ADDAC System

Instruments for Sonic Expression

Est.2009

INTRODUCING
ADDAC SYSTEM SERVO CONTROLLER

USER'S GUIDE . REV01

November.2025

ADDAC System

From Portugal with Love!

Welcome to:
ADDAC SYSTEM
SERVO CONTROLLER USER'S GUIDE

Revision.01 November.2025

WELCOME

At ADDAC we always admired the geniality of Neil Young's Whizzer, way ahead of its time, a great example of how great ingenuity and engineering can come together to make something great.

Inspired by its motor controlled method we created a standalone solution featuring 8 Servo outputs to control any knob on any amplifier, guitar pedal, rack gear, etc. Bottom line any hardware that has a knob that needs to be controlled/sequenced/automated externally.

The idea behind it was to create a device that would open the possibility to control any knob, any physical knob, be it from a musical device or any other tech appliance that "needs" to be controlled, for musical, artistic or automation purposes.

Our solution comes with a Servo Connector that screws into any compatible physical potentiometer, a coupler connects the motor shaft to the target knob which will turn as the Servo turns.

We use servo motors which can be digitally controlled and move to a precise angle. The motors are controlled by a microcontroller that receives MIDI signals or the internal Expression Pedals and converts these signals to the 270 degree Servo motor range.

Each expression pedal input features 2 knobs: MINimum and MAXimum. These are used to set the range of action of the expression pedal, allowing to dial the range to any sweet spot desired.
Raising the MINimum knob above the MAXimum knob inverts the Servo range.

It features MIDI over USB-C, Bluetooth MIDI, and a 3.5mm MIDI IN jack. MIDI can come from any of the 3 sources at the same time as long as they don't overlap the servos channels being controlled.

Enclosure 3D Printed in ASA with aluminium front panel.

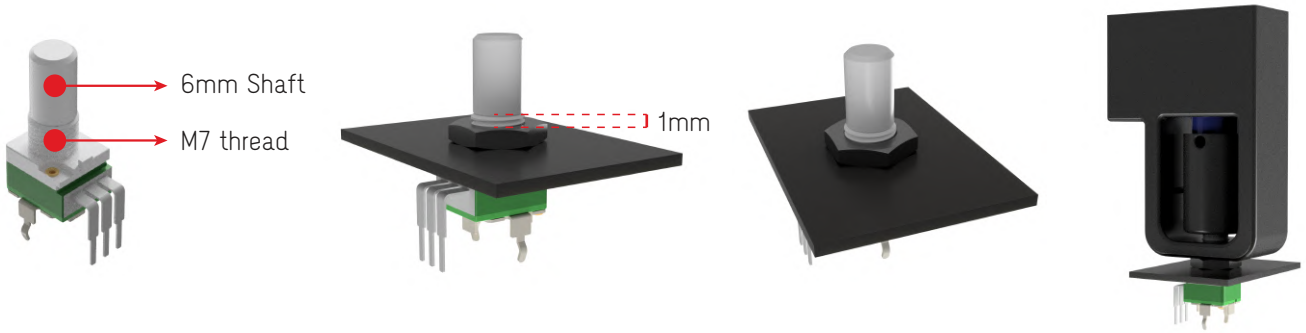
Ships with:
8x Servo Connectors
9V 3A Power adapter
3.5mm to DIN5 adapter
2x Servo extension cables

SERVO CONNECTOR

Potentiometer Compatibility

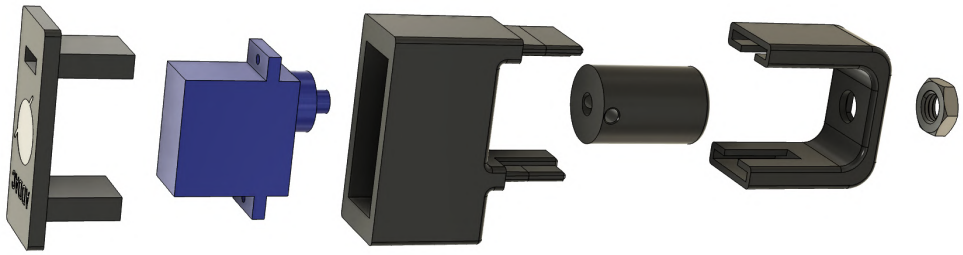
Our Servo connector is the interface that will allow to control the potentiometer.
Compatible with any 6mm shaft potentiometer that has exposed M7 threads as it screws directly into the potentiometer.
It only needs about 1mm of thread to be secure and it will screw on top of the nut already in place.

We accept custom requests for other pot threads and shaft diameters.
For potentiometers with no threads the connector could be attached using double sided tape which has proven to work although unpredictable for how long it will last. Notice that the tape will probably leave some residue behind once removed.



Description

Inside our Servo Connector there's a servo motor, the shaft of the servo is attached to a coupler that will attach to the shaft of the pot to be controlled. This connector features an M7 nut on its base that screws directly into the target potentiometer thread.

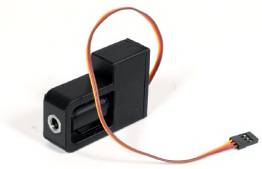


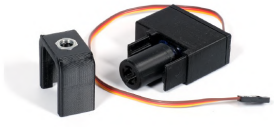
The connector U bracket detaches from the connector body for an easy installation,
The coupler connects to the potentiometer shaft by friction, no screws necessary.
The white logo on the top creates an area where the user can write the channel number where the servo is connected.
The Servos distance to the Control box can be extended using extension cables.

SERVO CONNECTOR

In Use Examples

Here's a few examples of the Servo Connector installation on different hardware.



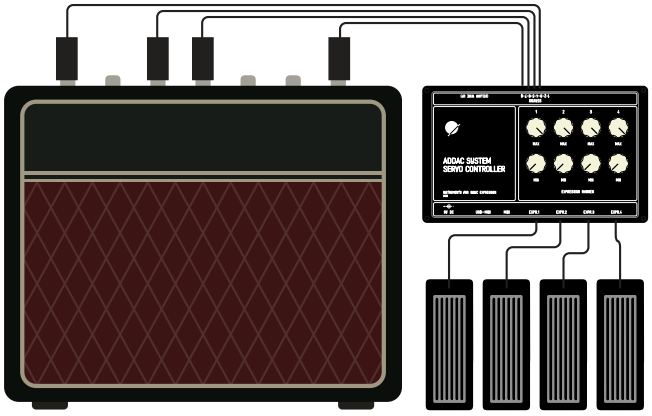


CONNECTION POSSIBILITIES

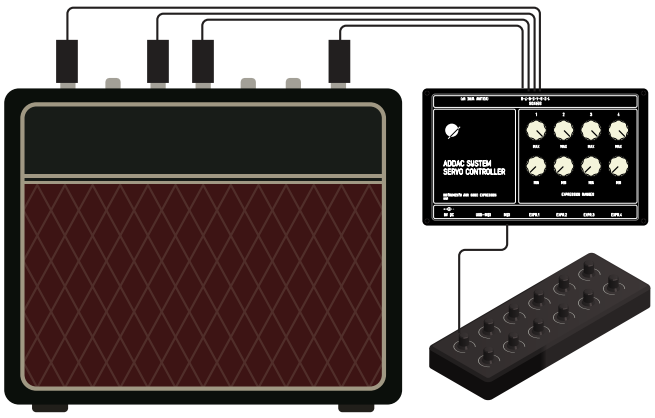
Setup Examples

Thought with flexibility in mind, with multiple MIDI inputs and the possibility to control multiple devices just plan out your setup and install it accordingly. It can be simple or complex below you'll find some examples.

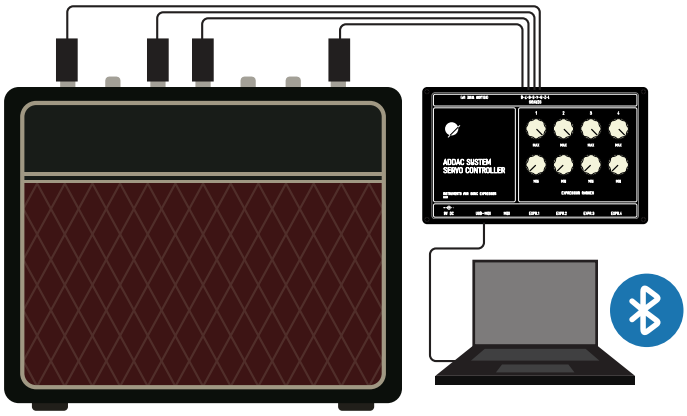
Standalone with Expression Pedals



Standalone with MIDI Controller

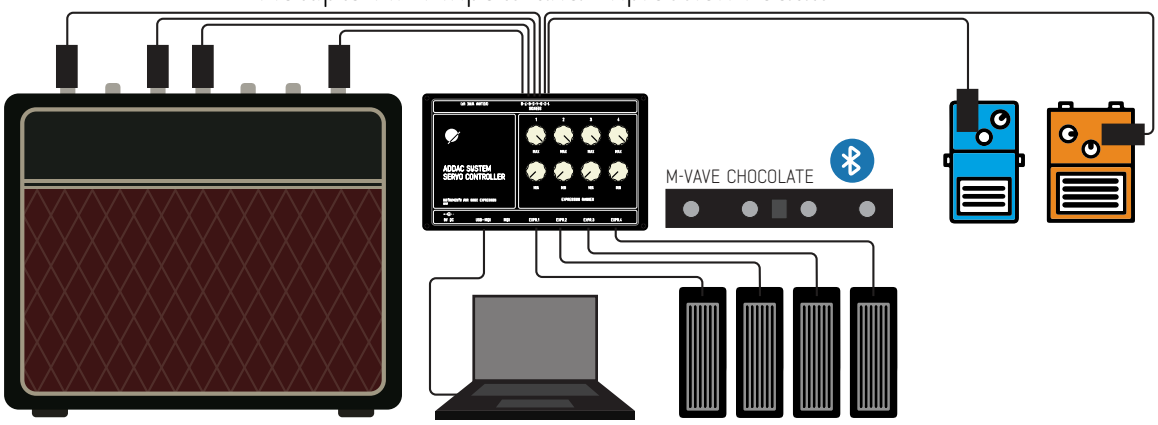


DAW control over USB-C or Bluetooth



Remote Preset Controller over Bluetooth MIDI

Multiple MIDI Inputs and Expression Pedals



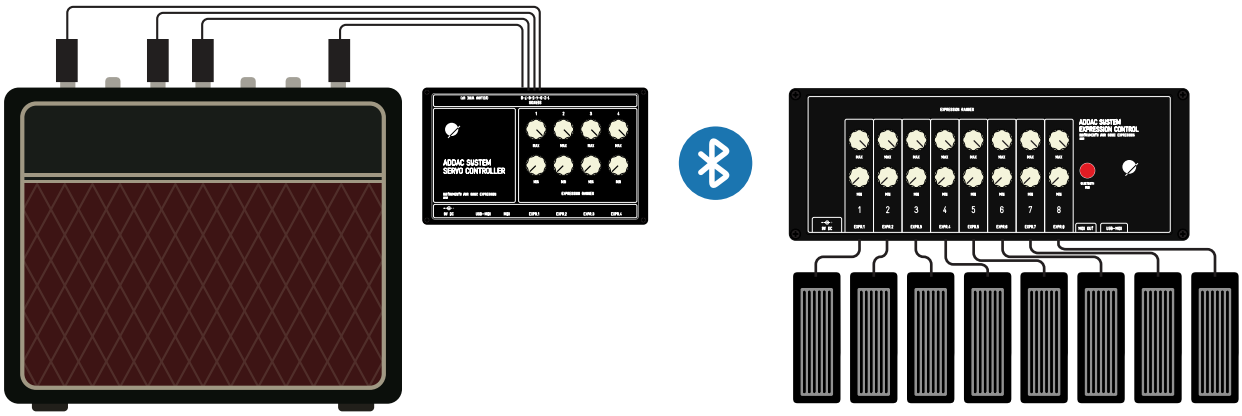
CONNECTION POSSIBILITIES

Remote Expression Pedal Operation

Using our ADDAC EXPRESSION CONTROL one can fully control the 8 servos remotely with expression pedals, this allows for situations where the hardware to be controlled is not close to the player, be it a stage situation where the amp is being controlled from the front of the stage or in the studio where the amp is being controlled from the control room.

Find more about ADDAC SYSTEM EXPRESSION CONTROL here:
http://addacsystem.com

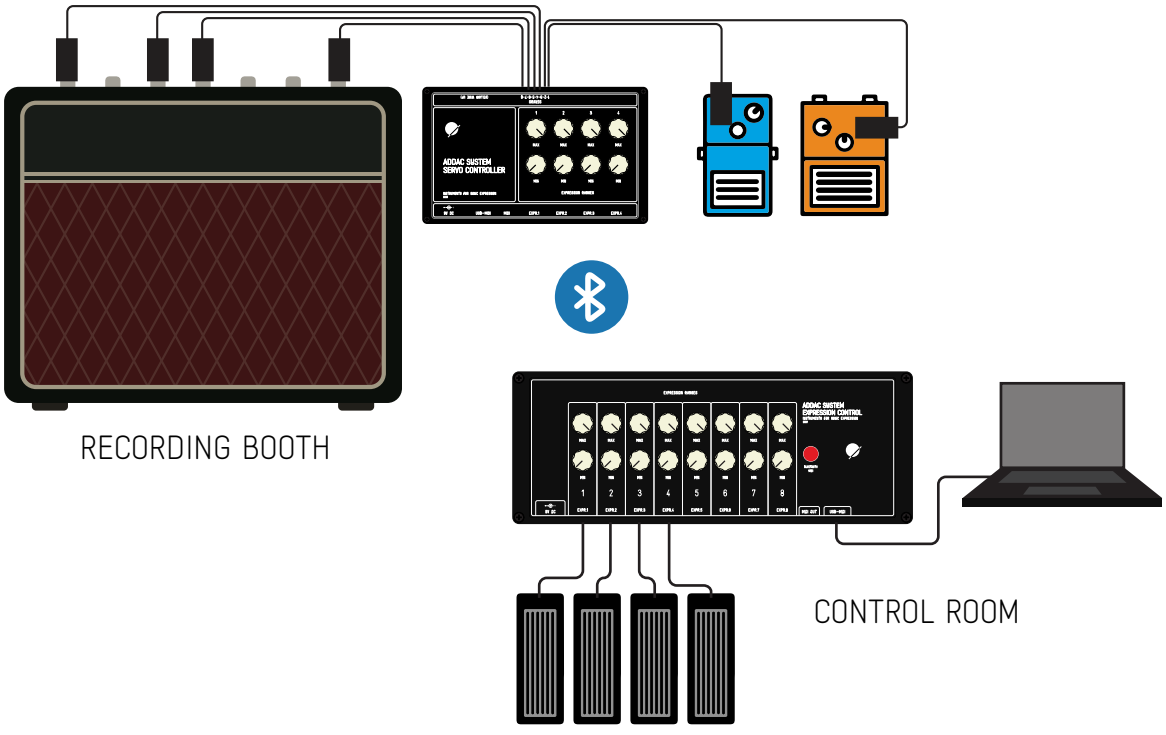
Remote control with ADDAC Expression Control over Bluetooth MIDI



BACKLINE

FRONT OF THE STAGE

Remote control with ADDAC Expression Control and DAW over Bluetooth MIDI



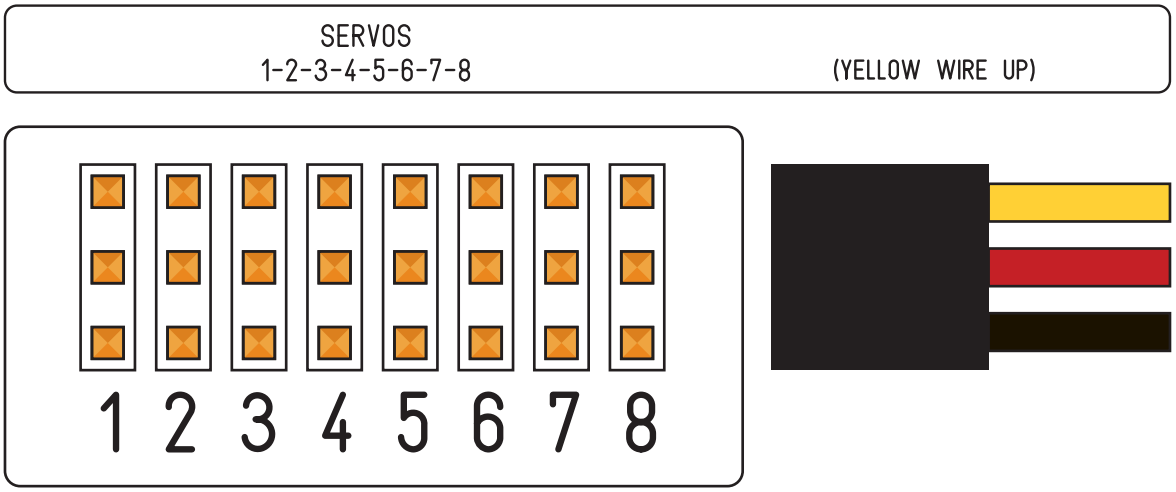
RECORDING BOOTH

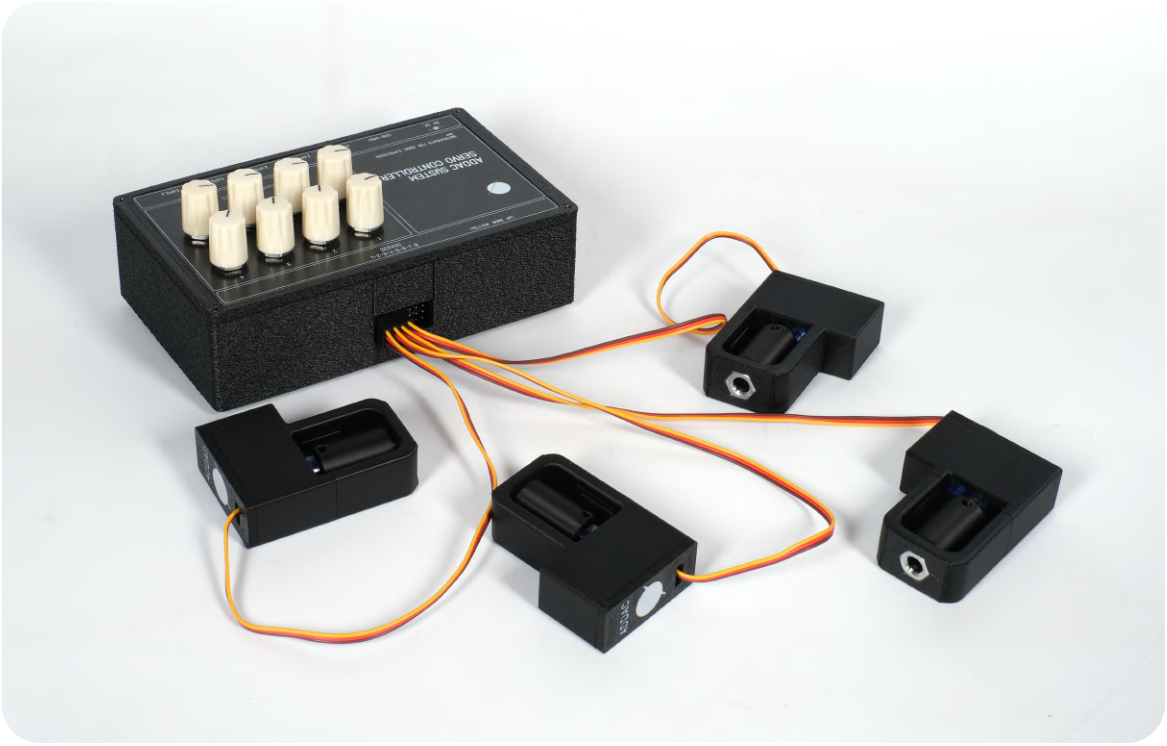
CONTROL ROOM

CONNECTING SERVOS

Servos Pinheader Port

Servos are connected using the pinheaders on the back of the box.
The servo female socket connects vertically to 3 pins. Always face the yellow wire up.
Choose the channel for your servo and carefully insert the socket into the respective pinheaders.





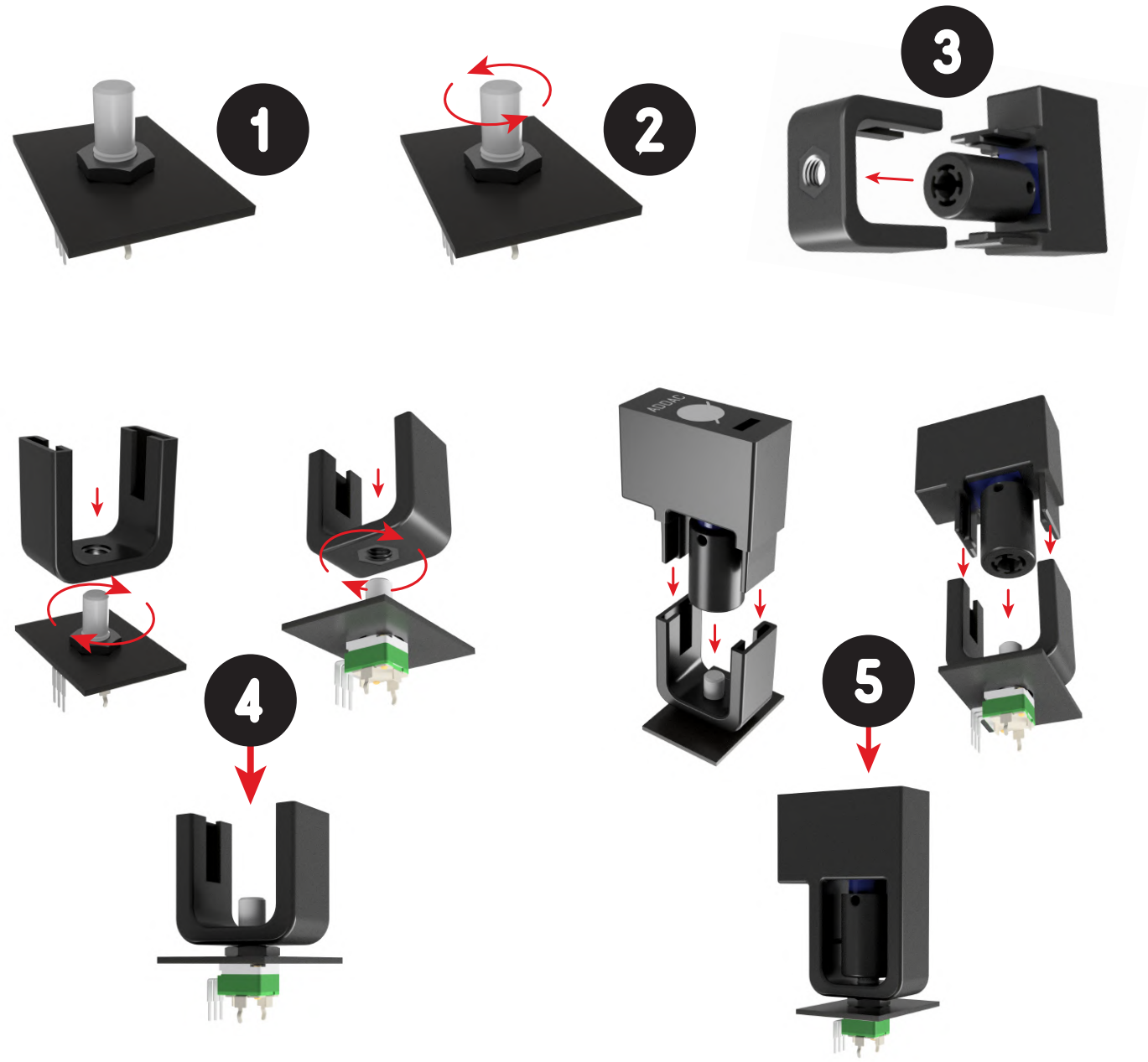
SETTING UP

Installation Procedure

1. Remove the knob from the potentiometer
Start by removing the knob from the potentiometer to be controlled, exposing its shaft and thread.
The complexity of this task varies, some knobs come out fairly easy just by pulling on them, some others have grub screws on their side that attach to the potentiometer shaft and need to be removed, some others will have a very tight fit (for these there are special tools to help remove them without causing any cosmetic damage however with some care and practice using a screwdriver as a lever pushing from under the knob can be very effective).

2. Rotate the potentiometer all the way counter clockwise
3. Proceed by detaching the U bracket from the Servo Connector
4. Screw the U bracket to the exposed potentiometer until it locks in place, don't over tighten it!
5. With the servo already connected to the Controller box and at zero value, attach the connector body to the U bracket.

Finish the procedure by testing the servo range using CC values from 0 to 127.



MIDI IMPLEMENTATION

MIDI INPUTS

There's 3 MIDI inputs available to control the Servos, they can be used at the same time, just be sure not to overlap Servo channels from two different MIDI sources.

These options allow different devices to be connected depending on the user preference, for ex:
Control it from a midi controller or sequencer via the 3.5mm jack
Control it from a DAW via USB-C or Bluetooth MIDI to automate the physical controls of the remote device

USB-C MIDI . Useful if the MIDI device is close to the Servo Control box.
Simply plug into a device a look for Port:
ADDAC USB SERVO CONTROL

Bluetooth MIDI . Useful if the MIDI device is far from the Servo Control box.
Look for the device named:
ADDAC BT SERVO CONTROL

DIN5 MIDI . Useful for midi controllers and sequencers with DIN5 outputs.
Plug to any device using the 3.5mm jack or through our DIN5 adapter.

SERVO CC Channels

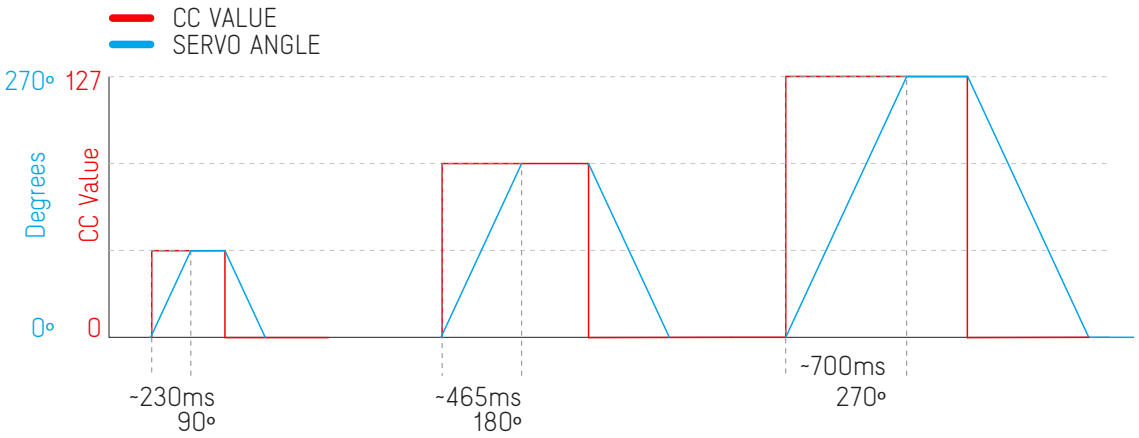
MIDI implementation is extremely straight forward,
Always use MIDI Channel 1
And then each Servo responds to its channel number:
Servo 1 responds to CC Channel 1
Servo 2 responds to CC Channel 2
..

The CC values (0-127) control the servo angle (0-270)
CC value = 0 <=> minimum servo rotation
CC value = 127 <=> maximum servo rotation

MIDI IMPLEMENTATION	
SERVO	CC CHANNEL
SERVO 1	1
SERVO 2	2
SERVO 3	3
SERVO 4	4
SERVO 5	5
SERVO 6	6
SERVO 7	7
SERVO 8	8

RESPONSE TIME

The Servo response time is digitally limited to prevent abrupt changes extending the motor life and avoiding extreme strain on the motor gears. For reference it takes approx. 230ms to travel 90º, ~465ms to travel 180º and ~700ms to travel the full range of 270º.
If the incoming MIDI data rate of change is above the servo speed then the Servo angle will lag behind.



SERVOS DURABILITY & REPLACEMENT

We use good quality servos with metal gears for extra resistance to heavy use, still being a mechanical element it is prone to eventually wear out and stop working. The Servo durability will vary greatly depending on frequency of use.

The life expectancy will also depend on the style of use, slow changes will have less wear than faster movements which cause more gear wear.

Servos are easily replaceable by detaching the coupler using an hex key, then lifting the Servo Connector top lid and replacing the servo for a new one.

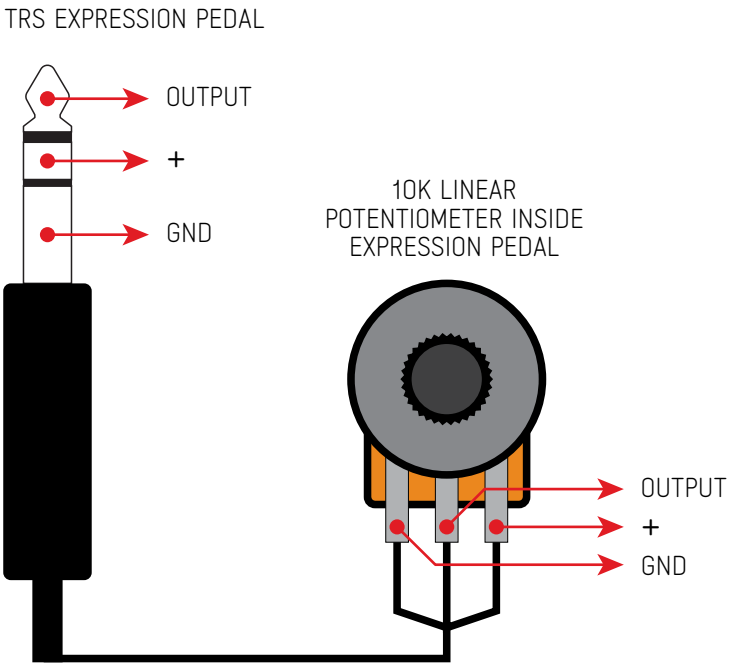
We provide Servo replacements upon request.

EXPRESSION PEDALS INPUTS

Choosing a TRS Expression Pedal

There are many TRS expression pedals in the market, from our experience cheap ones like the Lead Foot LFX-1 or M-Audio EX-P work great, if looking for a compact and rugged solution the Digitech DOD Mini Expression Pedal is a great option. If looking for no compromises the best one we tried is still the Headrush Expression Pedal.

If choosing other options look for a TRS style expression pedal with a Linear 10k potentiometer.



Expression Pedal Controlling a Servo

There are 4 TRS expression pedals inputs, they allow an easy way to access the first 4 servos without any MIDI connection.
Each pedal input will control its corresponding Servo:

SERVO	EXPRESSION PEDAL
SERVO 1	INPUT 1
SERVO 2	INPUT 2
SERVO 3	INPUT 3
SERVO 4	INPUT 4

Only use MIDI to control channels that are not being controlled by expression pedals and vice-versa.
If overlaps occur the Servo will behave erratically.

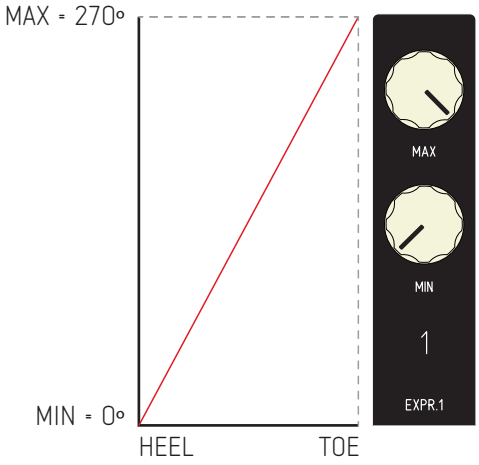
EXPRESSION PEDAL RANGES

MIN MAX CONTROLS

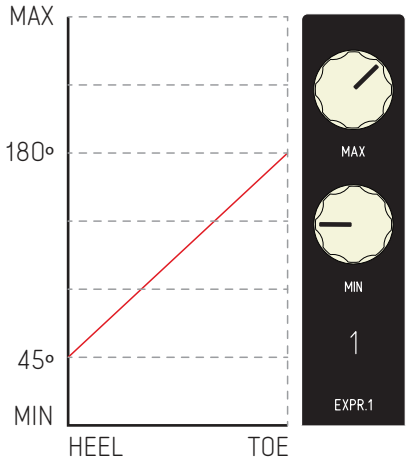
The two knobs per channel allow to set the range of the Expression Pedal and can also be used to invert the Heel > Toe action.
With [MIN] fully counter clockwise and [MAX] fully clockwise the Heel pedal position rotates the servo to the minimum position, the Toe pedal position rotates the servo to the maximum position.
If the MIN and MAX knobs are inverted, the MIN knob above MAX knob then the Heel > Toe action will also be inverted.
For example, with [MIN] fully clockwise and [MAX] fully counter clockwise the Heel pedal position rotates the servo to the maximum position and the Toe pedal position rotates the servo to the minimum position.

Here's a few graphic examples of the Heel > Toe action together with the MIN and MAX knobs setting the servo angle.

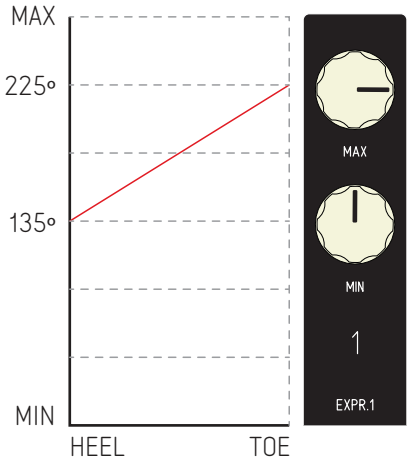
REGULAR ACTION



Expression pedal range
CC Value: 0 - 127

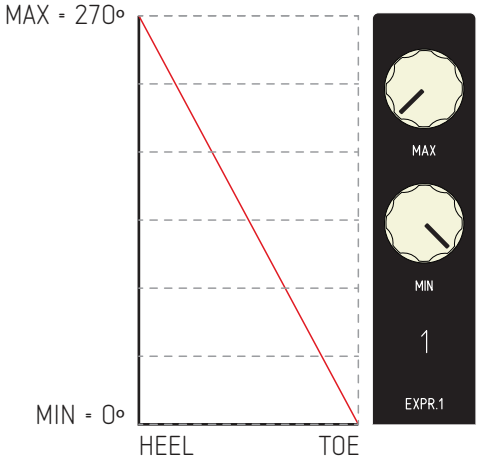


Expression pedal range
CC Value: 21 - 84

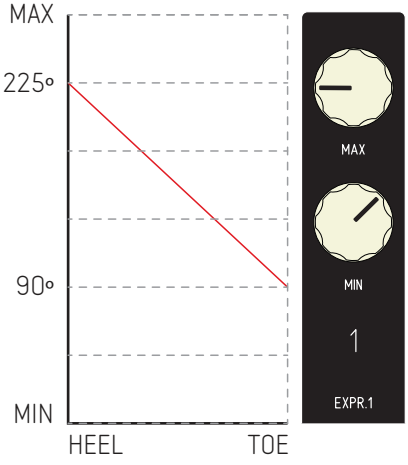


Expression pedal range
CC Value: 64 - 106

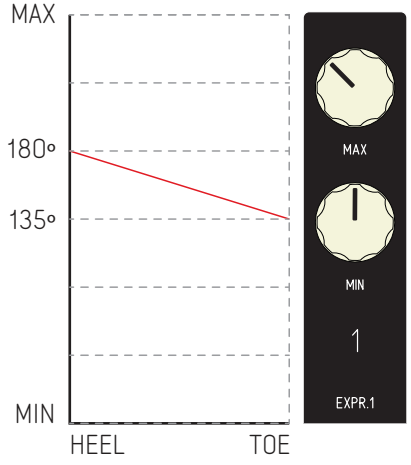
INVERTED ACTION



Expression pedal range
CC Value: 127 - 0



Expression pedal range
CC Value: 106 - 42



Expression pedal range
CC Value: 84 - 64

EXPANDING THE POSSIBILITIES

Unusual Uses

This sytem can also be used in situations that need to control some other non-musical devices in installation or performace contexts, such as a controlling a light dimmer knob, a motor speed controller, a fan speed controller, a smoke machine intensity knob...

For feedback, comments or problems please contact us at:
addac@addacsystem.com

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