



FUME HOOD AUTO-SASH CONTROLLER

Installation & Operating Manual

Temperature Electronics Ltd.

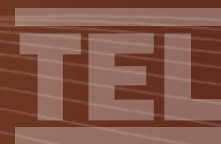
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1. SAFETY

1 SAFETY

1.1 Safety Practices

This document describes the general safety practices and precautions that must be observed when operating the Auto-Sash Controller.

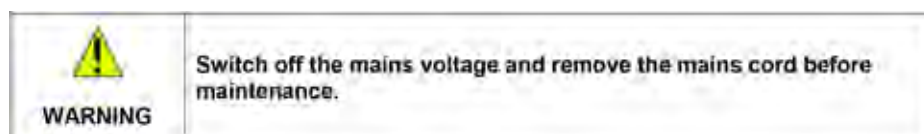
This advice is intended to supplement, not supersede, the normal safety codes in the user's country. The information provided does not cover every safety procedure that should be followed. Ultimately, maintenance of a safe laboratory environment is the responsibility of the user and the user's organisation.

Please consult all documentation supplied with the Auto-Sash Controller before starting to work. Carefully read the safety information in this document and in the other documentation supplied. When setting up the equipment or performing analysis or maintenance procedures, strictly follow the instructions provided.

1.2 Warning Notices

Within this User Guide WARNINGS are used to highlight information or instructions that must be followed in order to avoid personal injury to yourself or other people in the vicinity, eg. switch off the mains voltage before any maintenance.

WARNINGS appear as below:



1.3 Precautions

The following precautions must be observed when using the Auto-Sash Controller and associated systems:

- Be sure that the voltage of the Auto-Sash Controller equipment corresponds to the voltage available where it is to be installed.
- Never remove the side or back panels of the Auto-Sash Controller without first shutting down the equipment and disconnecting the mains cord.

1.4 General Operating Conditions

The Auto-Sash Controller and equipment have been designed and tested in accordance with the safety requirements of the International Electrotechnical Commission (IEC). The Auto-Sash Controller conforms to IEC61010-1 (Safety Requirements for electrical equipment for measurement, control and laboratory use) as it applies to IEC Class 1 (earthed) appliances, and therefore meets the requirements of EC directive 73/23/EEC.

If possible, avoid any adjustment, maintenance or repair to the equipment whilst covers are open or it is operative. However, if any adjustment, maintenance or repair is necessary while the covers are open, this must be done by a skilled person who is aware of the hazards involved.

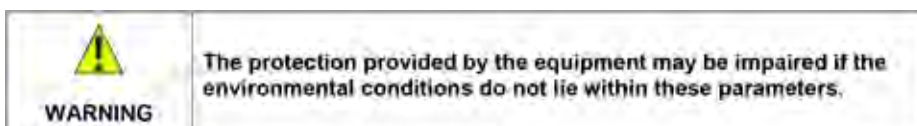
Whenever circumstances arise that mean an Auto-Sash Controller may be unsafe, make it inoperative. In particular, an Auto-Sash Controller may be unsafe if it:

- Shows visible damage.
- Fails to perform correctly.
- Has been subjected to severe transport stresses.
- Has been subjected to prolonged storage in unfavorable conditions.

1.5 Environmental Conditions


The Auto-Sash Controller should only be used under the following conditions:

- Indoors.
- In ambient temperatures between 5°C and 40°C.
- With relative humidity below 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C.
- Electrical supply fluctuations not exceeding +10% of the nominal voltage.





1.6 Electrical Safety


The Auto-Sash Controller and associated equipment are designed to protect the user from potential electrical hazards. This section describes some recommended electrical safety practices.

 <p>WARNING</p>	<p>Lethal voltages are present at certain points within the equipment.</p> <p>When the equipment is connected to mains power, removing the equipment covers is likely to expose live parts.</p> <p>Even when the power switch is off, high voltages can still be present – capacitors within the equipment may still be charged even if the equipment has been disconnected from all live voltage sources.</p>
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The Auto-Sash Controller and associated equipment must be correctly connected to a suitable electrical supply. The supply must have a correctly installed protective conductor (earth or ground) and must be installed and checked by a qualified electrician before initial power up.

 <p>WARNING</p>	<p>Any interruption of the protective conductor inside or outside the Auto-Sash Controller System, or disconnection of the protective conductor terminal is likely to make the equipment dangerous.</p> <p>Intentional interruption of the protective conductor is prohibited.</p>
---	--

 <p>WARNING</p>	<p>If the mains power cord has to be replaced, ensure that the replacement cord is appropriately rated and approved for the intended use.</p>
---	--

 <p>WARNING</p>	<p>To prevent potential personal injury and damage to the equipment, switch OFF all components in the system and disconnect them from the mains power supply before altering, or making any new electrical connections.</p>
---	--

When working with the Auto-Sash Controller System:

- Connect the equipment to a correctly installed mains power outlet that has a protective conductor connection.
- Do not operate the equipment with any covers or internal parts removed.
- Disconnect the equipment from all live voltage sources before opening it to make any adjustments, replacements, maintenance or repair. If the opened equipment must be operated for further adjustment, maintenance or repair, this must only be done by a supplier's Service Engineer.

If it is possible that the equipment is no longer electrically safe for use, make the equipment inoperative and secure it against any unauthorised or unintentional operation.

The electrical safety of the equipment is likely to be impaired if:

- It has any signs of visible damage.
- If it has been subjected to prolonged storage in unfavourable conditions.
- If it has been subjected to severe stress during transportation.

1.7 Electrical Protection

Observe the following electrical protection precautions:

- Insulation: Class I rating for external circuits. Only connect equipment that meets the requirements of IEC 61010-1, IEC 60950 or equivalent standards.
- Installation Category: The equipment is able to withstand transient over-voltages typically present on the mains supply. The normal level of transient over-voltages is impulse withstand (overvoltage) Category II of IEC 60364-4-443.
- Pollution Degree 2: Normally only non-conductive pollution occurs. Occasionally, however, temporary conductivity caused by condensation must be expected.

1.8 EMC Compliance

EC Directive

The Auto-Sash Controller System is designed and tested to meet the requirements of the EC directive 89/336/EEC and 93/68/EEC and complies with the EMC standard EN61326 (EMC standard for electrical equipment for measurement, control and laboratory use) and EN55011 (ISM) Class A (RF emissions).

FCC Rules and Regulations

The Auto-Sash Controller System is classified as a digital device used exclusively as industrial, commercial or medical test equipment. It is exempt from the technical standards specified in Part 15 of the FCC Rules and Regulations based on Section 15.103 (c).

1.9 Warning Labels

Warning labels attached to the equipment draw attention to specific hazards - refer to this guide and other documentation provided with the equipment for more details concerning potential hazards and any precautions or other actions that must be taken.

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2. OVERVIEW OF THE FUME HOOD AUTO-SASH CONTROLLER

2 OVERVIEW OF THE FUME HOOD AUTO-SASH CONTROLLER

The Auto-Sash Controller automates the opening and closing of the fume hood sash. Automation of the sash movement provides an increased level of safety to the controlled environment as sashes cannot be 'accidentally' left open and can respond to safety critical inputs from external sources such as fire alarms and ventilation system failures.

Such automation also facilitates cost savings, if linked to ventilation controls, as automatically closing an unattended fume hood allows extractor fan speeds and electricity consumption to be reduced.

2.1 Features

The Auto-Sash Controller has the following features/functionality:

1. **Auto-Close** - The sash can be automatically closed when the fume hood is unattended.
2. **Auto-Open** - The sash can automatically open (or re-open if previously automatically closed) when the operator returns.
3. **Sash Lock** - The sash can be programmed to lock, ie. Auto-Sash Drive inhibited, when moved to a user defined position, eg. fully open, to allow for loading or setting up of equipment inside the Fume Cupboard.
4. **Manual Sash Open/Close** - Allows the sash to be opened or closed manually.
5. **Keypad Pushbutton Open/Close** - The sash can be opened or closed using the Keypad pushbuttons.
6. **Footswitch** - The sash can be opened or closed using an optional, third party supplied, footswitch.
7. **Tilt Switch** - An optional, third party supplied, tilt switch can be used to disable the Auto-Sash Control Unit when the sash is opened for maintenance.
8. **Building Management System (BMS) Inputs** - The sash can automatically close when a signal is received from the BMS, eg. in the event of a fire alarm.
9. **Building Management System (BMS) Outputs** - The Auto-Sash Controller can send a number of signals to the BMS regarding the current status of the fume hood, eg. sash position, alarm status.

2.2 Auto-Sash Control Options

Three main control options can be utilised by the Auto-Sash Controller to control the opening and closing of the fume hood sash:

- Auto-Sash Controller fitted with Tiptronic Open/Close Control.
- Auto-Sash Controller fitted with Sash Low Micro-Switch.
- Auto-Sash Controller fitted with Sash Low Proximity Switch.

2.2.1 Auto-Sash Controller with Tiptronic Open/Close Control

Tiptronic Open/Close control is the default control setup, using a Sash Position Sensor (sprung potentiometer) with a draw wire (1.2m long) attached to either the sash or the counterweight. **The Auto-Sash Controller can then be calibrated to give one of the following methods of operation:**

Method A - Close only (bottom position only calibrated)

The sash automatically drives to the bottom position when the operator is not present. Pressing the **Down** pushbutton drives the sash to the bottom position when the operator is present. The **Up** pushbutton is disabled.

Method B - 2-Position (bottom and mid-positions calibrated)

The sash automatically drives to the bottom position when the operator is not present. Pressing the Down pushbutton drives the sash to the bottom position when the operator is present. Pressing the Up pushbutton drives the sash to the mid-position when the operator is present.

If the Tiptronic feature is enabled, manually tip (move) the sash upwards - the sash drives to the mid-position. Manually tip the sash downwards - the sash drives to the bottom position.

If the Auto Open feature is enabled, the sash automatically drives to the mid-position when the operator is present (slight time delay following user detection).

If the Auto Lock feature is enabled and a Sash Lock position has been calibrated, once the sash is raised to a position equal to or above the Sash Lock position the sash locks in its current position and the Auto Close feature is disabled. This facilitates loading of the Fume Cupboard.

Method C - 3-Position (bottom, mid and top positions calibrated)

The sash automatically drives to the bottom position when the operator is not present. Pressing the Down pushbutton drives the sash to the bottom position when the operator is present. Pressing the Up pushbutton drives the sash to the next calibrated position when the operator is present, ie. if the sash is lower than the mid-position the sash is driven to the mid-position, if the sash is higher than mid-position the sash is driven to the top position.

If the Tiptronic feature is enabled, manually tip (move) the sash upwards - the sash drives to the next calibrated position. Manually tip the sash downwards - the sash drives to the bottom position.

If the Auto Open feature is enabled, the sash automatically drives to the mid-position when the operator is present (slight time delay following user detection), if the sash is lower than mid position.

If the Auto Lock feature is enabled and a Sash Lock position has been calibrated, once the sash is raised to a position equal to or above the Sash Lock position the sash locks in its current position and the Auto Close feature is disabled. This facilitates loading of the Fume Cupboard.

2.2.2 Auto-Sash Controller with Sash Low Micro-Switch

If the Tiptronic Open/Close control option is not chosen, a Sash Low Micro-Switch can be specified for fitting by TEL or by the fume hood manufacturer. The switch can be arranged to be closed or open when the sash is closed, depending on how and where the switch is fitted. The wiring arrangement must be modified to suit the particular installation and the operational requirements of the fume hood.

The following functionality is available:

- The sash automatically drives to the bottom position when the operator is not present.
- Pressing the Down pushbutton drives the sash to the bottom position when the operator is present.
- The Up pushbutton is disabled.

2.2.3 Auto-Sash Controller with Sash Low Proximity Switch

If the Tiptronic Open/Close control option is not chosen, a Sash Low Proximity Switch can be specified for fitting by TEL or the fume hood manufacturer. The switch can be arranged to be closed or open when the sash is closed, depending on how and where the switch is fitted. The wiring arrangement must be modified to suit the particular installation and the operational requirements of the fume hood.

The following functionality is available:

- The sash automatically drives to the bottom position when the operator is not present.
- Pressing the Down pushbutton drives the sash to the bottom position when the operator is present.
- The Up pushbutton is disabled.

2.3 Control System Components

The Auto-Sash Control System comprises a control unit accompanied by a number of additional components and options depending on the installation.

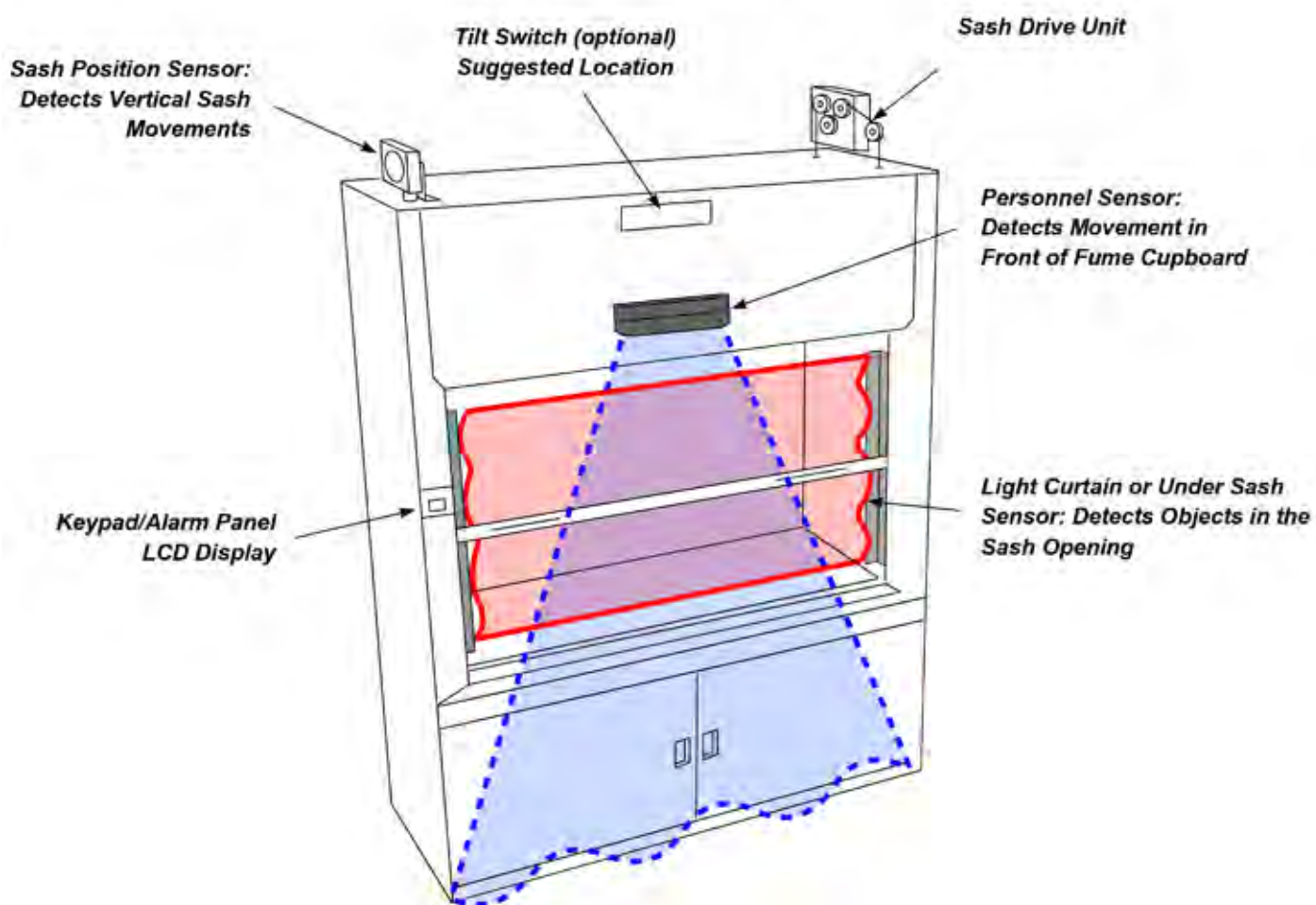


Figure 1 - Typical Location of Main Components

Note: This example installation is fitted with a Pulley and Wire Sash Drive.

2.3.1 Auto-Sash Control Unit

The Auto-Sash Control Unit processes the inputs from the sensors and switches associated with the sash control function and outputs relevant signals to the motor drive(s) and alarm panel.



Figure 2 - Auto-Sash Control Unit - Single and Dual Controller Enclosure

2.3.2 Personnel Sensor

The Personnel Sensor is a Passive Infra-Red (PIR) occupancy detector which detects the presence or absence of the fume hood operator and prevents the sash closing automatically when the operator is present at the fume hood.



Note: If the operator is detected, the sash will not automatically close but can still be opened and closed either manually or by using the **Up/Down** pushbuttons.

On power up, the Personnel Sensor 'learns' the reflection characteristics of the environment within its field of view and stores this information as reference background data. The sensor then 're-learns' the background every three minutes, so that if a stationary object, such as a stool, is left in the field it will become part of the background and 'ignored' by the sensor. Then, when the operator is no longer present at the fume hood, the sash will close automatically, following a pre-set delay time, as long as the Sash Light Curtain is not broken and the sash is not already closed.

2.3.3 Keypad/Alarm Panel

The Keypad/Alarm Panel provides a visual indication of the status of the Auto-Sash, including any fault conditions, via a Liquid Crystal Display (LCD).



Figure 5 - US Keypad



Figure 6 - UK/EU Keypad

2.3.4 Sash Light Curtain

The Sash Light Curtain is a safety device designed to detect whether the opening below the sash is clear of obstructions before the sash is automatically closed. When an obstruction is detected, the sash drive is disabled and the alarm activated. The Sash Light Curtain comprises an infra red transmitter mounted on one side of the fume hood and an infra red receiver mounted on the opposite side of the fume hood's inner chamber.

The infra red transmitter has multiple, closely spaced, Light Emitting Diodes (LEDs) to facilitate the detection of small objects.

Objects are detected when infra red light from the transmitter is not detected by the receiver due to an obstruction in its path.

A separate Sash Light Curtain Control Box includes a sensitivity potentiometer that allows the beam sensitivity to be set to 'see' glass or other objects partially transparent to infra red light.



**Figure 7 - Sash Light
Curtain Transmitter and
Receiver**



Figure 8 - Sash Light Curtain Control Box

2.3.5 Under Sash Sensor

The Under Sash Sensor is used as an alternative to the Sash Light Curtain and is designed to detect whether the opening below the sash is clear from obstructions before the sash is driven closed.

A single sensor on one side of the fume hood detects the reflection of a beam of light from a self-adhesive strip of retro-reflective tape mounted on the opposite inside wall of the fume hood.

The sensor incorporates a potentiometer which allows the beam sensitivity to be set to 'see' glass objects.

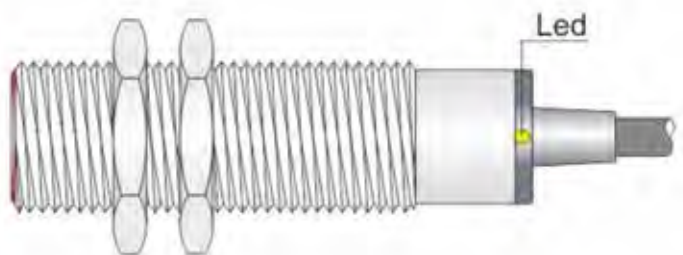
2.3.6 Sash Low Switch

The Sash Low switch is used when the Tiptronic control option (see Section 2.2 - Auto-Sash Control Options) has not been chosen and is used to signal to the Auto-Sash Control Unit that the fume hood sash is closed.

The switch can be either a mechanical roller lever type micro-switch or an inductive proximity switch.



Roller Lever Micro-Switch



Inductive Proximity Switch

Figure 9 - Typical Sash Low Switches

2.3.7 Sash Position Sensor

The Sash Position Sensor, comprising a flexible cable, a spring-loaded spool and a potentiometer, is used in conjunction with the Tiptronic control option to detect and measure vertical sash movement and the position of the fume hood sash.

During the initial on-screen calibration set up (see Section 4 - Setting Up and Calibration of Auto-Sash Control Unit), the sash controller will detect the direction of travel of the sensor and then provide information on the position of the sash to the Auto-Sash Control Unit to enable calibration of the sash open and sash closed positions.

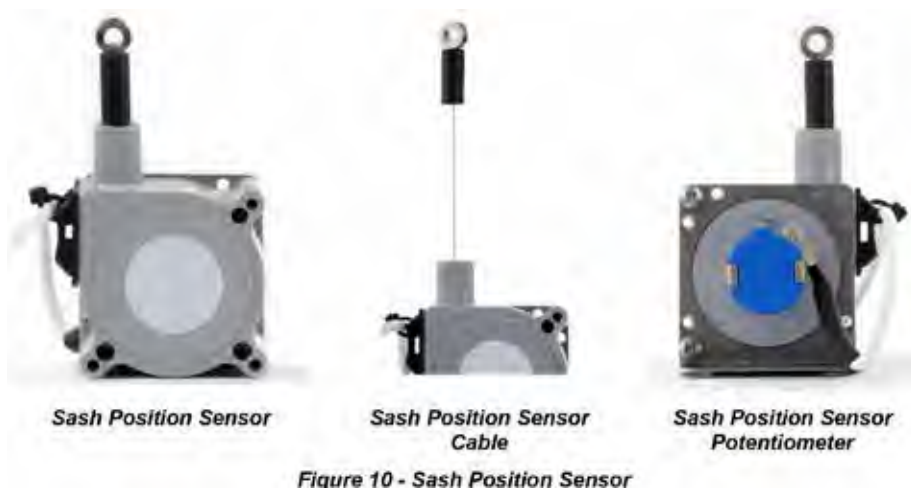


Figure 10 - Sash Position Sensor

2.3.8 Tilt Switch

The Tilt Switch is an optional, third party supplied, component fitted to the fume hood top panel which operates to isolate the Auto-Sash controls when the top panel is opened to facilitate servicing of the fume hood.

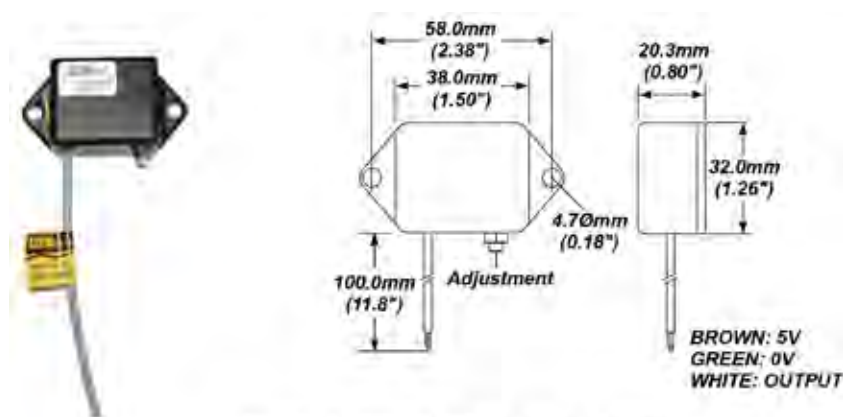


Figure 11 - Typical Third Party Tilt Switch

2.3.9 Foot Switch

The Foot Switch is an optional, third party supplied, component which can be positioned on the floor in front of the fume hood and is used to open the sash.



Figure 12 - Typical Third Party Foot Switch

2.3.10 Sash Drive Unit

The Sash Drive Unit is a geared electric motor and clutch assembly used to drive the sash open and closed.

Three types of drive are available, none of which preclude manual opening and closing of the fume hood:

- Rack and Pinion drive.
- Chain and Sprocket drive.
- Pulley and Wire drive.



**Figure 14 -
Rack and Pinion Drive**



**Figure 13 -
Chain and Sprocket Drive**



**Figure 15 -
Pulley and Wire Drive**

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3. INSTALLING THE AUTO-SASH CONTROL SYSTEM COMPONENTS

3 INSTALLING THE AUTO-SASH CONTROL SYSTEM COMPONENTS

The following section outlines the installation of the various components of the Auto-Sash control system.

As the size and format of individual fume hoods may vary considerably, specific installation instructions are not possible, though the principles outlined below should remain valid in all cases.

Note: Before starting installation, ensure that the sash is free to move in its runners. Use silicon spray on the sash runners or adjust the sash runner's alignment if the sash does not move freely.

3.1 Auto-Sash Control Unit

3.1.1 Mounting the Unit

The Auto-Sash Control Unit can be mounted as follows:

- Screwed flat to the outside of the fume hood roof (horizontal mounting).

Note: For horizontal mounting, the control box should always be mounted with the lid/front panel facing upwards.

- Screwed to the outside wall of fume hood wall (vertical mounting).



Figure 16 -
Auto-Sash Control Unit Lid/Front Panel



Figure 17 -
Auto-Sash Control Unit Connectors
(Single and Dual Fume Hoods)

Once the Auto-Sash Control Unit has been positioned, mark its position using the fixing holes in the rear of the housing as a template. Then, attach the Auto-Sash Control Unit with screws.



Figure 18 - Rear of Auto-Sash Control Unit

3.1.2 Wiring in the Auto-Sash Control Unit

On a fume hood with an inner and outer sidewall, cables to and from sensors, the motor drive and the Auto-Sash Control Unit can be routed through the sidewall and into the service void.

On a single wall type fume hood, cables to and from sensors, the motor drive and the Auto-Sash Control Unit should be routed up the outside of the sidewall using suitable trunking or fixing pads and ties.

When wiring in the Auto-Sash Control Unit, observe the following:

- In all cases, cables should be kept clear of moving parts such as components of the motor drive and sash.
- In all cases, grommets should be used where cables pass through sidewalls to prevent abrasion of the cable insulation and/or sidewall. Where a cable is supplied with a DIN connector, the grommet should have a minimum internal diameter of 17mm (0.67").
- Ensure that any bending of the cables, such as when passing at 90° through a sidewall, does not lead to them becoming overstressed.

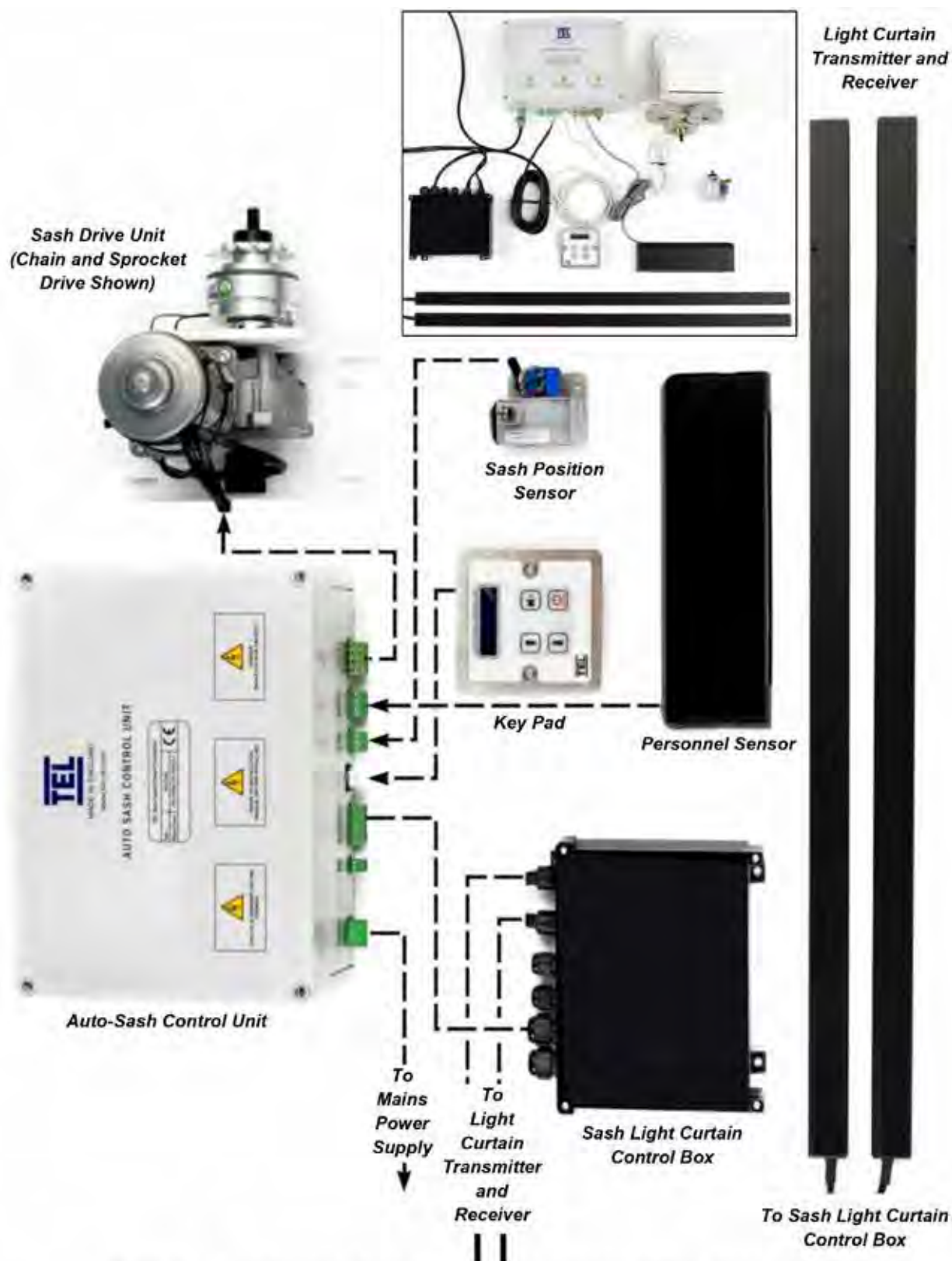


Figure 19 - Sash Controls System - General Layout and Wiring Schematic and Wiring Illustration (Inset)

CABLE SPECIFICATIONS	
Mains cable	3-core, 0.7mm ² , 2m long
Light Curtain cable	4-core, 0.5mm ² , 2m long
Keypad cable	RJ45, 3 m long
Sash Position Sensor cable	4-core, 0.2mm ² , 2.5m long
Personnel Sensor cable	5-core, 0.2mm ² , 3m long
Motor cable	2-core, 0.5mm ² , 2m long

3.2 Auto-Sash Keypad/Alarm Panel

Alternative Auto-Sash Keypad/Alarm Panels can be supplied for US and EU markets. Both should be mounted on the front of the fume hood, ensuring there is adequate clearance behind for the cables connecting the keypad to the Auto-Sash Control Unit.

3.2.1 Fitting the Auto-Sash Keypad/Alarm Panel

1. Fit the Auto-Sash Keypad to the fume hood using either a single gang socket for UK applications or, for US applications, using a cut-out to the (Version 2) dimensions shown in Figure 20 and Figure 21:

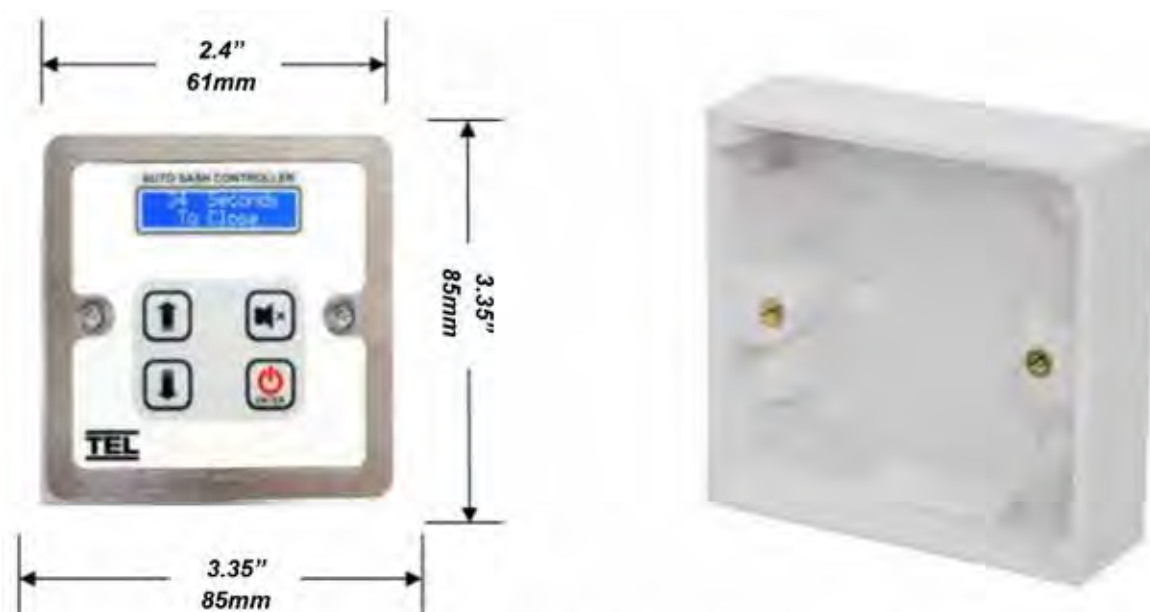
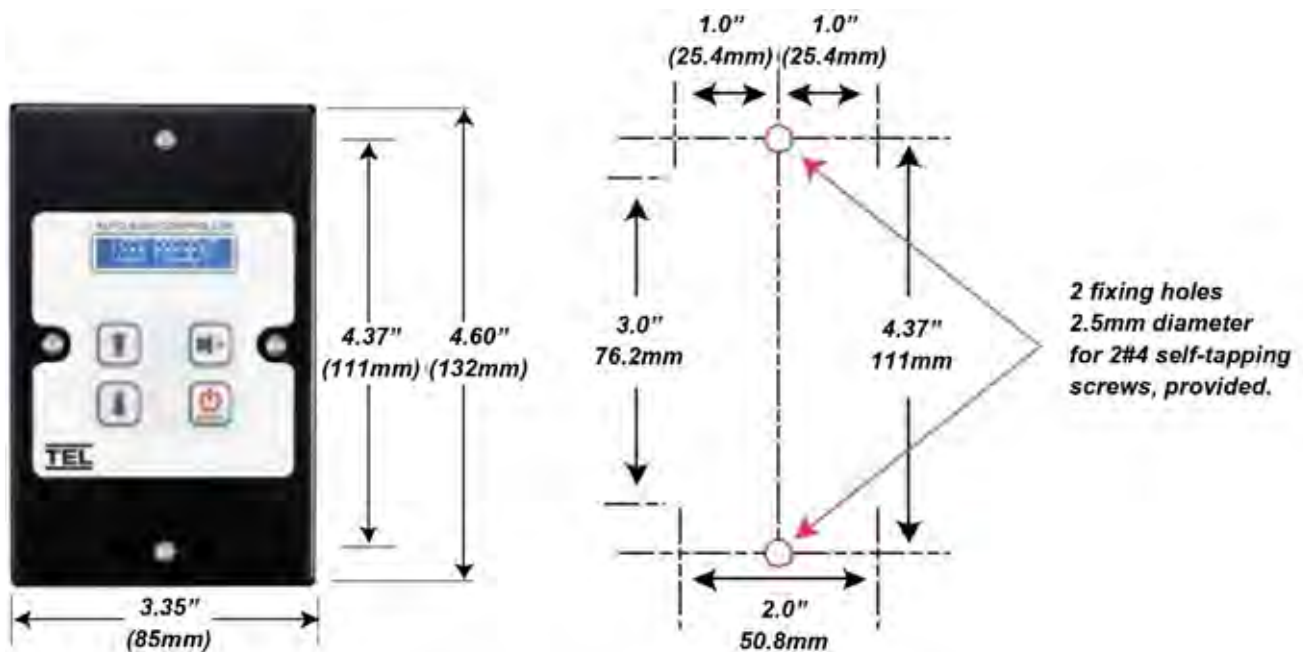


Figure 20 - Version 1 - UK Single Gang Keypad Fits in Standard Single Gang Socket



**Figure 21 - Version 2 US Single Gang Keypad –
(requires cut out in front panel)**

2. Connect the Keypad/Alarm Panel to the Auto-Sash Control Unit. See the wiring schematic in Section 3.10 - Auto-Sash System Control Box - General Wiring Diagram and Figure 22.

3.3 Auto-Sash Motor Drive Unit

A Motor Drive Unit is used to automatically raise and lower the fume hood sash.

Three types of drive are available:

- Rack and Pinion Motor Drive.
- Chain and Sprocket Motor Drive.
- Wire and Pulley Motor Drive.

The optimal choice of sash drive type depends on whether the installation is part of a new build or a retro-fit, the size and configuration of the fume hood and its location.

None of these options preclude manual operation of the sash.



Figure 22 - Keypad/Alarm Panel Rear View

3.3.1 Rack and Pinion Motor Drive

The Rack and Pinion Motor Drive utilises a rack fitted directly onto the sash frame and a motor drive assembly fitted to a framework above the fume hood.

This drive system is ideal for retro-fit installations where there is no access to the sash wires or counterweights and/or where the sash is fitted to a metal framework, eg. combination type sash fume hoods.

3.3.1.1 Installing the Rack and Pinion Drive

1. Raise the sash to the fully open position.
 2. Offer up the motor assembly and rack to ensure that there is a clearance of at least 1.2m (47.24") above the top of the sash.
- The rack is supplied in 1m (39.37") lengths.
3. The motor drive assembly should be fitted to a rigid framework and positioned centrally above the sash.

To ensure that the T-bar fixing clears the bottom of the motor assembly, there should be at least 50mm between the top of the sash and the bottom of the motor drive assembly, when the sash is fully opened

Note: Ensure that the rack is of sufficient length to still protrude through the top of the motor assembly when the sash is fully closed.

4. Once the motor drive assembly is fixed to the fume hood, the T-bar should be fixed to the rack and offered up the sash frame.
5. Ensure that the rack is free to move over the full sash opening before marking up and fixing the T-bar to the sash frame.

Note: The rack must to run vertically at 90 degrees to the horizontal axis of the sash frame.



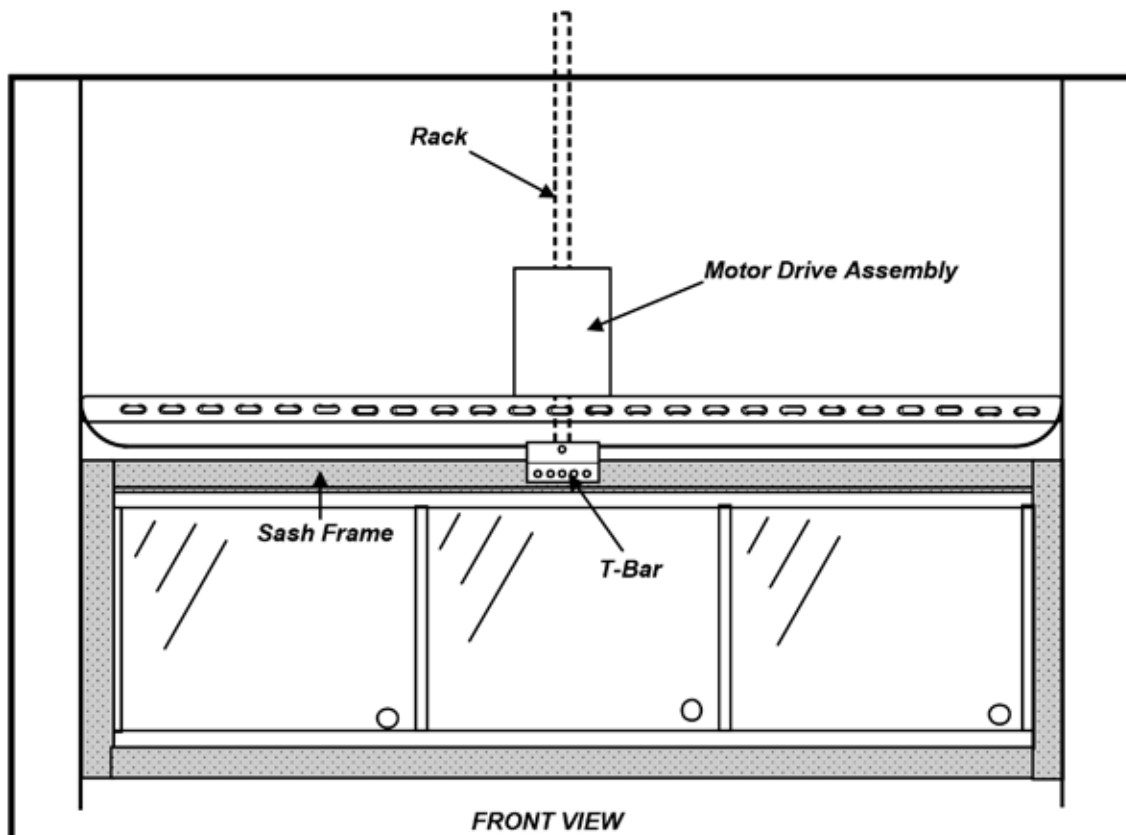


Figure 24 - Front View of Rack and Pinion Sash Drive

6. If a sash low switch is fitted instead of a sash position sensor, the rack will need to be cut to the correct length to enable the switch to operate.

Close the sash fully and mark the rack just below the position of the proximity low switch at the top of the motor assembly to ensure that the rack is clear of the switch when the sash is closed.

7. Connect the Sash Drive to the Auto-Sash Control Unit using the cables provided (red and black connectors). See the wiring schematic in Section 3.10 - Auto-Sash System Control Box - General Wiring Diagram.

Note: It is important to observe the correct polarity when making electrical connections.

8. Connect the clutch assembly to the Auto-Sash Control Unit using the cables provided (blue and yellow connectors).

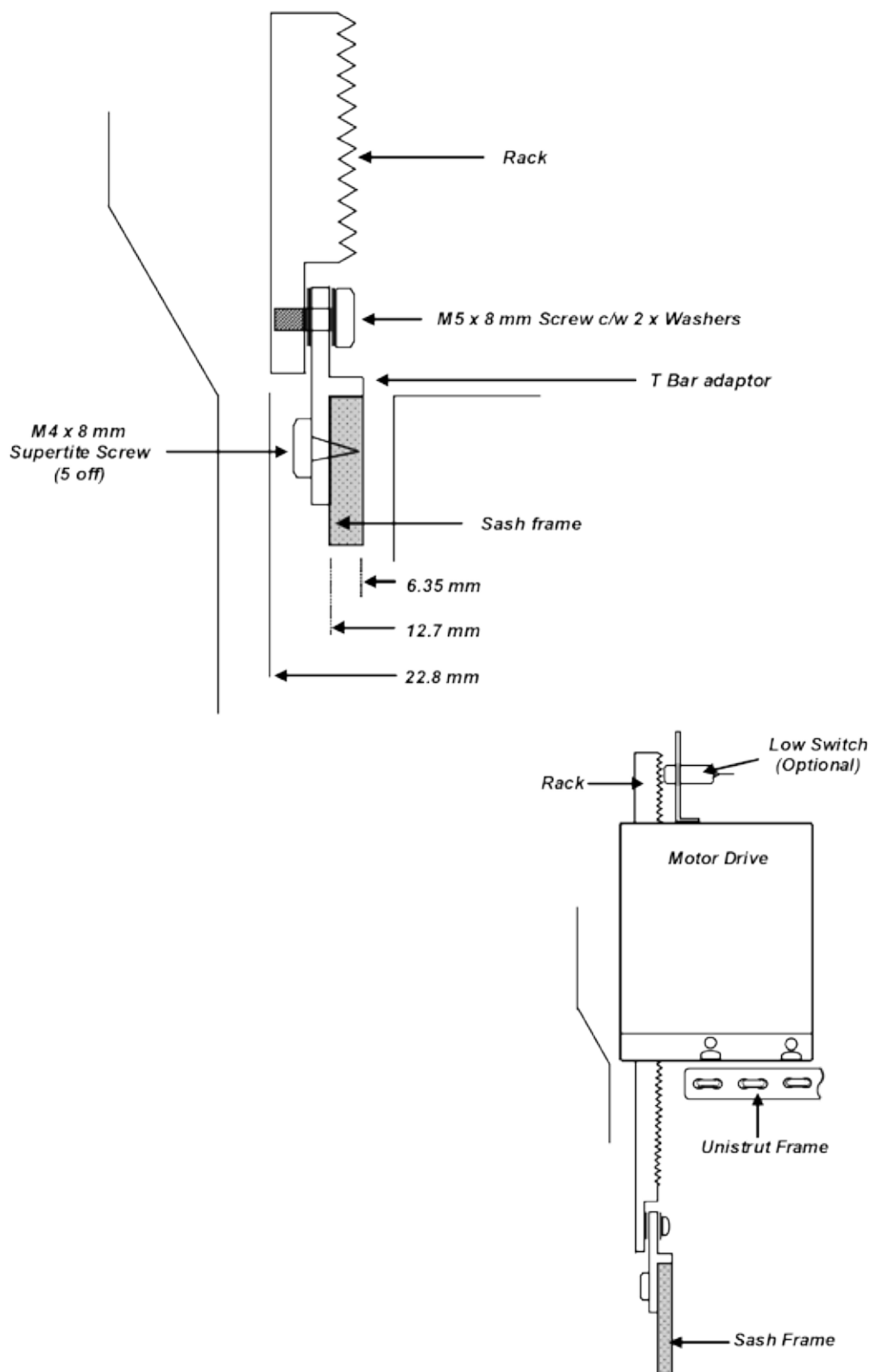


Figure 25 -
Side Views of a Typical Installation of the Rack and Pinion Sash Drive

3.3.2 Chain and Sprocket Drive

Two types of chain and sprocket drive are available:

- Shaft Drive.
- Counterweight Drive.

3.3.2.1 Chain and Sprocket Shaft Drive

With the Shaft Drive arrangement, the motor drive utilises a taper bore sprocket and a roller chain to drive a shaft running between the counterweight pulleys.

The motor assembly is supplied fitted to an adjustable bracket so that the correct chain tension can be set.

The Shaft Drive arrangement can accommodate one or two sash wires.

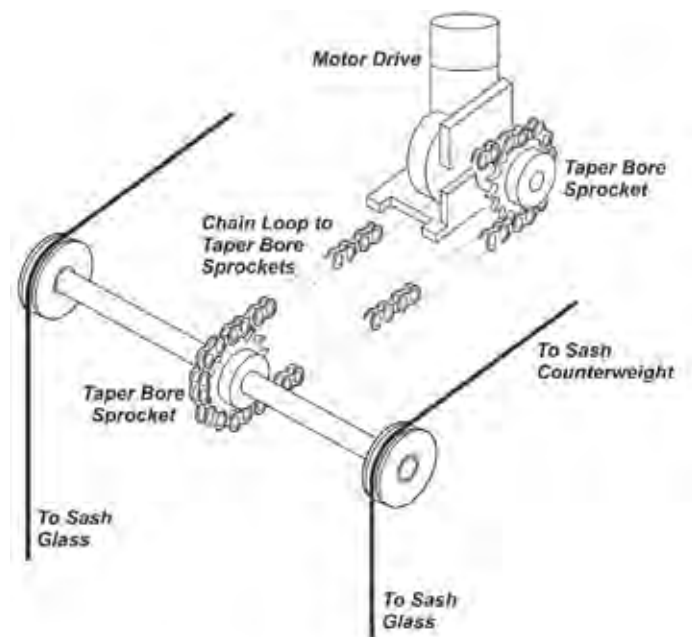


Figure 26 - Typical Chain and Sprocket Shaft Drive Installation

3.3.2.2 Installing the Chain and Sprocket Shaft Drive

1. Fit the taper bore sprocket to the shaft and ensure that the sprocket is securely fitted. The motor drive and sprocket should be positioned centrally on the shaft where possible and the motor assembly should be fitted to a rigid framework to support the motor.
2. Loosely fit the chain before fixing the motor plate to ensure the chain is correctly tensioned and aligned.

3.3.2.3 Chain and Sprocket Counterweight Drive

With the Counterweight Drive arrangement, the chain and sprocket drive system is used to directly lift the sash counterweight by fitting a roller chain to the counterweight and utilising a separate counterweight and freewheeling sprocket to maintain the correct chain tension.

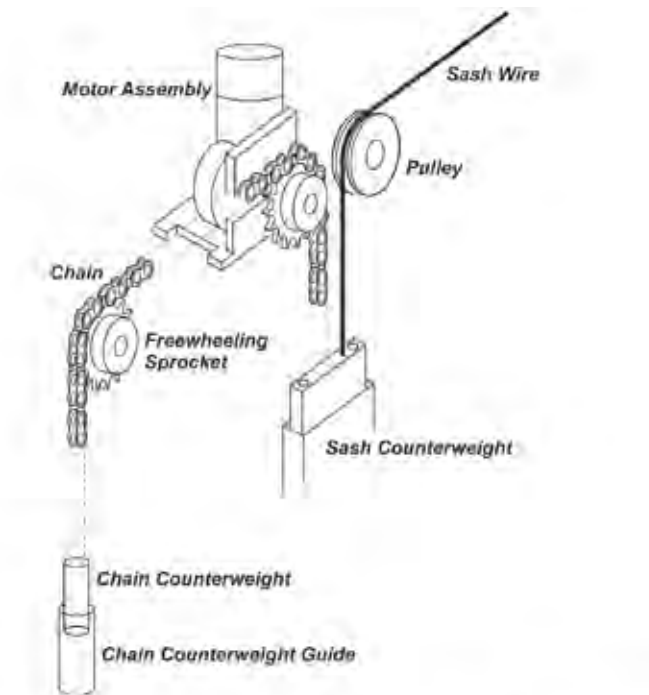


Figure 27 - Typical Chain and Sprocket Counterweight Drive Installation

3.3.2.4 Installing the Chain and Sprocket Counterweight Drive

1. Once the motor, chain and freewheeling sprocket are fitted, manually open and close the sash to ensure that the motor drive is free running and the chain is not too slack or too tight.
2. Fit the motor so that the drive sprocket is in line with the counterweight pulley.
3. Fit one end of the chain to the counterweight or sash wire in close proximity to the counterweight.
4. Fit the freewheeling sprocket in line with the drive sprocket.
5. Loosely fit the chain over the freewheeling pulley and determine the best position for the chain counterweight.
6. Fit the chain counterweight using a counterweight guide if necessary.
7. Once the motor, chain and counterweight are fitted manually open and close the sash to ensure the motor drive, chain and counterweight are free running.

3.3.3 Wire and Pulley Drive

With the Wire and Pulley Drive, the pulley motor drives the sash wire and can accept both single and dual sash wire systems. The motor assembly is fitted in line with the sash wires and uses two guide pulleys and a drive pulley.

The pulley drive is ideal for new fume hoods but can be retro-fitted if a longer replacement sash wire can be fitted.

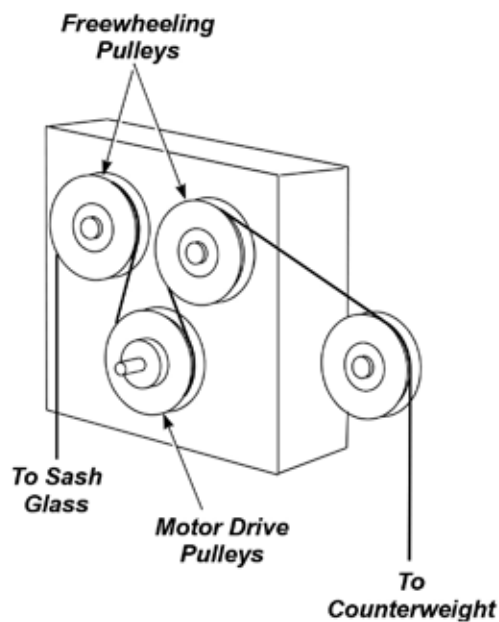


Figure 28 - Typical Wire and Pulley Drive Installation

3.3.3.1 Installing the Wire and Pulley Drive

The motor assembly can be fitted horizontally or vertically on either side of the fume hood, as follows:

1. Fit the motor assembly so that the guide pulleys are in line with the sash wire.
2. Run the sash wire over the first guide pulley, around the drive pulley and then over the final guide pulley.
3. Once the motor drive is installed, open and close the sash to ensure that the sash can travel freely.

3.4 Sash Light Curtain

The Sash Light Curtain consists of three main components and associated wiring:

- Sash Light Curtain Control Box.
- LED Transmitter.
- LED Receiver.

The Sash Light Curtain Control Box is connected to the main Auto-Sash Control Unit.

3.4.1 Installing the Sash Light Curtain Control Box

1. Fix the Sash Light Curtain Control Box onto the top of the fume hood, using the tabs attached to the control box and the screws provided, ensuring that there is access to the terminals to connect the wiring.



Figure 29 - Sash Light Curtain Control Box

2. Connect to the Auto-Sash Control Unit, using the pre-assembled cables and connectors supplied, as per the wiring schematic in Section 3.10 - Auto-Sash System Control Box - General Wiring Diagram.

3.4.2 Installing the Sash Light Curtain Transmitter and Receiver

1. Find a suitable position as close as possible to the back of the sash track, ensuring that the sash handle will not protrude into the light beam and that there are no other obstructions on each side wall.

2. Carefully remove the front plastic covers from the right hand side of the light curtain receiver and the left hand side of the light curtain transmitter cases.

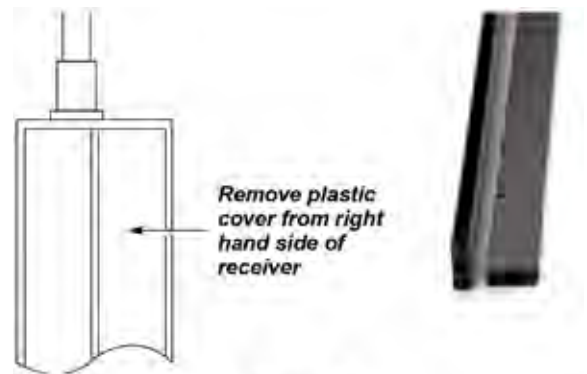


Figure 30 -
Light Curtain Receiver Plastic Cover

3. Position the light curtain transmitter and receiver on opposite sidewalls ensuring that the back of the sash handle does not penetrate the light beam paths. The sash light curtain transmitter and receiver should be fitted so that their cable entry/exit points are at the top. Ensure that the light beam paths are free from other obstructions.

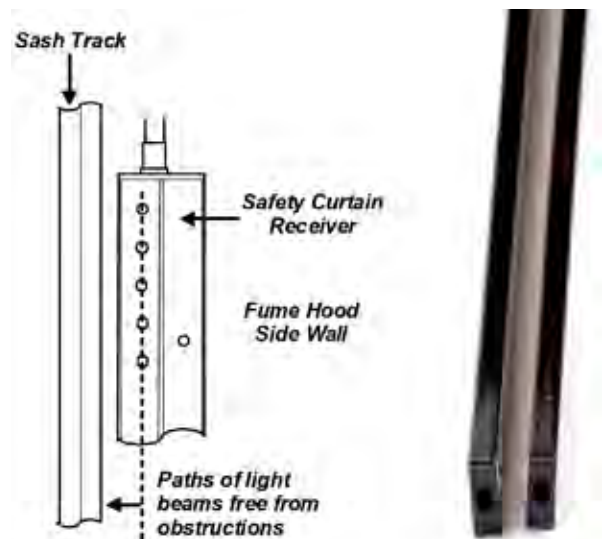


Figure 31 -
Mounting Transmitter/Receiver

3.4.3 Aligning the Light Curtain Transmitter and Receiver

Mounting the light curtain receiver and transmitter at the same height on opposing sides of the fume hood opening will usually be sufficient to align them correctly with no further adjustment required.

A small error in alignment is acceptable, the allowable error being dependent on the spacing between the transmitter and receiver.

Figure below, illustrates the maximum allowable transmitter to receiver misalignment/displacement for a 0 to 3m (0 to 118.11") range of fume hood widths. As can be seen, for a typical fume hood width of 1 to 2m (39.37 to 78.740"), the maximum allowable misalignment/displacement ranges from approximately 20 to 40mm (0.79 to 1.58").

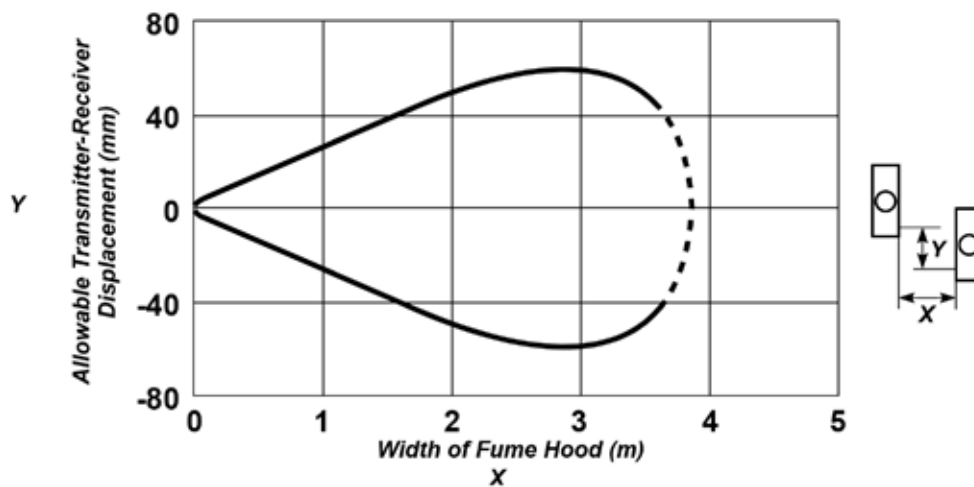


Figure 32 - Maximum Allowable Displacement for a Range of Fume Hood Widths

- The area protected by the light beams should cover the open area under the sash, typically 500mm (20") from its base.

The light curtain transmitter and receiver can be positioned above the bottom of the sash in the fume hood as long as they are free from obstructions.

In a typical installation, the light path would be aligned flush to the bottom of the sash's base.

Note: There is a 123mm (4.84") gap from the top of the light curtain transmitter to the first LED down and a 22mm (0.87") gap from the bottom of the transmitter to the first LED up.

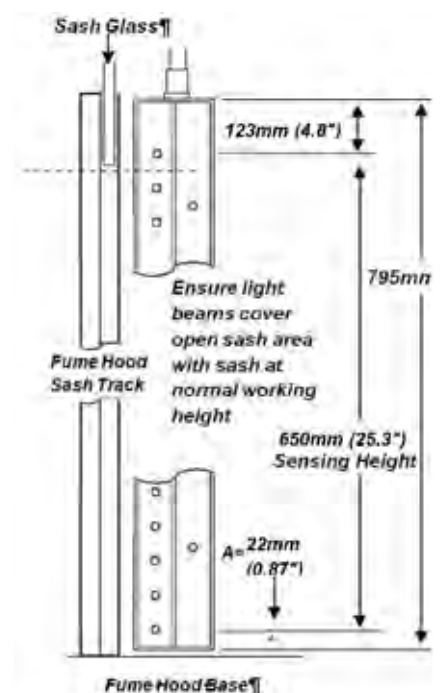
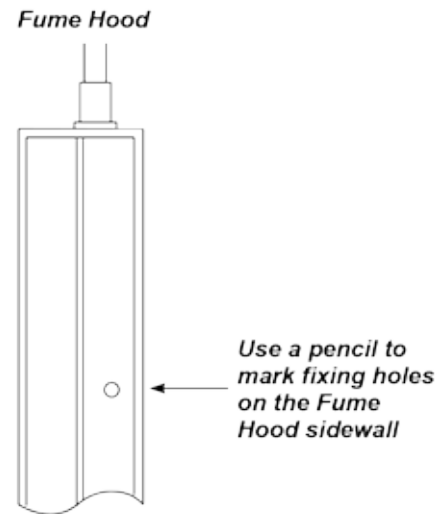


Figure 33 - Light Curtain Vertical Range

5. Once the light curtain transmitter and receiver have been positioned, mark the sidewall using the fixing holes in the transmitter and receiver as templates.
6. Drill the holes for the fixing screws, using the 2mm (0.08") drill bit provided and attach the transmitter and receiver.



**Figure 34 -
Transmitter/Receiver Fixing Holes**

7. On a conventional fume hood with an inner and outer sidewall, the light curtain transmitter and receiver cables can run through the sidewall into the service void and up to the Sash Light Curtain Control Box on top of the fume hood.

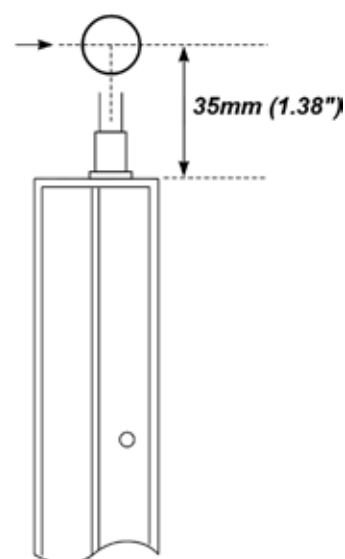
If the fume hood is a single wall type, drill the hole in the top soffit panel and run the cables up the sidewalls using suitable trunking or fixing pads and ties.

If a grommet is used, drill a suitable hole in the sidewall to accept the grommet.

If no grommet is used, drill a 17mm (0.67") hole to clear the cable DIN connector.

Note: The hole's centre should be a minimum of 35mm (1.38") from the top of the light beam path, so that the cable is not stressed when it bends 90° through the inner sidewall.

8. Pass the cables through the sidewall and connect to the Sash Light Curtain Control Box on the top of the fume hood.
9. Connect the light curtain transmitter and receiver to the Sash Light Curtain Control Box using the plug-in RJ45 cables provided.



**Figure 35 -
Light Curtain Cable Entry**

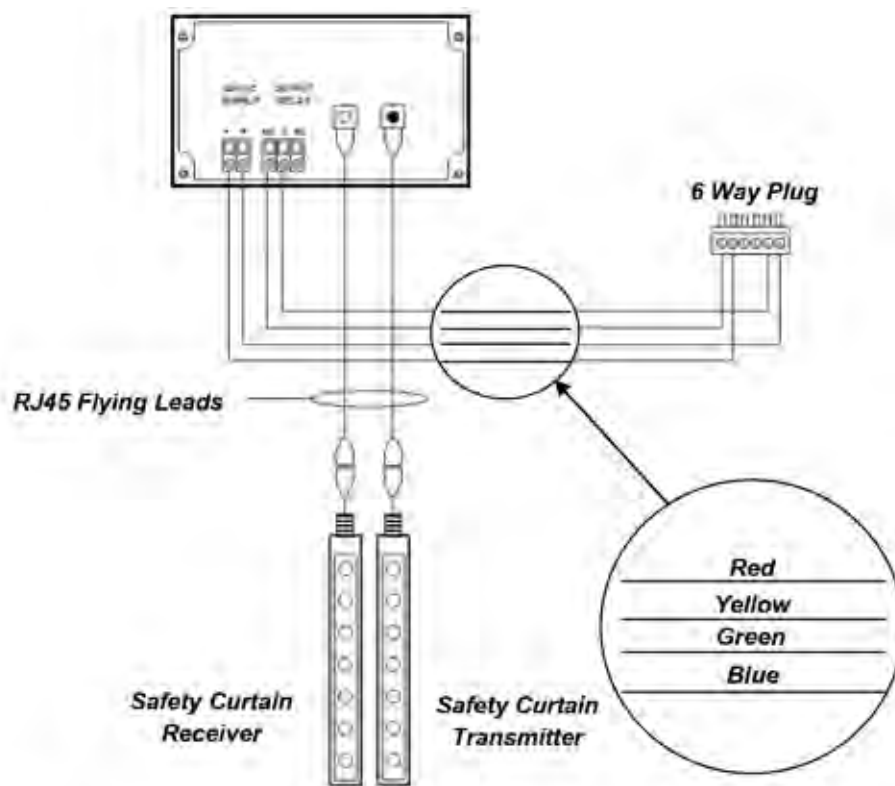


Figure 36 - Light Curtain Vertical Range Safety Curtain Transmitter and Receiver Wiring Schematic

10. Connect the output from the Safety Curtain Control Box to the Auto-Sash Control Unit. See Section 3.10 - Auto-Sash System Control Box - General Wiring Diagram using the pre-assembled cables provided.
11. Fix the light curtain transmitter and receiver to the sidewall using their fixing holes and re-fit the plastic covers.

3.5 Installing and Aligning the Under Sash Sensor

The Under Sash Sensor consists of two components:

- Sash Sensor
- Retro-reflective Tape Strip

1. Fit the sensor so that its lens is clear of obstructions and below the bottom of the sash handle. A suitable bracket should be used so that the sensor position can be adjusted to the best position.

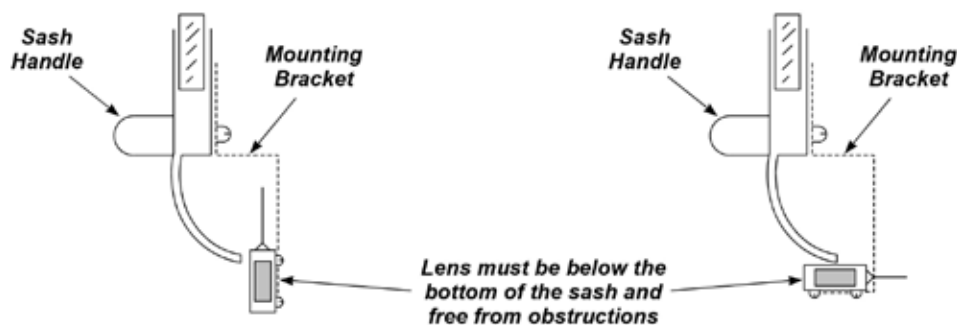


Figure 37 - Under Sash Sensor Mounting

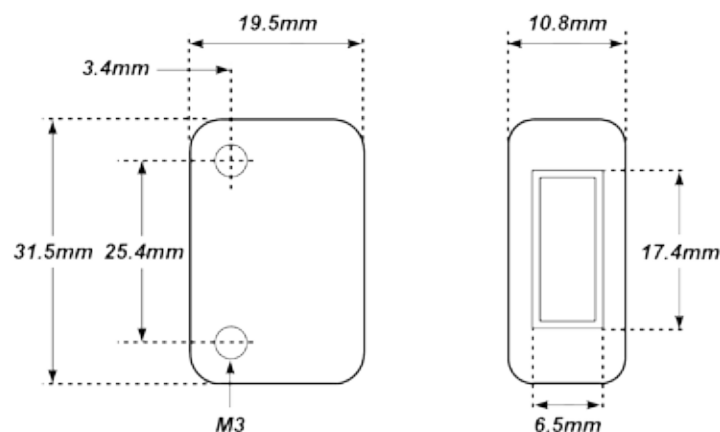


Figure 38 - Under Sash Sensor Dimensions

2. Fix the 5m cable attached to the sensor to the sash wire along its length (where possible) using cable ties and attach to the sash counterweight to keep the cable taught as the sash opens and closes.

The cable slack from the sash counterweight to the sash controller box can be encased in plastic sheathing to guide the cable and stop it from snagging.

The cable can be attached to the sash using small diameter trunking if it is not possible to fix the cable to the sash wire.

A roller bearing or pulley should be used where the cable runs over any metal surface.

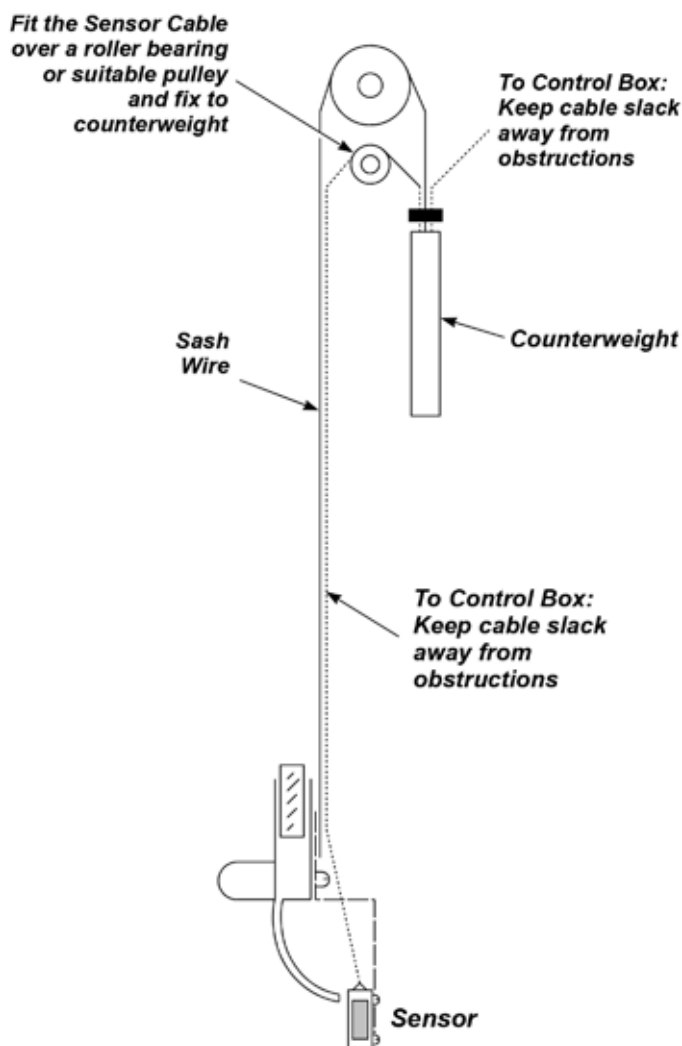


Figure 39 - Typical Under Sash Sensor Retro-Installation

3. Fix the retro-reflective tape strip to the inside of the fume hood on the opposite side to the sensor.

The centre of the retro-reflective tape strip should be positioned in line with the centre of the sensor where possible however, a small offset between the sensor and retro-reflective tape strip is acceptable. The maximum offset values, for a range of fume hood widths, are illustrated in Figure 40 overleaf.

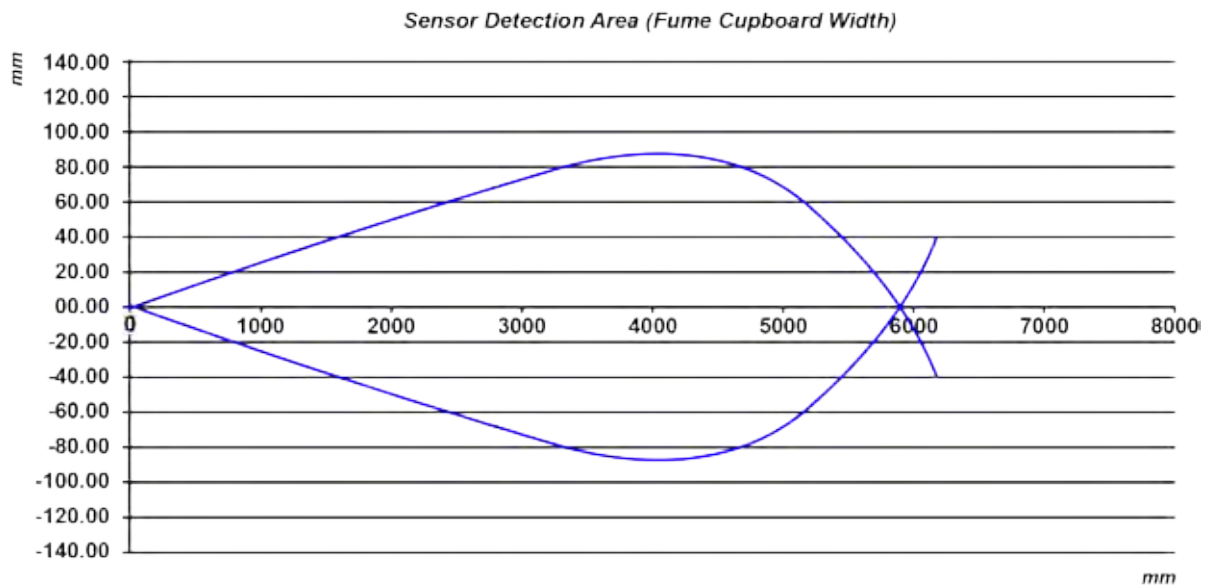


Figure 40 - Maximum Under Sash Sensor Offset

For example, on a 1000mm wide Fume Hood the sensor can detect the retro-reflective strip up to +/- 20mm either side of the Under Sash Sensor's centreline.

4. Connect to the Auto-Sash Control Unit as per the wiring diagram in Section 3.10 - Auto-Sash System Control Box - General Wiring Diagram.

3.6 Tilt Switch

As Tilt Switches are provided in a variety of forms, specific installation instructions are not possible, though the following applies in all cases:

- Ensure that the Tilt Switch is installed in the correct orientation ie is 'open' when the front panel is closed and 'closed' when the front panel is open.
- Connect the Tilt Switch to the Auto-Sash Control Unit as per the wiring schematic in Section 3.10 - Auto-Sash System Control Box - General Wiring Diagram and the schematic in Error! Reference source not found.
- If a Tilt Switch is not used, link out/connect together the relevant terminals on the Auto-Sash Control Unit – see wiring schematic in Section 3.10 - Auto-Sash System Control Box - General Wiring Diagram.

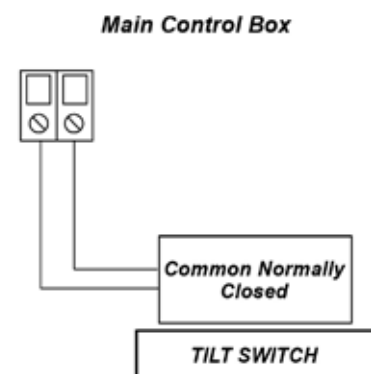


Figure 41 - Tilt Switch Wiring Schematic

3.7 Sash Low Switch

Two types of Sash Low switch can be employed:

- Micro-Switch.
- Proximity Switch.

In both cases, the switch can be employed so that the sash is signalled as being open when the switch is 'open' or 'closed' depending on the requirements of the particular installation.

3.7.1 Installing the Sash Low Micro-Switch

The Sash Low Micro-Switch is a change-over type switch so can be set up to either make or break when the sash is closed as long as the correct terminals are used on the switch for each type of activation. Typically, the switch would be fitted so that the lever engages (pushes in) when the sash is open.

Connect the Sash Low Micro-Switch to the Auto-Sash Control Unit as per the wiring schematic in Section 3.10 - Auto-Sash System Control Box - General Wiring Diagram and the schematic in Figure 42.

If the switch is installed so that the lever pushes in when the sash is closed, connect the wiring to the Auto-Sash Control Unit to terminals C and NO on the switch.

If the switch is installed so that the lever pushes in when the sash is open, connect the wiring to the Auto-Sash Control Unit to terminals C and NC on the switch.

**4 Way Connector
To Sash Control Box**

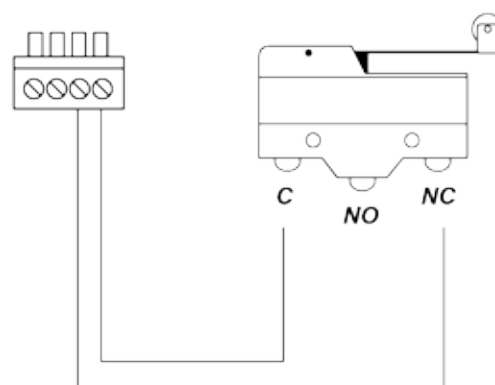


Figure 42 - Sash Low Micro-Switch Wiring Schematic

3.7.2 Installing the Sash Low Proximity Switch

The Sash Low Proximity Switch is an inductive switch that operates when it comes within range of a metal plate attached to the sash, ie. when the sash is closed. Depending on the type of switch selected, the circuit can be either made or broken when the sash is closed. Typically, the switch would be fitted so that the switch is closed when the sash is open.

Connect the Sash Low Proximity Switch to the Auto-Sash Control Unit as per the wiring schematic in Section 3.10 - Auto-Sash System Control Box - General Wiring Diagram and the schematic in Figure 43.

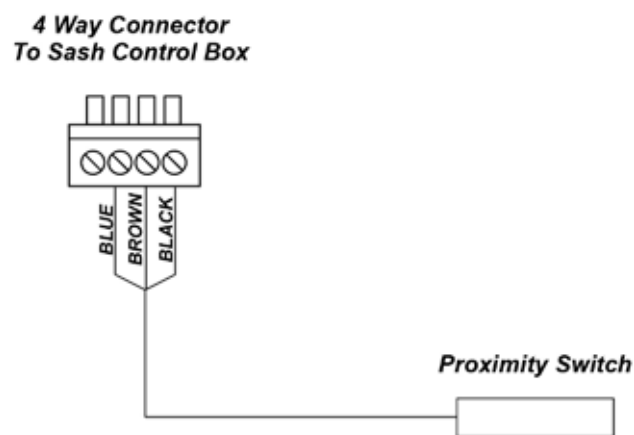


Figure 43 - Sash Low Proximity Switch Wiring Schematic

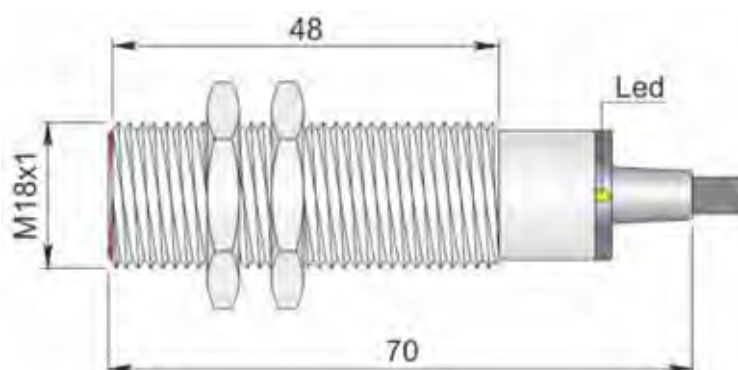


Figure 44 - Sash Low Proximity Switch Dimensions

Note 1: In both cases, if the Auto-Sash control is being retro-fitted to a fume hood, ensure sufficient fixing bracket adjustment is provided to allow for any over-travel of the sash.

3.8 Sash Position Sensor

The sash position sensor is fitted with a mounting bracket which can be fitted in four different orientations to enable the sensor draw wire to be correctly aligned.

1. Offer up the sensor to determine the best fixing position on the fume hood framework.

For best results, the sensor draw wire should run straight out of the sensor housing in line with the cable housing extension. In cases where the wire has run at an angle to the sensor, ensure the angle is as small as possible to ensure that the wire does not rub on any part of the sensor body including the cable housing extension.

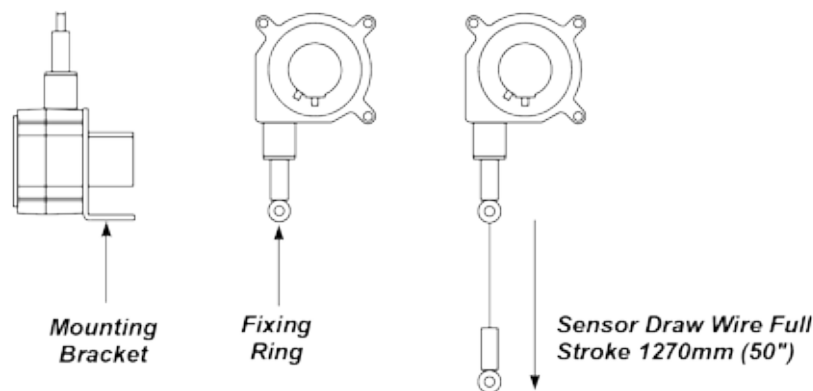


Figure 45 - Sash Position Sensor

2. Mark the fixing holes in the framework and attach the sensor.

The fixing bracket has two 0.37mm (0.015") diameter fixing holes.

Note: Ensure that the sensor is in a suitable position to ensure that the draw wire does not over extend. The sensor draw wire full stroke is 1270mm (50") maximum.

3. Attach the draw wire to either:

- The sash using a suitably sized screw - the draw wire has a 9.53mm (0.38") diameter fixing ring with a 4.85mm (0.18") diameter fixing hole in its centre.
- The sash cable using a cable tie, ensuring that the fixing ring does not run over pulleys etc.
- The counterweight using a cable tie as shown in Figure 46.

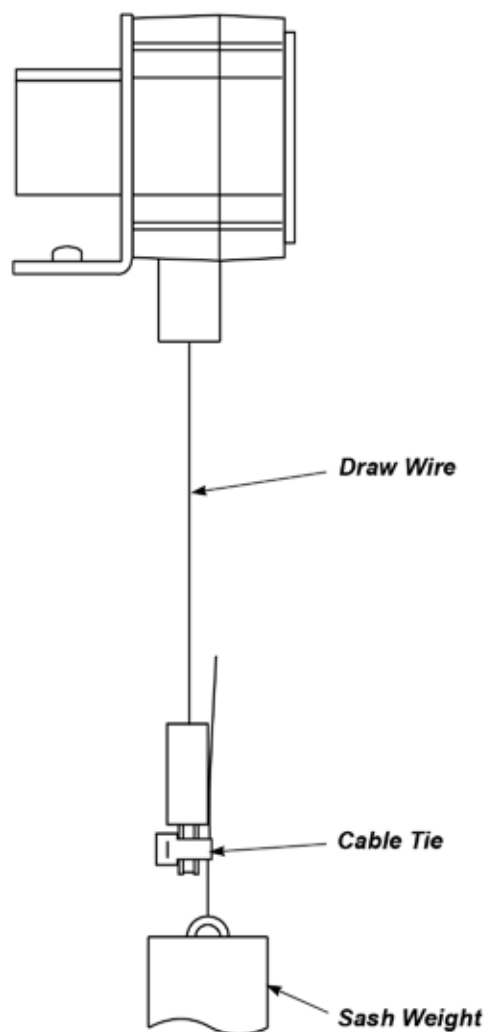


Figure 46 - Sash Position Sensor Draw Wire Attached by Cable Tie

4. Once the sensor is fitted, manually open and close the sash to ensure that the sensor is installed correctly and does not snag.

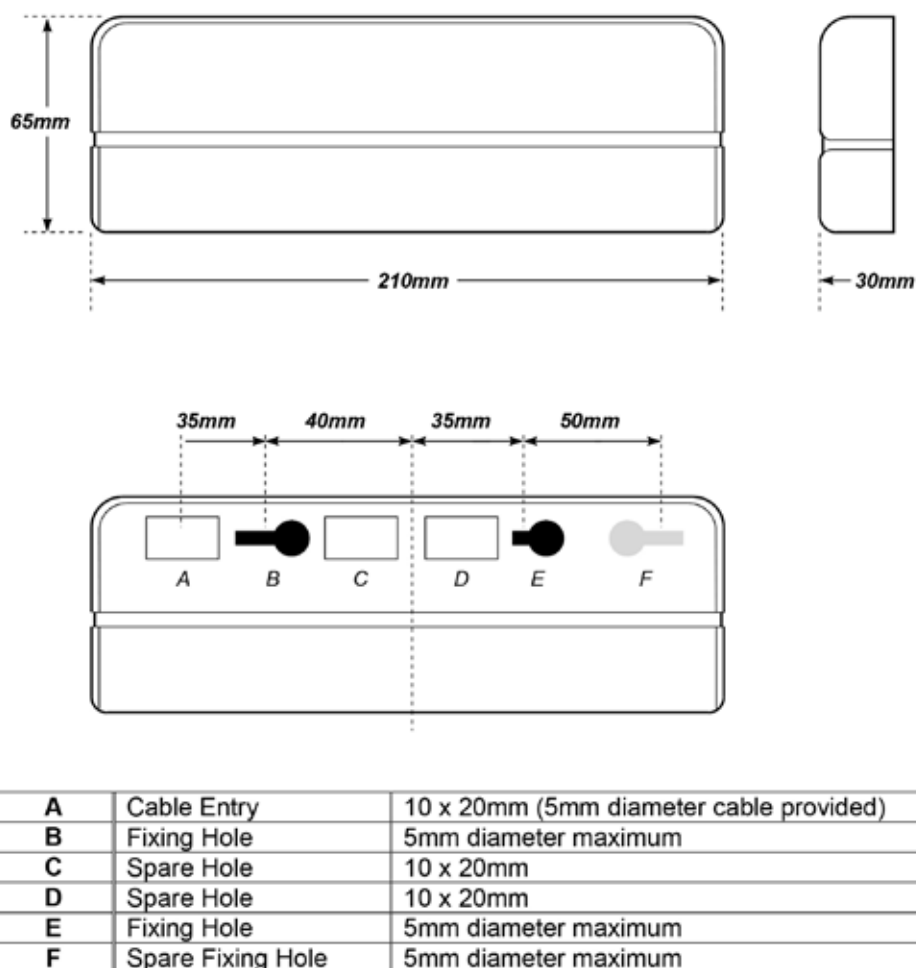
3.9 Personnel Sensor

The Personnel Sensor is supplied as a single transmitter/receiver unit.

3.9.1 Installing the Personnel Sensor

1. Use the mounting template illustrated in Figure 47 and fixing screws provided to fix the Personnel Sensor centrally to the front of the fume hood, above the fume hood sash, using the fixing holes in the back of the sensor.

Refer to the table in Figure 47 for the correct mounting hole dimensions and locations.



**Figure 47 -
Personnel Sensor Dimensions, Mounting Template and Hole Sizing Chart**

The Personnel Sensor should be positioned so that it points straight down, with the horizontal (long) axis of the sensor parallel to the horizontal (long) axis of the fume hood. See Figure 48.

Note: Do not mount the sensor higher than 2500mm (98") from the laboratory floor.

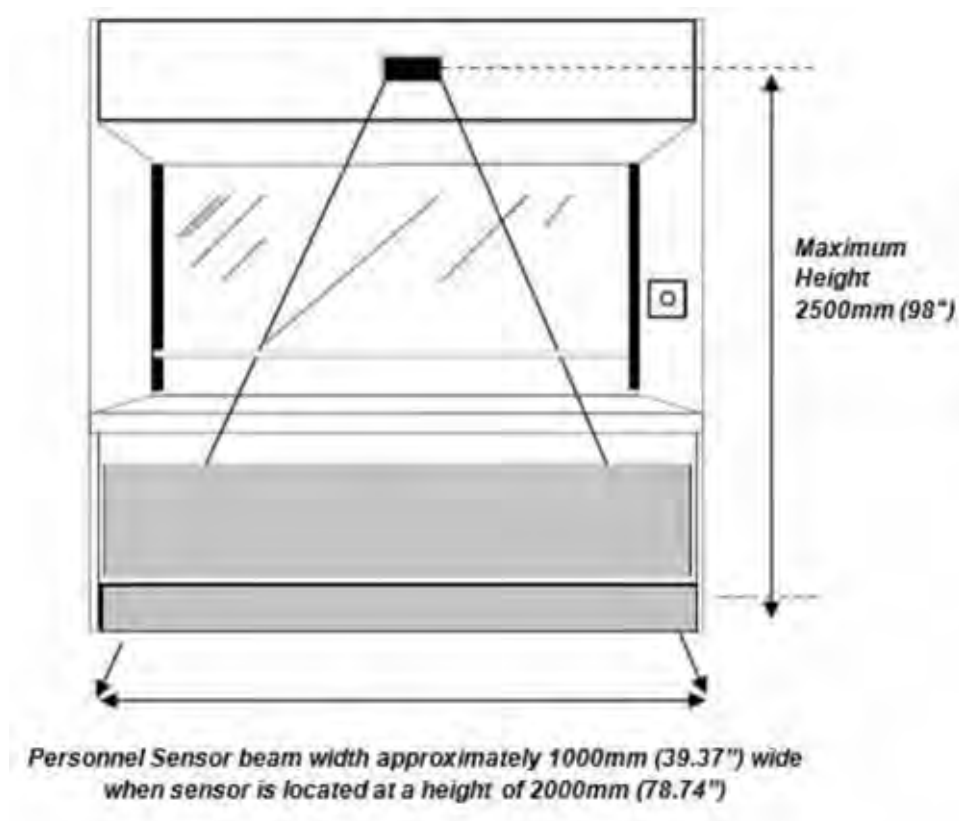


Figure 48 - Vertical Positioning of Personnel Sensor

2. Fit the connection cable to the sensor cable inside the sensor housing.
3. Plug the 4-way terminal block into the Auto-Sash Control Unit. See wiring schematics in Section 3.10 - Auto-Sash System Control Box - General Wiring Diagram and Figure 49.

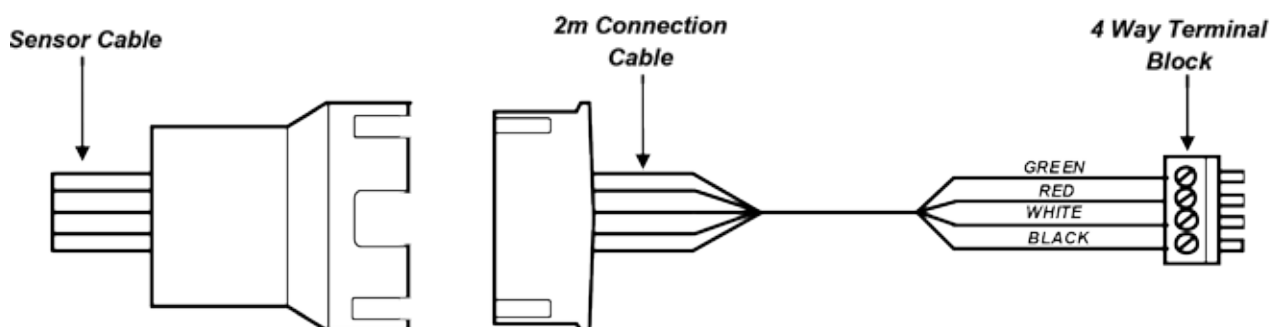


Figure 49 - Personnel Sensor 4-Way Terminal Block

3.9.2 Adjusting the Personnel Sensor Beam Width

It is possible to adjust the width of the Personnel Sensor's beam to suit different widths of fume hoods.

To adjust the beam width:

1. Access the two potentiometers under the sensor's front cover as illustrated in Figure 50 below.

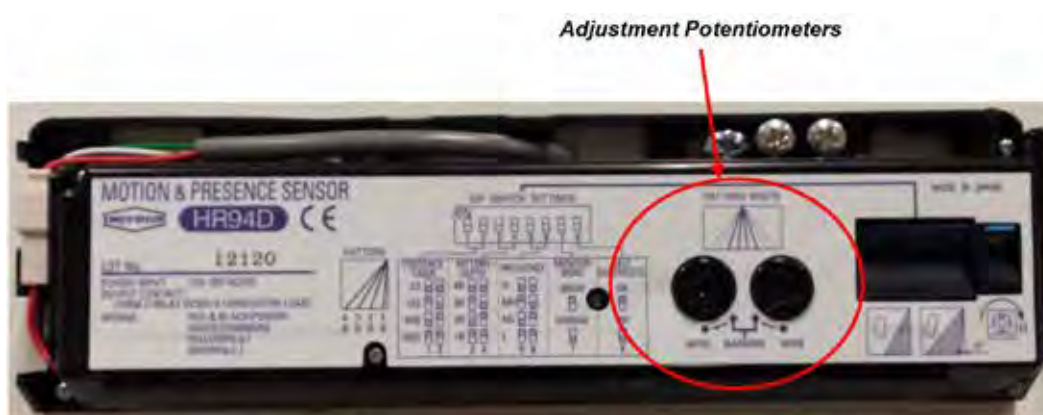


Figure 50 - Personnel Sensor Beam Width Adjustment Potentiometers

2. Referring to Error! Reference source not found. below, adjust the width of the Personnel Sensor beam using the two potentiometers to achieve the best field coverage in front of the fume hood for the hood's particular width.

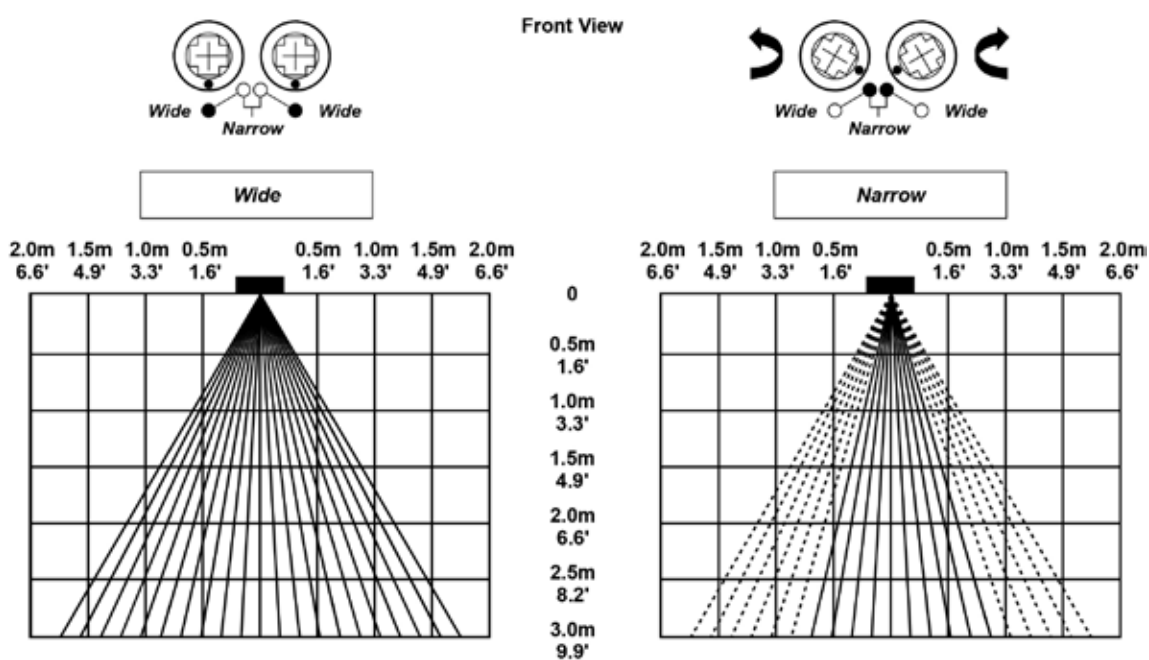


Figure 51 - Adjusting Personnel Sensor Beam Width

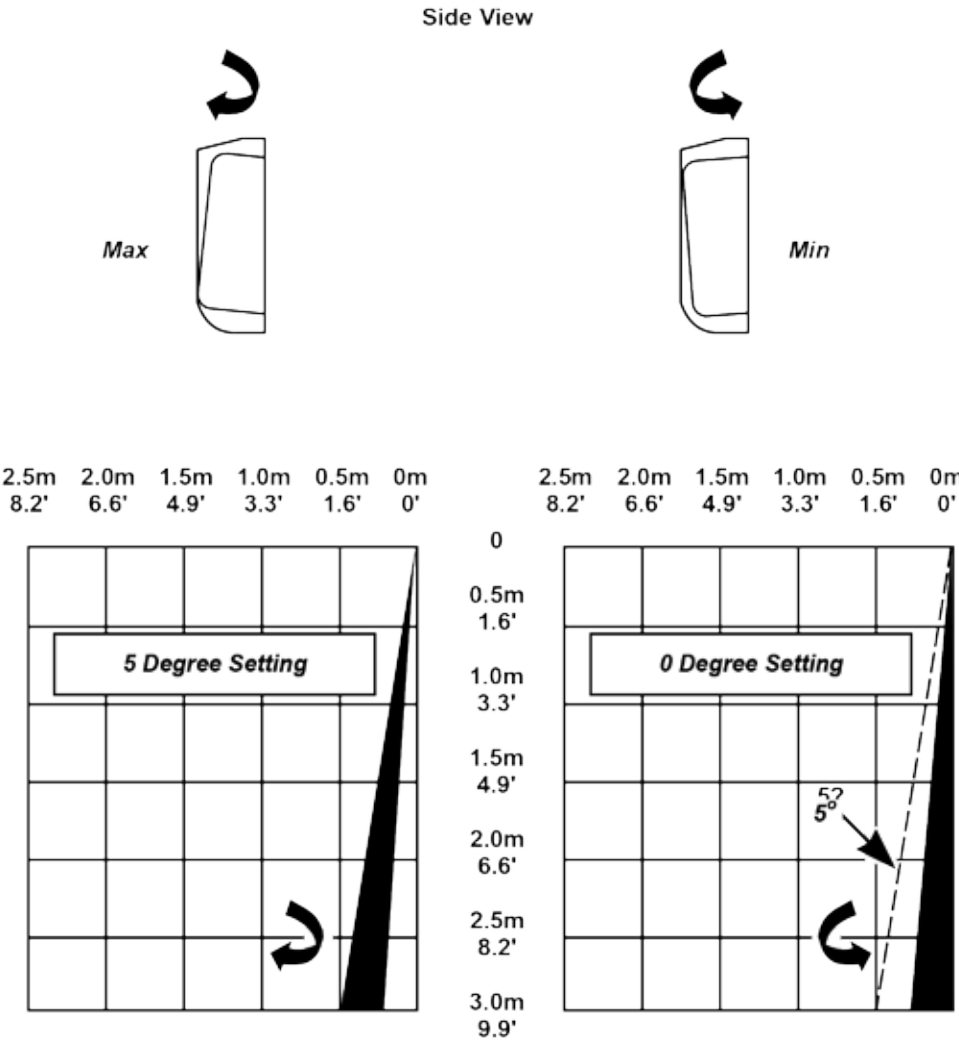


Installation & Operating Manual

3.9.2.1 Adjusting the Beam Depth

Referring to Figure 52 below adjust the sensor by tilting the bottom of the sensor towards or away from the front wall of the fume hood, so that its beam is at optimum angle from the fume hood to achieve the best field coverage for the particular fume hood’s height.

The body of the Personnel Sensor can be tilted from 0o to 5o in three increments to achieve this.



The body of the sensor can be adjusted from 0° to 5° in 3 steps

Figure 52 - Adjusting Personnel Sensor Beam Angle Away From The Fume Hood



3.9.3 Personnel Sensor Dip Switch Settings

The following Personnel Sensor functions and parameters are controlled by Dip switches, located within the Sash Light Curtain Control Box. See Section 4 - Setting Up and Calibration of Auto-Sash Controller.

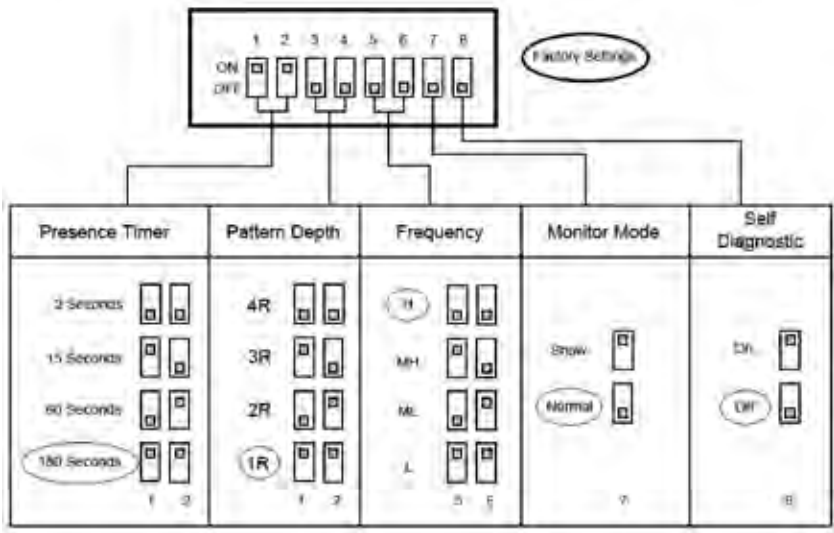


Figure 53 - Personnel Sensor Dip Switch Settings

Switches 1 and 2: Presence Timer.

Select the time delay before the Personnel Sensor ‘re-learns’ the background if a stationary object is detected.

2, 15, 60 or 180 second delays are selected by setting associated switches 1 and 2 to combinations of ON/OFF. See Figure 53.

Note: The timer will reset if any movement is detected during the time period.

Switches 3 and 4: Pattern Depth.

Sets the distance of the detection field away from the sensor.

Switches 5 and 6: Frequency.

Allows the selection of up to four different sensor frequencies (H; MH; M and L) if two or more sensor beam paths overlap.

Switch 7: Monitor Mode.

Selects the Monitor Mode. The ‘Snow’ setting is only applicable to outdoor applications and therefore is not used. The switch should be set to ‘Normal’.

Switch 8: Self Diagnostics.

If the sensor is suspected of not working, selecting switch 8 to ‘ON’ will start a self diagnostic test when the sensor is switched on. If the test detects a fault the LED will continually flicker red and green.



4. SETTING UP AND CALIBRATION OF AUTO-SASH CONTROL UNIT

4 SETTING UP AND CALIBRATION OF AUTO-SASH CONTROL UNIT

Before Starting up the Auto-Sash Controller, ensure that all Auto-Sash Control System components have been correctly installed and that all connections have been made.

Note 1: Check that the fume hood sash and associated motor drives, pulleys, operating cables, racks and chains move freely over their entire operating ranges without binding or catching on adjacent components.

Note 2: Check that all cables are secured away from moving components and that none are overstressed or damaged.

Note 3: Check the security of all electrical connections.

4.1 Starting Up the Auto-Sash Control Unit

The Auto Sash Controller is started by pressing the Power Up/Menu Entry Button illustrated in Figure 5 / Figure 6.

1. Switch on the Auto-Sash Control Unit.

On power up, the Auto-Sash Control Unit performs a self-test of its functions, LEDs and the audible alarm which takes approximately 3 seconds.

During the self-test period, all inputs and outputs are de-activated.

2. At the end of the self-test, the Auto-Sash Control Unit will do one of two things:

If the Auto-Sash Control Unit has previously been calibrated:

- The Auto-Sash Controller will enter Normal Operating Mode and display its current status or alarm condition on the display.

If the Auto-Sash Control Unit has not been calibrated:

- When the Tilt Switch input is open, the display will show 'Sash Drive Inhibited'.
- When the Tilt Switch input is closed, the display will show 'Auto-Sash Not Configured'.

4.2 Calibrating the Auto-Sash Control Unit for Tiptronic Operation using the Auto-Sash Keypad

The Auto-Sash Control Unit needs to have each of its required stationary positions defined for Tiptronic functionality as follows:

1. Press and hold the **Enter** button for approximately 5 seconds or until the main menu appears.

The LCD display will show the current hardware and software versions eg. '1. HW2.0 FW1.1'.

2. Use the **Down** arrow to scroll down and select '2. Setup'.
3. Press **Enter**.
4. Enter the Password (factory default is 1 0 0 1) using the **Up** arrow and **Enter** buttons. In the **Set-Up** menu, the controller will display 'Keypad Tones'.
5. Use the **Down** arrow to scroll through the menu and select 'Sash 1 Settings'.
6. Press **Enter**.

In the S1 (Sash 1) Settings menu, the display will show '1. S1 Enabled'.

7. Use the **Down** arrow button to scroll through the menu and select '8. S1 Calibration'.
8. Press **Enter**. The display will show on screen instructions. As an example, for this stage of the process, the following message will be displayed:

"Manually move sash to center and then press the Up/Down keys to find sash down direction. Press Cancel to abort Calibration"

9. Move the sash to the middle of the sash opening (eg. 250mm from fume hood base).
10. Press the **Up** and **Down** arrow buttons to find which arrow activates sash closing.
11. Press the button which closes the sash, then press **Enter**. This tells the controller which direction the motor needs to turn to close the sash.
12. Move the sash to the lowest position required.
13. Press **Enter**.



14. **Either:** Press Quit (Mute button) if this is the only preset position required,
or: Set the sash to the normal working height (eg. 500mm)
15. Press **Enter** again for two position operation.
16. **Either:** Press **Quit (Mute)** button if only two preset positions ('lowest' and 'normal') are required, **or:** Set the sash to the full opening height (eg. 750mm).
17. Press **Enter** again for three position operation.
Lowest, normal and fully open positions are now calibrated.
18. Press **Enter** to quit Calibration mode.
19. Using the **Down** arrow button, select 'Back to Set up menu'.
20. Press **Enter**.
21. Use the **Down** arrow button and select 'Exit and Save Changes'.
22. Press **Enter**.

The Controller will now enter Run mode.

Note: Even though the Auto-Sash Controller drive allows for acceleration and deceleration, the sash may slightly over run the calibration points if the Auto-Sash motor drive is set to a very fast speed. To prevent this, when calibrating the sash positions, allow a margin for the sash to over-run the lowest, normal and fully open positions set during calibration. See Section 4.2 - Calibrating the Auto-Sash Control Unit for Tiptronic Operation using the Auto-Sash Keypad above.

For example:

To calibrate the lower stop height with this allowance, close the sash fully and then open 5mm (0.197") before calibrating.

To calibrate the normal stop height with this allowance, open the sash to the normal height and then lower by 5mm (0.197") before calibrating.

4.3 Calibrating the Sash Lock Function

The required Sash Lock position is defined as follows:

1. Press and Hold the **Enter** button for approximately 5 seconds or until the **Main** menu appears.
2. The display will show the current Hardware and Software versions eg. "1. HW2.0 FW1.1"



3. Use the **Down** arrow to scroll down, select "2. Setup" and press **Enter**.
4. Enter the Password (Factory default is 1 0 0 1) using the **Up** arrow and **Enter** buttons.
5. In the Set up menu, the controller will display "Keypad Tones"
6. Use the **Down** arrow to scroll through the menu and select "Sash 1 Settings" and press Enter.
7. In the **S1 Settings** menu the display will show "1. S1 Enabled"
8. Use the **Down** arrow to scroll through the menu and select "11. S1 Auto Lock" and press **Enter**.
9. Set to Enabled and press **Enter**.
10. Use the **Down** arrow to scroll through the menu and select "11b. S1 Lock Alarm" and press Enter.
11. Use the **Up** and **Down** arrows to set the required alarm delay time and press Enter.
12. Use the **Down** arrow to scroll through the menu and select "11c. S1 Lock Pos Calibration".
13. Press **Enter**.

The display will show on screen instructions. As an example, for this stage of the process, the following message will be displayed:

*"Lock the sash then move the sash to the lowest lock position. Enter to accept.
Cancel to abort"*

14. Open the sash to the Lock position and press **Enter**.
15. If the position chosen is too low (lower than the calibrated Bottom, Middle or Top positions) "Bad position - try again" will be displayed.
16. If the chosen position is acceptable, the lock position will be set.
17. Use the **Down** button and select "Back to Set up menu" and press **Enter**.
18. Use the **Down** button and select "Exit and Save Changes" and press **Enter**.
19. The Auto-Sash Controller will now go to **RUN** mode.

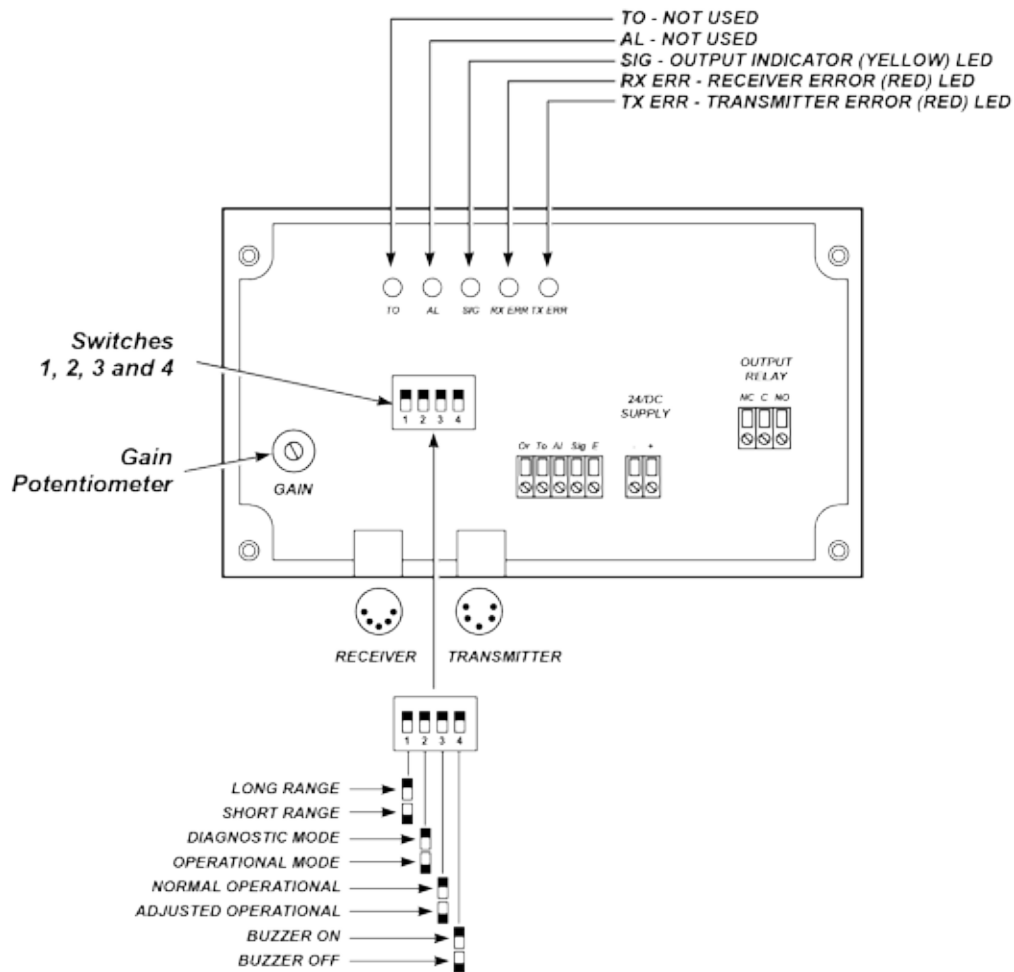
4.4 Calibrating the Safety Light Curtain

Adjust the range and sensitivity of the Safety Light Curtain as follows:

1. Ensure that the area between the Safety Light Curtain transmitter and receiver is free from obstructions.
2. Ensure that the light beam paths are not broken and that the Personnel Sensor is disabled so that the sash does not Auto-Close whilst the Safety Light Curtain is being calibrated.

Note: If it is not possible to disable the Personnel Sensor, remove the motor/clutch connector from the Auto-Sash Control Unit. This will activate the Sash Control Alarm after the selected time delay and the reset button will need to be pressed once the Safety Light Curtain has been calibrated.

3. Remove the cover from the Safety Light Curtain Control Box.



**Figure 54 –
Safety Light Curtain Control Box with Lid Removed**

4. Power up the Auto-Sash Control Unit.
5. Check that the Safety Light Curtain Transmitter and Receiver are connected correctly and are operational.

The red Power On LED should now be visible on the receiver.
See Figure 55.

6. Ensure that Switch 1 (sw1) (see Figure 54) is set to the correct range.
See table overleaf:

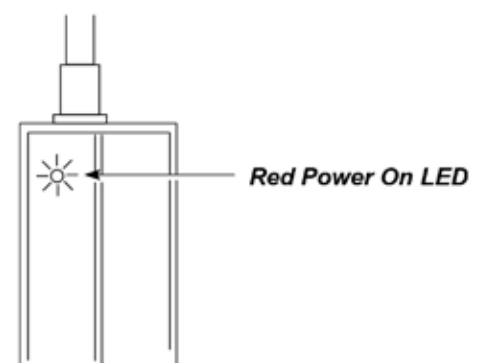


Figure 55 - Red Power On LED

Fume Hood Size	Sash Beam Range	sw1 Setting
0 to 10' (up to 3000mm)	Short	Off
10' to 16' (3000 to 5000mm)	Long	On

6. Ensure that Switch 2 (sw2) (see Figure 54) is set to Off (Operation Mode).
7. Ensure that Switch 3 (sw3) is set to On (Normal Operation)
A buzzer can be set to sound when the beam is broken to aid setting up the beam.
To enable the buzzer, set Switch 4 (sw4) to On.

The signal LED also indicates beam status; green if the detection area is clear and red if an object or the operator is detected.
8. Adjust the gain potentiometer fully counter-clockwise (to minimum), so that the transmitter and receiver cannot 'see' each other ie. the receiver can no longer detect the beam sent from the transmitter.
9. Slowly adjust the gain potentiometer (see Figure 54 above) clockwise (to maximum) until the transmitter and receiver can 'see' each other ie. the receiver can detect the beam sent from the transmitter.
10. Set Switch 3 (sw3) to Off to store the settings.
11. Turn the gain potentiometer approximately 5 degrees clockwise to ensure sufficient gain.
12. Use a glass object (eg. a beaker) to check that such objects can break the beam across the entire open face of the fume hood.

If the glass object does not break the beam over the full area, slowly adjust the gain potentiometer counter-clockwise until inserting the glass object breaks the beam.

13. Disable the buzzer if required by setting Switch 4 (sw4) to Off.

If the sash light beams only intermittently 'see' glass objects, ensure sw1 is set to Off (short range) and repeat steps 5 to 14.

If adjusting the Gain Potentiometer does not allow the transmitter and receiver to 'see' each other and always indicates a broken beam, inspite of a clear path between the light beams:

Either:

Switch sw2 On (Diagnostic mode). After approximately 15 seconds the RX ERR and TX ERR LEDs (see Figure 54 above) will indicate if there is a faulty beam ie:

- RXERR Red LED On – Faulty receiver.
- TXERR Red LED On – Faulty transmitter.

Or:

Clean or replace the faulty component and set sw2 back to Off (Operation mode).

4.5 Calibrating the Tilt Switch

No user calibration of the Tilt Switch is possible however, if a Tilt Switch is fitted, ensure that the top panel of the fume hood is closed before switching on the Auto-Sash Control Unit.

4.6 Calibrating the Sash Position Sensor

No user calibration of the Sash Position Sensor is possible, the unit simply provides sash position data to the Auto-Sash Controller relative to its starting position.

4.7 Calibrating the Personnel Sensor

The sensor is self-calibrating and needs no adjustment. To ensure optimum performance, ensure the detection field in front of the fume hood is clear from objects and personnel when powering up the Auto-Sash Control Unit.

The sensor will be fully operational approximately 10 seconds after power up. The LED on the sensor's fascia will be green if the detection area is clear and red if an object or the operator is detected.

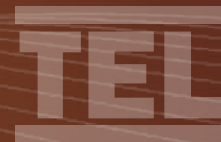
To check that the sensor is operational, listen to hear whether the internal relay energises and de-energises (clicks) when standing in front of and then walking away from the fume hood.

4.8 Calibrating the Sash Low Switch

No user calibration of the Sash Low Switch is possible.

The background is a solid orange color with decorative wavy lines in a lighter shade of orange. These lines are composed of many thin, parallel curves that create a sense of motion and depth, primarily concentrated in the upper and lower portions of the page.

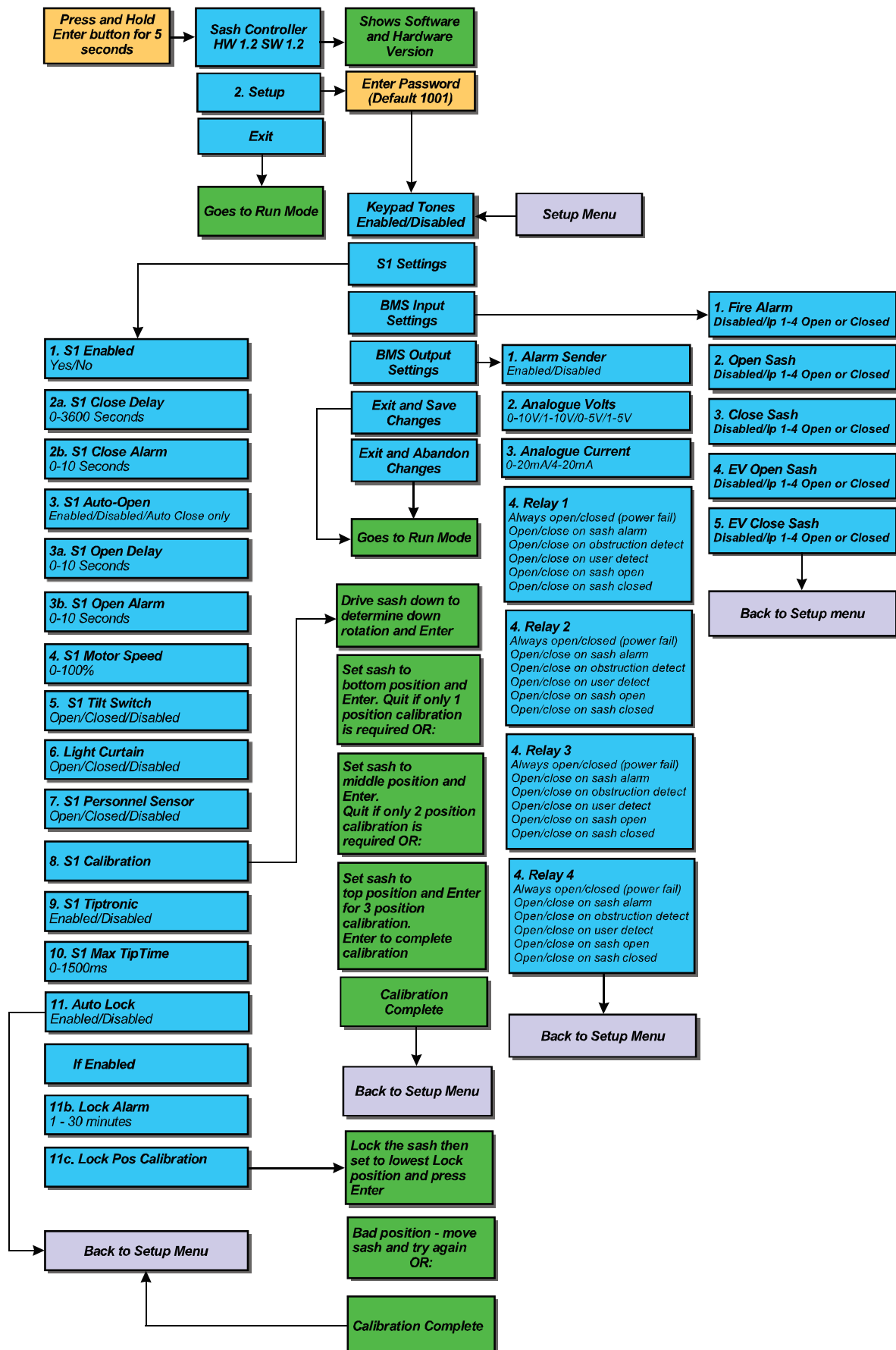
5. SYSTEM MENUS



5 SYSTEM MENUS

The System Menus allow the Operator to define parameters affecting the operation of the Auto-Sash Controller and associated systems.

The overall structure of the System Menus and routes to access individual menu items are illustrated in the flow chart overleaf:





5.1 Accessing System Menus

To access the System Menus, press and hold the Keypad **Enter** button for approximately 5 seconds or until the **Main/Setup** menu is displayed.

1. Navigate the **Main/Setup** menu using the **Up** and **Down** arrow buttons on Keypad.
2. Select the required menu
3. Press **Enter** button
4. Navigate the chosen menu using the **Up** and **Down** arrow buttons.
Select from the following System Menus:
 - Keypad Tones.
 - Sash 1 Settings.
 - BMS Input Settings.
 - BMS Output Settings.
5. Select a menu entry by pressing the **Enter** button.
6. Select a menu entry value/parameter by using the **Up** and **Down** arrow buttons to display the required value/parameter.
7. Press **Enter** button.
8. Press **Cancel** button to exit menu entry and return to menu.
9. To return to **Main/Setup** menu, scroll down to the bottom of the current menu and select <Back to Setup Menu.
10. Press **Enter** button.
11. Scroll down through **Main/Setup** menu and select one of:
 - Exit and Abandon Changes
 - Exit and Save Changes

5.2 Navigating the System Menus

5.2.1 Keypad Tones

Enables or disables tone sounding when a key is pressed on the Keypad.

Select from:

1. Enabled.
2. Disabled.

5.2.2 Sash 1 Settings Menu

1. S1 Enabled

Permanently enables or disables the Auto-Sash Controller motor drive.

Select from:

1. No.
2. Yes.

2a. S1 Close Delay

Sets the time delay before the sash closes (0 to 3600 seconds).

2b. S1 Close Alarm

Sets the time delay between the Close Alarm activating and the sash closing (0 to 10 seconds).

3. S1 Auto-Open

Enables or disables Auto-Open feature or sets to Auto-Close Only.

3a. S1 Open Delay

Sets the time delay before the sash opens (0 to 10 seconds).

3b. S1 Open Alarm

Sets time delay between Open Alarm activating and the sash opening (0 to 10 seconds).

4. S1 Motor Speed

Sets motor drive speed (0 to 100%).

5. S1 Tilt Switch

Sets input activation.

Select from:

1. Normally Open.
2. Normally Closed.
3. Disabled.

6. S1 Light Curtain

Sets input activation.

Select from:

1. Disabled.
2. N/C Contact (Normally Closed).
3. N/O Contact (Normally Open).



7. S1 Personnel (Sensor)

Sets input activation.

- Select from:**
1. Disabled
 2. N/C Contact (Normally Closed)
 3. N/O Contact (Normally Open)

8. S1 Calibration

Calibrates sash position sensor and motor direction. See Section 4.2.

9. S1 Tiptronic

Enables or disables the Tiptronic feature.

- Select from:**
1. Enabled
 2. Disabled

10. S1 MaxTiptime

Sets Tiptronic touch sensitivity (0 to 1500ms – 0 to 1.5 seconds)

Note: This is the minimum time the sash must travel to be operated manually. Manual movement for less than the specified time will cause the sash to Auto-Drive to the calibrated position.

11. S1 Auto Lock

Enables or disables the Auto-Lock feature (see Section 4.2).

- Select from:**
1. Enabled
 2. Disabled

11b. Lock Alarm

Sets the alarm delay time - time before alarm activates if sash remains locked (1 to 30 minutes).

11c. Lock Pos Calibration

Calibrates the Lock position (see Section 4.3).

5.2.3 BMS Input Settings Menu

1. Fire Alarm

- Select from:**
1. Disabled
 2. Input 1 Open
 3. Input 1 Closed

2. Open Sash

- Select from:**
1. Disabled
 2. Input 1 Open
 3. Input 1 Closed

3. Close Sash

- Select from:**
1. Disabled
 2. Input 1 Open
 3. Input 1 Closed

4. EV Open Sash

- Select from:**
1. Disabled
 2. **Input 1 Open**
 3. Input 1 Closed

5. EV Close Sash

- Select from:**
1. Disabled
 2. Input 1 Open
 3. Input 1 Closed

6. Foot SW Open

- Select from:**
1. Disabled
 2. Input 1 Open
 3. Input 1 Closed

7. Foot SW Closed

- Select from:**
1. Disabled
 2. Input 1 Open
 3. Input 1 Closed

5.2.4 BMS Output Settings Menu

1. Alarm Sounder

Enables or disables Remote Alarm Sounder.

2. Analogue Volts

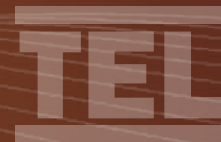
Selects analogue output voltage for sash position indication.

- Select from:**
1. 0 - 10V
 2. 1 - 10V
 3. 0 - 5V
 4. 1 - 5V

3. Analogue Current

Selects analogue output current for sash position indication.

- Select from:**
1. 0 - 20mA
 2. 4 - 20mA



4. Relays 1 to 4 (RLY 1; RLY 2; RLY3; RLY4)

For each relay, select from:

1. Always Open
2. Always Closed
3. Open on Sash Alarm
4. Close on Sash Alarm
5. Open on Obstruction Detected
6. Close on Obstruction Detected
7. Open on User (Detected)
8. Close on User (Detected)
9. Open on Sash Open
10. Close on Sash Open
11. Open on Sash Locked
12. Close on Sash Locked

The background is a solid orange color. It features two sets of thin, white, wavy lines that sweep across the page from the left and right edges towards the center. These lines create a sense of motion and depth, framing the central text.

6. OPERATIONS

6 OPERATION

6.1 Control Philosophy

When all components are installed, setup and calibrated correctly, the Auto-Sash Controller will close the sash after a preset delay, provided the area in front of the fume hood is clear.

The following additional protocols also apply:

- if the user returns to the fume hood during the delay period, the control timer will stop and reset once the user has left the fume hood again.
- if the user returns to the fume hood once the sash is closing, the drive will stop as soon as it 'sees' the user.
- if an obstruction is detected under the sash, the Auto-Sash Controller will not open or close the sash and will give a visual alarm to indicate a fault condition.
- if an obstruction is detected whilst the sash is closing, the sash drive will stop and give a visual indication to indicate a fault condition. The fault alarm can be reset by pressing the reset button.
- once the sash is closing a timer is initiated, if the sash does not close within the specified time, the sash drive will stop and will give a visual alarm to indicate a fault condition.
- whenever a user is present in front of the fume hood, the sash can be operated by hand.

6.2 Modes of Operation

The Tiptronic Auto-Sash Controller has the following modes of operation:

- User Present.
- User Not Detected.
- Auto-Open (User Configurable).
- Building Management System (BMS) Inputs.
- Sash Lock.

6.2.1 User Present

When the user is detected the sash can be moved in the following ways:

- Manually

If the Tiptronic feature is enabled, the sash can be opened or closed manually as long as it is kept moving for more than a user defined period of time ranging from 0 to 1500ms (0 to 1.5 seconds).

Note: This is the minimum time the sash must travel to be operated manually. Movement for less than the specified time will lead to the sash Auto -Driving to the appropriate calibrated position.

- Tiptronic

If the sash is moved manually for less than its user defined period of time (0 to 1.5 seconds), the sash will drive to its user defined position.

- Up/Down Pushbuttons

If these buttons are pressed, the sash will drive to its programmed position.

- Optional Footswitch (Open and Close options)

If operated the sash will drive to its programmed fully open or fully closed position

6.2.2 User Not Detected

When the user is not detected, the sash will Auto-Close to its lowest programmed position following a pre-set delay time unless:

- The Safety Light Curtain beam is broken (ie. an object is detected in the sash opening).
- The Auto-Sash Controller detects no sash movement whilst the motor is operating.

6.2.3 Auto-Open (User Configurable)

When enabled, the sash will automatically open when the Operator returns following a pre-set time delay:

- if the sash was Auto-Closed, the sash will automatically open back to the same position the sash was in before it automatically closed.
- if the sash was closed by any other method (manually, Tiptronic, pushbutton, BMS etc.), the sash will open automatically and return to its calibrated position.

The sash will not open automatically if:

- an object is detected in the sash opening.
- the controller detects no sash movement whilst the motor is operating.

6.2.4 Sash Lock

The sash can be set to Lock (Auto-Sash drive inhibited) when the sash is set to a preset position (eg fully open).

An audible and visual alarm will activate following a preset alarm time delay to remind the user to lower the sash.

This function is used when the sash needs to remain in the open position for a prolonged period of time to allow loading or setting up of equipment inside the fume hood.

6.2.5 Building Management System (BMS) Inputs

The sash can be set to operate from BMS inputs as follows:

- Open/Close

The sash will only Auto-Drive open/closed at the start/end of the day, following an input to the Auto-Sash Controller from a BMS, if the Operator is not present and the no object is detected in the sash opening.

- EV (Emergency) Open/Close

EV audible alarm tone will sound whilst the EV input is active.

The sash will only Auto-Drive open/close if the Operator is not present and no object is detected in the sash opening.

In EV mode, the sash can be manually moved if the Operator is detected. The sash will then Auto-Drive open/closed again, if the EV input is still active, when the Operator is no longer detected.

- Fire Alarm Close

The fire alarm audible alarm tone will sound whilst the fire alarm input is active.

The sash will only Auto-Drive open/closed if the user is not present and no object is detected in the sash opening.

In Fire Alarm Close mode, the sash can be manually moved if the Operator is detected. The sash will then Auto-Drive open/closed again, if the EV input is still active, when the Operator is no longer detected.

6.3 Operation and Alarm Indication

6.3.1 RUN Mode

In RUN mode, the display will show the current status:

“User present”

The user is detected, the sash drive is inhibited, Tiptronic and manual drive are enabled.

“XX Seconds to close”

The user is not detected; the sash will close following the countdown delay time.

“Sash Closing”

Displayed when the sash is driving closed (Tiptronic, Auto-Close or pushbutton).



“Sash Closed”

When the user is not present and the sash has closed. (keypad backlight dimmed).

“XX Seconds to open”

When the user is detected; the sash will open following the countdown delay time.
(Auto-Open enabled)

“Sash Opening”

Displayed when the sash is driving open (Auto-Open, Tiptronic or pushbutton).

“Operator Manual Move”

Displayed if the sash is manually opened or closed.

“Sash Inhibited”

Displayed if the Tilt switch input is open, drive is inhibited until the Tilt switch is closed.

“Sash Disabled”

Displayed if the sash drive has been disabled in the menu settings.

“Sash Locked”

Displayed if the sash is at or above the calibrated Lock position.

If the Auto-Open feature is enabled in the menu and is switched on from the keypad, an “*” (asterix) will be displayed in the left hand corner of the screen, eg. “* User present”.

To enable Auto-Open press and hold the Mute button for 5 seconds or until the “*” symbol is displayed.

To disable Auto-Open press and hold the Mute button for 5 seconds or until the “*” symbol disappears.

Auto-Open can be set to ‘Disabled’, ‘Enabled’, ‘Enabled if Auto-Closed’.

Note: If set to ‘Enabled if Auto-Closed’, the sash will only Auto-Open if the sash has Auto-Closed.

Closing the sash manually or by using the pushbuttons will inhibit the Auto-Open when the user returns to the fume hood.

6.3.2 Alarm Conditions

In an Alarm Condition originating from within the fume hood, the display will show the current alarm status:

“Obstruction Detected”

Displayed if the sash beam is broken when the sash starts to close – remove obstruction and press the Mute button to reset the alarm.

1. "Sash Fault"

Displayed if the sash does not close or open when expected - press Mute to reset alarm. Check sash drive for faults.

2. "Remove Sash Lock/Cancel to Reset"

Displayed if the sash is at or above the calibrated lock position for longer than the preset alarm time - press Mute or lower the sash to reset the alarm.

Following an input from the BMS, the display will show one of the following messages:

1. "Fire Alarm"

Displayed along with the normal text (eg. "Fire Alarm, User Present") when the fire alarm input is activated.

In this situation, the sash will drive closed if the user is not detected and the sash is clear.

The sash can be operated manually if the user is detected (Auto-Open, Tiptronic and pushbuttons are disabled).

2. "BMS open"

Displayed along with the normal text if the user is not detected when the BMS Open input is activated.

In this situation, the sash will drive open if the user is not present and the sash is clear. The sash can be operated normally if the user is detected (Auto-Open, Tiptronic and pushbuttons are active).

3. "BMS close"

When the BMS close input is activated, the sash will drive closed if the user is not present and the sash is clear.

The sash can be operated normally if the user is detected (Auto-Open, Tiptronic and keypad pushbuttons are active).

4. "Emergency (up)"

Displayed along with the normal text if the user is not detected when the EV Open input is activated.

In this situation, the sash will drive open if the user is not present and the sash is clear. The sash can be operated manually if the user is detected (Auto-Open, Tiptronic and pushbuttons are disabled).

5. "Emergency (dn)"

Displayed along with the normal text if the user is not detected when the EV Close input is activated.



In this situation, the sash will drive closed if the user is not present and the sash is clear.

The sash can be operated manually if the user is detected (Auto-Open, Tiptronic and pushbuttons are disabled).

6. “Sash Opening”

Displayed if the Sash Open Footswitch has been operated whilst the Operator is present.

7. “Sash Closing”

Displayed if the Sash Close Footswitch has been operated whilst the Operator is present.

The background is a solid orange color. It features two sets of thin, white, wavy lines that sweep across the page from left to right. One set of lines is positioned in the upper half, and another set is in the lower half, creating a sense of motion and depth.

7. TROUBLESHOOTING

7 TROUBLESHOOTING

7.1 Faults and Alarms

Sash does not Auto-Drive

- a) Check that there is mains power to the control unit and all of the connections are correct.
- b) Check that the Sash 1 Settings Menu entry S1 Enabled is set to Enabled ("Sash Disabled" will be displayed in run mode if set to Disabled).
- c) Check the Tilt Switch is connected or linked out at the control box terminals.

Motor drives but clutch does not engage

Check that the clutch is connected.

Fault LED is illuminated

Check that the area between the sash sensor transmitter and receiver is clear and that the sensors are aligned – power up again to reset.

Sash drive does not stop when sash is closed

Check that the Sash Low switch is connected and operational.

Sash drive is slow or fast

Adjust the Sash 1 Settings Menu entry S1 Motor Speed (0 – 100%).



8. LIMITATION OF WARRANTY AND LIABILITY



8 LIMITATION OF WARRANTY AND LIABILITY

Seller warrants that this product, under normal use and service as described in the operator's manual shall be free from defects in workmanship and material for a period of twelve (12) months, or the length of time specified in the operator's manual, from the date of shipment to the customer.

This limited warranty is subject to the following exclusion:

1. Batteries and certain other components when indicated in specifications are warranted for a period of 90 days from the date of shipment to the customer.
2. With respect to any repair services rendered, Seller warrants that the parts repaired or replaced will be free from defects in workmanship and material, under normal use, for a period of 90 days from the date of shipment to the customer.
3. Seller does not provide any warranty on finished goods manufactured by others. Only the original manufacturer's warranty applies.
4. Unless specifically authorised in a separate writing by Seller, Seller makes no warranty with respect to, and shall have no liability in connection with, any goods which are incorporated into other products or equipment by the Buyer. All goods returned under warranty shall be at the Buyer's risk of loss, Seller's factory prepaid, and will be returned at Seller's risk of loss, Buyer's factory prepaid.

The foregoing is IN LIEU OF all other warranties and is subject to the conditions and LIMITATIONS stated herein. NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE.

THE EXCLUSIVE REMEDY OF THE USER OR PURCHASER, AND THE LIMIT OF LIABILITY OF SELLER FOR ANY AND ALL LOSSES, INJURIES, OR DAMAGES IN CONNECTION WITH THIS PRODUCT (INCLUDING CLAIMS BASED ON CONTRACT NEGLIGENCE, STRICT LIABILITY, OTHER TORT, OR OTHERWISE) SHALL BE THE RETURN OF THE PRODUCT TO THE FACTORY OR DESIGNATED LOCATION AND THE REFUND OF THE PURCHASE PRICE, OR, AT THE OPTION OF THE SELLER, THE REPAIR OR REPLACEMENT OF THE PRODUCT. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES. SELLER SHALL NOT BE RESPONSIBLE FOR INSTALLATION, DISMANTLING, REASSEMBLY OR REINSTALLATION COSTS OR CHARGES. NO ACTION, REGARDLESS OF FORM, MAY BE BROUGHT AGAINST THE SELLER MORE THAN ONE YEAR AFTER THE CAUSE OF ACTION HAS ACCRUED.

The purchaser and all users are deemed to have accepted the terms of this LIMITATION OF WARRANTY AND LIABILITY, which contains the complete and exclusive limited warranty of Seller. This LIMITATION OF WARRANTY AND LIABILITY may not be amended or modified nor may any of its terms be waived except by a writing signed by an authorised representative of the Seller.



9. AUTO-SASH CONTROLLER SERIES SPECIFICATION



9 AUTO-SASH CONTROLLER SERIES SPECIFICATION

	Tiptronic Auto-Sash Controller	Options and Features
Power Supply	100-240V AC 50/60Hz 3A	2 metre power lead with plug-in connector
Keypad	16*2 Backlit LCD display with Pushbuttons	UK single gang socket (85mm x 85mm) version US single gang socket (3" x 2") version
Drive Motor Assembly	PWM output DC Motor and Clutch	Chain and Sprocket Shaft Drive Sash wire pulley drive Rack and Pinion sash direct sash drive
Personnel Sensor	PIR with background re-learn function	
Sash Position Sensor	Steel wire sprung potentiometer	1 metre length for Bench type F/Cs 3 metre length for walk in type F/Cs
Sash Sensor	PIR sensor with Glass Detection	Light Curtain (retro-fit and new build types) Under the sash retro-reflective (single sensor)
Tilt Switch	Tilt switch input to inhibit controller if access panel is open	
Field Set up	Menu calibration and setup with Password Protection	Menu adjustment of motor speed/time delays etc
BMS Inputs	4 Programmable Volt free inputs	Open sash Close sash Fire Alarm (close sash) Emergency open/close sash
BMS Outputs	4 Programmable Volt free Outputs 1 x 0 – 10/1 – 10/0 – 5/1 – 5V (sash position) 1 x 0 – 20/4 – 20mA (sash position)	Always Open/Closed Open/Close on sash fault alarm Open/Close on user detected Open/Close on obstruction detected Open/Close on sash open/closed Remote audible alarm
Control Functions	Sash operation	Manual sash operation (where user detected) Tiptronic 'touch sensitive' open/close Auto-Close (unoccupied condition) Auto-Open (pushbutton enable feature) Keypad Pushbutton open/close Footswitch open/close (optional) BMS input open/close
Alarms	Audible/visible indication	Obstruction detected Sash fault
Status Indication	Keypad LCD display	Sash status (user present/open/closing/closed etc)
Connections	Flying leads with plug in connections	(All cable lengths can be specified)
Agency Listings	CE RoHS	