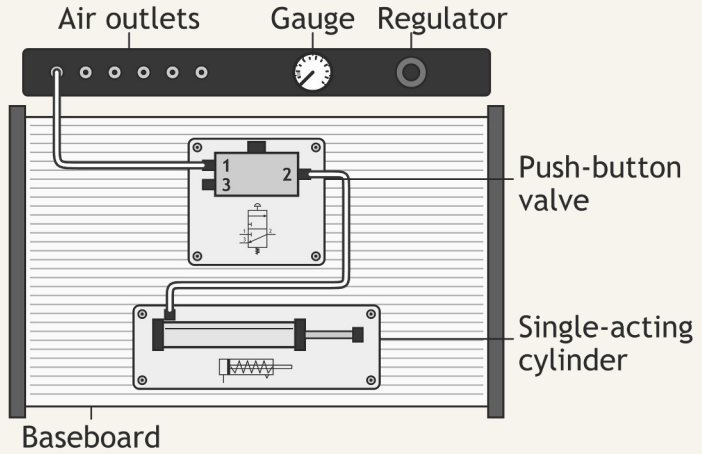
Daily Review

1	**Name** one thing air can move.	Bus doors, a tyre pump
2	**State** the three parts of a system.	Input, process, output
3	**Name** the engineer for moving parts.	Mechanical
4	**Name** the energy of movement.	Kinetic energy
5	**State** the unit of energy.	Joules (J)

Single-Acting Cylinder

Air can push hard. Use it safely.



S3 Engineering Science

By the end of this lesson...



1. I can **follow** the 5 **safety** rules
2. I can **build** and **test** a push-button circuit
3. I can **explain** where the air goes

Air Can Push Hard

Pneumatics

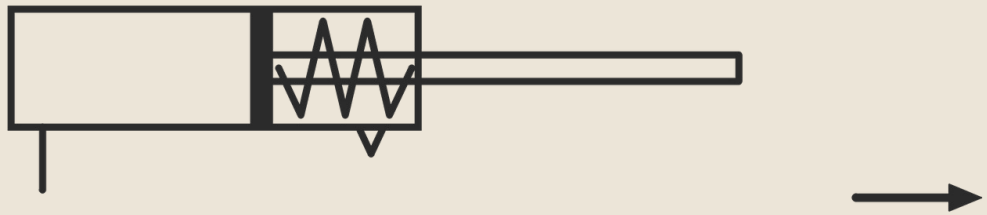
using compressed air to make things move

Compressed air

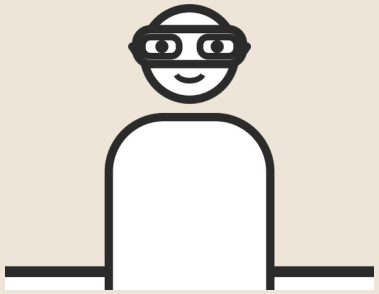
air squashed into a small space

Take care

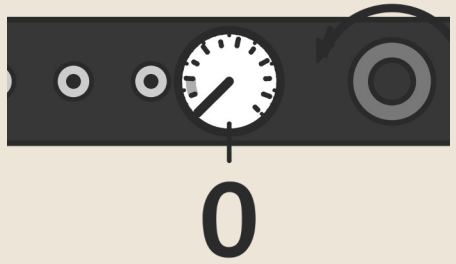
it pushes hard: eyes, ears, skin



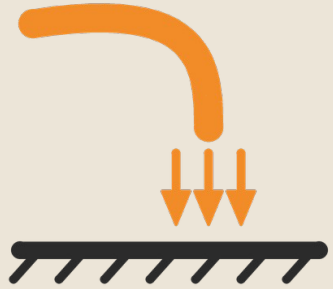
The 5 Safety Rules (1 of 2)



1 **Goggles** on when you build and when you test.



2 Regulator at **0** while you build or change a circuit.

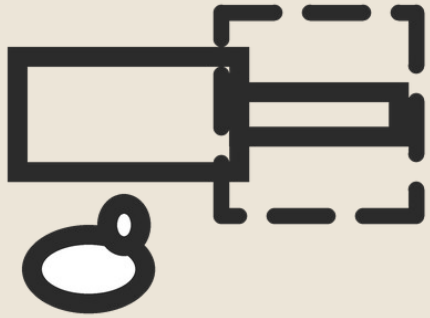


3 Never point **air** at anyone. Tube ends point down.

The 5 Safety Rules (2 of 2)



4 Hear a **hiss**? Regulator to 0 at once.



5 Fingers clear of the piston **rod**.

The Gauge: Between 1 and 2 Bar

Build

regulator at **0**

Hands up

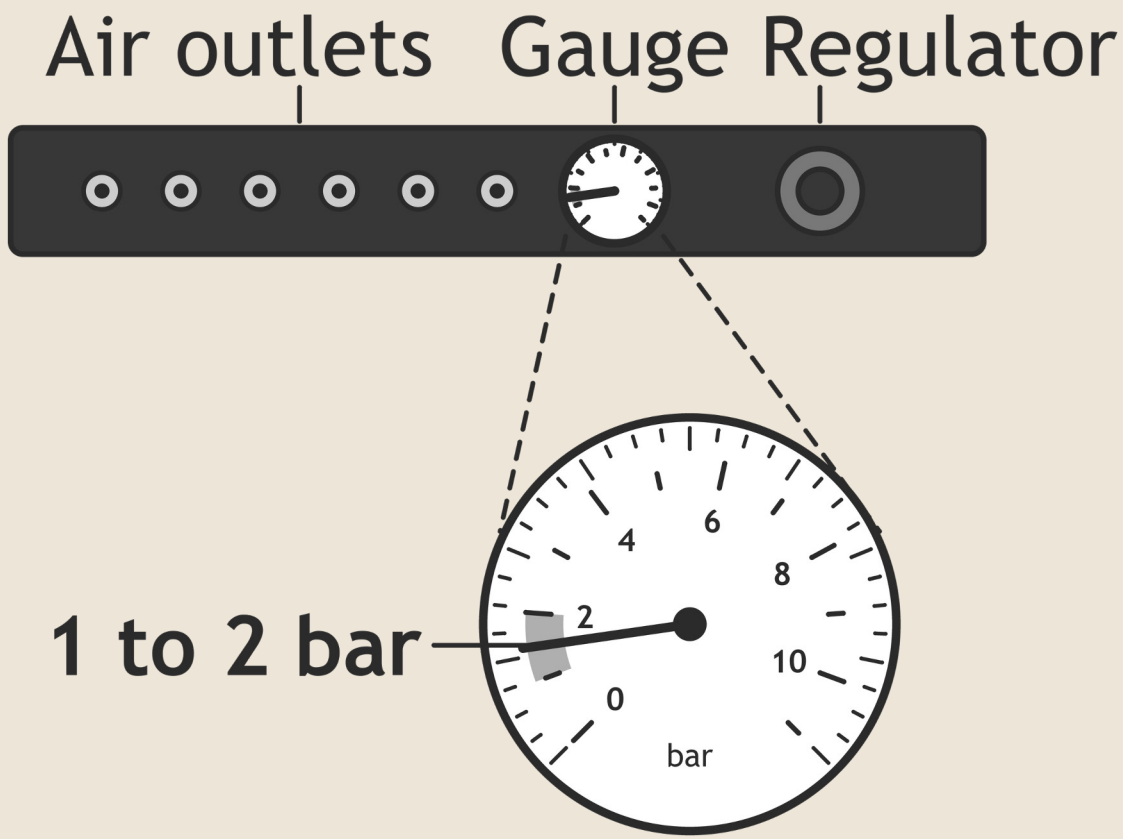
the teacher checks

Test

1 to 2 bar: inner numbers

Finish

back to **0**



Show Me: Safety



1	**State** the regulator setting while you build.	0
2	You hear a hiss. **State** what you do first.	Regulator to 0
3	**State** where tube ends point.	Down at the bench
4	**State** the pressure we test at.	1 to 2 bar

Meet the Parts: the Push-Button Valve

3/2 valve

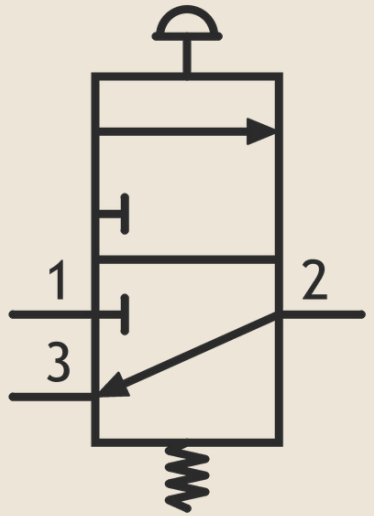
3 ports, **2** states

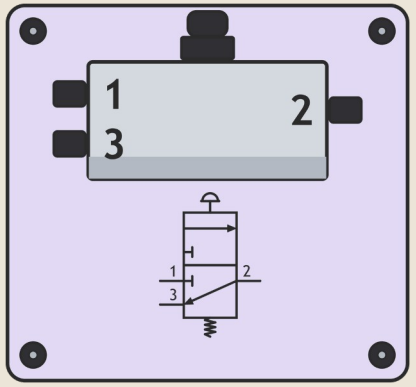
Button

push it to change **state**

Spring

pushes it **back**





The real push-button valve.

Meet the Parts: the Single-Acting Cylinder

Single-acting

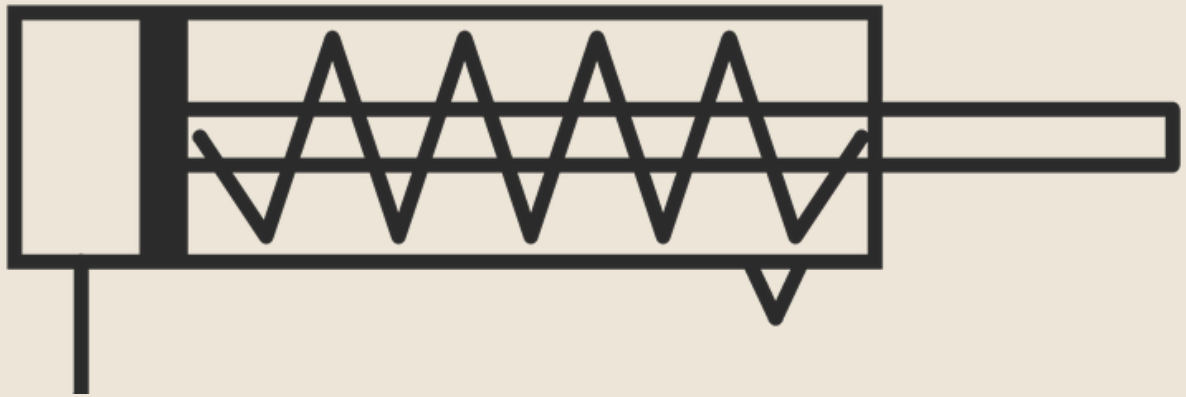
air pushes **one** way

Outstroke

air pushes the rod **out**

Instroke

a **spring** pushes it in

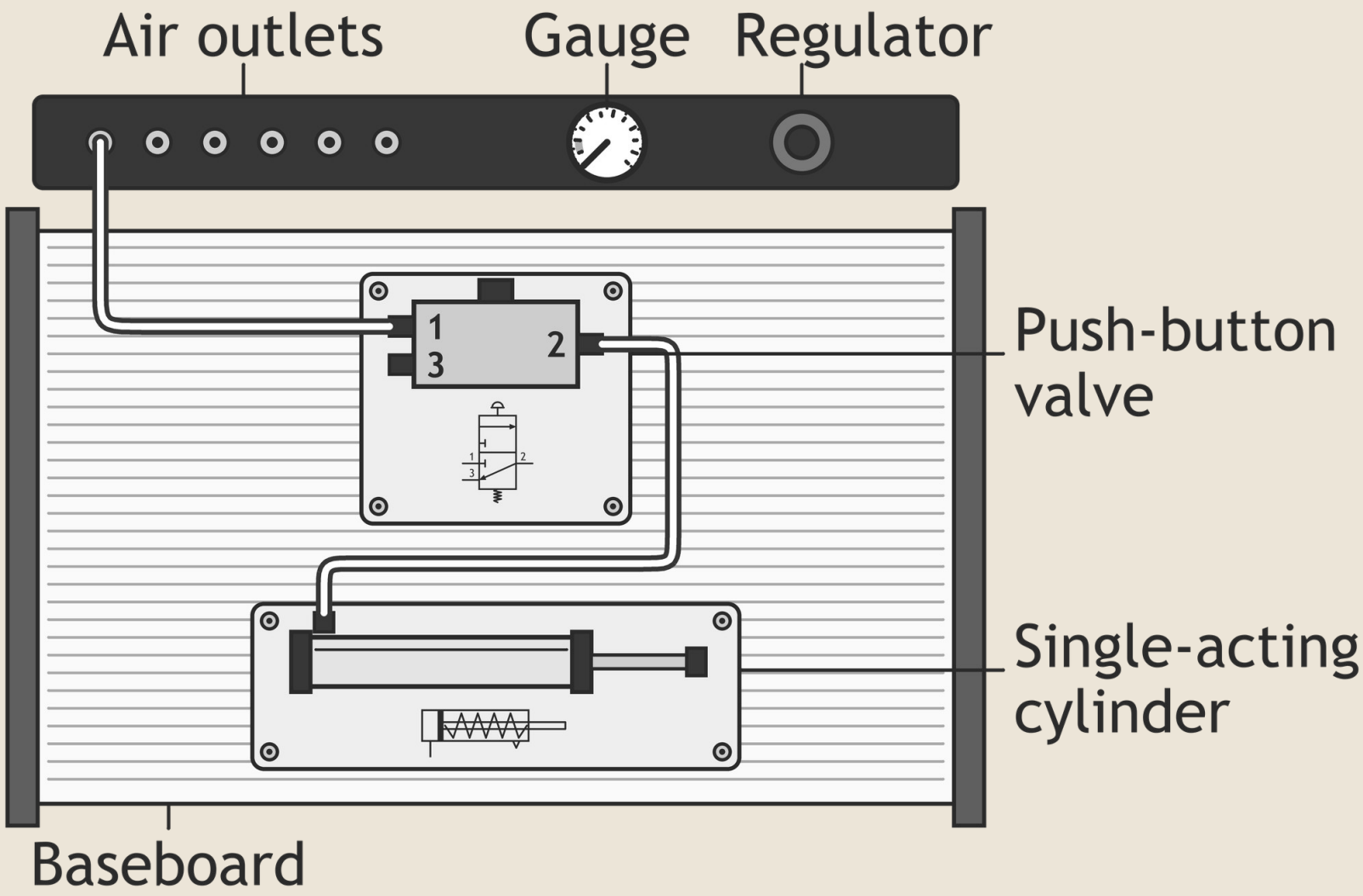


Collect, Simulate and Build

Collect the parts on the layout, tubing and goggles.

SAFETY Regulator at 0 to build. 1 to 2 bar to test.

Simulate, **build**, hands up. **Press** the button, then **let go**.



What Did You Find?

1. **State** what the rod did when you pressed.
2. **State** what the rod did when you let go.
3. **State** where you heard air when you let go.
4. **State** what pushed the rod back in.

Out

In

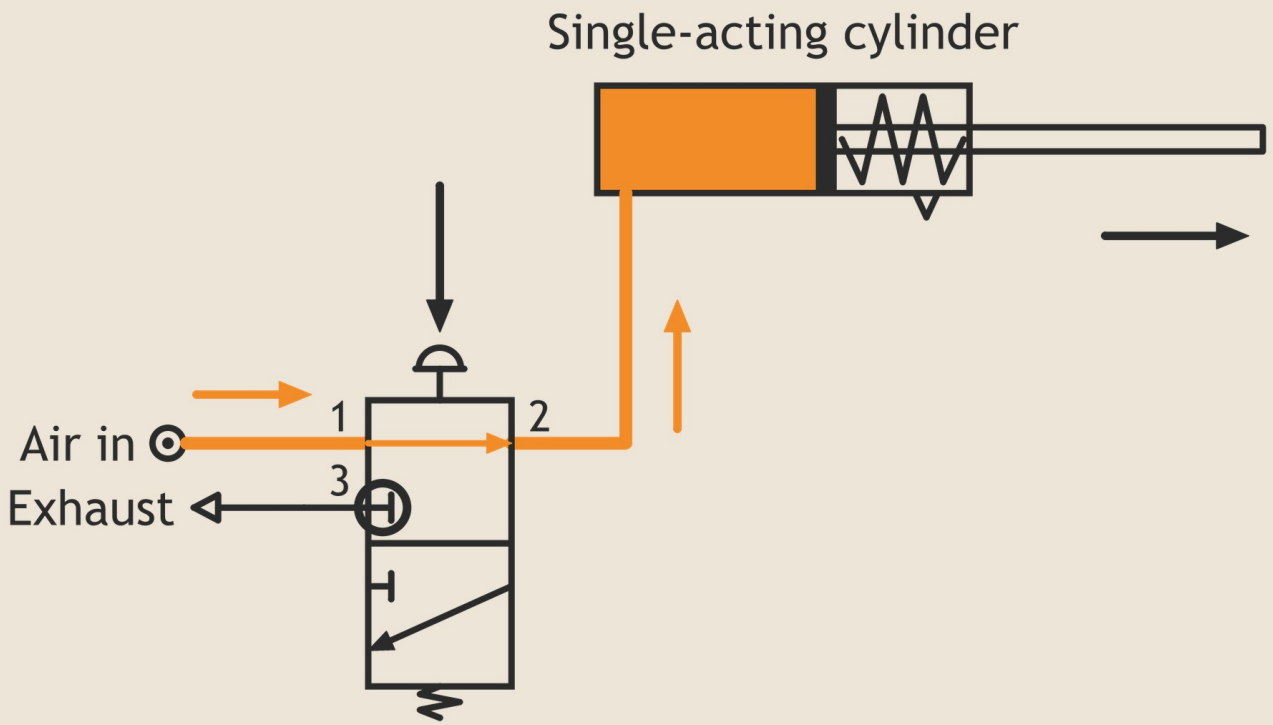
At the valve

The spring

Second Start

1	**State** what 3/2 means.	3 ports, 2 states
2	**Name** the rod moving out.	Outstroke
3	**Name** the rod moving in.	Instroke
4	**State** the regulator setting to build.	0
5	**State** the pressure we test at.	1 to 2 bar

Why: Press the Button



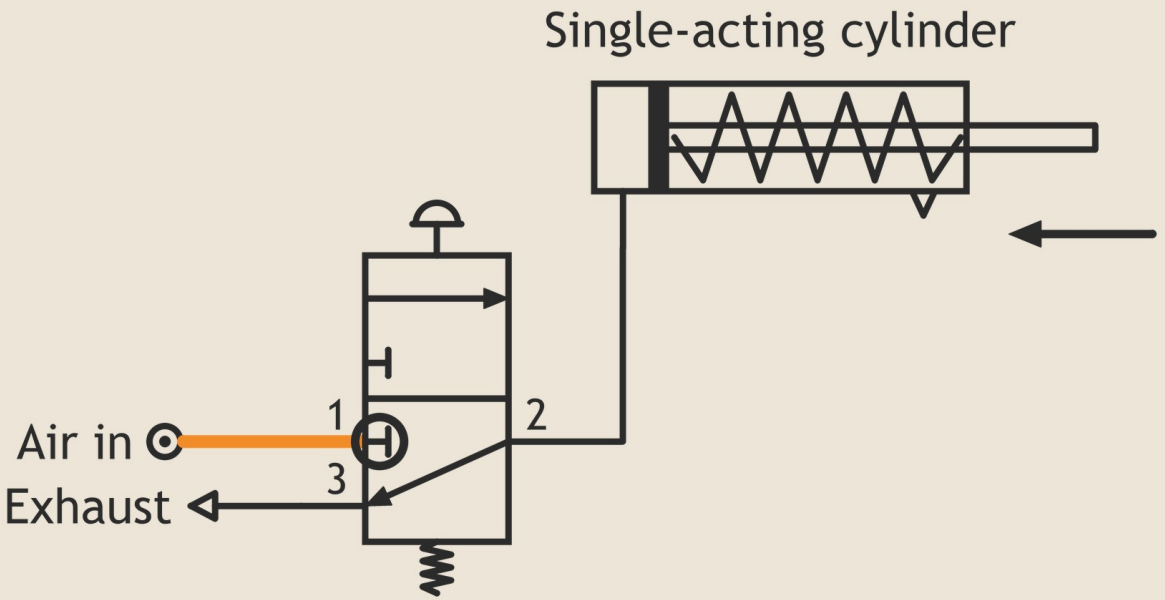
1 Push the button: both boxes slide **down**.

2 Port **3** is now blocked.

3 Air flows in port **1**, out of port **2**.

4 The rod moves **out**: the outstroke.

We Do: Let Go



1 Let go: the **spring** pushes the boxes up.

2 Port **1** is now blocked.

3 Air leaves: in port 2, out of port **3**.

4 The rod moves **in**: the instroke.

Why: The Circuit You Built

Input

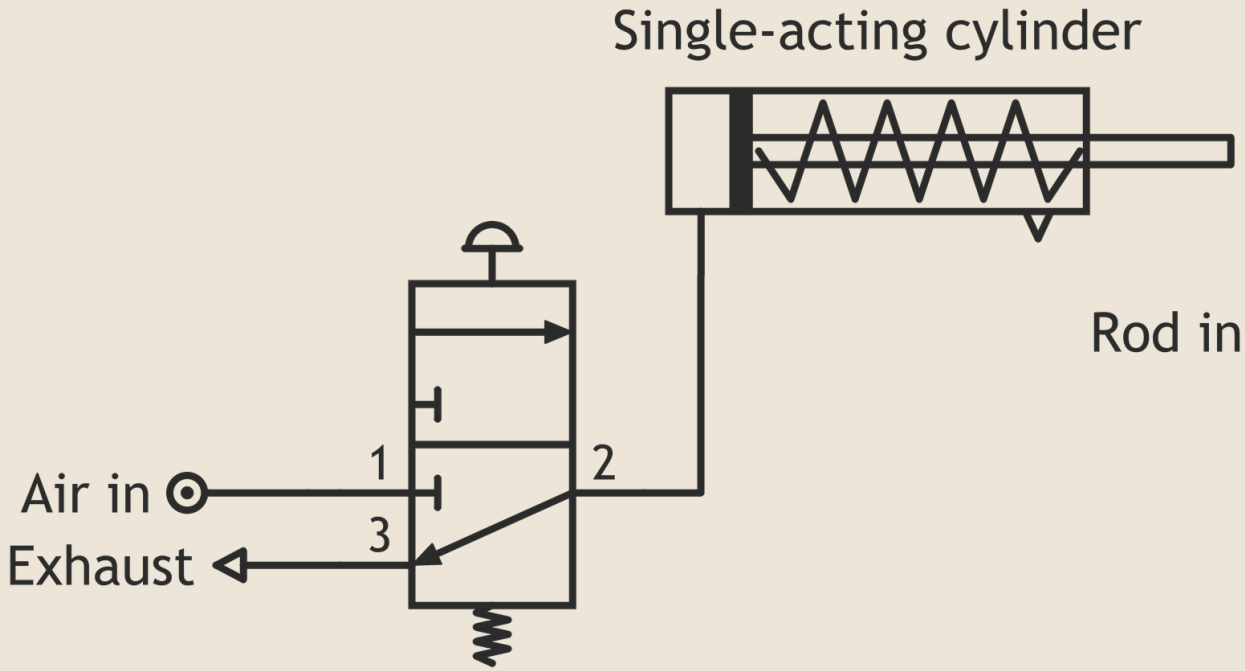
push-button valve

Output

single-acting cylinder

Pipe

port 2 to the cylinder



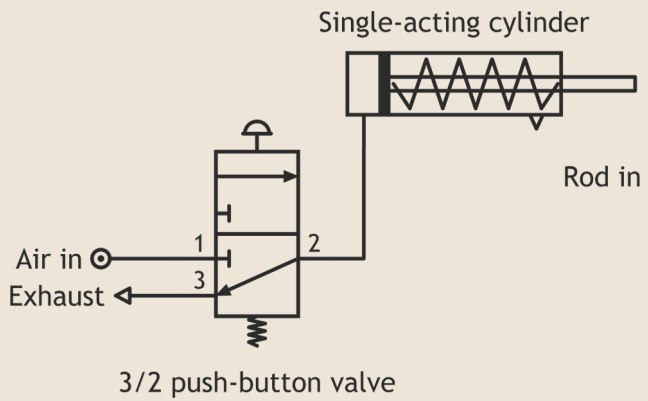
3/2 push-button valve

Review Questions

Booklet page 3

Answer Questions 1 to 5 on your own.

Finished? Try the Challenge.



Answers: Review Questions

Question	Answer
1	A push-button valve; B single-acting cylinder
2	0; 1; 2
3	out; 1; 2
4	spring; 3
5	3 ports; 2 states
Challenge	Pressed: 1 to 2, rod out; released: out of 3, rod in

Look back — by the end of this lesson…



1. I can **follow** the 5 **safety** rules
2. I can **build** and **test** a push-button circuit
3. I can **explain** where the air goes

Credits (1 of 2)

Cylinder: The Lesson 1 circuit adapted from the Matrix CP2080 Pneumatics Essentials worksheets (© Matrix Technology Solutions Limited). Drawings by R Stewart.

The 5 Safety Rules: Sources: safety rules adapted from the Matrix CP2080 Pneumatics Essentials worksheets (© Matrix Technology Solutions Limited). Poster drawings by R Stewart.

Air unit: Sources: safety rules adapted from the Matrix CP2080 Pneumatics Essentials worksheets (© Matrix Technology Solutions Limited). Poster drawings by R Stewart.

Real part drawings: Sources: kit drawings by R Stewart, from the Matrix CP2080 kit.

Kit layout: The Lesson 1 circuit adapted from the Matrix CP2080 Pneumatics Essentials worksheets (© Matrix Technology Solutions Limited). Drawings by R Stewart.

Credits (2 of 2)

Circuit: The Lesson 1 circuit adapted from the Matrix CP2080 Pneumatics Essentials worksheets (© Matrix Technology Solutions Limited). Drawings by R Stewart.

R Stewart - October 2026