

3/22/2025

Installation instruction manual for the
Universal Piston Stepper (UPS)
By AOB INC
Version 4.3

Notice:

This installation requires technical skills in electronic wiring and voltmeter use. Contact us if you are in question about your level of skills.

PLEASE READ ALL INCLUDED MANUALS BEFORE YOU BEGIN THE INSTALLATION.

The Universal Piston Stepper (UPS) has static sensitive parts on it that can fail if handled incorrectly. Take preventative precautions during handling and installation. Once **completely wired** in a system the UPS is protected against static discharge to a reasonable level.

Because of the multitude of different systems in the world, we cannot test them all. There is a remote chance there may be circumstances where our system is not compatible with what you have. Contact us and we will do our best to work things out. This includes having the UPS returned for a full refund.

System requirements:

The host organ must have a completely functional solid state combination action with multiple memory levels that are increased or decreased through a push button, piston, or rotary dial. The base UPS will accommodate up to 16 general pistons, or 32 with an optional daughter board. The number of memory levels is irrelevant as they are only accessed.

The console system voltage used to power the UPS board should be between 10vdc and 18vdc and provide at least one ampere of current.

Voltages across the pistons can be 4.3vdc to 35vdc (measured between piston contacts). Polarity of the piston common can be negative or positive (select with jumper). But it must be the same for all General pistons, General Cancel, Step Up, and Down pistons. The level up and Down pistons (or Rotary method) on the combination action has its own common (polarity not important) that is connected to the MemOutCom terminal.

Additional parts needed:

Two toe or thumb pistons for Stepper Up and Down action. (supplied in Kit)

One General cancel piston. (supplied in Kit)

OLED display with attached cable. (supplied in Kit)

22 gauge minimum is required for the UPS circuit board power supply connection. Pistons' can use 24 to 34 gauge wire. Piston common wires can be the same gauge as the piston sense wires.

(Continued)

Installation Instructions:

The following must be completed:

Record the number of General pistons available. ____

With the organ on, measure the voltage across a General piston and record voltage here. ____

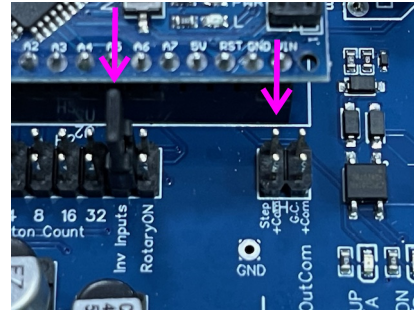
While measuring the piston voltage, notice the polarity of the common wire and record here. ____

Now is a good time to set up polarity jumpers.

Positive Jumpers

Install a Jumper on the Pins labeled “INV INPUT”.

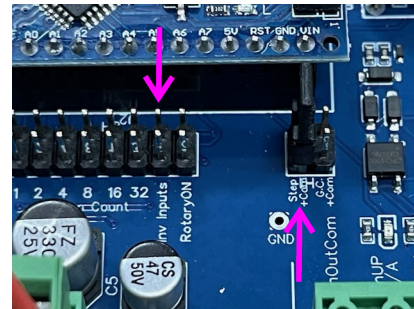
No Jumper on Pins labeled “Step +Com”.



Negative Jumpers

Install a Jumper on Pins labeled “Step +Com”.

No Jumper on Pins labeled “INV INPUT”.



Measure the console power supply voltage. The UPS circuit board power voltage connection can be between ten and eighteen volts. If the voltage is too high, install a 12vdc 1 ampere power supply and connect it to the UPS board. NOTE: The ground connection of any additional power (if used) must be directly connected to the ground connection of the combination action power supply.

Locate a position to mount the UPS circuit board. It should **NOT** be around any console lights or their wiring. It is important to keep spurious radiation away from the circuit board or its wiring. Use five #6 sheet metal screws provided to attach the UPS circuit board inside the console.

Find a path to install wiring from the pistons and toe studs. Make modifications to the console to provide an unencumbered route for wiring. Remember to provide extra wiring length to accommodate lifting of keyboards and piston rail removal. If the combination action has a spreader for its piston wires, the UPS piston wires can be attached there. The wire gauge should be as small as possible to make installation easy. Lace the wires with wax string or small tie-wraps. Use hot glue to attach cables to the back of the piston rail and/or other locations in the console. It only takes a little dab of hot glue to attach wires down.

Plan a location for the display. Follow separate instructions for mounting the bezel.

(Continued)

List of UPS Kit parts:

One Universal Piston Stepper circuit board.

One three-position power connector.

One OLED display with one surface mount bezel with attached cable

Three pieces of eight-position screw down wire connectors for pistons and commons.

Seven jumper pins to indicate the number of pistons used and polarity.

One Step Up piston and One Step Dn piston.

One toe piston.

Begin installation:

Make sure all listed parts have arrived in package. (Reference packing list included with shipment.)

Leave installation/mounting of display until UPS is functioning as expected.

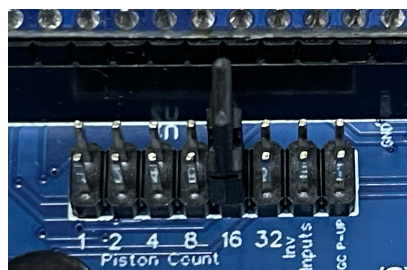
Attach the UPS circuit board into the desired position.

Attach power wires **only** with organ off. (Reverse polarity protection is provided.)

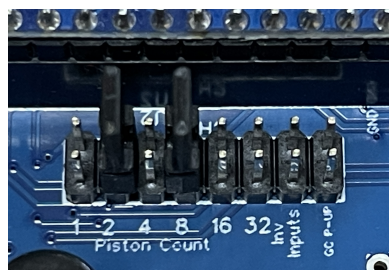
Plug the display cable onto the UPS board four pin connector label “DISPLAY OUT”. Place the display loosely out of the way, but visible.

Turn organ power on. There should be an illuminated LED on CPU. Leave the system on for one minute. Turn the system off and give the UPS board the smell test for burning or other foul smells. Nothing on the UPS board should be **HOT**. Continue if all is good. Of course, power down if any concerns arise. The display may display an error message at this time. Ignore display error messages at this time of installation.

There are six pairs of pins labeled “Piston Count”. Place supplied jumpers on pin(s) with numbers that add up to the total General pistons being used. Example: if there are 10 pistons used, place jumpers on number 8 and 2. Piston counts greater than 16 require use of a UPS Daughter Board.



16 Pistons

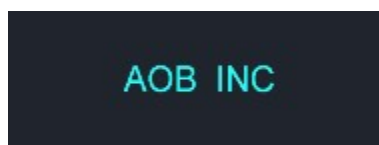


10 Pistons

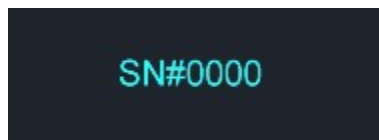
(Continued)

Turn the organ system power on. The display will go through the following startup messages.

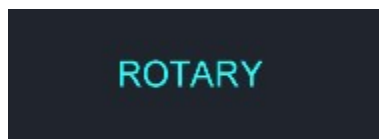
Startup Messages

A black rectangular display showing the text "AOB INC" in red.

Company Name

A black rectangular display showing the text "SN#0000" in red.

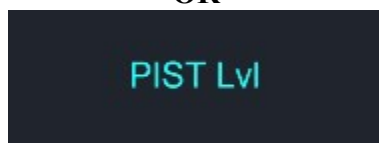
Serial Number of UPS Circuit Board

A black rectangular display showing the text "ROTARY" in red.

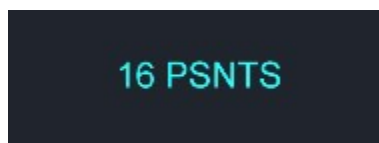
ROTARY indicates a Rotary Dial is used to change levels.

OR

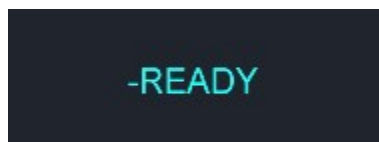
(Selected with jumper on UPS board.)

A black rectangular display showing the text "PIST Lvl" in red.

PIST Lvl indicates pistons are used to change levels.

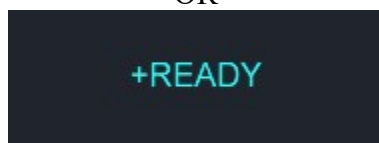
A black rectangular display showing the text "16 PSNTS" in red.

Displays the number of General pistons expected.

A black rectangular display showing the text "-READY" in red.

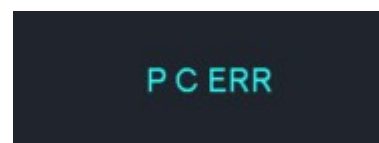
-READY indicates the common polarity is set to negative.

OR

A black rectangular display showing the text "+READY" in red.

+READY indicates the common polarity is set to positive.

Other display messages.

A black rectangular display showing the text "P C ERR" in red.

Indicates there is an abnormal piston count selected on jumpers.
Counts greater than 16 (or 32 with daughter board) will display this.
No jumpers selected will also give this message.

A black rectangular display showing the text "15 4" in red.

Active Stepper message with Level # on left and Last Piston Pressed # on the right.

Continue if things appear good. Otherwise, call us for support.

The pistons need to be connected to the eight-position push-on connectors (on the circuit board side with the power plug). Connections are numbered consecutively from one to sixteen, left to right. Leave unused piston

connections empty. Remember to strip wires going into the eight position connectors. Be gentle when tightening the connector wire locking screws. They do not need much force.

The piston connections can be wired directly to the combination action piston spreader if desired.

(Continued)

Pin connections starting from Left (power connector end):

#1 MemOutCom	Used for combination action Level Up & Dn controls.
#2 MemUpOut	Connect to Level Up piston or button.
#3 MemDnOut	Connect to Level Down piston or button.

#4 StepCom	No Used.
#5 StepUpIn	Connect to Step Up piston.
#6 StepDnIn	Connect to Step Down piston.

#7 PistonCommon	Connect to General piston common.
#8 G.C. In	Connect to General Cancel piston.

#9 Pin1	Connect to General Piston #1.
...	Same for piston #2 to #15.
#24 Pin16	Connect to General Piston #16.

All pistons and General Cancel share the same common wire.

The MemUpOut and MemDnOut have their commons attached to Pin #1 (MemOutCom).

Since new (to the console) toe and/or thumb pistons will be installed for Step Down and Step Up. Attach their commons to any other common at a nearby piston.

Multiple Step Up and Down pistons may be used. Just parallel their complimentary wires to each other.

It is unknown what the installed combination action has for controlling its memory level up and down functions. This will require some detective work on your part. The switch or buttons need to be understood how they make contact. It is your job to intersect these wires or contacts along with their common wire between them. These wires will connect as follows:

The combination action memory level switches common will go to “MEMOUTCOM” connection.
The combination action memory level up switch sense wire will go to “MEMUPOUT” connection.
The combination action memory level down switch sense wire will go to “MEMDNOUT” connection.

There are separate instructions included if a **rotary switch** is connected.

It is now time to test the system.

Normal startup messages are as follows:

AOB INC
SN#00000
Xx PSNTS (number of pistons wired.)
Rotary or Piston level control.
+READY or –READY (the polarity sign indicates the current piston common polarity.)

Press General piston one. The display will show the number “1” on left and right side. Now press Step Up piston. The display should be increased to piston “2”, and so on. Continue pressing Step Up to until your last piston. Look at the display while you press Step Up on more time. The display should now show “2” and “1”. “2” being the level it moved to and “1” being the current piston engaged. Stops should have moved if registration was set on these pistons.

Now reverse the test using the Step Down piston. Continue pressing until you are back to piston 1 on the display.

Testing is now complete.

Now it is time to permanently mount the display on the console. Follow the separate instructions provided for OLED display installation.

(Continued)

Input Supplement

