



Temperature Electronics Ltd

## Engineering Change Notification

# Auto Sash Controller Auto Stop & Load Monitoring Functions Firmware Upgrade V2.00

Rev02

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The Auto sash controller firmware has been upgraded with the following functions :

a. Auto Stop Feature

The Auto Stop function will act as a mechanical stop at the middle position when the sash is manually opened.

If the sash is raised above the middle position the clutch will engage to stop the sash moving further and the sash will then return to the middle position after a preset time.

The Auto sash controller will display “Auto Stop” when the limit is reached, and “Sash Closing” when it returns to the middle position.

Pressing the Up button for 2 seconds will allow the sash to open past the middle position if a top position has been set.

This feature is menu enabled / disabled.

b. Load Monitoring

The Auto Sash controller monitors the motor drive current and if the current increases above a preset level the sash will stop and the “Sash Fault” alarm will activate.

The controller can be set to display the motor current as the sash is driving and the trigger level can be determined by using a weighing scale under the sash to monitor the force applied to the scales.

The limits can be applied for sash opening and sash closing operation.

This function is always active and can be set to maximum current limit values if not required.

c. Menu structure change

The Sash 1 settings menu has been restructured into function groups to simplify the menus now that the above additional functions are included.

Auto Stop

3.0

The new Auto Stop feature can be enabled and disabled, there are new parameter settings to allow fine tuning of the operation if the sash is slow or fast moving, or very stiff or very loose.

The controller has acceleration and deceleration to give smooth sash operation, the speeds and zones can be adjusted. When the sash is in the acceleration and deceleration zones it now used a PID loop to maintain the set deceleration speed, e.g. if the sash is stiff it will increase the speed to keep the sash moving at the required speed.

This is also beneficial with the Auto Stop feature as the sash will return to position 1 at deceleration speed as it will only be a short distance above the stop position.

Menu Parameters used for Auto Stop			
9	Auto Stop	Enable / Disable	
↓	Auto Stop Distance	5 to 99mm	Sets how far above the Middle position the Clutch engages to stop the sash opening further.
↓	Auto Stop Delay	1 to 5 Seconds	Sets the time delay before the sash returns to the Middle position after the Auto Stop is triggered.
3	Motor Drive		
↓	Stall Detection Sensitivity	1 to 6	Sets the sensitivity level, 1 - 6mm/sec sash velocity. If the sash is travelling slower than the set velocity the Sash Fault alarm will trigger.
↓	Stall Detection Delay	1 to 5 Seconds	Sets a time delay once a low sash velocity is detected before the Sash Fault alarm is activated.
↓	Advanced Settings		Enter ENGINEERING PASSWORD 1212
↓	Slow Down Zone	10-100mm	How far above or below stop position the deceleration begins
↓	Slow Down to	10-100mm/sec	Sets Decelerated speed
↓	Accelerate Fast Over	0.0-5.0 Seconds	Sets Fast Acceleration time (for fast modes, e.g. Fire Alarm, Emergency Open or Close)
↓	Decelerate Fast Over	0.0-5.0 Seconds	Sets Fast Deceleration time (for fast modes, e.g. Fire Alarm, Emergency Open or Close)
↓	Decelerate Fast Over	0.0-5.0 Seconds	Deceleration time from normal to reduced speed

The Advanced menu default settings should be correct for most installations and should only be used if there is a problem with the sash sticking or overshooting.

The Operation is as follows:-

Auto Stop Enabled.

- a. When the sash opened by Tiptronic, foot switch or up button the sash will stop at the Middle position, with a tolerance of +/- Close threshold value.
- b. Holding the Up button for 2 seconds will open to the Top position if a Top position is calibrated.
- c. Once the sash has driven past the Auto stop position, the Stop or Mute button can be used and the sash can be manually operated anywhere above the stop position, as soon as the sash is lowered below the stop position, the Auto stop will re-engage.
- d. If the sash is raised by hand, the sash will stop at the Middle position + Auto Stop Distance, then after the Auto Stop Delay time, the sash will return to the Middle position +/- Close threshold value.
- e. Whilst the sash is Accelerating and Decelerating, the speed and distances set in Advanced settings will be used, and a fixed PID loop will auto adjust the motor speed to maintain the set deceleration speed to minimize under and overshoot.

Auto Stop Disabled.

Current Operation is used, the sash can be manually opened to any position, when the sash is opened to Pos 1, a single press of the Up button will open to Pos 2.

## Load Monitor

4.0

The Load monitor is used to stop the sash driving if the sash moves with a force greater or equal to a required limit when it is opening or closing.

A limit can be set that will trigger the Sash Fault alarm and stop the sash drive if the limit has been exceeded for a set time.

Each type of Fume Hood will have inherent resistance to the motor drive, to determine the current limit the operating current should first be monitored in normal operation. Once calibrated the controller can be set to display the output drive current as follows:

Off	Not displayed
Live	Live current is displayed
Max	Peak current value is displayed
Note - Displayed current is not true motor current, it is current at the point it is internally measured	

**Important Note** - the force the sash produces when moving is greatly affected by the speed of the sash and the inherent resistance of the sash mechanism, if the sash is difficult to move in the tracks a greater force is required to move the sash which may trigger the limit alarm in normal operation. The sash movement should be free and regularly checked and maintained to ensure a constant level of performance.

The sash controller includes functions that will affect the performance of the limit operation and should be considered as part of the limit function :

Item	Function	Operation	Factory Value	Suggested Value
1	Motor Speed	Closing Speed	80%	50-60%
2	Close Threshold	Sash opening the controller will accept as closed if <than this value above the stop position	60mm	Should be considered when testing the limit value.
3	Stall Detect Sensitivity	Controller will alarm if the sash velocity is less than 1-6 (mm/sec)	1	Ensure is set to 1.
4	Stall Detect Delay	Will alarm after 1-5 Seconds	5	Ensure is set to 5.
5	Slow Down Zone	Decelerates at this value above the sash stop position	60	Reduce to 10mm (minimum)
6	Slow Down to	Decelerated speed mm/sec	19	To stop or reduce deceleration measure closing speed and distance to set the level. e.g. 500mm / 20 seconds = 25mm/sec.

Setting the above will reduce the sash speed and force and reduce or stop the deceleration as deceleration will not be required at a lower sash speed, the current will be lower at reduced speeds so will allow greater force before the limit alarm is triggered so reducing or inhibiting the deceleration is important.

Setting the limits:-

The factory setting will be max (3.00A), This will allow the Auto Sash controller to be calibrated normally.

Once the Auto Sash controller has been calibrated :-

1. Setting the Close limit
  - a. Set the Motor Current Display parameter to Max (Peak) and Exit and Save changes,
  - b. On the Run screen, note the displayed current when the sash closes.
  - c. Open and close the sash again to ensure the value is repeatable or within a sensible range.
  - d. Set the Closing current limit to 1.1\* the peak value, Exit and Save changes.
  - e. Open the sash and place calibrated weighing scales on the base or under the sash (a fixed support may be required)
  - f. Drive the sash closed and note the weight when the sash hits the scales.
  - g. If the weight exceeds the required limit, reduce the sash closing speed or reduce the limit in small steps e.g. 10mA and repeat steps b to g.
  - h. If the sash fault alarm is triggered whilst the sash is closing increase the limit value by a factor of 10mA and repeat steps b to g.
  - i. If the weight is very low compared to the required limit and the Sash Fault alarm does not immediately activate reduce the limit by 10% and repeat steps b to g.
  - j. Set the Motor Current Display parameter to Off and Exit and Save changes.

Note - there is some filtering and latency in the controller current monitoring loop and sash drive mechanics, typical 10-20ms from overcurrent detection to the sash drive stopping, A lower limit than required should be attained if possible to allow for latency, e.g. required force = 10lbs, try to achieve <8lbs. This will also allow a tolerance if the sash speed varies due to slippage of sash wires on pulleys or of there are any pinch points on the sash track.

Once a current limit is established for a specific type of Fume Hood the settings can be used for all Hoods of that type, it is important that the sash should be kept free running on all installations as added resistance will mean the Sash drive current limit will be reached with less additional external force is applied.

2. Setting the Opening Limit

- a. Once the close limit has been determined, note the difference between the Max (Peak) current and the limit value (x).
- b. Set the Motor Current Display parameter to Max and Exit and Save changes,
- c. On the Run screen, note the displayed current when the sash opens.
- d. Add the value (x) to the Max (Peak) current to set the open limit.

*Example	Max running mA	Limit Value mA	Difference (x)
Close	120	130	10
Open	180	=190 (180+10)	

- e. Set the Motor Current Display parameter to Off and Exit and Save changes.

Drive the sash open and closed a few times to ensure the over current trip doesn't trigger.

Menu Structure

5.0

To aid setting up the Sash settings menu structure has been reorganized into function groups, this means that a specific function can be accessed quickly as there is no need to scroll through all menu items.

1	Enable	Enable/Disable
2	Sensors	Tilt Switch
		Light Curtain
		Light Curtain Test
		Auto Clear Obstruction Alarm
		Personnel Sensor
		Personnel Sensor Power Cycle
		Sash String Type
3	Motor Drive	Motor Voltage
		Motor Speed Open
		Motor Speed Close
		Clutch Off Delay
		Over Current Open
		Over Current Close
		Over Current Delay
		Stall Detect Sensitivity
		Stall Detect Delay
		Advanced Settings
		Motor Current Display
		Motor Current 0-10v Output
4	Calibration	
5	Auto Close	Enable/Disable
		Auto Close Delay
		Auto Close Alarm
		Close Threshold
6	Tiptronic	Enable/Disable
		Min Tip Time
		Max Tip Time
7	Auto Open	Enable/Disable
		Auto Open Delay
		Auto Open Alarm

8	Auto Lock	Enable/Disable
		Calibrate Position
		Auto Lock Alarm
9	Auto Stop	Enable/Disable
		Auto Stop Distance
		Auto Stop Delay