How to use a Rotary Switch

What is a rotary switch?
A rotary switch is a switch in which the contacts are changed when the spindle is rotated in either a clockwise or an anticlockwise direction. See Fig. 1a for a picture of a rotary switch, and Fig. 1b for a circuit symbol.

Fig. 1a A typical Rotary Switch

Fig. 1b Circuit diagram for one pole of a 3 pole 4 way switch

Rotary switches come in different pin arrangements, some of the most common are:
• 1 pole 12 way
• 2 pole 6 way
• 3 pole 4 way
• 4 pole 3 way

How does it work?
The rotary switch pictured in Fig. 2a is a 3 pole 4 way switch. This is shown by the text “3|4” in the centre. The ‘poles’ are the three legs in the centre and the ‘ways’ are the legs around the outside. The ‘ways’ are grouped together in sets of four legs and each set corresponds to one ‘pole’ - hence the name 3 pole 4 way.

Fig. 2a The base of a 3 pole 4 way rotary switch.

Fig. 2b Close-up of the base showing the labels next to the legs.

In Fig. 2b, you can see that each pole is labelled with a letter and that each way is labelled with a number. Pole A is connected to ways 1, 2, 3 & 4, pole B to 5, 6, 7 & 8 and pole C to 9, 10, 11 & 12.

Turning the spindle connects each of the poles to one of its ways in turn, with each pole/way set switching simultaneously.
So how can I connect one up?
If we concentrate on just one pole/way set, it is possible to use two connection methods:
• One input (on the pole) and four outputs (one on each of the ways) (see Fig. 3)
• Four inputs (one on each of the ways) and one output (on the pole) (see Fig. 4)

![Fig. 3 Rotary switch connected as one i/p four o/p](image1)
![Fig. 4 Rotary switch connected as one o/p four i/p](image2)

An example of the first method would be to have an audio input signal and switch it between the four outputs which are connected to different types of filter, so you can see what effect each type of filter has on the sound of the audio signal.

An example of the second method would be to have four different input signals (e.g. a sine wave, a square wave, a triangular wave and a sawtooth wave) and one output. You could then switch between the different inputs to put the different signals into the rest of a circuit via the output.

So how does this expand to the whole switch?
Essentially, for this example, you can have 3 inputs, each going to 4 respective outputs, or 12 inputs split between 3 outputs (depending on how you connect it). It’s easiest to treat each pole/way set as a module. There are no electrical connections between the modules, but they are mechanically connected.

This means that, although you can connect as many or as few of the inputs and outputs as you want/need to, when you turn the switch ALL of the modules will have their input/output combinations changed. Basically, there are 4 positions that the spindle can be in. The following table shows which of the ways are connected to which pole at each spindle position.

<table>
<thead>
<tr>
<th>Pole</th>
<th>Position 1</th>
<th>Position 2</th>
<th>Position 3</th>
<th>Position 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pole A</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Pole B</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Pole C</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>

This means that, if you want to change one input/output combination but leave any others the same, you will need to use a completely separate switch, as using a different input/output module on the same switch will not work.

How does all this apply to the other combinations of rotary switch?
Just the same. All that is different is the number of inputs/outputs. And remember you don’t need to use every single input and output on a switch, or even on a module, for it to work.