

Hauptwerk Hardware

Swell Pedal Encoder

Installation & User Manual

Release 1.0 – August 2022

Table of Contents

Introduction.....	3
What is it?.....	3
What does it do?.....	3
Who is it for?.....	3
Product Features.....	3
Operation.....	4
What Are Analogue Inputs?.....	4
Installation and use.....	4
General.....	4
Connecting the Swell Pedal.....	5
Wiring.....	6
Mounting.....	6
Notes.....	7
Our Hardware Ethos.....	7
LEGAL DISCLAIMER:.....	7

Introduction

What is it?

The Hauptwerk Hardware Swell pedal Encoder is a device designed to easily connect swell and effects pedals to your virtual organ setup. It works with Hauptwerk, Grand Orgue and other virtual organ software. It has 8 analogue inputs which can be used for pedals or any other analogue control such as master volume.

What does it do?

It generates the necessary Midi signals as your analogue pedals or controls are operated, and transmits these to the computer or synth via the legacy industry standard 5 pin DIN connection.

Who is it for?

The Hauptwerk Hardware Swell Pedal Encoder is designed as an add on for organs with multiple effects shoes or whose existing swell pedal(s) do not send Midi data.

If you are using the Hauptwerk Hardware Universal Midi Encoder you already have 8 analogue inputs available built in to the encoder. Likewise, our Tutti Encoder has three analogue inputs and the Single Bus Encoder has one. The Swell pedal Encoder can be used if you have more analogue controls as part of your setup than your existing encoder allows for.

Many commercial organs are fitted with a Midi Out port which can be used to control a virtual organ such as Hauptwerk or Grand Orgue, but a surprising number of these do not have their swell pedals connected to their Midi sub-system. You can add a Swell Pedal Encoder so that you have Midi control of your virtual organ's analogue functions from your commercial organ.

It is easy to use and suitable for anyone with a basic knowledge of electronics and capable of soldering to a reasonable standard.

Product Features.

- **Supports up to eight effects pedals or other analogue controls.**
- **Uses legacy MIDI 5 pin DIN connection.**
- **Powered by USB - No other power source required.**
- **Standard 2.54 mm pitch pin headers for easy connection of inputs.**
- **100% pin compatible with our M-Audio Pedal Adaptor.**
- **No programming required, simply connect your pedals and Midi lead - Done!**
- **Works with Hauptwerk, Grand Orgue and other Virtual Organ Software.**

Board dimensions (WxLxH): 80 x 60 x 30mm (3.15" x 2.36" x 1.18").

Operation.

What Are Analogue Inputs?

This encoder is designed to work with analogue controls only. It does not work with keyboards or other devices that have digital or 'on/off' inputs.

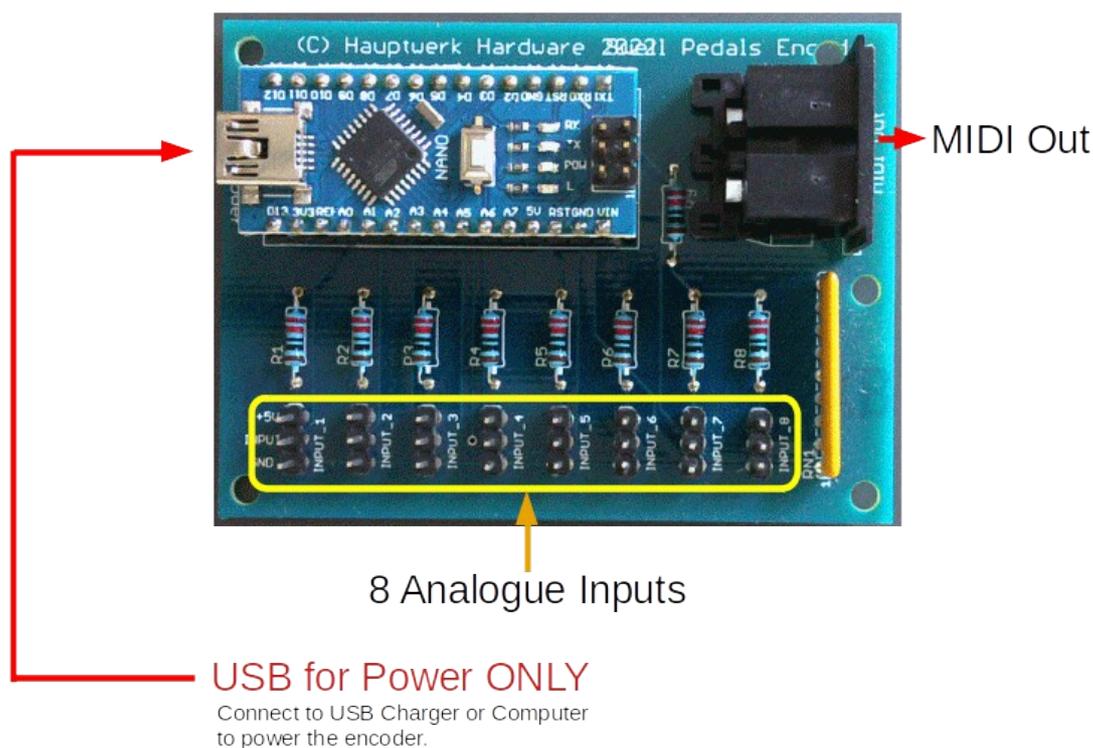
Analogue controls produce an output whose voltage changes between 0v at the controls minimum position, and 5v at the controls maximum position. The 5 volt supply and the 0 volt ground connection are both provided from the swell pedal encoder. As the control is advanced the voltage it produces rises, and falls again as the control is backed off. The encoder reads this voltage and produces Midi Control Change events as the control is operated. The computer running your virtual organ maps these events to whatever virtual control you choose.

As mentioned above the 5 volt supply and the 0 volt ground connections are both provided from the swell pedal encoder. It is important that you use these 'reference voltage' connections on the encoder board to provide power to your analogue controls. This is because if you were to use another power supply, say one already installed as part of the organ, the voltage that it supplies may be greater than the reference voltage that is expected on the encoder input. ***This would be bad and very likely to damage the encoder.*** If the voltage supply to the analogue control is too low the control will not provide the full travel range of the virtual control, worse still if the supply voltage is not stable the virtual control will waver and behave in unexpected ways, that is why the voltage outputs are provided on the encoder!

Installation and use.

General.

The Swell Pedal Encoder has eight inputs, each comprising of three connections as shown below.



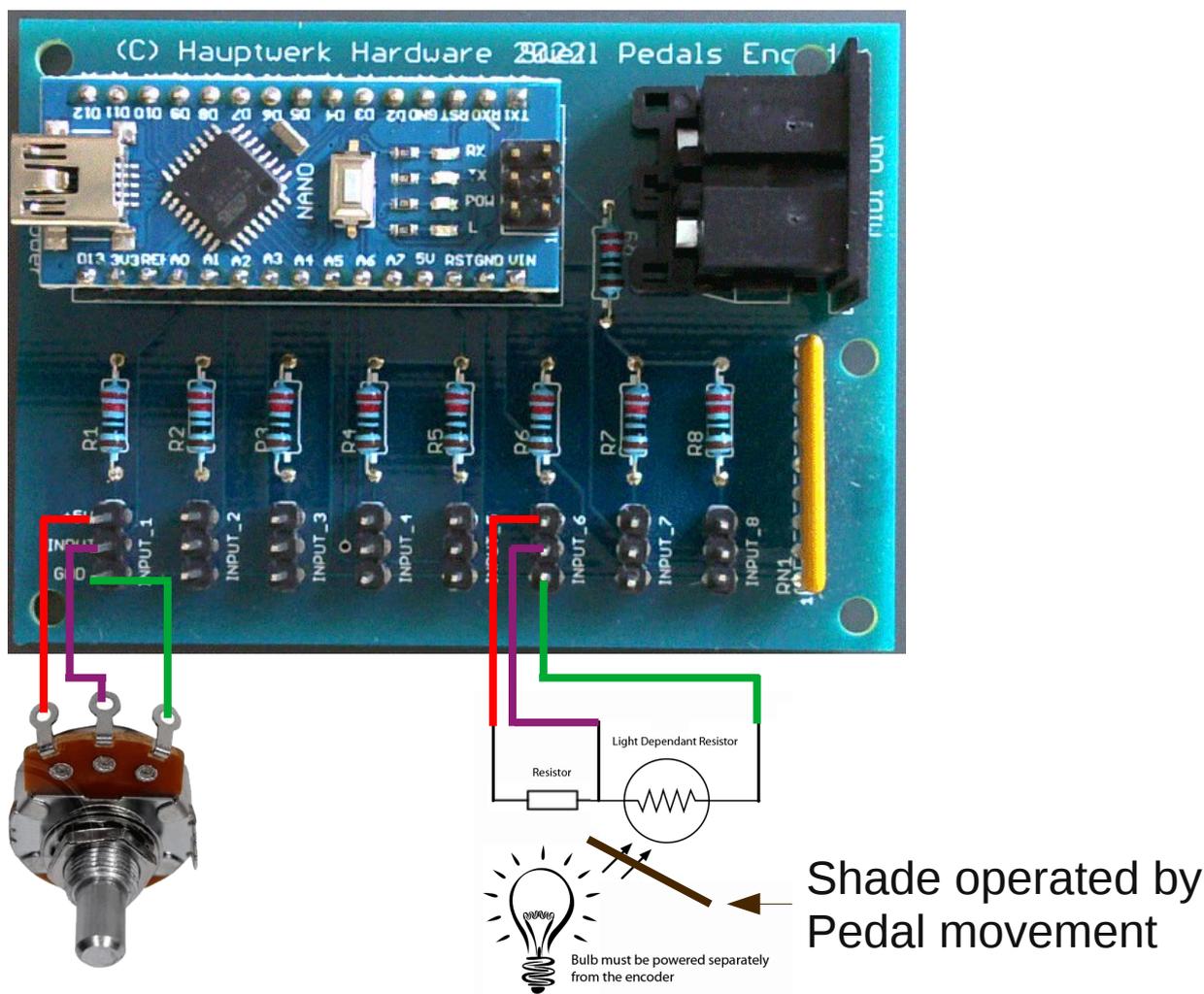
These inputs are where you will connect your analogue controls. As you can see from the above picture there are also two other connections to the board; the USB connection **which is only used to power the encoder. No MIDI data is available from this port**, and the 5 Pin DIN socket which is the MIDI output from the board and is connected to either a synthesiser via a standard 5 pin Midi cable or to a computer via a USB to MIDI adaptor.

Connecting the Swell Pedal.

The analogue inputs can be used for swell or expression pedals as well as any other variable control such as a rotary volume control or a drawbar. If you have a pedal that is fitted with a potentiometer you simply have to run three wires from the pot' to the Swell Pedal input. This input has three pins and they simply connect to the pot' in the way they are laid out. In other words the centre pin of the input connects to the centre pin of the pot and the outer pins of the input connect to the outer connections of the pot', it does not matter which outer pin connects to which side of the pot' so long as the centre goes to the centre of the pot'. If the swell pedal operates 'backwards' then simply reverse the outer two wires!

There are other possibilities for connecting a swell pedal. Many older swell pedals have an optical arrangement containing a light bulb and a light dependant resistor separated by a shade which moves with the action of the pedal.

This is arranged so that more light is allowed to fall onto the LDR as the pedal is advanced. It is possible to use this type of pedal with the Single Bus Encoder but you need to add a resistor and ensure that the power supply for the light bulb is completely separated from the encoder wiring. The diagram below shows how to wire it up.



The diagram above shows two types of analogue controls.

The first, shown on the left of the diagram is a simple potentiometer. These are very common and can be found used as rotary controls for functions such as master volume, tuning, etc. as well as fitted to effects pedals. They usually have a value marked on them which is their resistance in ohms. Any potentiometer with a value of between 500 to 50,000 ohms will work.

The second type as shown on the right in the picture is comprised of a lightbulb and a Light Dependant Resistor (LDR), with a shade between them which moves to expose more of the LDR to the light as the pedal is advanced. Many manufacturers use this method and originally there would be only four wires coming from the pedal to the existing internal electronics of the organ. That is two for the bulb, and two for the LDR. Some manufacturers such as Allen organs used two LDR's on their pedals and so there were more wires. A simple visual inspection with the control disassembled will reveal how the wires are connected.

For our purposes we need to add a resistor as in the diagram. The value of the resistor will be determined by initial measurement and a bit of trial and error. Basically the required value of the additional resistor, marked 'Resistor' above should be somewhere close to the dark resistance of the LDR. If you don't have a meter that can measure resistance then I would suggest trying a 4.7K resistor and then substituting that with a 10K resistor and see which works best for you. The lowest value you should try would be around 1K, below that you stand a chance of damaging the LDR.

Wiring

It is important to keep the wiring as neat as possible and to secure the resulting wiring loom carefully using zip ties or some similar cable restraint system. Do not create a birds nest of wiring or you will have a terrible time sorting it out if there is any problem after you're done installing it, also untidy wiring that is longer than it needs to be can act like an antenna and allow all sorts of interference to have an effect on the operation of your controls..!

Mounting

The Swell pedal Encoder has 4 mounting holes of 3mm diameter each. These are for mounting the board in a convenient place within your console. It is important to consider that the reverse of the board is made from copper and that parts of this copper surface carry the electrical signals to and from the encoder. It is therefore necessary to ensure that whatever mounting method you use does not allow the reverse of the board to come into contact with any conductive surface as doing so may present a fire risk and or cause irreparable damage to both the board and the encoder itself. It is suggested that suitable insulating spacers be used in mounting the board leaving a gap of at least 5mm between the board and the mounting surface. The front surface of the board is also made from copper and the same advice applies.

The board is suitable for mounting at any angle in any plane. The board must be installed in a position where it will not suffer condensing moisture, water, physical shock or any contact with moving parts. It must be protected from any conductive items, parts or waste that may fall on it.

Notes.

Our Hardware Ethos.

The hardware used in this controller is an Atmel AVR along with other components. Some of these components are readily available as a ready assembled 'core' unit which can then be programmed with whatever firmware you wish. Hauptwerk Hardware buy these 'dev' boards and use them to build our products. These microprocessors exclusively use our own production firmware and contain no boot loaders or other third party code. This firmware remains our intellectual property. It is copyright and protected from being read from the AVR.

The logic behind using these 'dev' boards is that they are readily available and likely to remain so for some considerable time. Should any of our products ever fail in the future, it is easy to simply unplug the dev board and replace it with a new one, safe in the knowledge that one will still be available. This is in contrast to our competitors bespoke boards whose availability is entirely dependent on provisions made by that particular manufacturer at the time.

LEGAL DISCLAIMER:

It is the installers responsibility to ensure that they have familiarized themselves with this product and its documentation and have the necessary understanding and technical and practical competence to be able to install and use it correctly. Whilst every care has been taken in the design, testing and documentation of this product, Hauptwerk Hardware will accept no liability whatsoever for any physical or consequential damage or injury caused by the use of any of our products in any circumstances.