Input devices

LEARNING INTENTION

We are learning the symbols, functions and purposes of electronic input devices.

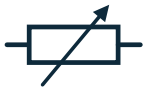
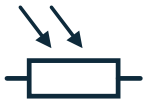
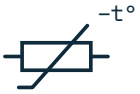
SUCCESS CRITERIA – I CAN

- ☐ draw and name the symbols for a switch, LDR, thermistor and variable resistor
- ☐ state what each input device senses or does
- ☐ choose a suitable input device for a task
- ☐ explain why the device suits the task

What does an input device do?

An **input device** senses a change or lets a user give a command. It turns that into an electrical signal for the process sub-system.

Some inputs are **manual** (a person operates them). Others are **sensors** (they respond to the environment).

Symbol	Component	Type	Function
	**Switch**	manual	Opens or closes a circuit when pressed or moved. Gives an on/off signal.
	**Variable resistor**	manual	Resistance is set by turning a knob. Used to set a level, speed or switching point.
	**LDR (light-dependent resistor)**	sensor	Resistance falls as light level rises. Senses light.
	**NTC thermistor**	sensor	Resistance falls as temperature rises. Senses temperature.

DATASHEET · INPUT DEVICES

01 Switch → on/off command.

02 Variable resistor → adjustable setting.

03 LDR → light level.

04 Thermistor → temperature.

Input devices

Inputs in a sub-system diagram



A night light: the LDR is the input sub-system

Sensors such as LDRs and thermistors are used in a **voltage divider**. The divider turns the change in resistance into a change in voltage (unit E4).

Choosing an input

WORKED EXAMPLE **Choosing an input device**

1 GIVEN	2 FIND	3 FORMULA	4 SUBSTITUTE	5 ANSWER + UNIT
frost warning for a ferry ramp	input device	condition → quantity sensed → device	condition: cold quantity: temperature device that senses temperature	**NTC thermistor**

Justify by linking the device to the quantity: 'it senses temperature, so it can detect frost conditions.'

SHORT CIRCUIT

× WHAT EXAMINERS SAW

Asked to justify a component, pupils named it but gave no reason, or a reason not linked to the task (“it is cheap”).

✓ THE FIX

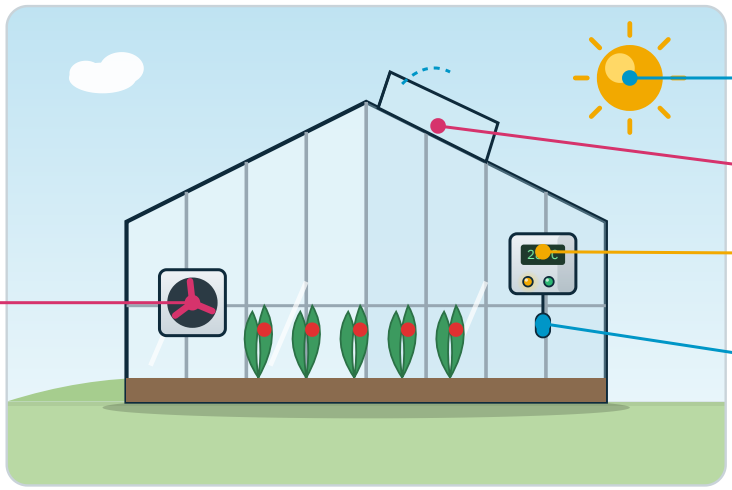
Name the device, then link it to the task: “A thermistor, because its resistance changes with temperature, so it can detect when the ramp is cold.”

Course reports: 'justify' and 'explain' answers need a linked reason.

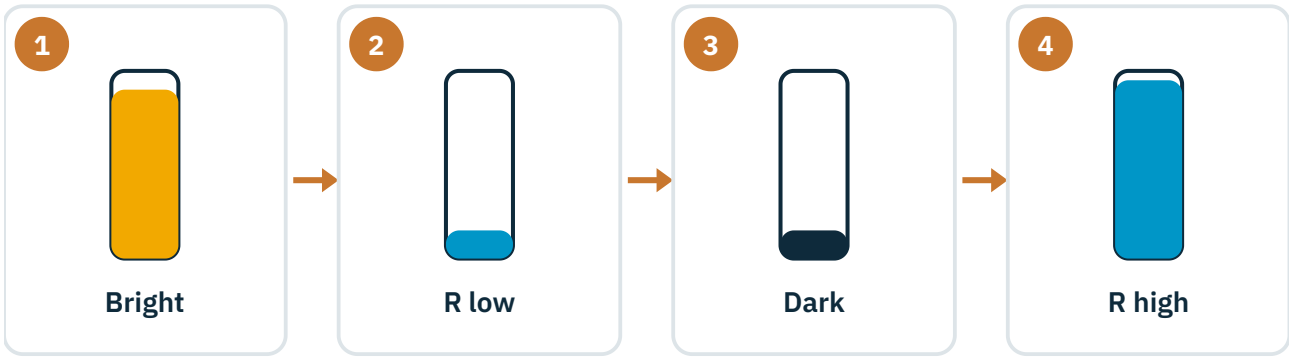
Input devices

Input devices in a real system

Kirkton Growers greenhouse (fictional)



HOW AN LDR RESPONDS TO LIGHT

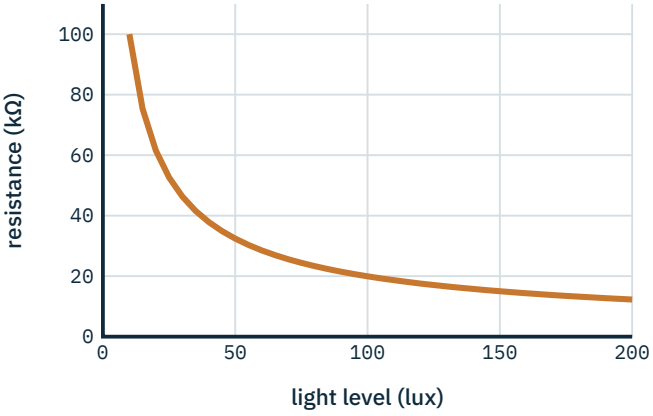


Bright light

LDR resistance is low

Dark

LDR resistance is high



LDR: resistance falls as light rises

Read graphs carefully: go up from the x-axis to the line, then across to the y-axis. Always give the unit.

Input devices

WORKED EXAMPLE Justifying a sensor

1 GIVEN	2 FIND	3 FORMULA	4 SUBSTITUTE	5 ANSWER + UNIT
frost warning sign on a road must detect cold	input device + reason	name it say what it senses link to the task	thermistor its resistance changes with temperature so it can detect when the road is near 0 °C	**Thermistor (NTC)**

A reason must link the device to the task.

WORKED EXAMPLE Which switch?

1 GIVEN	2 FIND	3 FORMULA	4 SUBSTITUTE	5 ANSWER + UNIT
a lift door must stop if a person touches the edge	input device	contact → switch light → LDR heat → thermistor	a person pushing the edge is a contact a push-to-make (micro)switch closes	**Push-to-make switch**

WORKED EXAMPLE Variable resistor or fixed resistor?

1 GIVEN	2 FIND	3 FORMULA	4 SUBSTITUTE	5 ANSWER + UNIT
a greenhouse alarm must be adjustable	which resistor	adjustable → variable	the gardener sets the switching temperature so the resistance must change by turning a knob	**Variable resistor**

Input devices

WRONG

Thermistor: it is cheap and small

Reason not linked to the task: no mark.

RIGHT

Thermistor: it senses temperature, so it can tell when the road is near 0 °C

Reason linked to the task.

REAL ENGINEERING · BEN CORRACH SNOWSPORTS

The snow cannons at Ben Corrach (fictional) only work when it is cold enough. A thermistor senses the air temperature.

Staff use a variable resistor on the control panel to set how cold it must be before the cannons start.

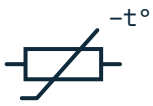


PROBE · QUICK CHECKS

1. Which input device senses light? _____
2. Which input lets a user set a level? _____
3. Is a push switch manual or a sensor? _____

EXAM READY · 5 MARKS

1 **State** the name of this component. **[1]**



2 **State** the input device used to sense light level. **[1]**

Input devices

3 A fan must switch on when a server room gets hot. **State** a suitable input device and **justify** your choice. **[2]**

4 **Describe** the function of a variable resistor in a lamp dimmer. **[1]**