

Daisy PPV Unit

Installation & Maintenance Manual

(Jan 2018 batches onwards)



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1.0 SYSTEM DESIGN AND CAPABILITY

The Daisy PPV Unit incorporates a duty and standby low temperature supply fan housed within the PPV enclosure. Each of the fans is capable of delivering 0.5m³/s at an operating pressure of 50pa. This will provide a constant pressure difference of 50pa across a total leakage area of 0.08m² assuming an air tight fire compartment and closed doors.

It is critical the Client is aware of the importance of an **air tight compartment** as the pressure difference will not be achieved from a leaky enclosure as the fan is developing a fixed volume to overcome the leakage across British Standard fitted doors.

Table 1 below shows the typical leakage areas for British Standard tested and fitted fire and lift doors and is an extract from BS EN 12101: Part 6 (Table A.3).

Element	Leakage area (m ²)	Volume to achieve 50pa (m ³ /s)
PPV unit capability	0.08	0.500
Single leaf door in rebated frame opening into a pressurised space (2m high, 0.8m wide)	0.01	0.060
Single leaf door in rebated frame opening outwards from a pressurised space (2m high, 0.8m wide)	0.02	0.120
Double leaf door (2m high, 1.6m wide)	0.03	0.180
Lift landing doors (2m high, 1.6m wide)	0.06	0.350

Table 1 – Leakage Areas for BS Doors

When all the doors opening onto the pressurised lobby are added together, the leakage area should not exceed 0.08m².

In addition to the above the swing of the doors also needs to be considered. Where the fire door opens into the pressurised space, the door frame stops will prevent the door being pushed out as the pressure builds up. This is the preferred swing as no reliance is placed on the door closer.

On lobbies with the doors opening out of the pressurised space, which we recommend against, door closures of a heavy duty will be required to keep the door closed against the pressures when the PPV unit is running. If the correct door closer is not fitted, the door will be pushed open and the pressurised air will escape. The door closers will exceed 60N+ force, but every site is different and the door closer selected needs to suit door construction and site conditions.

Maintenance to door closers opening out of the pressurise space will also become more critical opposed to the robust door stop where the door opens into the pressurised space.

Each PPV unit has a unique reference number. The units are fully tested and documented at the end of assembly. After this process, the only damage that can occur is during transportation or installation. The majority of issues we have seen is from fixing the unit incorrectly or wrong wiring.

IMPORTANT CONSIDERATIONS

Where doors open out of the pressurised space, heavy door closers will be required to ensure the doors remain closed when the PPV unit is operating. During commissioning, where these door closers are not fitted, the doors will be required to be wedged closed to ensure 50pa is achieved across the closed door. The Client will need to fit the door closers afterwards to ensure the door remains closed when the PPV system is running.

Lockable LED illuminates fuse spurs isolators adjacent to the PPV unit for local isolation where required. The duty and standby power supplies should be monitored by 3rd party controls so power supply failure can be monitored.

The fire damper section of the PPV unit should sit within the compartment wall.

Access is required to the back of the PPV unit for commissioning and maintenance.

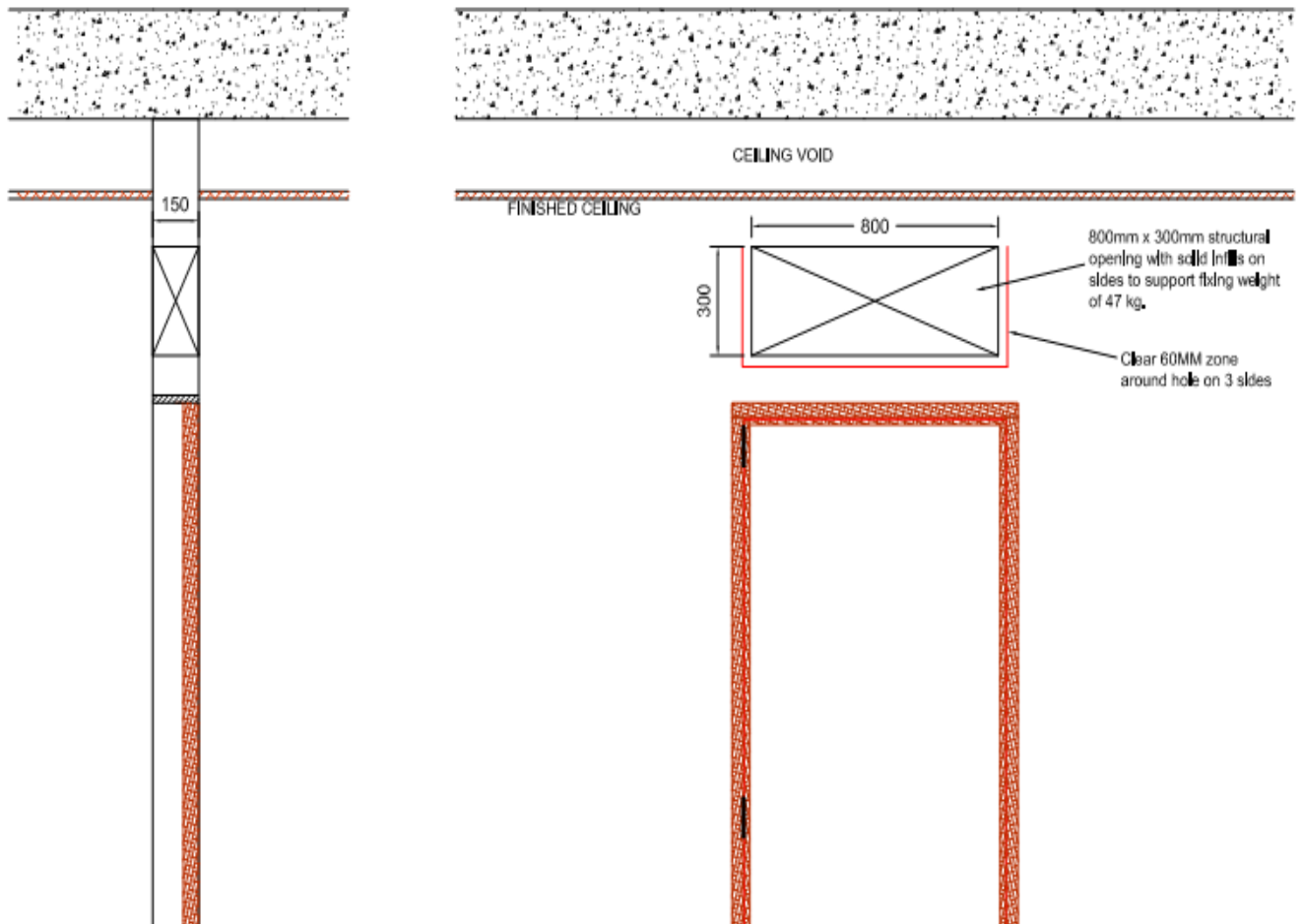
The operating detector should be located on the car park/refuse/bike store door side of the pressurised space.

- 1) Pressurised lobby enclosure needs to be of airtight construction with the only leakage between doors and the frames.
- 2) The PPV unit should be positioned on the non-risk wall side of the pressured space as shown in Figure 4 so the sterile clean air is injected into the pressurised space. This will also protect the PPV unit from the hot gases impinge on the PPV casing.
- 3) Sufficient makeup air should be available to the PPV unit fan inlet.
- 4) To allow the pressure difference to be maintained, it is necessary to have leakage from the risk area outside the pressurised space to outside the building. In the case of car parks, this is normally achieved by the car ramp or ventilation. In the case of stores, dedicated natural ventilation should be provided.
- 5) The PPV unit can be positioned in the vertical or horizontal position.
- 6) Lift door should be avoided in the pressurised lobby as they create a large leakage area. It is our recommendation not to pressurise a lobby containing a lift door.
- 7) Fire doors should be fitted to the British Standard tested criteria.
- 8) Leakage consideration should be made to all fire doors, lift doors, cupboard doors and any openings within the pressurised lobby.
- 9) Vertical riser compartments should be made airtight at floor and ceiling level.
- 10) The leakage area across all openings should not exceed 0.08m².
- 11) Double doors add an additional 50% leakage area.
- 12) Where any ventilation grills are provided, they will need to be of an airtight standard during fire mode.
- 13) We recommend doors should open into the pressurised space to ensure they remain closed when the PPV unit is running. Where the Client chooses not to follow this recommendation, they need to discuss implication with the design team and Approval Authorities.
- 14) We recommend the power supplies are monitored by 3rd party controls which will allow power supply failure to be identified.
- 15) Prior to ordering or installing a PPV Unit, the PPV concept should be agreed and signed off by the Approving Authorities.

2.0 BUILDER WORKS REQUIREMENTS

The Daisy PPV Unit can only be fitted in Fire Compartments of air tight construction as the unit only develops a pressure difference across closed doors and additional leakage will cause the unit to lose air resulting in the required pressure difference not been achieved.

The PPV unit can be mounted in the vertical or horizontal position.



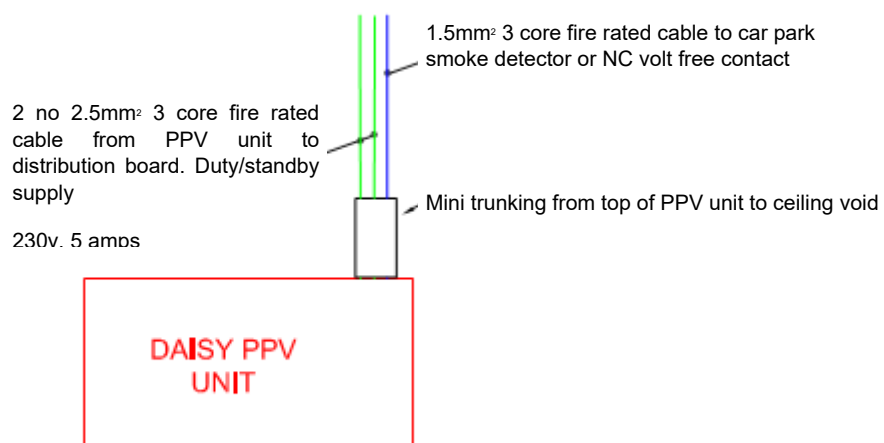
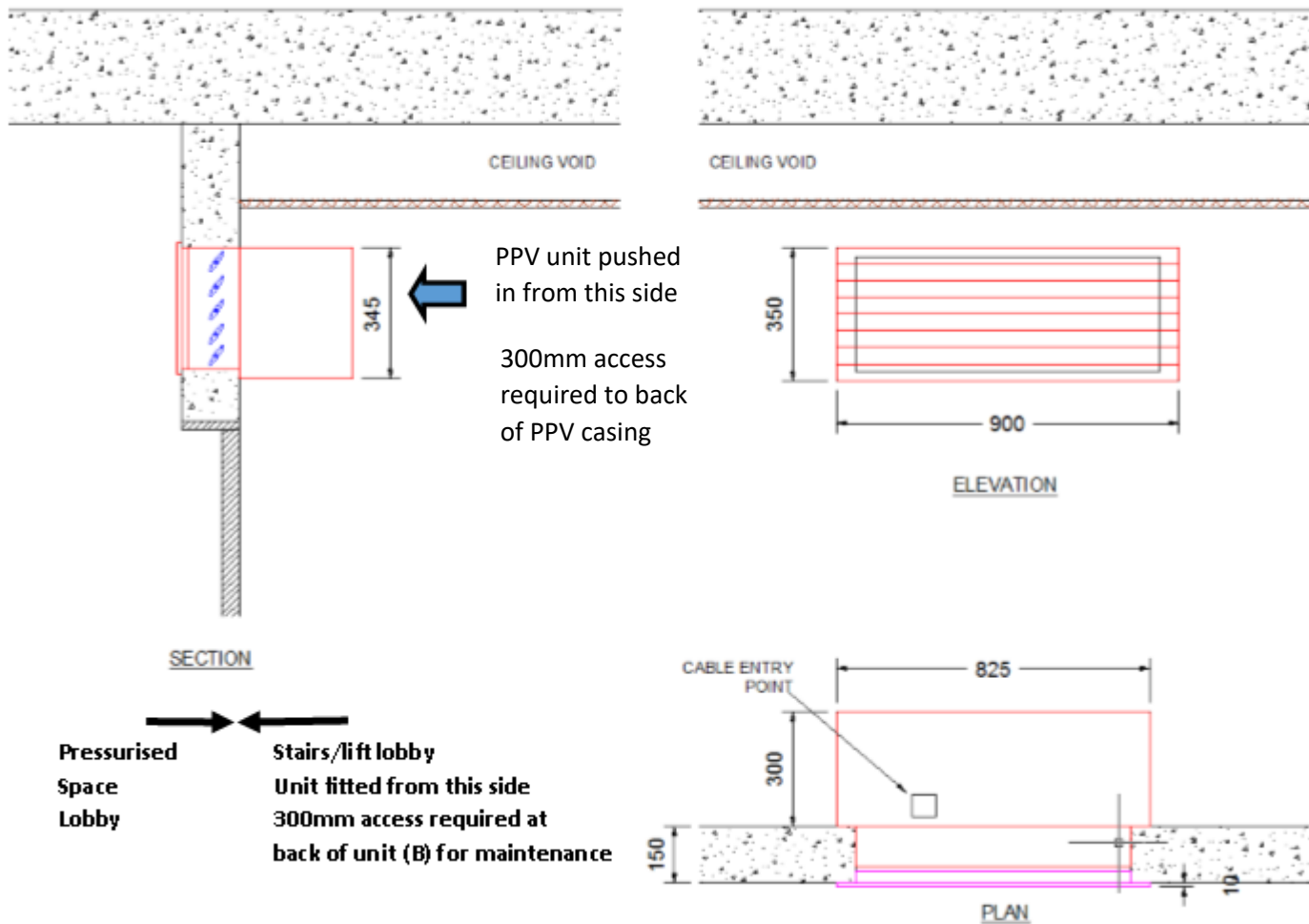
PPV BUILDERS WORK

It is recommended that the vertical sides of the air tight structural opening is of blockwork or solid timber infill construction so as to support a weight of 47kgs. Where the wall cannot support this weight, drop rods can be utilised to support the unit.

Where the wall is constructed of plasterboard construction, the openings on the 4 sides between the plaster boards need to be enclosed with air tight infill boards and wet seal. An air tight seal needs to be achieved between the wall and the PPV damper unit. Hanging rods or brackets will be required to support the unit.

The PPV unit is always fitted by pushing the fire damper into the structural fire opening in the compartment wall. The PPV casing does not push through the damper structural opening.

Access is required to the back of the PPV casing to allow commissioning and maintenance to the PPV controls.



PPV WIRING REQUIREMENTS

3.0 UNPACKING AND INSTALLATION

It is important these Installation Instructions are fully adhered too.

All fitting and electrical installation must be carried out by suitable qualified and competent persons with all current statutory requirements.

The Installer should provide easy access to the back of the PPV unit to allow future maintenance.

The Installer should ensure the PPV unit is adequately supported.

The PPV unit is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the PPV by a person responsible for their safety. At the end-of-life, the unit must be disposed of in an environmentally friendly manner by suitably qualified and competent personnel in accordance with the requirements of applicable Standards and Directive.

Only a suitably qualified and competent person may carry out maintenance on the PPV Unit.

Carefully remove the PPV unit from the pallet. The PPV unit weighs 47Kg and will require a two man lift or alternative method. DO NOT USE FORK LIFT FORKS.

Remove the two grills and side covers and place them aside safely for use when the installation is complete.

The PPV unit should be visually inspected to check for any damage. Ensure the dampers are closed and the impellers of the fan are free to rotate.

A structural opening of 300mm high by 800mm long should be provided to house the PPV damper unit.

Using the necessary lifting equipment, lift the PPV unit to the level of the opening and slide the PPV unit into the structural opening and continued to support until mechanically fixed.

Using four no 75mm long M6 raw bolts with chemifix for blockwork, or 75mm long M6 screws for the timber infill, fix through the silver supporting bracket holes as shown to the right on both sides of the PPV Unit. Mastic seal around the structural opening ensuring an air tight joint between the structure and the PPV unit.

The fixing heads should not protrude more than 5mm to allow for the cover plates which will hide the fixings.

Where it is necessary, provide support bars to the top front of the unit to provide additional support.

On the wall on the opposite side of the PPV unit, the area between the silver damper and the structural opening should be fire stopped with a wet fire sealant to achieve a fire and air tight seal.



A grommet is situated on the top of the unit to allow for the required cables to enter the PPV housing. The cables should be in place and ready to pass through the grommet and into the enclosure. If the cables are required to enter the enclosure from a different location, carefully drill the required size hole ensuring that no swarf is left where it can enter the electronics control module or damage the fans.

Once the unit is installed the cables can be connected as required and the grill fixed in place with the two screws. The grill on the damper side can also be mechanically fitted to the wall.

Clean the area around the side wall fixings, remove the double sided tape protective film and firmly press the cover plates in place.

4.0 ELECTRICAL INSTALLATION AND WIRING

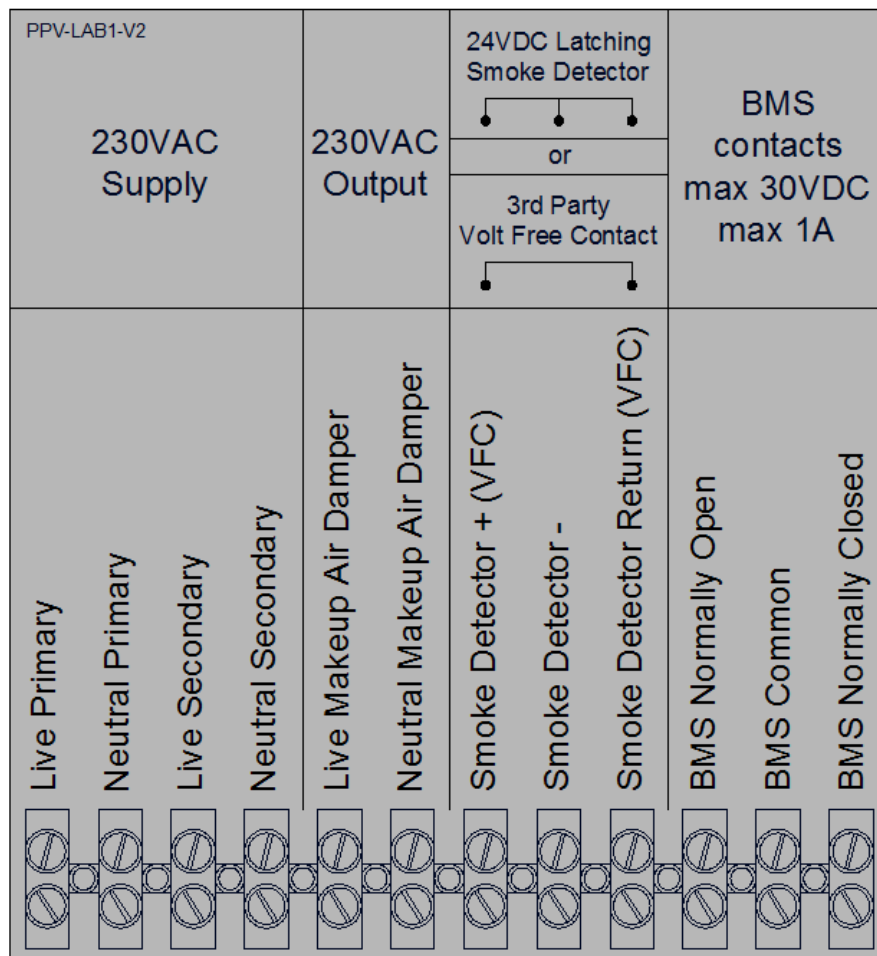
BE AWARE OF THE FAN AND DAMPER BLADES AT ALL TIMES WHICH OPERATE AUTOMATICALLY

Wiring to the PPV unit is carried out using the 12 way terminal strip as shown below. Accessed by removing the rear grill by removing the 2 security screws.

When the grill is removed a control enclosure will be visible in the centre of the PPV unit. The standard 12 way terminal block is labelled as shown. Not all terminals will require connection depending on function of the PPV unit.

Incorrect wiring can damage the control unit.

The starting current for the PPV unit is 2 amps.



Wiring to the unit as follows.

	Typical minimum wiring size.
Live Primary	2.5mm 230v ac
Neutral Primary	2.5mm 230v ac
Live Secondary	2.5mm 230v ac
Neutral Secondary	2.5mm 230v ac
Live Makeup Air Damper	1.0mm 230v ac power output to makeup air damper
Neutral Makeup Air Damper	1.0mm 230v ac power output to makeup air damper
Smoke Detector +	0.5mm 24V DC output from the unit to smoke detector or volt free contact
Smoke Detector -	0.5mm 0V DC output from the unit to latching smoke detector <u>ONLY</u>
Smoke Detector Return	0.5mm 24V DC return signal from the latching smoke detector or volt free contact
BMS normally open	contact rated at 24V maximum 1A
BMS common	contact rated at 24V maximum 1A
BMS normally closed	contacts rated at 24V maximum 1A

The system can be operated by a latching fire detector or fire alarm volt free contact which isolates the positive power back to the panel to operate the system. Where this is utilised, please remember to fit a reset switch to the latching detector.

The **live and neutral make up air damper** terminals are only utilised where an addition damper is provided outside the pressurised area to provide the necessary make up air.

The **smoke detector+** and **smoke detector return** terminals (2 terminals) are used where connected to the clean contacts of a volt free contact.

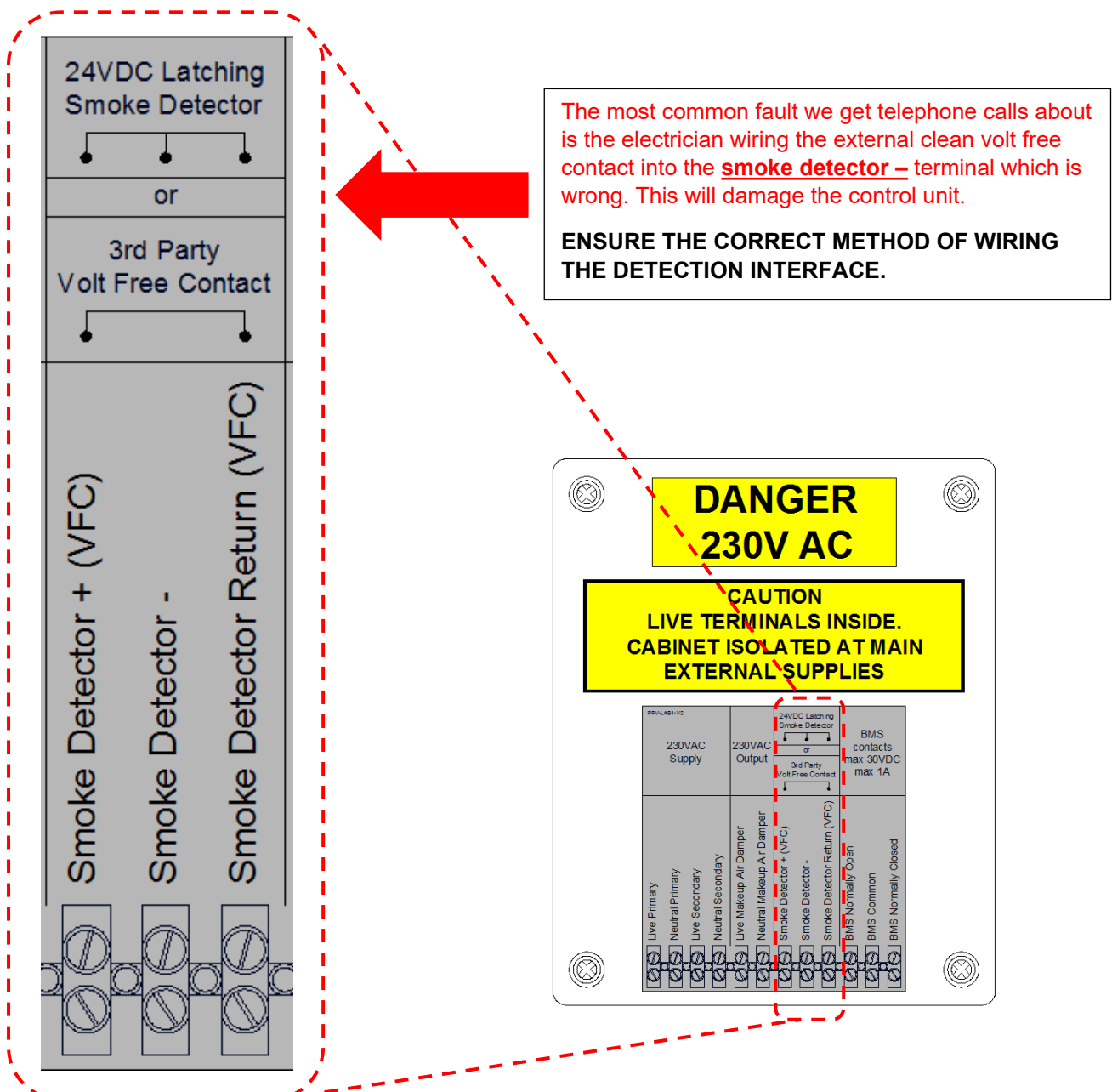
The **smoke detector +, - and return** terminals (3 terminals) are used with a latching smoke detector.

The BMS relay can signal external equipment when the unit is operating or in fault.

The switching contacts are rated at 30V DC and 1A maximum.

DO NOT SWITCH MAINS VOLTAGE THROUGH THE CONTACTS.

PPV external mode of operation



Accessing Fuses

The electrical electronic control unit is housed within the PPV unit's enclosure. The control unit is accessible by removing the fan grill by removing the 2 screws.

DISCONNECT THE PRIMARY AND SECONDARY SUPPLIES BEFORE REMOVING THE CONTROL MODULES LID. FAILURE TO DO SO MAY RESULT IN HARM OR DEATH.

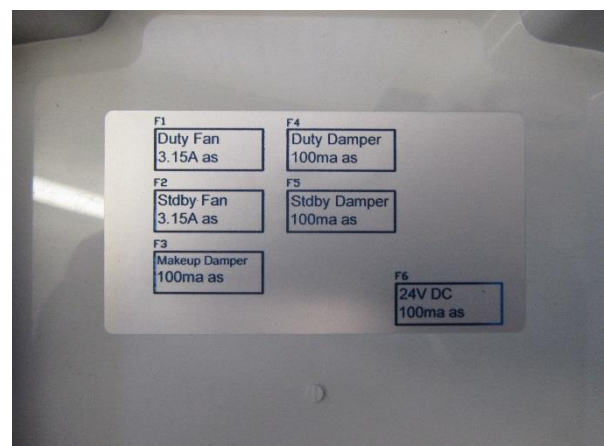
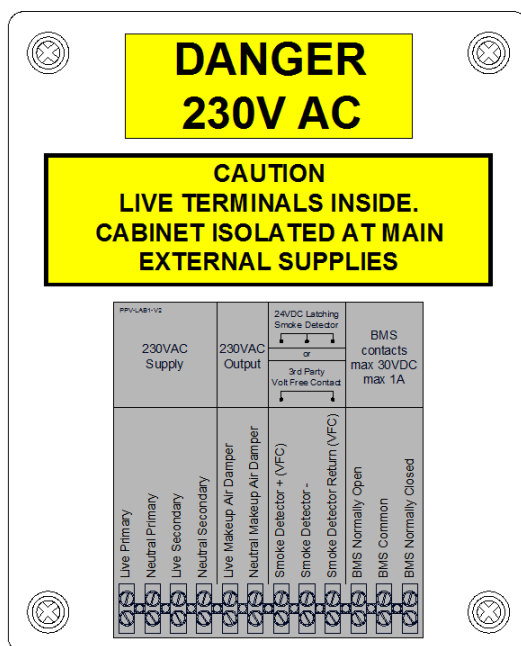
The PPV's control module has 6 fuses to protect the unit from damage due to fault conditions and are labelled as follows:

F1	3.15A anti surge	This fuse protects the unit from a Duty Fan over current fault
F2	3.15A anti surge	This fuse protects the unit from a Standby Fan over current Fault
F3	100ma anti surge	This fuse protects the unit from an over current fault with the Makeup Air Damper
F4	100ma anti surge	This fuse protects the unit from a Duty Fan Damper over current Fault
F5	100ma anti surge	This fuse protects the unit from a Standby Fan Damper over current Fault
F6	100ma anti surge	This fuse protects the 24V DC supply used for the Smoke Detector or volt free fire contact

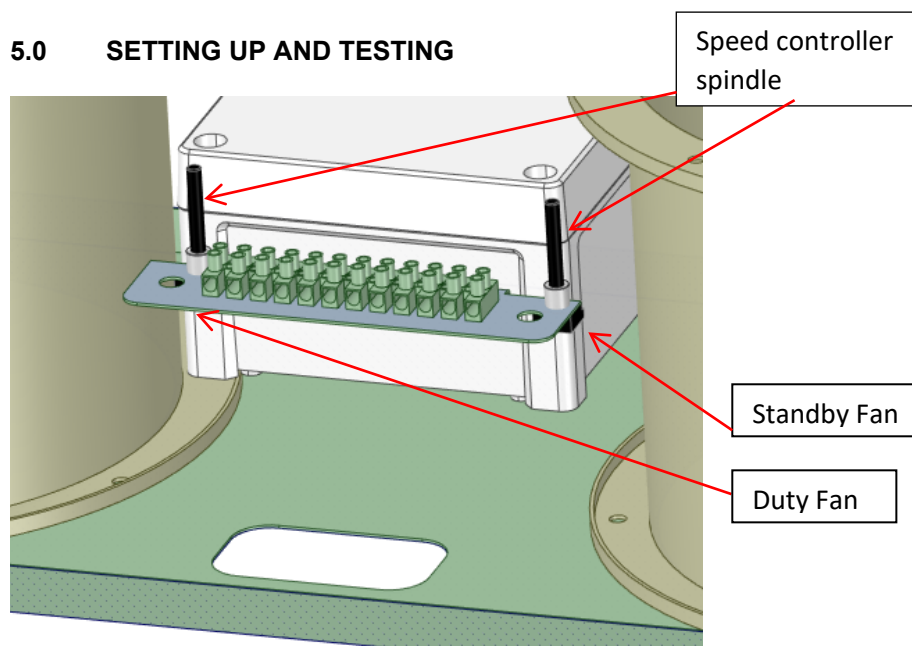
The fuses are accessible by removing the control enclosure lid. Remove the 4 screws to remove the lid.

PLEASE ENSURE BOTH THE PRIMARY AND SECONDARY POWER SUPPLIES ARE REMOVED BEFORE REMOVING THE LID. FAILURE TO DO SO MAY RESULT IN HARM OR DEATH.

PLEASE REPLACE THE FUSES WITH SAME RATING AND TYPE. FAILURE TO DO SO MAY DAMAGE THE CONTROL UNITS PCB. THERE ARE NO SERVICABLE PARTS EXCEPT FOR THE FUSES. IF A FUSE CONTINUES TO RUPTURE PLEASE DO NOT REPLACE THE FUSE WITH A HIGHER RATING. CONTACT THE SUPPLIER OR ARRANGE FURTHER INVESTIGATION.



5.0 SETTING UP AND TESTING



The duty and standby fans are each fitted with a speed control module. These are located adjacent to the fan and is adjusted using the black spindle which is mounted on either side of the terminal connection block as shown in the picture above. Do not bend the spindle.

The speed is variable from stopped to maximum speed so as to develop the necessary pressure across the doors. Please note that if the speed of the duty fan is set to minimum then the duty fan will fail and the standby fan will be started.

Setting the Speed of the Fans

Set both the duty and standby fan speed control to the mid position.

A suitable pressure sensor device will be required to set the pressure required in the area protected by the PPV unit. This is 50pa and it is recommended a manometer is used with a sensing tube located either side of the closed door between the pressurised lobby and car park/store.

Initiate a fire test by either using a smoke can to the smoke detector or triggering the fire system to initiate the volt free fire contact.

The duty fan damper will open and the duty fan will run. Adjust the speed control spindle for the duty fan to obtain the correct pressure in the protected area with all the doors closed. Mark the spindle position. We suggest a marking like tipex on the spindle and board.

Twist black spindle fully anti clockwise to stall the duty fan. This will cause the duty fan to stop and the duty damper to close. The standby damper will open and start the standby fan.

When the standby fan is running adjust the speed control spindle for the standby fan to obtain the correct pressure in the protected area with the doors closed. Mark the spindle position. When the pressure is correct remove the fire signal either by resetting the smoke detector or resetting the fire panel.

Reposition the duty fan speed control spindle to the marked position.

It is critical the position of the spindles is marked on both spindles and casing for easy reference.

The grill should be repositioned and system left live.
Complete the Commissioning Sheet.

Where doors open out of the pressurised space, it will be necessary to wedge the doors closed so the 50pa can be achieved across the pressurised lobby/store door during commissioning. Once commissioned the required door closer force can be measure by the designers. The selected door closer can then be selected and fitted by them. The door should remain closed when the PPV unit is running.

6.0 MAINTENANCE

The following section outlines information on the components and recommended maintenance to the PPV Unit.

The unit will only run during testing and in event of smoke detected within the car park.

The PPV unit is made up of the following components:

- Two low temperature single phase pressurisation fans.
- Two motor open spring closed fire dampers.
- Automatic electrical change over switch from single phase duty supply to single phase standby power supply.
- Control module to operate the unit.

The PPV unit is provided with an LED light on the underside of the casing.

A green light indicates the system is healthy. A red light indicates the unit is running or a fault and should be investigated.

In the event of a fire the PPV unit should be replaced.

Pressurisation Fans

Inspection of the fans at least once every 3 months is recommended to ensure the motor, fan blades and supporting guards, are clean. Any build-up of dust and deposits on the blades or guards should be removed using a non-abrasive cleaner.

All fastenings should be checked for tightness. In addition, all rotating items should be checked. Bearings are of the 'sealed for life' type and will not need a detailed inspection.

The fan is designed to be used in an ambient temperature up to a maximum of 70°C.

WARNING – The fan has internal electronic overload protection and the AC fan is fitted with an auto-reset thermal cut-out which switches the fan off in the event of a fault condition. Once the motor cools down the fan may start unexpectedly.

Fire Dampers

The PPV unit is provided with two fire dampers protecting the duty and standby fans. The fire damper will always open first prior to the fan operating.

Inspection of the dampers at least once every 3 months is recommended to ensure the damper motor, damper blades and supporting guards, are clean. Any build-up of dust and deposits on the blades or guards should be removed using a non-abrasive cleaner.

WARNING – The dampers are motor open spring closed and on system shut down will spring closed.

Electrical Change Over Switch

The PPV unit is provided with an automatic single phase change over switch which will change the power supply to the unit. On failure of the duty power supply, the standby power supply will be switched to ensuring the PPV unit continues to run.

It is recommended the changeover switch is tested every 3 months. This is simply done while the PPV unit is running by isolating the duty power supply external to the PPV unit, which should change the power supply to the standby power supply allowing the system to continue working.

The dual power supplies should be monitored by 3rd party controls so failure of a power supply can be actioned.

Remember to reset the power supplies and leave live.

Testing of the PPV Unit

The PPV unit should be tested as a minimum every 3 months.

This can be achieved by operating the car park detector. On operation of the detector, the following should occur:

1. Duty damper will open.
2. The duty fan will commence operation.
3. The pressurised space should be pressurised to 50 pa with all doors closed.
4. The system should be left running for 10 minutes as a minimum.
5. The grill should be removed to the rear of the unit. Caution to be taken at all times as the fan and damper blades will continue to operate.
6. Turn the duty fan speed control spindle fully anti clockwise to stall the duty fan.
7. The standby damper should open and start the standby fan.
8. The system should be left running for 10 minutes as a minimum.
9. Reset the standby fan by resetting the car park detector.
10. Reset the duty fan speed control spindle to their correct running settings.
11. Test the automatic electrical change over switch, by isolating the duty power supply outside the panel. The system should change over to the standby power supply.
12. Reset the power supplies and ensure both supplies are left live.

7.0 INSTALLATION & COMMISSIONING RECORD SHEET

Project Name	Location		
Date	Engineer		
	Yes	No	Comment
Structural opening has infills on the vertical sides			
PPV unit fixed to vertical side supports			
Describe fixings used			
Structural opening between PPV unit and structural opening fire stopped			
Power cables checked prior to connecting			
Power cables and smoke detector cables connected to PPV Unit			
PPV Unit powered up and fan speed controller turned to maximum speed			
All doors opening into pressurised space closed			
Doors opening out of pressurised space fitted with heavier door closers or wedge closed			
Pressure recorded across door for duty fan with all doors closed	Pa		
Pressure recorded across door for standby fan with all doors closed	Pa		
Speed controller reset to achieve 50pa for duty fan with all doors closed			
Where doors open out of space, remove wedge and test if heavier door closer holds door closed. Where door opens, report to Client who will need to fit heavier closer. Refit wedge.			
Speed controller reset to achieve 50pa for standby fan with all doors closed			
Where doors open out of space, remove wedge and test if heavier door closer holds door closed. Where door opens, report to Client who will need to fit heavier closer. This is an action for the Client and does not stop the commissioning process			
System turned off and tested under smoke detector			
Duty power supply isolated outside PPV unit to test automatic change over switch			
Duty power supply reconnected			
Duty fan failed using duty fan speed spindle.			
Fans reset			
Two grills fitted			
Side covers fitted in place			
System left live			
Power supplies monitored by 3 rd party controls as recommended by DMS DN01			
Installation & Maintenance booklet and Installation Record Sheet passed to Client			
Signed off by			
Comments			

8.0 MAINTENANCE LOG

Project Name	Location		
Date	Engineer		
Recommended three monthly	Yes	No	Comment
Unit visually inspected			
Smoke detector in car park operated			
Duty damper will open			
Duty fan commences operation			
Pressurised space should reach 50 pa with doors closed			
System left running for 10 minutes			
Grill removed to the rear of the unit. Caution to be taken at all times as the fan and damper blades will continue to operate.			
Duty fan speed spindle position noted and then turned fully anticlockwise causing the duty fan to stop and the duty fan damper to close			
Standby damper should open and start the standby fan.			
System should be left running for 10 minutes as a minimum			
Reset the duty fan using the fan speed spindle and reposition to the marked position.			
Test pressure difference across doors where necessary			
Automatic electrical change over switch should be tested by isolating the duty power supply outside the panel. The system should change over to the standby power supply			
Power supplies should be reset and ensure both supplies are left live			
System should be left in functioning condition			
Signed off by			
Comments			