

# AUTOMATICS

## User Guide

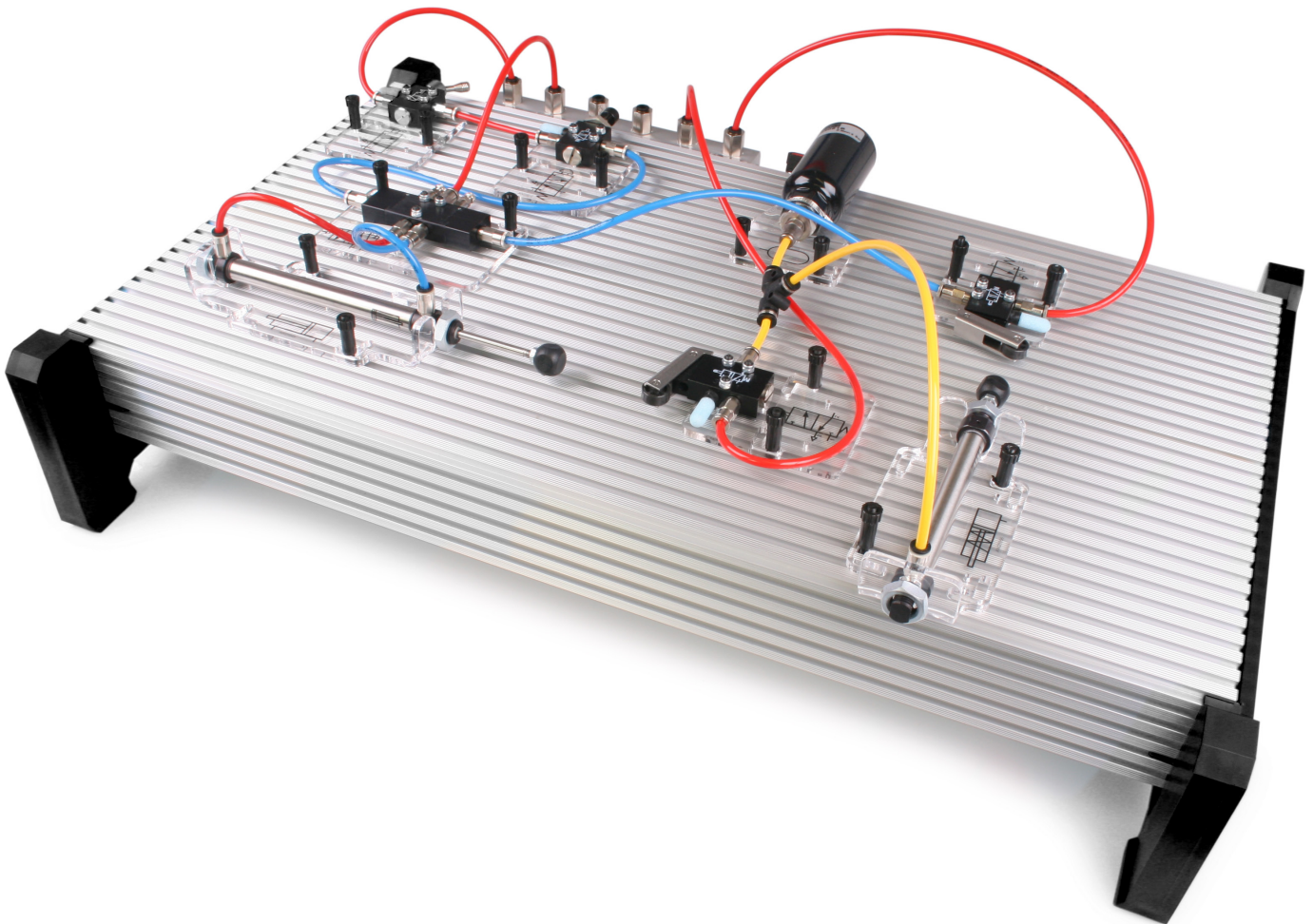


Pneumatics

Automation

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**Disclaimer:**

We have tried our best to make all of the information in this document up to date at the time of publication. However, we want to supply our customers with the best possible products, and so may revise product specifications at any time. Please check our website for the latest information.

## About this document

This guide is intended to provide extra technical information about the Automatics components that you would not find in our product catalogues.

All of the components in the product range are designed to work perfectly with each other in any combination, so it will be rare that the detailed specifications are necessary. However, you may find them useful if, for example, you intend to run your Automatics circuits from your own compressor, or are combining Automatics parts into an existing system.

Specification	Value	Units
Operating pressure (max)	5.0	kgf/cm <sup>2</sup>
Supply voltage (max)	12	V
Supply Current (max)	2.0	A
Fixing point spacing	10	mm
Air tube diameter	4	mm
Air supply connections	4mm OD, push fit	
Electrical connections	4mm socket, shrouded	
Valve body material	Aluminium	
Cylinders	to ISO 6432	
Component carriers	Acrylic (PMMA)	

## Make choosing easier

If you are uncertain whether you have selected appropriate components, please contact one of our sales staff, and we will gladly look at your intended application and help you to ensure you have what you need.

Or simpler still, why not purchase one of our Automatics 'Solutions'?

These offer a selection of components chosen to meet the needs of a particular curriculum area - and come complete with storage trays.

Each solution is also provided with a comprehensive curriculum pack, including student worksheets, teacher's notes, tests and quizzes.

Please visit our website for more details.

## Further reading

On the Matrix TSL website you will also find many other documents that may help you to get the best out of Automatics...

- **Automatics Safety Sheet** - learn how to use pneumatics safely. Essential reading for every teacher and student.
- **Free curriculum .pdf's** - structured courseware including worksheets, tests and teacher's notes.
- **Product catalogues** - you can find out all the latest product prices, and details of other product ranges.

## System overview

The table to the left show the overall system specifications for Automatics. They outline the standards to which we have designed every component.

Some components may exceed these general specifications, but within the parameter ranges shown here, all parts are guaranteed to work together.

## User safety

In order that Automatics is safe to use in the classroom, we have intentionally restricted some of the specifications shown in the overview table. The values shown here indicate what we consider to be safe for use by typical students, and we do not recommend that you exceed these limits.



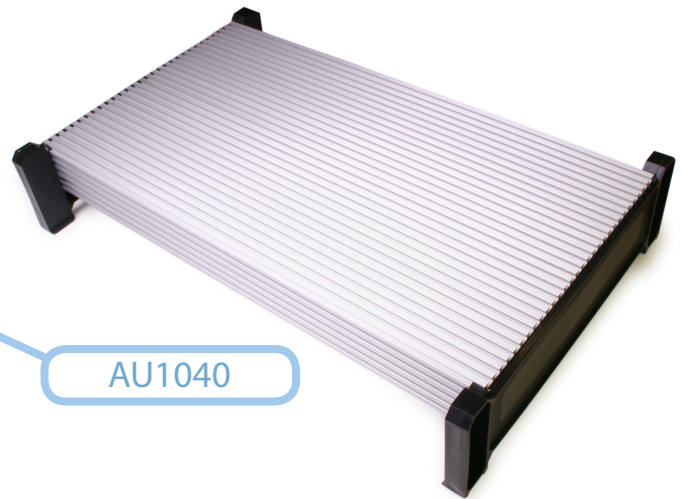


## Platform

The platform is a sturdy aluminium extrusion with channels into which the tee-bolts will fit.

Components can be fixed to the large top surface and also the two smaller surfaces at the back and front of the platform.

Dimensions (mm)	W	D	H
Overall size	600	350	100
Top face	570	300	-
Front face	570	60	-
Rear face	570	60	-



AU1040



AU1060

## Tee Bolts and Sleeves

Tee bolts are used to secure components to the platform. No tools are required - the bolts lock into the channels of the platform when rotated, and then tighten up using the knurled thumbscrew.

## Compressor

The compressor is complete with air filters, pressure gauge and regulator. This ensures a steady supply of clean air at a constant pressure.

Specification	Min.	Max.	Units
Regulated pressure	0.0	4.0	kgf/cm <sup>2</sup>
Absolute max. pressure	0.0	6.0	kgf/cm <sup>2</sup>
Flow volume	0.0	20	l/min
Supply voltage	240		V
Power	-	150	W



AU1050

## Manifold

The manifold is used to distribute the compressed air to up to six destinations at once. There is a manual shut-off valve on the input, and automatic shut-off valves on each outlet.



AU1010

Specification	Min.	Max.	Units
Pressure	0.0	9.0	kgf/cm <sup>2</sup>
Effective orifice	2.6		mm <sup>2</sup>

# Tubing & Connectors

## Tubing

Strong nylon tubing, specifically designed for pneumatic systems. Available in red, yellow, blue and clear; all with the same technical specifications.

Tubes are connected to the other components using standard push fit connectors...

- Cut the tube neatly to length.
- Push the tube end firmly into the connector.

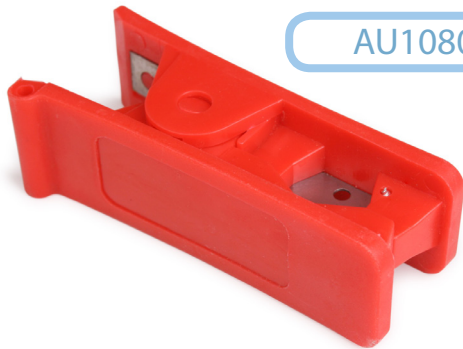
To disconnect them...

- Press down on the collar around the connector.
- Gently pull out the tube.



AU1072 - Blue, 30m  
AU1071 - Yellow, 30m  
AU1073 - Clear, 30m  
AU1070 - Red, 30m

Specification	Min.	Max.	Units
Pressure	0.0	>100	kgf/cm <sup>2</sup>
Outside diameter	4.0		mm
Inner diameter	2.5		mm
Bend radius	11	-	mm



AU1080

## Tube Cutting Tool

This specially designed tool ensures perfectly cut ends to the tubing every time. The spring loaded jaws and shrouding around the blades also ensure maximum safety for the user.

## Equal Tee Junction

The equal tee allows three air lines to be joined to make junctions that split the pneumatic circuit along multiple paths.

Specification	Min.	Max.	Units
Pressure	0.0	9.0	kgf/cm <sup>2</sup>
Effective orifice	5.3		mm <sup>2</sup>



AU1030

# Cylinders

## Single Acting Cylinder

Industry standard ISO 6432 miniature cylinder. Single acting - pressure at the single input port extends the piston; a spring returns the piston to the retracted position when not pressurised.

Magnetised piston for use with reed switches and hall effect sensors.

Specification	Min.	Max.	Units
Operating pressure	0.8	7.0	kgf/cm <sup>2</sup>
Operating speed	50	500	mm/sec
Piston area	78.5		mm <sup>2</sup>
Piston force	6.2	54	N
Piston stroke	40.0		mm



AU2140

## Double Acting Cylinder

Industry standard ISO 6432 miniature cylinder. Double acting - separate extend and retract input ports. Magnetised piston for use with reed switches and hall effect sensors.



AU2280

Specification	Min.	Max.	Units
Operating pressure	0.8	7.0	kgf/cm <sup>2</sup>
Operating speed	50	500	mm/sec
Piston area	66.0	78.5	mm <sup>2</sup>
Piston force (extend)	6.2	54	N
Piston force (retract)	5.4	46	N
Piston stroke	80		mm

# Reservoir

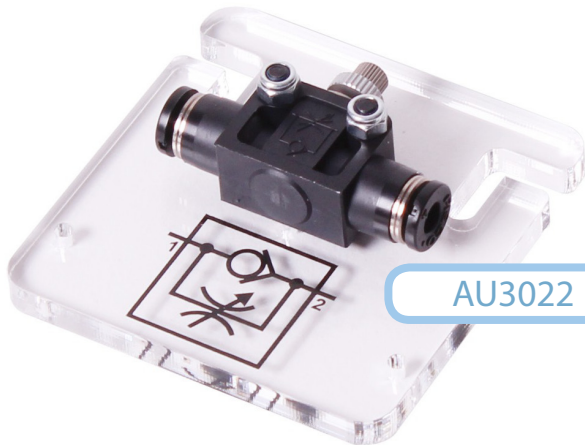
## Reservoir

The reservoir provides a volume of space that will slowly pressurise and de-pressurise in order to introduce time delays into a pneumatic circuit.



AU1020

Specification	Min.	Max.	Units
Operating pressure	0.0	8.0	kgf/cm <sup>2</sup>
Capacity	45.0		cm <sup>3</sup>



AU3022

## Flow Control

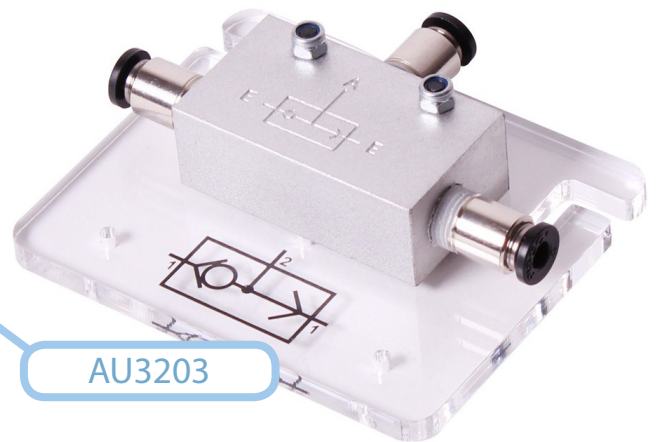
A lockable thumb-screw sets the rate at which air can flow through the valve in one direction; the other direction is unrestricted.

Specification	Min.	Max.	Units
Operating pressure	0.1	9.0	kgf/cm <sup>2</sup>
Flow rate	0.0	70	NI/min
Control range	0	8	turns

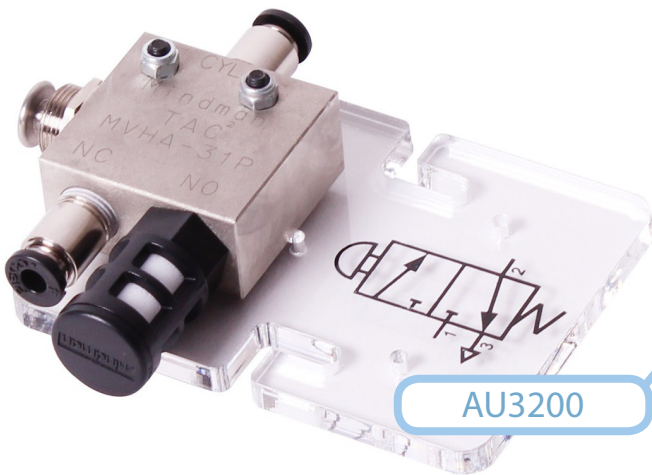
## Mini Shuttle

Allows two air sources to be connected to the same output. Whichever input is pressurised supplies the destination; the other is sealed off.

Specification	Min.	Max.	Units
Operating pressure	1.0	9.9	kgf/cm <sup>2</sup>
Effective orifice	11.5		mm <sup>2</sup>



AU3203



AU3200

## 3/2 Button-Spring

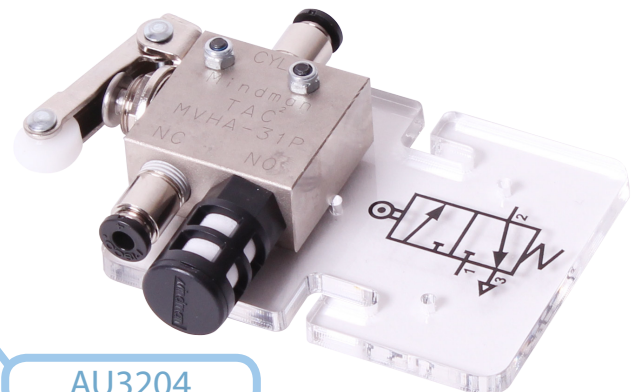
When the button is pressed, air is connected to the destination. When released, a spring returns the valve to the exhaust position.

Specification	Min.	Max.	Units
Operating pressure	0.0	9.0	kgf/cm <sup>2</sup>
Effective orifice	4.5		mm <sup>2</sup>
Button movement	2.4		mm

## 3/2 Roller-Spring

When the roller is depressed, air is connected to the destination. When released, a spring returns the valve to the exhaust position.

Specification	Min.	Max.	Units
Operating pressure	0.0	9.0	kgf/cm <sup>2</sup>
Effective orifice	4.5		mm <sup>2</sup>
Roller movement	4.8		mm



AU3204

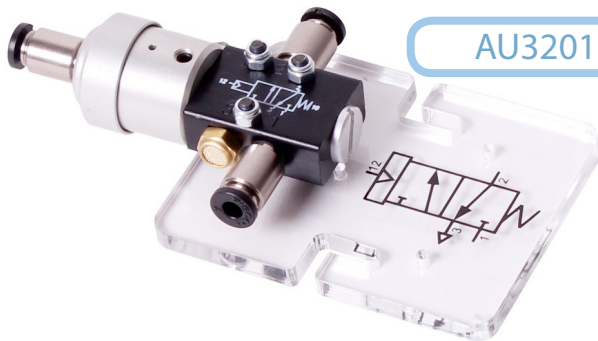
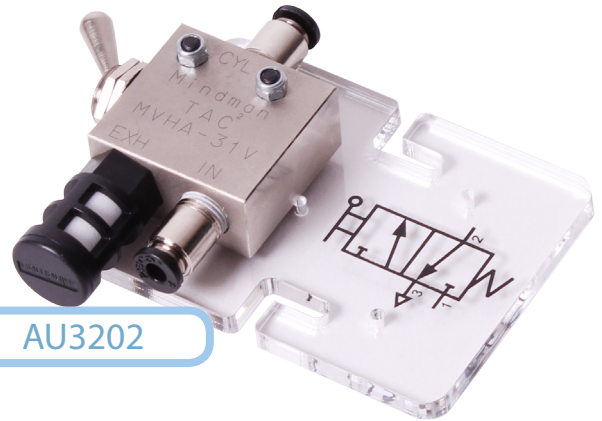


# Valves

## 3/2 Lever-Spring

This valve has a toggle which will latch at either the pressurised or exhaust position. For supplying a single destination.

Specification	Min.	Max.	Units
Operating pressure	0.0	9.0	kgf/cm <sup>2</sup>
Effective orifice	4.5		mm <sup>2</sup>
Toggle movement	-40.0	40	degrees



## 3/2 Diaphragm-Spring

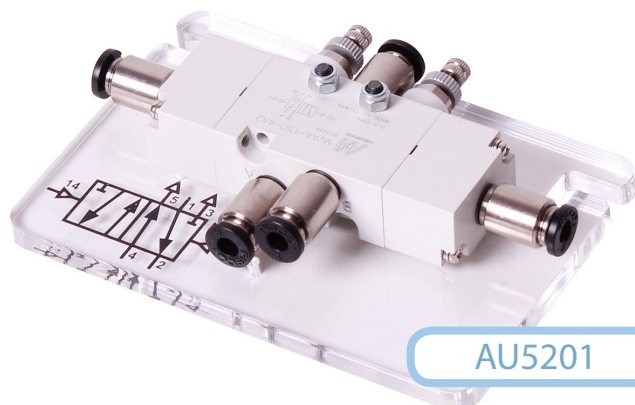
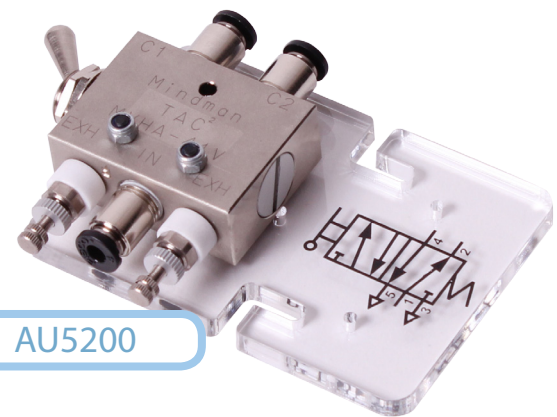
The diaphragm unit detects air pressure at the pilot input - allows a low pressure air line to control the flow through a high pressure line.

Specification	Min.	Max.	Units
Operating pressure	0.0	10.0	kgf/cm <sup>2</sup>
Effective orifice	2.5		mm <sup>2</sup>
Diaphragm pressure	0.5	7.0	kgf/cm <sup>2</sup>

## 5/2 Lever-Spring

The toggle lever will latch into either of two positions. Each position connects the air supply to one of two different destinations and exhausts the other via an adjustable restrictor.

Specification	Min.	Max.	Units
Operating pressure	0.0	9.0	kgf/cm <sup>2</sup>
Effective orifice	5.5		mm <sup>2</sup>
Toggle movement	-40.0	40	degrees



## 5/2 Pilot-Pilot

Connects the air supply to one of two destinations under the control of two pressure sensing pilot inputs. The unconnected output port is exhausts via an adjustable restrictor.

Specification	Min.	Max.	Units
Operating pressure	0.0	8.0	kgf/cm <sup>2</sup>
Effective orifice	3.8		mm <sup>2</sup>
Pilot pressure	1.5	8.0	kgf/cm <sup>2</sup>





AU6010

## 3/2 Solenoid-Spring Valve

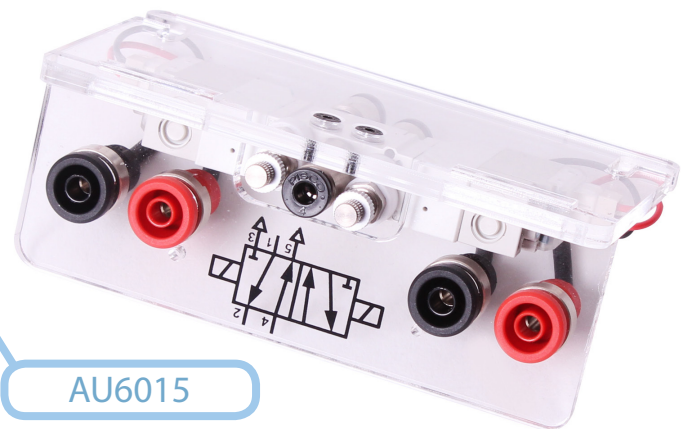
A simple on/off pneumatic valve, switched on when a voltage is applied across the electrical terminals.

Specification	Min.	Max.	Units
Operating pressure	0.0	8.3	kgf/cm <sup>2</sup>
Effective orifice	0.95		mm <sup>2</sup>
Response time	10.0		ms
Coil rating	0.13 A at 12V, 92Ω		

## 5/2 Double-Solenoid Valve

This valve sends the input air to one of two destinations under the control of two solenoids. Locks in position when no voltages are present.

Specification	Min.	Max.	Units
Operating pressure	2.0	7.0	kgf/cm <sup>2</sup>
Effective orifice	4.0		mm <sup>2</sup>
Response time	15		ms
Coil rating	0.1 A at 12V, 120Ω		



AU6015



AU8025

## Reed Switch & Holder

The reed switch makes the electrical circuit between its terminals in the presence of a magnetic field. The carrier is designed to clip over the body of a cylinder to detect the built in piston magnet.

Specification	Min.	Max.	Units
Operating distance	6.0	18	mm
Operating time	1.0		ms
Current	0.5 cont'	1.2 peak	A

## Push To Make Switch

A simple push-to-make momentary switch with terminals brought out to two 4mm banana connectors.

Specification	Min.	Max.	Units
Voltage	-	50	Vdc
Current	-	6.0	A

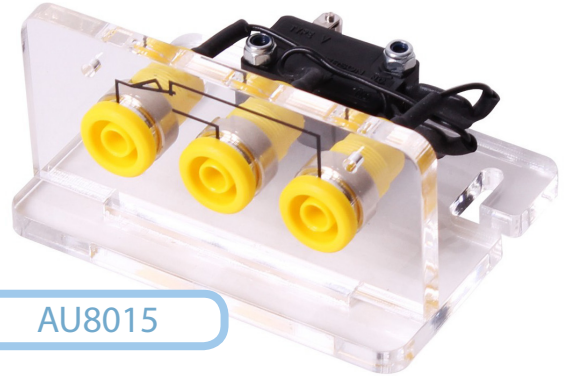


AU8030

## Microswitch

An industry standard V3 size microswitch fitted with a short roller arm. Normally-open, normally-closed and common terminals are all brought out to 4mm sockets.

Specification	Min.	Max.	Units
Current	-	15	A
Operating force	off: 85	on: 300	g
Roller travel	0.5	1.5	mm

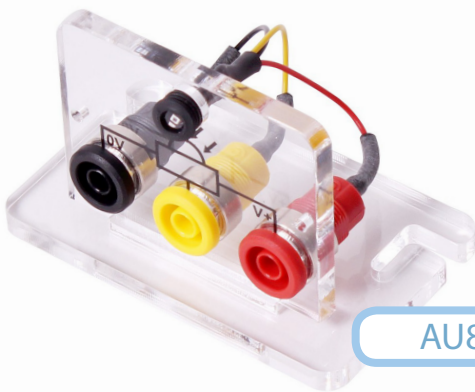


AU8015

## Light Sensor

A phototransistor light sensor, complete with biasing resistor. Terminals for power and sensor output.

Specification	Min.	Max.	Units
Light spectrum	440	800	nm
Power voltage	5.0	12.5	Vdc
Current	-	75	mA



AU8010

## Power Panel

The power panel accepts a standard 2.1mm DC power jack and distributes the power to four pairs of shrouded 4mm banana connectors.

Specification	Min.	Max.	Units
Voltage	-	30	Vdc
Current	-	2.0	A



AU8020

## Power Supply

A switchable plug-top power supply with a range of output voltages, and input adapters for most international mains electricity outlets.

Specification	Min.	Max.	Units
Input voltage	90	250	Vac
Power	-	14	W
Output voltages	3, 4.5, 6, 7.5, 9, 12		V
Output current-	-	1.4	A



HP2666

## Electrical Leads

All electrical connections in Automatics are made using standard 4mm 'banana' connectors.

All of the sockets used will accept either shrouded or unshrouded plugs.

We can supply these cables in a range of colours, all of which have the same electrical specification.



LK5603 - Red  
LK5604 - Black  
LK5607 - Yellow

Specification	Min.	Max.	Units
Voltage	-	500	Vdc
Current	-	12	A

# MIAC

## MIAC

The MIAC is an industrial grade programmable control unit, which can be supplied complete with a custom ABS casing that exposes all of the connections via 4mm 'banana' sockets.

Among the MIAC's many features are...

- Fully programmable. This is especially easy if you use Matrix's Flowcode software (supplied separately).
- Built in LCD screen and control buttons.
- 8 inputs which can be used to sense digital or analogue signals.
- 4 relay outputs for high current switching.
- 4 transistor controlled outputs, two with PWM capability for motor control etc.
- CAN bus communication between multiple units.
- Forms the 'core' of an expandable system - add extra features using our MIAC expansion modules.

For more information about MIAC and the Flowcode programming software, please visit the MIAC page of our website at:

<http://www.matrixtsl.com/miac>



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