BBSA
BRITISH BLIND & SHUTTER ASSOCIATION

Training Guide

Motorisation and Automation Module

This module covers:-

Key Benefits/Reasons for Motorisation

Simple Installation at Home

Types of Motor

Types of Power

Operation of Blind(s)

The Right Motor for the Job

Wiring Containment

Commissioning and Testing

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Intro

Motorisation of blinds, shutters and awnings is becoming an increasingly popular way of operating solar shading.

Once a motor is added to a product, a vast array of operating methods are potentially available from a simple wall switch through to full integration with building management systems or home automation systems providing automated control.

Sometimes shading products have to be motorised by necessity (high level, large sizes) but frequently motorised options are chosen for convenience, particularly as the costs of motors and controls have reduced.

Battery and solar powered solutions remove the need for wiring and potentially for an electrician and are quick and simple to fit.

Where connection to a mains supply is needed, there may be a requirement for an electrician, particularly if new power feeds are needed for the solar shading products.

In the rest of this training guide we will use the term blinds to represent any shading product including awnings and shutters.

NOTE

It is essential that only qualified individuals carry out final connections for motorised products that are connected to the mains supply via a fused spur. Connection by a plug top can be carried out by most individuals.

Installing additional sockets or fused spurs MUST be carried out by a competent person and a Part P certificate must be issued (see BBSA Guidance Note A12).

Remember battery or solar powered motors require no electrical expertise.

TIP

Motorisation typically removes the need for operating cords and chains and is therefore child safe.

1.0 Key Benefits / Reasons for Motorisation

1.1 Users

- **Safety**

As there are no cords or chains, motorised blinds are generally ideal for use where babies and young children may be present.

- **Ease of Use**

Operate one or more blinds with the touch of a button.

No stretching or straining to reach cords or wands.

Automated open/close/adjust position from timers or sensors.

Easy to operate multiple blinds in one go – for example conservatory shading or dimming out a room containing a number of windows.

- **Comfort**

Sensors and timers can automatically activate blinds to provide solar shading when needed and provide a cooler, more pleasant room temperature. They help to make homes more comfortable, office environments more productive and can also aid concentration in school classrooms.

- **Security**

Operating with timers and sensors, blinds and/or awnings can make it look as if someone is at home even while the homeowner is away.

- **Protection**

Fitting of light sensors or timers will lower/extend the blinds and help prevent the drying/bleaching effect of the sun on furnishings and plants.

Using motors to physically operate the blinds reduces wear and tear caused by users (for example rubbing the roller cloth with the operating chain) and therefore extends the life of blinds and awnings.

- **Autonomy**

Motorisation offers convenient and easy operation for those with limited mobility.

1.2 Energy

- **Fuel Bill Reduction**

Automated blinds keep buildings warmer in winter and cooler in summer thus contributing to lower fuel bills by reducing the amount of heating and/or air-conditioning required.

- **Emission Reduction**

Reducing energy requirements for heating and/or cooling contributes to reductions in CO_2 emissions.

1.0 Key Benefits/Reasons for Motorisation

1.3 Products/Position

- **Large Blinds & Awnings**

For certain blind or awning sizes motorisation may be the only option.

- **Accessibility**

Blinds at high level or in inaccessible places need motorisation.

- **Links to other systems**

Once a blind is motorised, it can then be automated - linked to systems or sensors that control the operation of the blind.

- **Prevention of Unauthorised Use**

Use of key switches or ensuring only certain people have access to controls prevents unauthorised use of the blinds and awnings.

2.0 Simple Installation in a Home

An increased demand for motorised blinds in and around the home is down to a number of factors. These are:

- reduction in typical costs of motors and controls
- ease of installation and set-up of modern motorised systems
- compliance with child safety requirements relating to internal window blinds
- increased use of remote controls for convenience
- increased trend towards energy efficient homes
- development of battery powered and solar powered systems - this removes the need for mains wiring and the need to conceal it afterwards. This also means that the existing decor is less likely to get disturbed

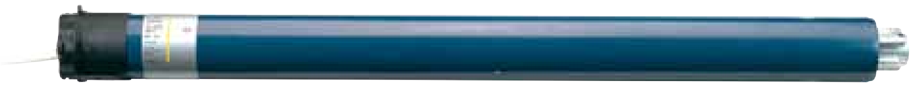
Battery operated and motor technology has advanced rapidly in recent years and even large blinds ($7m^2$ or more) can be operated this way.

Rechargeable battery operated tubular motor.

3.0 Types of Motor

In essence there are two types of motor for shading products.

3.1 Tubular Motors

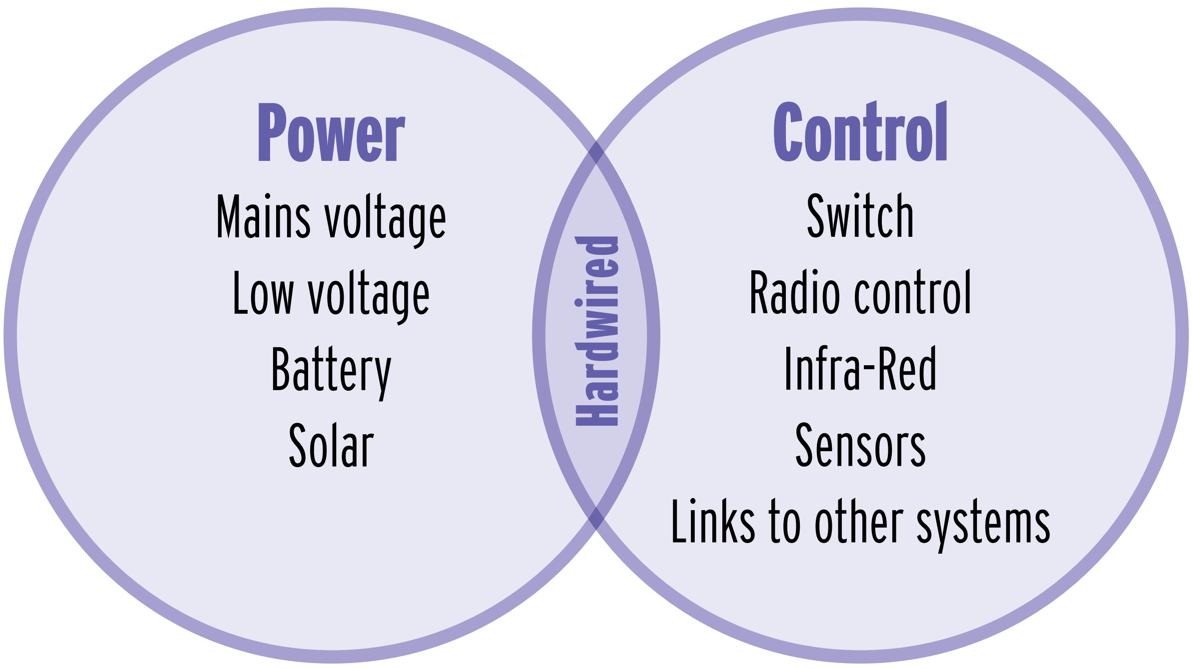


As the name suggests tubular motors are inserted into a tube and are typically used in roller blinds, shutters and awnings.

3.2 Shaft Motors

Shaft motors drive a shaft to pull up cords. They can provide the tilting of slats as well as raising and lowering of blinds. Shaft motors are used for roof blinds, pleated, Roman or Venetian blinds. Larger shaft motors are used on external Venetian blinds.

There are two elements that need to be considered when motorising blinds – Power and Control.



Power and control may be combined in a hardwired example but will often be separate – for example with radio control.

4.0 Types of Power

There are different types of power for motorised products.

The choice is determined by the type of product, its size and location as well as customer's requirements.

- **230V AC**

Mainly used for larger capacity motors.

Mains power typically from a fused spur, relay or directly from a 3 pin socket.

NOTE

Voltage in the UK is 230V with a tolerance of +10% to -6%.

- **Low Voltage**

Typically 24V or 12V DC. Supplied from a regulated power supply/transformer which needs a 230V supply.

Suitable for bathrooms and kitchens for safety reasons. Cabling to the motors is thinner compared with mains voltage motors so it is easier to conceal.

- **Battery**

Wire-free option with either reloadable single use batteries, rechargeable battery pack or internal rechargeable battery.

Battery operation is ideal where there is no power source available or where you are retrofitting blinds as there is no disruption to the décor. Easy and quick to install. Also ideal for bathrooms and kitchens.

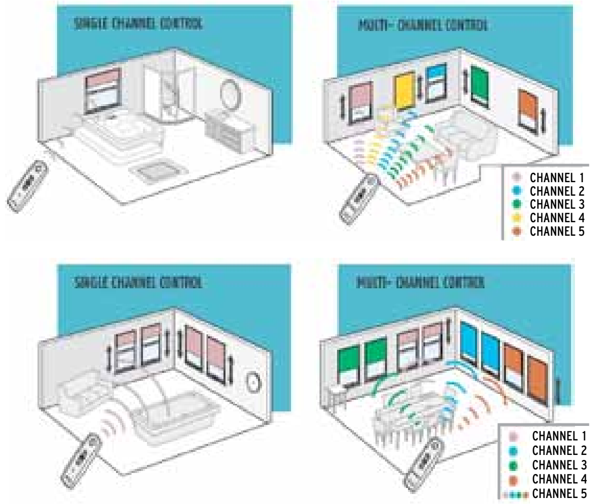
- **Solar Power**

Optional add-on for rechargeable battery packs which typically provides a long-term, cost effective and wire-free solution.

5.0 Operation of Blind(s)

Discuss with your client what level of functionality is required - for example:

- individual or group control
- single group control or multiple groups
- programmable timed operation
- sensors (e.g. light, wind, rain)
- alignment of blinds
- link to some form of automation – in the home this could be to a home automation system or in commercial projects links to Audio Visual (AV) systems or Building Management Systems (BMS)



TIP

Keep it simple! Often clients try and over-complicate the installation by requesting blinds to be operated in different groups when in reality most operate all the blinds in one go or at least per elevation.

NOTE

With most motors there are at least three stop positions – fully extended, fully retracted and an intermediate stop set for the client's preference. Stopping the blinds at any other point may mean that they do not all stop in exactly the same position and so may not line up. Similarly due to mechanical tolerances, cable runs and possible blind size differences, the blinds may not travel at exactly the same speed. For greater control see section 5.1.5 below.

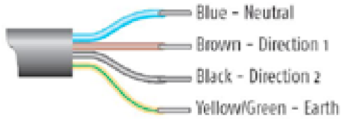
5.1 Types of Motor Controls

There are various methods of controlling a motor, typically:

- hard wired
- radio controlled
- infra-red
- dry contact (DCT) or volt free
- digital/data
- sensors

5.1.1 Hard wired

Hard wired
230 V / 50 Hz
4 core



In the blinds industry hard wired switched 230V is usually a term used to describe the control method of a motor and not that it has a physical cable for power.

A wall switch can be used to operate the blind UP, DOWN or STOP.

Mains powered switching is the control method for 230V AC hard wired motors and would normally be via 4 core cabling providing: Live UP, Live DOWN, Neutral and Earth.

A relay may need to be used when operating more than one motor. A relay provides separate power feeds to each motor. This avoids interference and power feedback between motors which can cause blinds to jump and could damage the motor.

TIP

Consider where the relay boxes will be positioned. If considered at the beginning of a project, these may be concealed in a services cupboard by the electrician. Retrofitting is more challenging as the relays will need to be concealed somewhere.

24Vdc connection
2 core

24V DC motors can also be hard wired.

2 core cable from a transformer to a wall switch and then to the motor carries the + or - current.

TIP

24V DC motors can be connected using a typical thin doorbell type wire which means it can be more easily concealed.

However it is typically only available in a couple of colours. If the wire is visible when surface mounted, you can always use a thicker 2 core cable which may come in a colour that blends in more with the surroundings.

NOTE

Voltage drop - with 24V DC connections, the longer the cable run from the transformer, the lower the voltage at the motor. This can cause low voltage motors to run at different speeds. Using the same cable length to each motor will help to ensure each motor is receiving a similar voltage.

5.1.2 Radio Control

Radio control does not require line of sight between the control and the blind as the signal can pass through walls to other rooms. For example a radio controlled awning can be operated from inside the house.

A wider choice of radio motors is available and there is a wider choice of single / multi-channel handsets, wall switches, timers and sensors.

The coding is more secure than Infra-Red.

Example radio controls

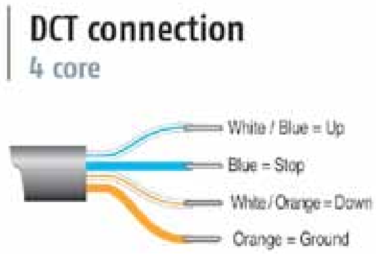
5.1.3 Infra-Red

Infra-Red (IR) control is not so commonly used these days but remains an option for automation and is simple to integrate with other IR systems.

Like a TV remote an IR handset requires line of sight to the blind. The blind requires an IR receiver or eye to pick up the signal from the handset.

IR is an open code and can easily be copied from one control system to another but it has a limited range and its operation is also affected by the amount of light in the room.

5.1.4 Dry Contact (DCT) or Volt Free



The Dry Contact has no current, it can be considered to be a switch completing a circuit to create the operation UP, DOWN or STOP. The blind still requires power connected to it.

The Dry Contact signal can operate blind(s) via connection to a suitable relay or switches. There are some Dry Contact motors that can be connected to directly.

5.1.5 Digital or Data Control

A digital network can be installed connecting to all motors. Using RS485 or other protocols a message can be sent across the network with a command for a specific operation to any specific motor. A far higher level of control is possible helping to achieve alignment across a number of blinds or tilt of slats, group controls and automation to pre-set criteria on light levels, times etc.

Signals can be sent to a motor controller operating a number of blinds or directly to individual digital motors.

5.1.6 Sensors

Rain sensor

There is a wide range of sensors available which can turn a motorised product into an automated one. Some are hardwired, some operate by radio control.

5.1.6.1 External Sensors

Most motorised external shading product applications will use wind sensors or a combined sun and wind sensor. For example an awning will be extended if the light levels exceed the limit set and retract when the light levels fall below the limit. The wind sensor will automatically retract the awning (or prevent a closed awning from being extended) if the wind speed exceeds the operational limits of the blind.

Sun and wind sensor

Rain, external temperature and wind direction sensors are available too.

Vibration sensors fitted to the bottom lathe of awnings are also used and ensure the awning is retracted if the movement of the awning, due to weather conditions, exceeds the operational limits set.

NOTE

The position of external sensors is critical to the correct operation of the blind. For example a wind sensor needs to be positioned on the building where it can pick up the general wind speed, not alongside the awning (as so often happens) where it may be protected from the wind.

5.1.6.2 Internal Sensors

A range of internal sensors are available to automate shading products including:

- light (lux) sensor - blinds will operate based on the light levels set
- temperature sensor - blinds will operate based on the temperature levels set
- motion sensor - blinds will operate when motion is detected

NOTE

Some external sensors can be used to automate internal blinds and vice versa.

5.2 Other controls

There is a growing range of other controls including timers and weather stations.

Apps accessed via smart phones and tablets are also available from motor manufacturers and third party suppliers.

5.3 Open Bus Systems

A bus is a network in which all devices are attached directly to a line and all signals pass through each of the devices. Each device has a unique identity and can recognise the signals intended for it.

There is a wide range of different solutions but probably the most common are KNX and LON.

Each of these is based on an open data transfer language that is non-proprietary and allows different suppliers to connect to the bus line. This permits the creation of a control strategy that can be detailed and based on specific parameters.

6.0 The Right Motor for the Job

When choosing the right motor for the job, you need to consider:

- **type of blind/awning**
  - roller, Venetian, Roman, etc.
- **preferred power supply**
  - 230V AC, 24V DC, battery
- **cabling already supplied**
  - 2 core, 3 core, 4 core, power/data
- **headrail or tube**
  - a wide variety of motor adapters for headrails or crown & drive wheels for tubes are available to suit different systems from various manufacturers
- **shapes and sizes of motors**
  - check the motor length to see if it is suitable for the blind width you require
- **capacity (torque) of the motor**
  - fabric width x drop x fabric weight + bottom bar = motor capacity required
  - consult your motor supplier to confirm the correct torque rating required

NOTE

A blind with side channels may require a more powerful motor due to the friction created when in operation.

- **motor speed**
  - establish whether motor speed is important
  - longer drops benefit from quicker motors

NOTE

Motors are protected by a thermal cut-out device that prevents the motor from getting too hot from extended operation. A slow motor on a long drop blind in particular may overheat and so the thermal cut-out will operate to protect it.

6.0 The Right Motor for the Job

- **level of noise**
  - establish whether the level of noise is important
  - different motors emit varying amounts of noise when in use and your supplier will be able to provide you with the decibel (dB) ratings of their motors

TIP

Also consider the grounds you are fitting the blinds to. Some materials will resonate with the motor and amplify its sound. This can be reduced by using rubber or neoprene washers between the brackets and the structure you are fitting to.

- **motors with obstacle detection**
  - some manufacturers offer motors which detect if there is an obstruction in the path of travel of the blind or shutter
  - typically these motors use a combination of electronic and mechanical sensors to detect the obstacle and stop the blind or shutter
  - these motors are particularly useful with cassetted blinds, shutters and products fitted in high use areas such as schools

NOTE

Some shutters must be fitted with safety sensors – typically pressure sensors fitted on the bottom lathe or photo beams. These will stop the shutter if the beam is broken.

6.1 Is the correct infrastructure in place?

Check if:

- **the correct cabling is in place**
  - the number of cores and the correct rating
  - consult your motor supplier to confirm the correct requirements
- **the power source is correct**
  - ensure that suitable relays (see section 5.1.1) are used for hardwired 230V AC motors or an appropriate regulated power supply (transformer) for 24V DC motors
- **the power usage is correct**
  - Has the electrician allowed for the start-up current of all motors and checked the cable and fuse rating?
  - consult your motor supplier to confirm the correct requirements

NOTE

On start-up 230V AC motors will have a current draw around 1.5 times that stated on the rating plate, compared to the current draw of the motor when it is turning. For example a motor rated at 1.2 Amps will draw around 3.6 Amps on start-up.

NOTE

Any external installation will need to be protected by a Residual Current Device (RCD).

7.0 Wiring Containment (Cable Management)

Wiring to blinds is often contained in trunking or conduits; this is sometimes for aesthetic reasons (the wiring is neatly concealed) and also for safety reasons.

7.1 Trunking

Trunking is typically available in white plastic formed of a U-shaped section with self-adhesive backing and a top which clips on. Trunking is available in a wide range of sizes typically starting at 10 x 10mm.

Various accessories such as right angle bends are available to ensure a neat run of trunking.

TIP

Although fitted with self-adhesive backing this should be secured with screws in hot environments such as conservatories as the glue will not hold the trunking.

Similarly on painted plasterwork the adhesive is only sticking to the thin layer of paint so screw fixing may also be required.

Dado and skirting trunking are also available.

NOTE

Trunking is not suitable for external use.

7.2 Conduit

Conduit is typically available in PVC and galvanised finishes.

Junction boxes, right angle bends, T-sections and other fixings allow for conduit to be run around obstructions and provide a neat finish.

NOTE

Galvanised trunking should be used in situations where cabling could be subject to damage or where there are extreme temperatures or a presence of certain chemicals.

8.0 Commissioning and Testing

8.1 Commissioning

NOTE

It is essential that only competent individuals carry out final connections for motorised products connected to the mains supply via a fused spur. Connection by a plug top can be carried out by most individuals.

Installing additional sockets or fused spurs MUST be carried out by a competent person and a Part P certificate issued (see BBSA Guidance Note A12).

All motorised blinds must be commissioned to ensure that the limits of the motor are set to the site conditions so the blinds stop at the correct position when fully deployed, fully retracted and any intermediate stop positions that have been requested.

Any sensors fitted, such as wind, sun or vibration should be set to site conditions and in accordance with the manufacturer's instructions.

TIP

Buy a test lead to allow you to operate and test individual blinds. This will be essential when installing the blinds if the mains feed has not been made live or if you need to isolate and just run one blind.

Example mains voltage test lead

The client should be shown how to correctly operate the blinds and appropriate instructions left for future reference.

8.2 Testing

If a motorised product is not working, the first check is whether the power is flowing to the motor.

For mains voltage use a voltage tester which when held against the external sheathing of the cable will light up in the presence of a feed.

Voltage testers can also be used to identify the current flowing to the motor. These should only be used by competent individuals.

9.0 Glossary

AC (Alternating Current)

AC is an electric current in which the flow of electric charge periodically reverses direction.

Amp (Short for Ampere)

Amp is a unit of electric current.

Audio Visual (AV)

Audio Visual = images and sound.

In homes this could represent a home cinema. In a commercial context this could represent a conference room facility where blinds could be linked to an AV controller and be lowered as a projection screen is deployed and the lights dimmed (this is known as a Scene – see below).

Building Management System (BMS)

A BMS is a computer-based control system installed in buildings that monitors and controls the building's mechanical and electrical services such as ventilation, lighting, power systems, fire systems, security systems and even blinds and awnings.

Also known as BEMS (Building Energy Management System) or BAS (Building Automation System).

DC (Direct Current)

In direct current the flow of electric charge is only in one direction.

Fuse

A fuse is a type of low resistance resistor that acts as a device providing overcurrent protection. Its essential component is a metal wire or strip that melts when too much current flows through it, interrupting the circuit that it connects.

Fused Spur

A fused spur is hardwired within an electric circuit like a socket outlet. The fused spur has a fuse within the faceplate to allow a lower rated cable to feed a product like a blind or awning. With the correct rated fuse the product is also protected. For blinds and awnings typically a 3 amp fuse is used.

Junction box

An electrical junction box is a container for electrical connections, usually intended to conceal them from sight, deter tampering and/or protect them from weather and other environmental conditions.

Klik Connector

The Klik Connector System is a unique modular plug and socket interface that provides simultaneous mechanical and electrical connection in one click-in action.

Relay

A relay is sometimes used with 230V AC motors to regulate the power feed to each motor. Typically you cannot simply connect 230V AC motors together from one power feed.

Residual Current Device (RCD)

These electrical wiring devices disconnect a circuit when it detects that the electric current is not balanced between the energised (line) conductor(s) and the return (neutral) conductor. Under normal circumstances, these two wires are expected to carry matching currents. Any difference usually indicates that a short circuit or other electrical anomaly is present and the RCD will trip, disconnecting the power.

Scene

This term is commonly used with home and building automation systems and describes a collection of changes to the internal environment. These affect one or more electrically operated services - for example there could be an evening scene where the blinds would close and the lights would turn on inside the home and possibly outside as well - depending on the setting.

Transformer

A transformer typically reduces the 230V AC power to a lower DC voltage – the most common in the blind and shutter industry is either 12V or 24V.

Volt

Volt is a measure of electric potential and refers to the energy that could be released if electric current is allowed to flow.

Voltage Drop

This describes how the supplied energy of a voltage source is reduced as the electric current moves through the passive elements (elements that do not supply voltage) of an electrical circuit. Typically the longer the cable run, the greater the volt drop subject to the cable size.

Other Modules in this series:

Measuring

Fitting

Fixings

Fabrics and Materials

Surveying, Quoting and Estimating

Acknowledgements

BBSA Technical Working Group

Somfy

Louvolite

Disclaimer

This guide is only intended to give general advice. The information should not form the basis upon which the reader makes any decisions or conclusions and the reader should always seek advice from their suppliers to determine the specific information required.

The BBSA is not responsible for any loss, howsoever caused and whether arising directly or indirectly from reliance on information contained in this guide.

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