

# Q182KP Knob and Pressure Controller

Feb 2014

The Knob and Pressure controller produces voltages as the knob is turned and pressed. Perfect for pitch bending and controlling amplitude as you play notes on the keyboard, or to control any parameter in the synthesizer system.

The knob acts like a horizontal wheel controller, complete with user-configurable spring return, center detent and end switches.

The Knob and Pressure controller uses our standardized Q182 dual-channel Controller Interface module providing an Auto Gate, Switch Gate and a voltage output range switch for each sensor. The left side of the panel handles knob rotation and the right side handles knob pressure.

The module can be mounted in a Box-style cabinet next to your keyboard controller, or in a synthesizer cabinet just like any other module.

An Auto Gate signal is automatically created as the knob is turned and as it is pressed. This gate can be used to trigger sequencers and envelope generators.

A switch at each end of the knob's travel activates the Switch Gate signal for triggering devices also.



## Q182KP Knob and Pressure Controller Specifications

**Panel Size:** 4.25"w x 8.75"h. (double-space)

**Knob Range:** ~90 degrees

**Spring Return:** Off, Center, Forward, or Reverse - user-configurable

**Detent:** Center - user-configurable

**Knob:** 2.25" diameter

**Voltage Output:** Selectable range - 5V, 2V, 4/12V

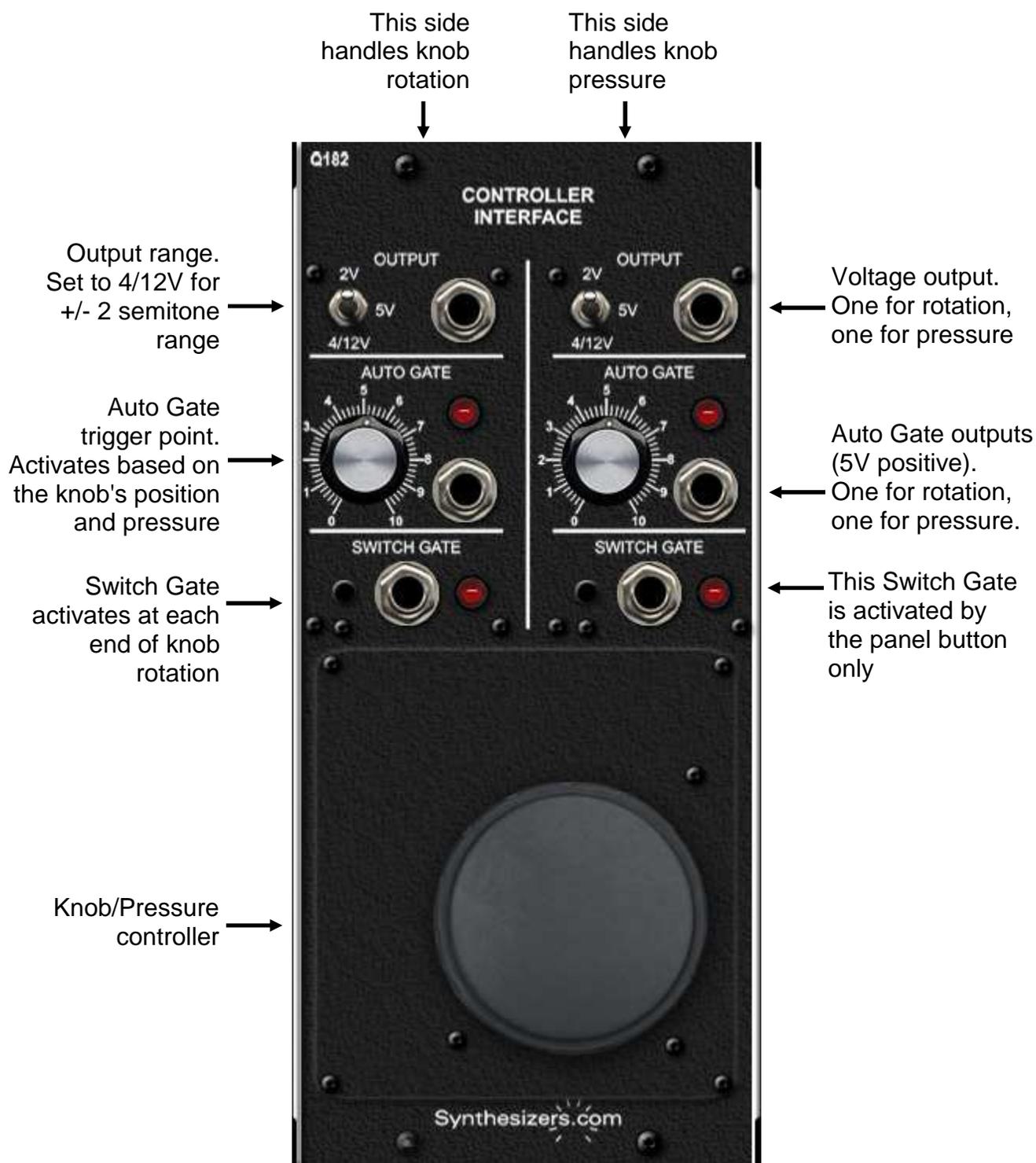
**Auto Gate Output:** 5V, adjustable position activation

**Switch Gate Output:** 5V, activated at knob end travel

**Power:** +15V@100ma, -15V@100ma, +5V@100ma

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## Features and Operation

The Q182KP produces signals as the knob is rotated and as it is pressed down. The controller operates through the Q182 Controller Interface module to produce voltages and gate signals - one set for the knob's rotation, another set for the knob's pressure. These signals can be used to control parameters in a synthesizer system.

### Voltage Output

The main outputs of the Knob and Pressure Controller are voltages that vary as the knob is turned and pressed. The range of this voltage is controlled by the output range switch to select 5 volts, 2 volts or 4/12ths volt. Use the 4/12ths volt position for 4 semitones which works well for pitch bending. For modulation, use the 5 volt position then attenuate or invert the signal at the destination module.

### Auto Gate

A gate signal is produced automatically when the controller changes. One for rotation, one for pressure. The position that triggers this gate signal is set by the variable control. An LED shows status of the Auto Gate. This Auto Gate signal can be used to trigger envelopes, start sequencers or change other module parameters depending on the controller's position. Auto Gate may also be used to transpose oscillators or alter filter parameters at certain knob positions. The Knob and Pressure controller can be used for this Auto Gate feature alone, ignoring the voltage output if desired. Use a Q125 Signal Processor module to Invert, offset or attenuate this gate signal as needed.

### Switch Gate

The Knob and Pressure controller has a switch at each end of rotation. This switch activates the Switch Gate signal which can be used to control envelope generators, sequencers, etc. The Switch Gate can also be activated manually using the panel button. The controller can be used solely for this Switch Gate feature if desired. The Switch Gate signal on the pressure side of the panel is activated by the panel button only.

Knob and Pressure controller mounted in a Box2



## Calibration

Calibration is done at the factory and not required under normal circumstances. Only attempt these procedures if you have the skills and a good digital voltmeter. We can perform this procedure for you.

Two trimmers provide Scale and Offset adjustments so the knob's rotary motion produces the correct voltage output. The trimmer nearest the edge of the PCB is Scale, and the other trimmer is the Offset. Another set of trimmers handles the pressure sensor.

The potentiometer for the rotary motion is 50K linear but only part of the travel is used. The knob bracket must be attached to the pot so the resistance is about 5k when fully counter clockwise.

Rotary motion calibration (left side of module):

Attach a voltmeter to the Output jack of the Q182 Controller Interface.

Set the Output range switch to 5V.

Set the Mode jumper on the Q181 PCB to bipolar (pins 1-2).

With the knob fully CCW, adjust the Offset trimmer to get 0 volts.

Turn the knob between full CCW and full CW

and adjust the Scale trimmer for 5.00 volts of change.

This may take many cycles.

Then with the wheel centered, adjust the Offset trimmer to 0 volts.

Now the knob should produce -2.5 to +2.5 volts output.

Pressure calibration (right side of module):

Attach a voltmeter to the Output jack of the Q182 Controller Interface.

Set the Output range switch to 5V.

Set the Mode jumper on the Q181 PCB to unipolar (pins 2-3).

With no pressure on the knob, adjust the Offset trimmer to get 0 volts.

Press the knob with 3# of force and release it,  
and adjust the Scale trimmer for 5.00 volts of change.

This may take many cycles.

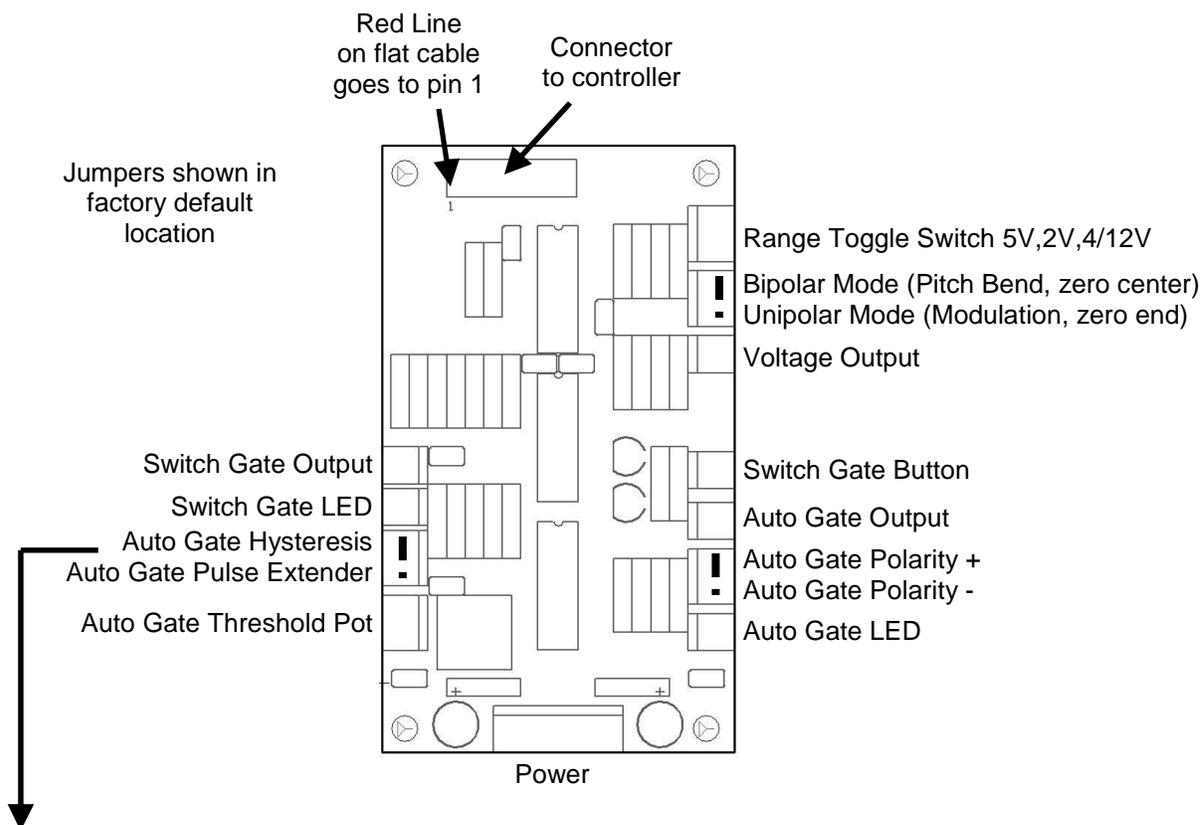
Then with no pressure on the knob, adjust the Offset trimmer to 0 volts.

Now the knob pressure should produce 0 to 5 volts output.

## End Travel Switch

A small circuit board with a tiny switch is mounted on the frame to activate when the knob is rotated fully CW and fully CCW. This activates the Switch Gate signal. If the switch does not activate, adjust the switch bracket so the switch fully engages when the knob is fully CW and CCW. Tighten the bracket.

## Q181 Controller Interface PCB



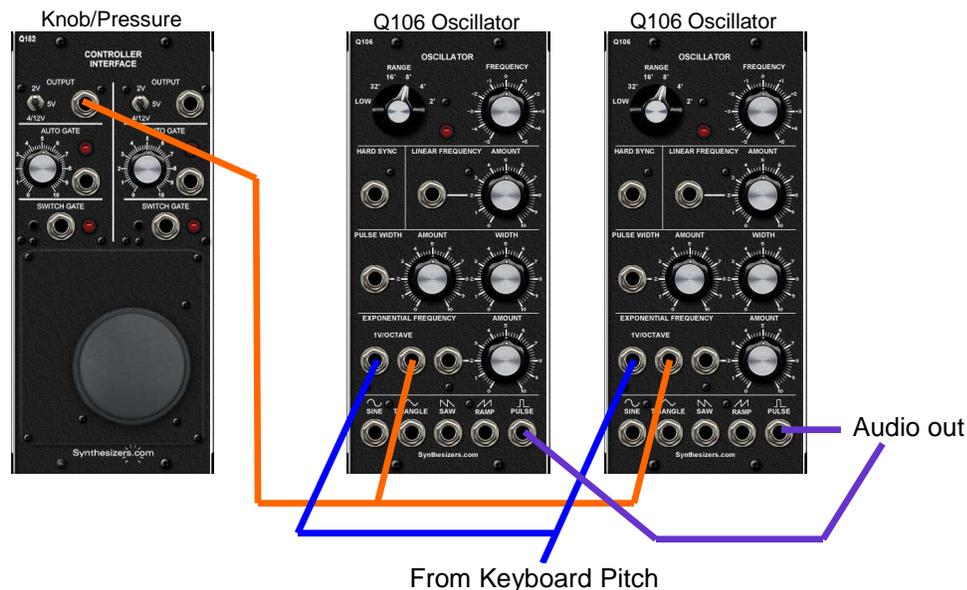
Hysteresis limits Auto Gate oscillation at the threshold. Pulse Extender is used for piezo sensors such as drums to lengthen the Auto Gate pulse.

### 14-Pin Controller Connector

1 Ground	8 Range pot
2 +15V	9 Auto Gate
3 Key	10 +5V
4 -15V	11 Up LED
5 Offset pot wiper	12 Down LED
6 Sensor	13 Switch Gate
7 Range pot wiper	14 LED ground

## Patch Ideas

This is a common patch where the Knob and Pressure controller is used to pitch bend two oscillators. Voltage from the knob is added to the keyboard's pitch voltage at each oscillator. Pitch bend can also be accomplished by using the Q174 MIDI Interface's ADD-IN input.



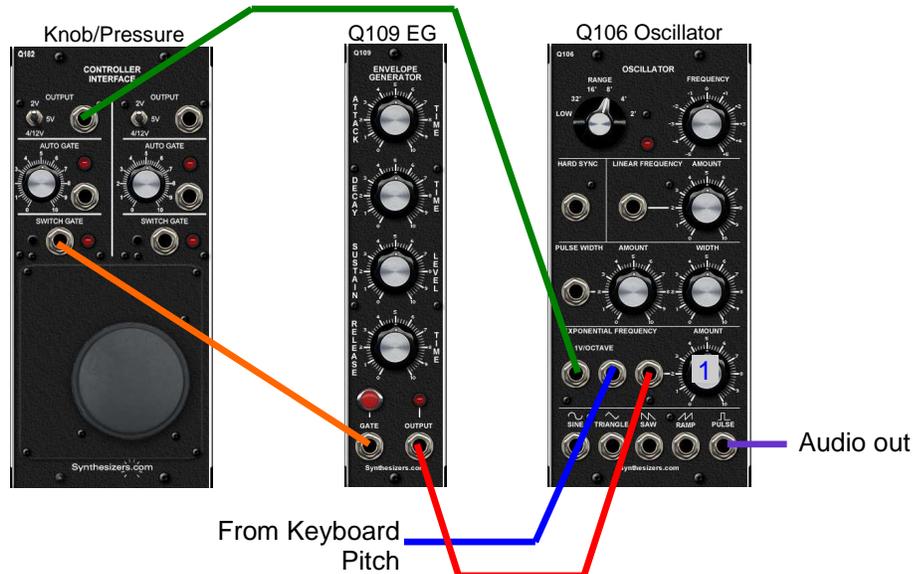
This patch shows the pressure output and a Q108 Amplifier (VCA) controlling the modulation depth of an oscillator. The first oscillator is used as an LFO to create vibrato on the second oscillator. The second oscillator produces the waveform for the synthesizer voice.



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In this patch, the Knob and Pressure controller is used as a pitch bender and the Switch Gate triggers an envelope generator for a special effect. When the knob is turned to the end, the envelope will trigger.



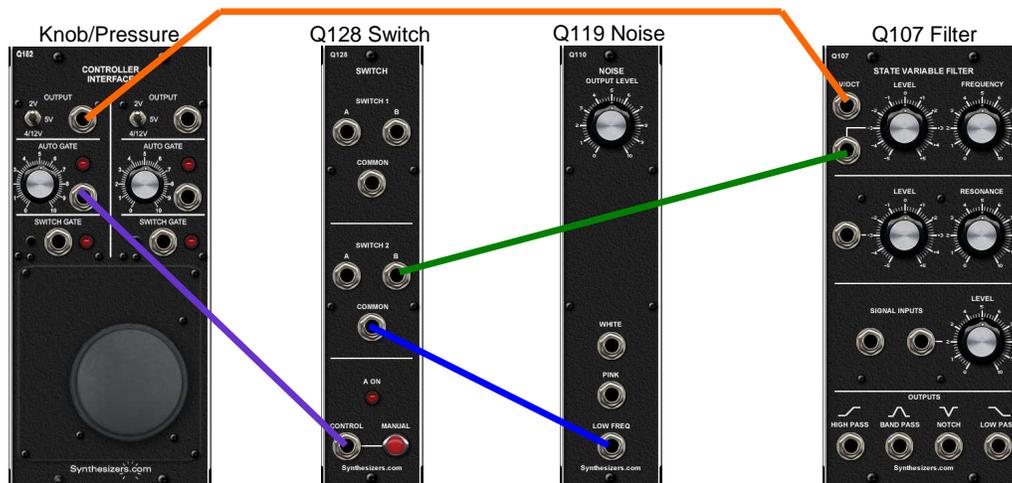
This patch shows the Knob and Pressure controller starting a Q960 or Q119 sequencer using the Auto Gate signal. The knob location which activates the Auto Gate is set by the panel control.



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This patch shows the Knob controlling a filter and the Auto Gate turning on noise modulation. As the knob is turned, the Auto Gate turns on according to the knob's position. That gate is then used to switch on a noise signal using a Q128 Switch. A Q108 Amplifier could be used as the switch.



Auto Gate and Switch Gate can be used for more than on/off functions. In this patch, Auto Gate from the pressure sensor is used to transpose an oscillator by one octave. Auto Gate provides 5 volts to the variable input on the oscillator and adjusted to produce a 1-volt (1-octave) change.

