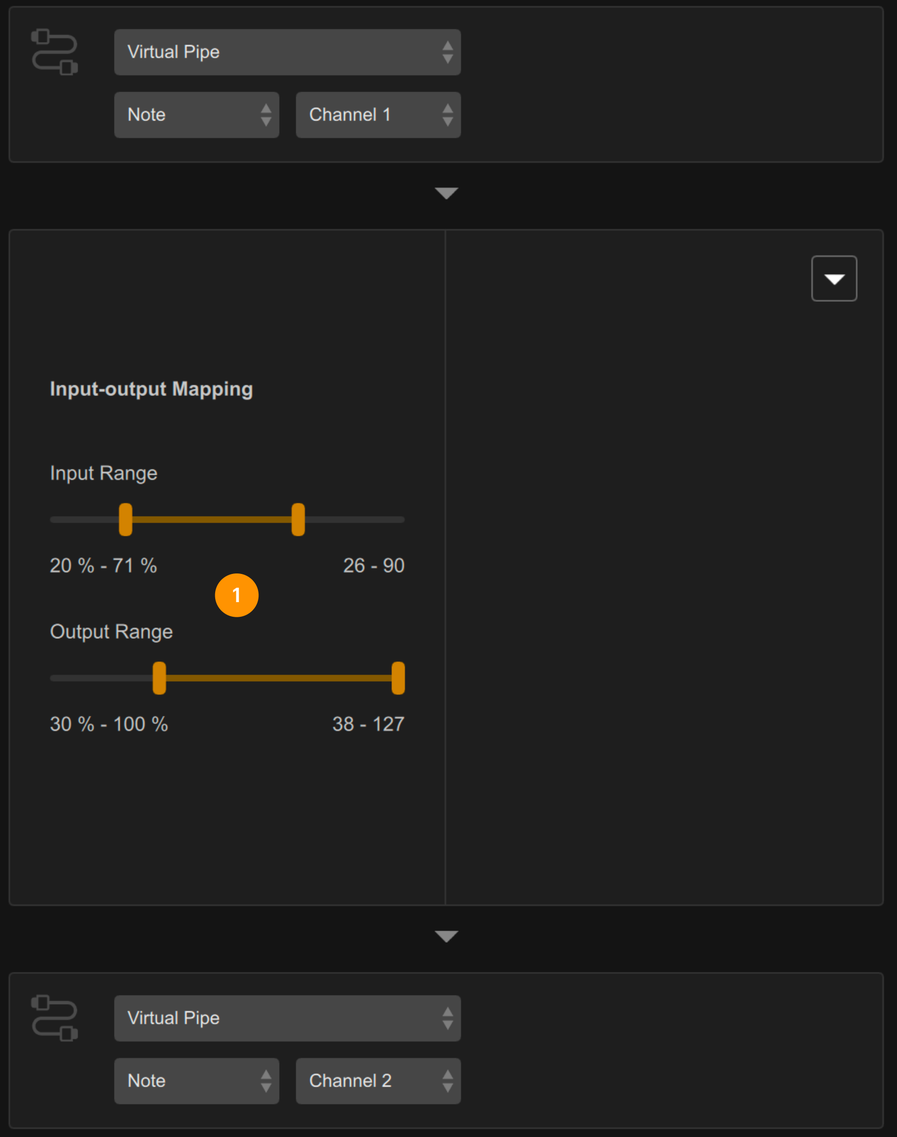
Note to Note

When linking a note input signal to another note output signal, the signal mapping and conversion parameters that can be set by the user include:

1. Input Range / Output Range lower and upper limits settings:

   When the input note velocity is between the input lower and upper limits, the output note velocity will correspond to the value range defined in the output lower and upper limits.

   When the input note velocity is less than the input lower limit, the output note velocity will always maintain the output lower limit setting value; when the input note velocity is greater than the input upper limit, the output note velocity will always maintain the output upper limit setting value.



Virtual Pipe

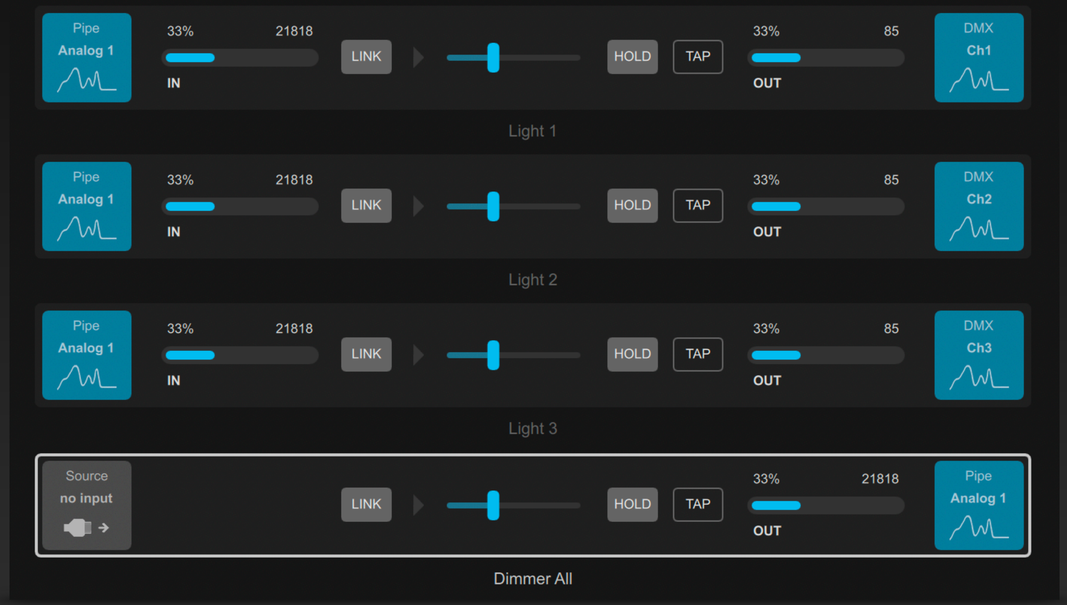
Virtual Pipe

- Virtual pipe is an additional communication interface provided by DigiShow, which can easily copy and transmit signals between different signal links, so as to organize the signal link table more flexibly.
- As the name implies, the signal in the virtual pipe does not really exist when DigiShow communicates with hardware devices or external software. But in the signal link table, it can be linked to any real signal.
- Users can define their own analog, binary or note type signals in the virtual pipe. They can appear at the input or output of each signal link. When the value of the virtual pipe signal at the output end of the signal bar changes, the signal with the same name at the input end of other signal bars will immediately trigger a synchronous update.

Virtual Pipe Example

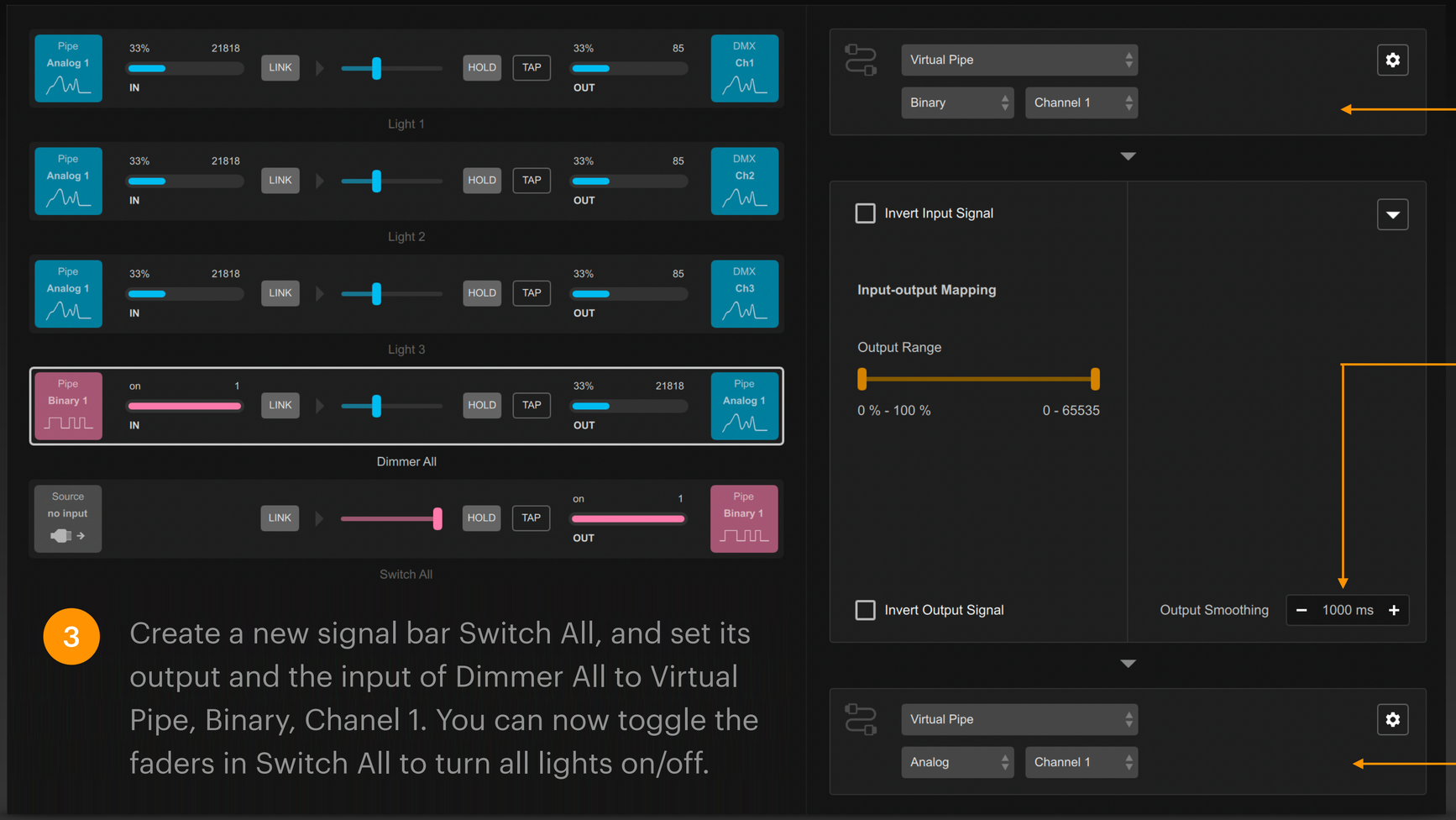
Let's use an example to explain the use of virtual pipes. In this project, an analog channel and a binary channel in the virtual pipe are used to realize the joint control of multiple lights.

1 Create three new signal bars, Light 1, Light 2, Light 3, each containing a DMX output signal terminal for controlling the light. Now you can move the fader in the signal bar to dim each light individually.



2 Create a new signal bar named Dimmer All, and set its output and the input of Light 1 to 3 to Virtual Pipe, Analog, Chanel 1. Now you can move the fader in Dimmer All to dim the three lights simultaneously.

Virtual Pipe Example



3 Create a new signal bar Switch All, and set its output and the input of Dimmer All to Virtual Pipe, Binary, Chanel 1. You can now toggle the faders in Switch All to turn all lights on/off.

The signal Binary 1 in the virtual pipe transmits the signal from the output of Switch All to the input of Dimmer All.

When mapping from Binary 1 to Analog 1, set the Output Smoothing parameter to 1000 milliseconds. When switching all lights on and off fully through Binary 1, there will be a one-second smooth gradient.

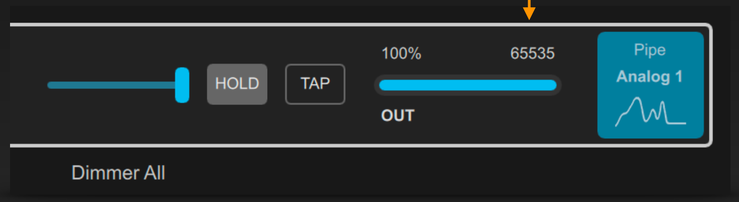
The signal Analog 1 in the virtual pipe transmits signals from the output of Dimmer All to the input of Light 1 to 3.

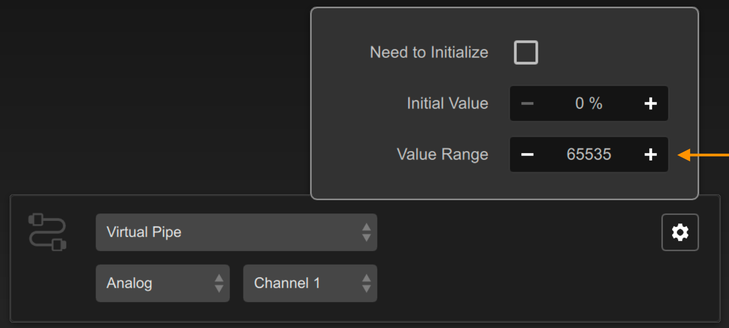
Analog Signal in Virtual Pipe

In DigiShow, the analog signals in various interfaces usually have their specific value ranges, while the value range of the analog signals in the virtual pipe can be defined by the user:

1

The default maximum value



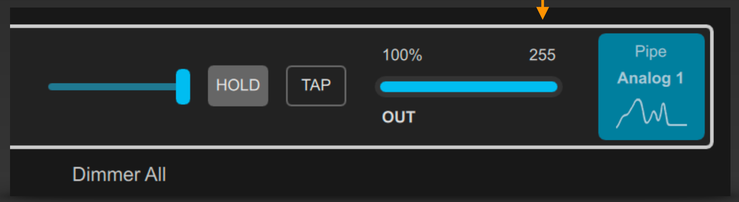


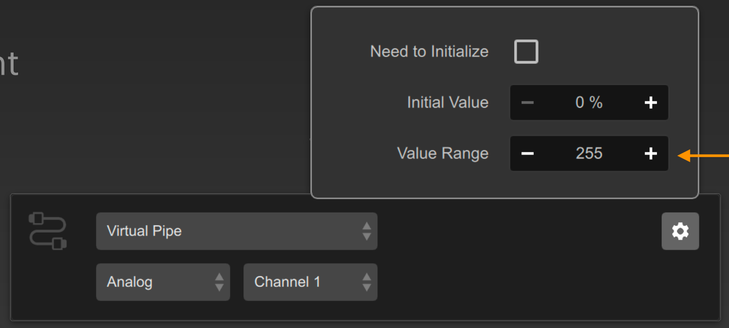
The default value range of the virtual pipe analog signal is 0 to 65535.

Click the gear button ⚙ to modify the Value Range in the pop-up setting panel.

2

Maximum value after adjustment





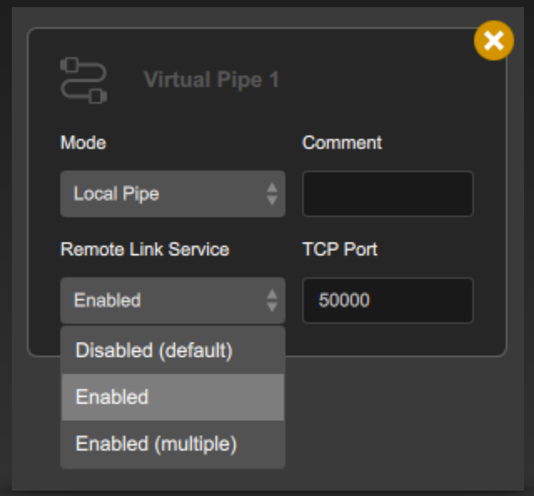
In this example, we adjust the signal value range to 0 ~ 255

This will keep the signal value range consistent with the DMX channel.

Remote Pipe

After opening the remote connection service, two DigiShow programs running on different computers can also share the signals in the virtual pipe. The signals with the same name in the DigiShow signal bars on different computers can always keep the values synchronized.

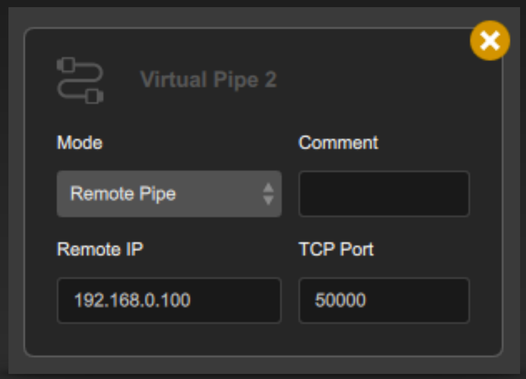
1 Master Computer



Go to the Pipe configuration page of Interface Manager and select Remote Link Service as Enabled to enable the remote link service to allow another DigiShow program to share this virtual pipe.

Using Enabled (multiple) mode will allow multiple remote DigiShow programs or third-party programs* to access.

2 Slave Computer



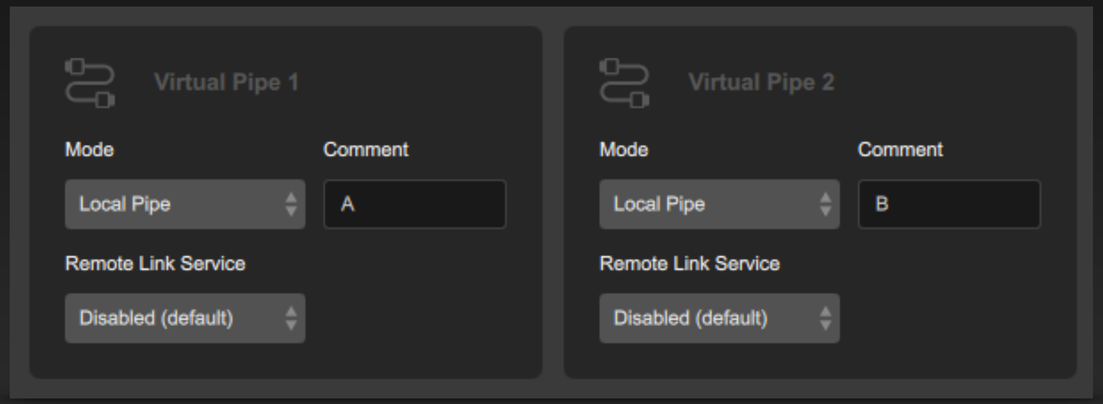
In the DigiShow program on another computer, set the mode of the virtual pipe in Interface Manager to Remote Pipe, and set Remote IP to the IP address of the main computer.

Then the two DigiShow programs on the two computers can share the same virtual pipe.

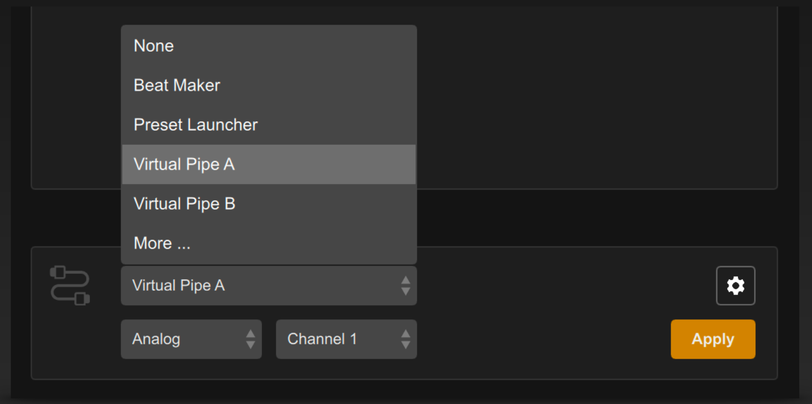
* The remote pipe implements network communication based on web socket. DigiShow provides an interface library that allows developers to make third-party extensions through this interface.

Multiple Virtual Pipes

A virtual pipe is included by default in a new DigiShow project. Users can also create multiple virtual pipes to manage virtual signals for different purposes.



1 You can create multiple virtual pipe interfaces in the Pipe configuration page in Interface Manager. To make it easier to distinguish them later, you can fill in some short description information in the Comment field.



2 Later, when you configure the input and output interfaces for the signal link, you will be able to distinguish them clearly.

Summary

- Understand the three types of signals in DigiShow:

  Analog, Binary, Note
- Understand the basic concept of Signal Mapping in DigiShow.
- Understand the parameters of mapping and conversion between various types.
- Understand the basic concept of Virtual Pipe.