EV-CP

Vehicle Parking Ventilation

Control System

User Manual

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1. Preface

1.1. Notices

This manual contains notices you have to observe to ensure occupant and personal safety, as well as to prevent damage to equipment and property.
Important notices relating to safety and the prevention of hazards are highlighted throughout the documentation by a caution safety symbol with a heading identifying the degree of risk. Read notices and instructions carefully, failure to take proper precautions may result in death or severe personal injury and equipment or property damage.

DANGER:
A notice with instructions or information to reduce the potential risk of death or severe personal injury and reduce potential risks in a life safety scenario.

CAUTION:
A notice with instructions or information to reduce the potential risk of irreversible equipment and/or property damage.

IMPORTANT NOTICE:
A notice with instructions or information to address issues not relating to damage or injury.

A quick reference showing the sequence of HMI icons for users to navigate to the section or command.

Access to the section or command is password protected.

The product/system described in this documentation should be operated by competent personnel in the operation of smoke control systems in accordance with the relevant documentation and guidance.
The installation and maintenance of these products shall only be by personnel competent in the operation and knowledge of electrical equipment, in particular its warning notices and safety instructions.
Competent personnel are those who, based on their training and experience, are qualified and capable of identifying risks and avoiding potential hazards when working with these systems.
Systems that are deemed complex and fall outside the standardized design model require the services of a suitably qualified and competent fire engineer. Commissioning of such systems will need to be undertaken by an approved or qualified person.

All life safety systems with fire engineered solutions are subject to approval with the local authority with jurisdiction.

2. Introduction

Ventilation of covered parking areas is recommended to limit concentrations of vehicle emissions and to remove smoke and heat in the event of a fire for occupant escape and firefighting.

The parking ventilation system delivers combined pollution and smoke clearance using a combination of extract, supply, jet or impulse fans. The control system monitors and ventilates pollutant gas levels and detects smoke or high temperature conditions to automatically operate the fans to protect and maintain safe and tenable conditions.

Pollution is monitored by a gas detection system with gas sensors located for maximum coverage throughout the parking zones. There are generally two types of sensors monitoring vehicle emissions pollution levels, CO (Carbon monoxide) for petrol vehicles and NO_2 (Nitrogen dioxide) for diesel vehicles. Detection of pollution levels will activate the fans to ventilate the zones at preset fan speeds to achieve design air change rates.

The system can provide normal background ventilation activated by time switch and receive signals from a sensor or BMS system to help maintain comfortable conditions.

3. HMI User Interface

The HMI is the user interface to the ventilation control system and provides system information and functions such as:

- System status, alarms, faults, and events.
- Override control and reset of the system.
- Configuration and operational settings.
- Diagnostics and maintenance features.

The HMI is normally located on the front of the main control panel for easy access and operation for maintenance activities.

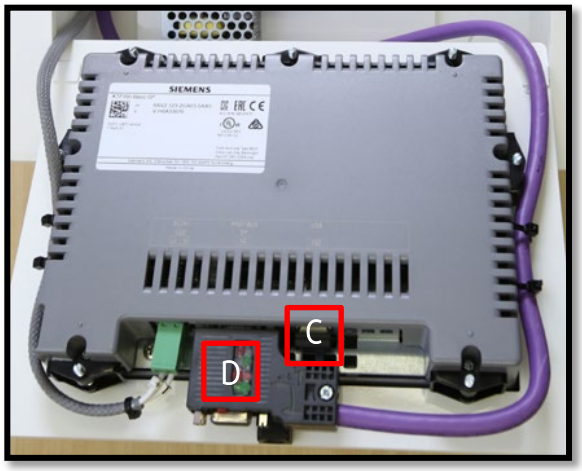
The HMI is a resistive type colour touch screen in landscape style. Operating the screen can be done by finger touch or by stylus/pointer.

A USB memory module is inserted at the rear of the HMI for storing event logs and backup files. To access the module for remote units, remove the screw located at the bottom of the bezel then open the hinged fascia door.

DANGER:
Risk of electrocution. Observe electrical safety procedures and check power supply has been isolated or disconnected safely before removing panel covers.

HMI User interface

HMI Rear



A.	Screen Buttons	User control for navigation and override commands. Activated by touching the icon or pressing the adjacent function button.
B.	Touch Display	Graphical display area of the system status. Additional user commands and inputs are indicated by 3D style touch buttons or icons.
C.	Memory Module	USB flash drive for storing event logs and backup files.
D.	Data Connector	Data communication connection adapter.

3.1. User Input

Command buttons on the touch screen are normally displayed in a 3D style or as an icon with a label. When prompted to enter a value, text or password a keypad will automatically pop up. The input range or limits are indicated by Max and Min values displayed above and below entry box. Enter the desired value and touch the RETURN key. Certain configuration inputs will have an option list to select from.

User input keypads

CAUTION:
Do not use hard pointed objects to operate the screen which may cause damage to the screen

3.2. Passwords

In normal conditions override & reset functions and system configuration require a password login to protect against tampering and unauthorised access. There are 3 different password levels. A login window will automatically pop up when requesting access or a command which is protected with a higher level than the current login level.
When the correct password is entered the associated user level will be appear in the User field within banner at the top of the screen. Unsuccessful entry will clear the User field and be recorded in the event log.

User Levels

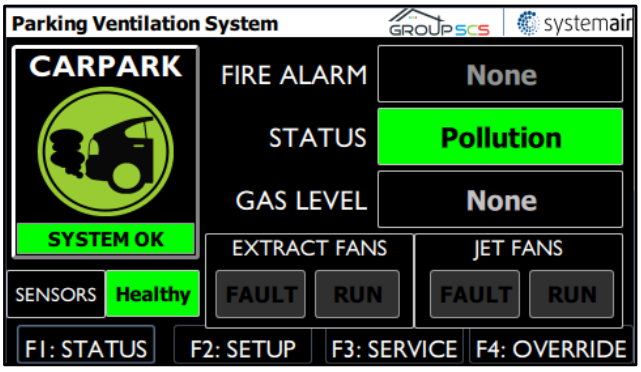
User	Password	Logout Time	Permissions
ALARM	SMOKE	On Reset	Automatic login when alarm activated Allows override control and reset functions
OPERATOR	smoke	10 minutes	Allows override control and reset functions Access to service and system settings
ENGINEER	*******	10 minutes	Authorised engineer's access

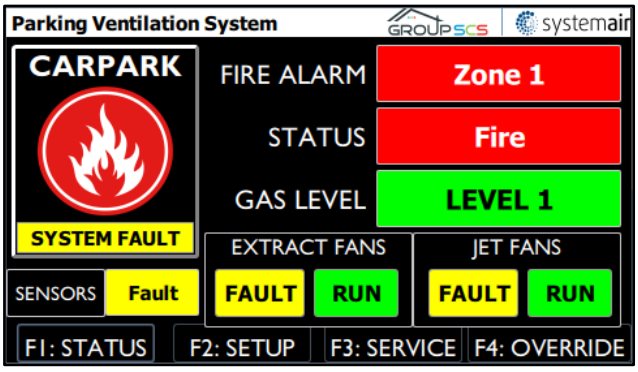
The user has an automatic logout after a period of inactivity or by a reset command.

4. Operation

4.1. Overview (Home) Screen

The default Home screen displays an overview of the system status and alarms.





The system icon indicates the current operating state:

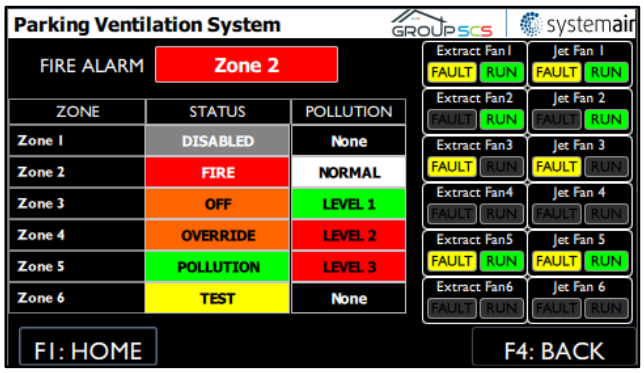
Table 1: System status

Pollution - Ventilation mode	Fault - System Error
Fire - Smoke clearance mode	Disabled – Unavailable or Resetting
Override – Override Run	Test - Maintenance mode
Off – Override Off	

FIRE ALARM	The active fire alarm zone
STATUS	The system priority operating state
GAS LEVEL	The highest pollution gas level detected
SENSORS	The status of gas detection system
EXTRACT FANS	The running or fault status of any extract and supply fans
JET FANS	The running or fault status of any jet and impulse fans

4.2. Status Screen

This screen shows the status of each zone and each fan group.



FIRE ALARM indicates the active fire alarm zone.

The STATUS column indicates the operating state for each zone:

POLLUTION	Pollution ventilation mode
FIRE	Zone fire alarm active
OVERRIDE	Override run active
OFF	Override off active
DISABLED	Zone unavailable or in reset
TEST	Maintenance mode
Error	System error

The POLLUTION column indicates the zone gas level detected.

None	No pollution detected and in standby
NORMAL	Normal ventilation mode
LEVEL 1	Low level pollution detected
LEVEL 2	Medium level pollution detected
LEVEL 3	High level pollution detected

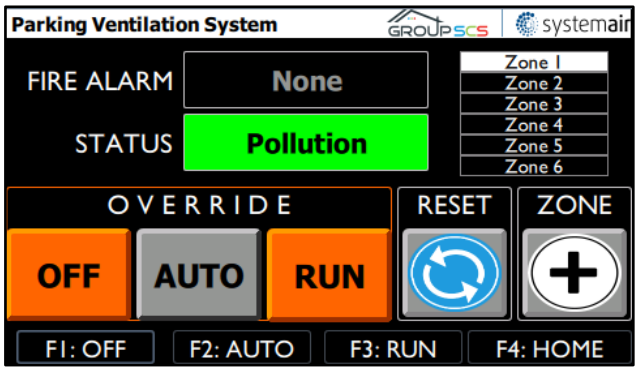
The common status of each fan group is indicated by:

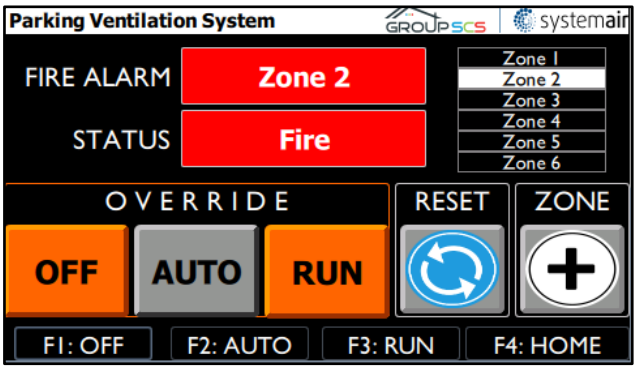
FAULT	A fan in fault
RUN	Fans are running

4.3. Override Screen

The override screen is automatically opened when a fire alarm condition is triggered.
It can be navigated to by pressing the **OVERRIDE** button from the overview screen.

Override control is password protected in normal conditions.
On a fire alarm condition the password protection is automatically removed for firefighter use.





This screen shows the system operating state and active fire zone.

4.3.1. Override Control

Fire alarms can be overridden for fire-fighting purposes or maintenance activities. Only a single fire zone can be activated at any time.
The highlighted zone indicates the zone active for override control. The initial fire alarm zone is automatically selected.
Change the zone by pressing **ZONE +** button until the desired zone is highlighted then press the override command button:

OFF will stop all the fans.
AUTO will return the system to automatic control and operate to the current fire alarm signal.
RUN will activate the selected zone into a fire mode.

4.4. Reset

The system will automatically reset when all the fire alarm inputs return healthy.

To manually reset the system press **RESET** button. When the system is in a reset condition the icon will turn yellow. The reset process can take up to 60 seconds and during this period the vents will return to their normal positions and any alarms and override commands will be ignored.

If a fire alarm signal exists following a reset the system will activate the first fire alarm detected.

5. Servicing & Maintenance

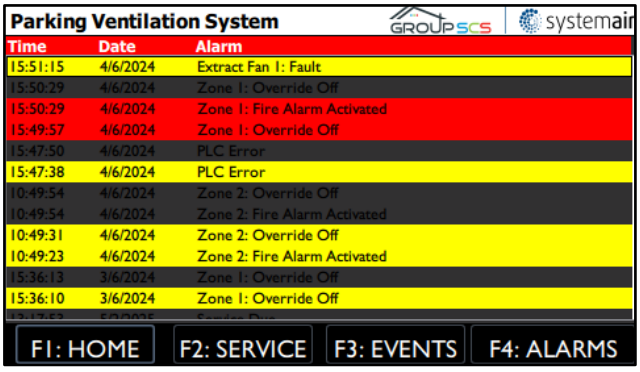
5.1. Event Logs

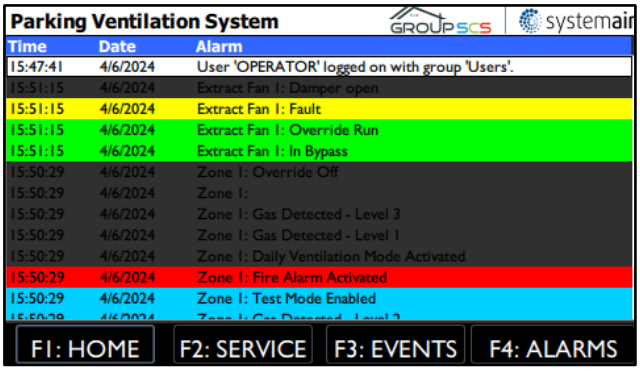
A history of events and alarms are logged and highlighted in a colour to identify its class.
The event logs are accessible via the SERVICE screen. The ALARMS button applies a filter to display critical alarm and faults only.

Table 4: Event status

RED	Emergency alarm event
YELLOW	Fault condition
BLUE	General ventilation or non-critical event
GREEN	General operation event or change of state
WHITE	System event or error message
GREY	When the event has returned healthy, reset or deactivated

The logs are stored on a removable memory module with the last 10,000 events recorded. The last entry is always at the top of the list. Swipe your fingers up or down on the log screen to scroll through the entries. The time is 24 hour format displayed as hrs:min:sec and the date is displayed as day/month/year. Location references the main control panel the event was generated from.





IMPORTANT NOTICE:
Removal of the memory module will stop log recording and disable viewing of the alarm and event history.

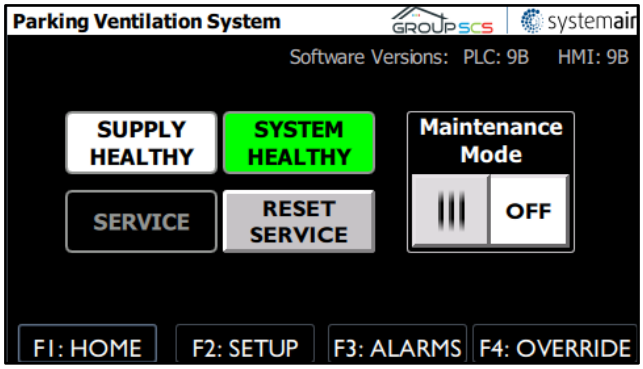
IMPORTANT NOTICE:
Event date & time are referenced to the system time set. Please check the system time is correct for accurate logging.

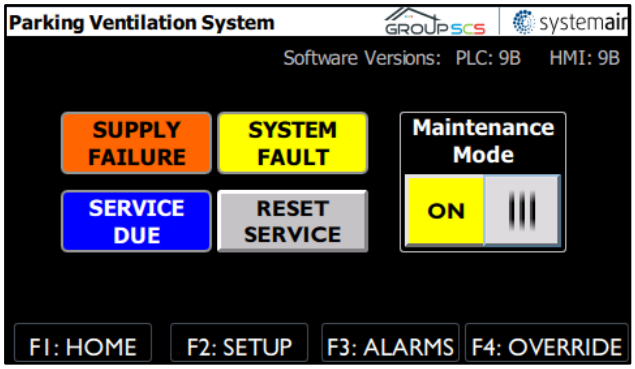
5.2. Servicing

The servicing screen provides a snapshot of the system's health with access to diagnostic features. The software versions for PLC & HMI need to match or be compatible. If there is a mismatch contact support for further advice.

Three indicators display general system health:

SUPPLY indicates the primary mains power supply state.
SYSTEM indicates when a system fault is present.
SERVICE indicates if a service is due or when the system requires maintenance.





5.2.1. Maintenance Mode

The system can be set into a maintenance mode for test activities by toggling the Maintenance Mode button.

During maintenance mode the fan firemode and bypass functions are disabled to enable full fan motor protection by the Variable Speed Drive (VSD) for testing. The alarm & fault output signals are temporarily disabled during testing.

Maintenance mode is automatically reset on a system or alarm reset.

5.3. Service Reminder

A service reminder timer can be reset on completion of a service or routine inspection. The timer is set for 12 months and when it expires the system will indicate a fault and the SERVICE DUE notification will activate.

Resetting a Service Due alarm requires a password when pressing the RESET SERVICE button.

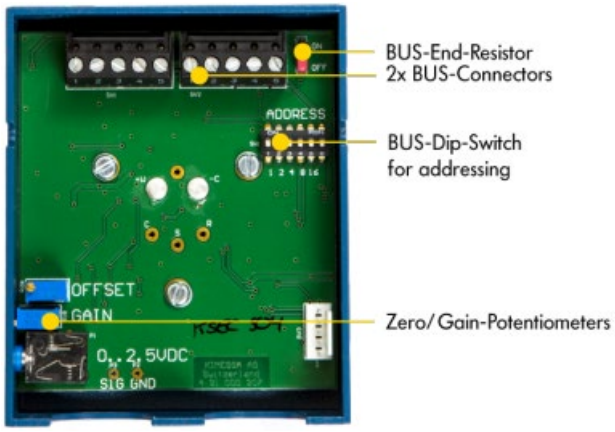
IMPORTANT NOTICE:
Ensure the system time is set correctly before completing a service.
It is important for the date and time to be correct for logs and servicing activities.

6. Gas Detection System

The Kimessa gas detection system has addressable sensors connected to a controller by data bus link. The controller signals the gas levels to the master controller to activate the system to ventilate.

6.1. Sensors

There are generally two types of sensors measuring CO or NO_2 which can be identified by the sensor label. Each sensor needs to be uniquely addressed starting from 1 for the controller to communicate and identify the sensor. The address is set by internal bus switches in a binary format.
The end of line resistor jumper needs to be set on for the last sensor at the end of the bus link.



6.1.1. Service & Calibration

The sensors are calibrated from factory should be recalibrated every 12 months or less if the environment is harsh or dirty. The sensor can be cleaned by gently wiping the sensor with a dry clean cloth to remove excess dirt & dust. Care should be taken not do damage the membrane.

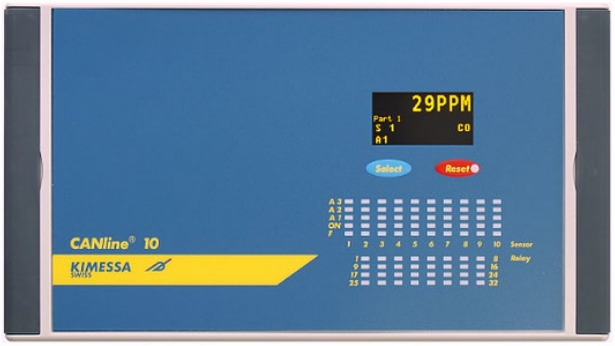
Calibration requires adjustment the offset & gain using a voltage meter with calibrated gas.

WARNING:
Calibration gases are compressed cylinders and requires a risk assessment and special safety measures when handling. Calibration should be carried out by a trained competent person.

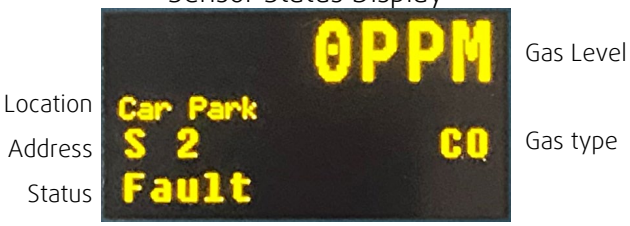
6.2. CANline Controller

The CANline gas detection controller normally mounted on the master panel door and shows the sensor values and status. The controller reads the gas levels from all the sensors and detects the highest pollution levels. The levels are signalled to activate the system into its respective pollution mode.

The controller has a display, LED indicators and two operator keys **Select** and **Reset**. The display will automatically cycle through all the gas sensors showing their status. Press **Select** repeatedly to show a particular sensor for 1 minute.



Sensor Status Display



6.2.1. Relay Status

The multicolour LED indicators below the display show the signal relay status. Green indicates the number of relays configured. Orange indicates the relay is ON.

Relay 1 indicates a sensor fault.

Relays 2/3 shows Zone 1 Gas level
Relay 2 only is Level 1 (Low) pollution
Relay 3 only is Level 2 (High) pollution
Relay 2&3 together is Level 3 (High High) pollution

Relays 4/5 shows Zone 2 Gas level
Relay 4 only is Level 1 (Low) pollution
Relay 5 only is Level 2 (High) pollution
Relay 4&5 together is Level 3 (High High) pollution

Relays 6/7 shows Zone 3 Gas level
Relay 6 only is Level 1 (Low) pollution
Relay 7 only is Level 2 (High) pollution
Relay 6&7 together is Level 3 (High High) pollution

6.2.2. Service Reset

The gas detection controller has a yearly service alarm which will display a SERVICE NOW alarm with audible warning when it expires.

To silence the alarm for 30 days press and hold the **Select** and **Reset** button together for 30 seconds to silence the alarm.

To reset the alarm for 365 days follow these instructions:

1. Press the 'hidden button' in between the **Select** and **Reset** button to open the menu.
   The **Select** and **Reset** buttons now become cursor keys (Left & Right) and Hidden button OK.

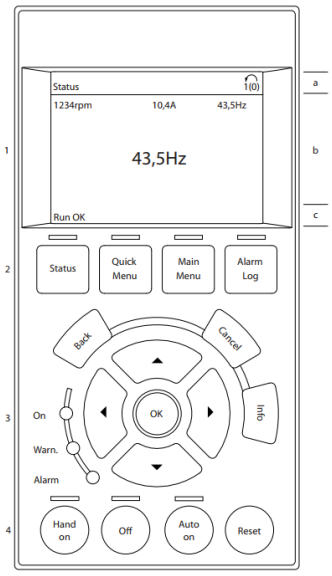
Left OK Right

2. Press **Select** until 'Service message' selected then press the **OK** button.
3. Press **OK** to select the first password digit 0.
4. Press **Reset** to change to 1 and OK to move to the next password digit.
5. Repeat until the code is set to **1111**
6. Then press **OK** to select '4dgt password'.
7. Press the **Reset** button until 'Reset Service Now' is selected
8. Press **OK** to select 'RESET' and press **OK** again to reset alarm.
9. Press **Select** until 'Exit' is selected and press **OK** to exit out of menu.

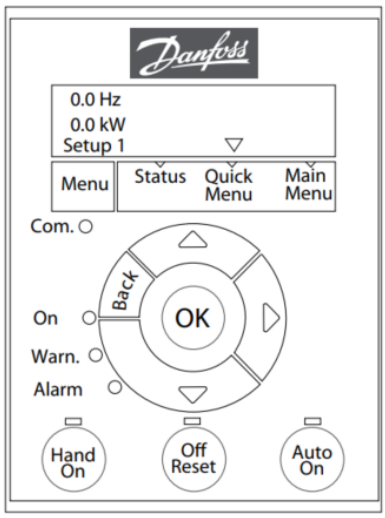
7. Variable Speed Drives (VSD)

Each fan is controlled by a Danfoss VSD located inside the control panels that run the fans at preset speeds for the operating scenarios. The VSD has a removable keypad displaying status with access to configuration parameters.

Extract/Supply Fan VSD (FC102) Keypad



Jet/Impulse Fan VSD (FC101) Keypad



The keypad shows the fan speed in Hertz by default. The output display can be changed by pressing the Status key for the FC102 or the Up & Down keys for FC101.

A fault or warning code is shown in the event of a fault condition. Most faults can be reset by pressing the Reset button. Critical faults will require a power cycle before resetting. Refer to the Danfoss VSD manual for further information on fault codes and troubleshooting.

WARNING:
In normal conditions all the VSD's must be set to Auto On. In fire scenarios the VSD's will always run the fans in firemode even if the VSD set to Off.

WARNING:
When the VSD's are running in firemode basic motor protection is disabled to run the fans to destruction. Check fan wiring is correct before activating a fire or override condition to avoid damage to the motor.

7.1. Fan Data Input

Before running the fans for the first time the fan motor data should be entered into the VSD to protect the motor and run efficiently. The motor data can be found on the fan motor rating plate. Input the following data using the keypad to navigate to and edit the parameters via the Main Menu.

Motor Data	VSD Parameter	Default Setting
Power	1-20 Motor Power	[Size] KW
Voltage	1-22 Motor Voltage	400V
Frequency	1-23 Motor Frequency	50Hz
Full Load Current	1-24 Motor Full Load Current	[Size] Amps
Speed	1-25 Motor Speed	[Size] RPM

7.2. Configuring Fan Speeds

Preset fan speeds are set for the different operating scenarios as per the cause & effect. Five speeds are set for each fan VSD. Navigate to the parameters below by using the keypad via Main Menu to edit the preset speeds.

7.2.1. Preset Fan Speed References

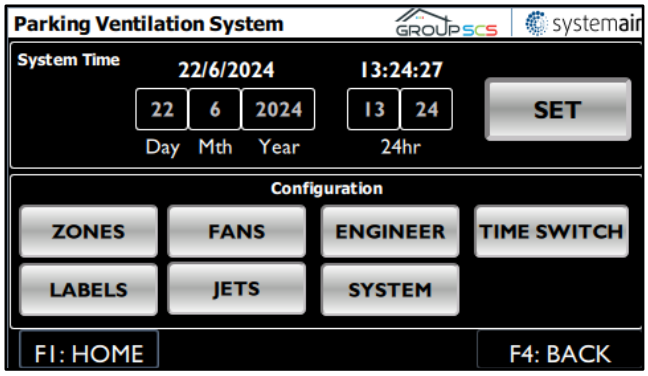
Operating modes	Preset Speed	VSD Parameter	Default Fan Speeds	
			Extract/Supply	Jet/Impulse
Fire alarm activation				
Fire mode	Firemode	24-05 Firemode Preset Speed	100%	100%
Override conditions				
Override Run	Firemode	24-05 Firemode Preset Speed	100%	100%
Override Off	Off	Not applicable	Off	Off
Ventilation modes				
High Pollution Level 3	Preset 3	3-10 [3] Preset Reference 3	100%	100%
High Pollution Level 2	Preset 2	3-10 [2] Preset Reference 2	60%	50%
Low Pollution Level 1	Preset 1	3-10 [1] Preset Reference 1	30%	50%
Normal ventilation	Preset 0	3-10 [0] Preset Reference 0	30%	50%
No Pollution – Standby	Off	Not applicable	Off	Off

8. System Setup

DANGER:
Configuration shall be by a competent and qualified person with the system installed and operate in accordance with the fire strategy.

8.1. Setup Menu

The setup menu provides access to system configuration settings.

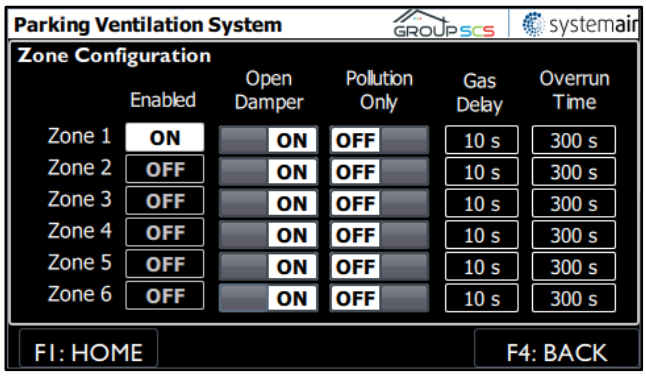


8.1.1. System time

To adjust the system clock, enter the desired date and time by touching the respective boxes. Press the **SET** button to apply the update. The actual system clock is displayed above the input boxes for reference.
Note: It can take up to 5 minutes to synchronise the displayed system time.

8.2. Zone Configuration

The standard system can have up to 6 zones and the Enabled column indicates the zones installed.



Open Damper

Switch ON when the main extract/supply points have motorised dampers installed. This will delay the fans from starting to allow for dampers to open.

Pollution Only

Zones set as pollution only will switch off the fans in the event of a fire alarm. Override control is available to run the fans for smoke clearance.

Gas Delay

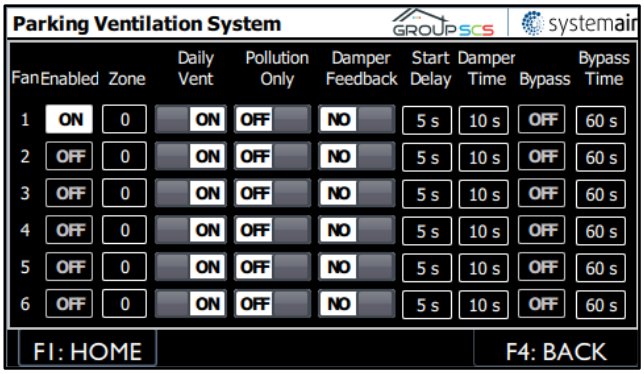
This is the saturation time delay in seconds before triggering a gas level detection.

Overrun Time

This is the time in seconds the system will continue to run at the highest gas level detected before dropping to lower level.

8.3. Fan Configuration

The standard system can have up to 6 fan groups and the Enabled column indicates the groups installed and available. A fan group will operate together and can consist of extract or supply fans.



Zone
Set to zero to run the fans for all zones. If the fan group is dedicated to run for a single zone set the zone here.

Daily Vent
This will enable the fans to operate in normal ventilation mode.

Pollution Only
Fans set as pollution only will only operate for normal ventilation modes and switch off the fans in the event of a fire alarm.

Damper Feedback
Set if the fan shut-off dampers have position feedback installed. This will start the fans only when the damper is proven open.

Start Delay
This is the delay time in seconds starting the fans. Apply for starting fans in sequence.

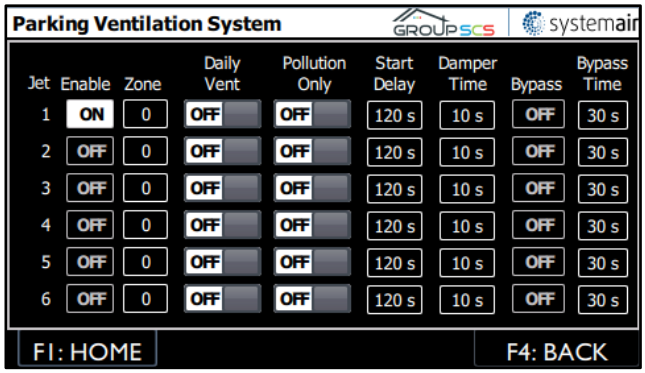
Damper Time
This is the delay time in seconds to allow dampers to open before starting the fans.

Bypass
Indicates if VSD bypass is installed and available for fire modes. When the fan is running in fire mode and at full speed the VSD is automatically switched over to bypass DOL.

Bypass Time
This is the time in seconds to allow the fan to reach full speed before switching to bypass DOL.

8.4. Jet Fan Configuration

The standard system can have up to 6 jet or impulse fan groups which operate together. The Enabled column indicates the groups installed and available.



Zone
Set the zone jet fan group is located or operates for. Set to zero to run the fans for all zones.

Daily Vent
This will enable the fans to operate in normal ventilation mode.

Pollution Only
Fans set as pollution only will only operate for normal ventilation modes and switch off the fans in the event of a fire alarm.

Start Delay
This is the delay time in seconds starting the fans. Apply for starting fans in sequence.

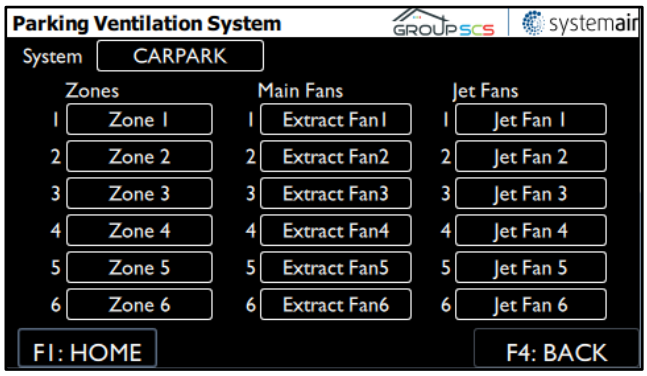
Damper Time
This is the delay time in seconds to allow dampers to open before starting the fans.

Bypass
Indicates if VSD bypass is installed and available for fire modes. When the fan is running in fire mode and at full speed the VSD is automatically switched over to bypass DOL.

Bypass Time
This is the time in seconds to allow the fan to reach full speed before switching to bypass DOL.

8.5. Labels

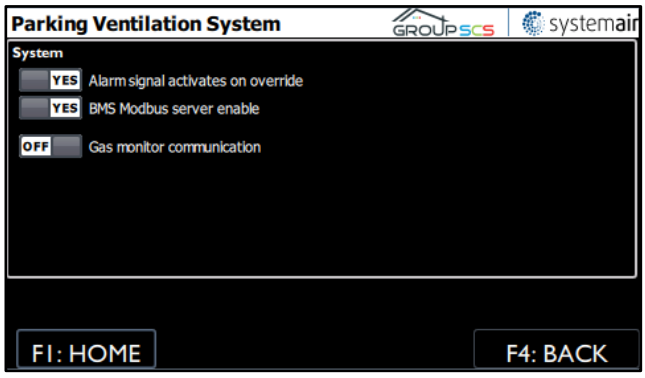
The system name, each fire zone and fan labels can be changed to easily identify its location or zone.



Touch the label to edit and enter a maximum of 12 characters including spaces with the pop-up keypad.

8.6. System Configuration

General system settings.



Alarm signal activates on override

Sets the operation of the main control panel alarm output contact for external signalling.
Select YES for the contact to operate for fire alarm and override conditions.
Select NO for the contact to operate for a fire alarm condition only.

BMS Modbus server enable

Enables communication to the EV-BMS interface option module for BMS/third-party systems connectivity.

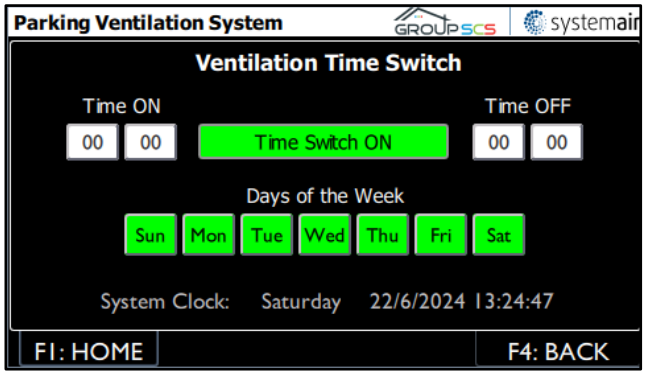
Gas monitor communication

Enables Modbus communication to the gas detection system.

8.7. Time Switch

Normal ventilation can be enabled by a 7-day time switch with activation by a ventilation input signal such as a temperature sensor or BMS system. To operate by time switch only the ventilation input can be overridden by inserting a link across the input signal.

During normal ventilation each fan group can be configured to run by enabling Daily Vent setting.



The days of the week to operate can be selected by toggling the day buttons. The day is enabled when highlight green. The on-off time for each day is set in a 24-hour format. The **Time Clock ON** indicator will illuminate green when switch is on. Set both **Time On** and **Time Off** to midnight **00:00** to enable ventilation for the entire day (24 hours).

IMPORTANT:
Check the system clock is correct before configuring the time switch for correct operation.

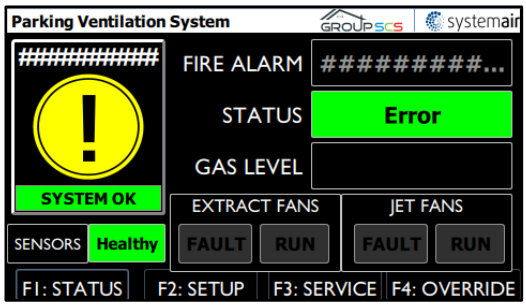
9. Troubleshooting

The alarm and event logs provide descriptions of the system faults. All critical faults are displayed on the home screen alarm list and the fault icon displayed.

9.1. System Faults

9.1.1. HMI Communication Error

In the event of communication loss between the HMI and master panel the HMI will display the system fault icon with ### for the labels. A "*Connection disconnected*" entry will be reported in the event log.



Fault	*Possible Cause & Action*
Master panel communication failure	Check master panel power supply healthy. Check data cabling, terminations and polarity are correct. Check port adapters at the HMI and PLC are connected tightly. Check PLC & HMI software versions match on service page.

9.1.2. Missing Events Log

The events & alarm logs should always show historical events. If they are empty the HMI memory module is missing or corrupt. See section the User Interface section for the location of the module.

The module can be replaced with the following USB flash drive with the following specification.

Maximum storage size	16GB
File System Format	FAT32
USB Type	USB-A

Power the HMI off before removing & inserting the memory module. On boot-up the log files should be automatically generated and restarted.

9.1.3. System Errors

Active Alarms
System Error
Primary Supply Failed
Maintenance Mode Enabled
Gas Sensor Fault
MCC(n) Offline
Service Due

Fault	*Possible Cause & Action*
System error	Check master panel PLC has memory card inserted and in run. Recycle power to panel. Check master panel for missing PLC modules or disconnections and faults.
Primary Supply Failed	System on a secondary supply source. Reinstate primary power supply. Check ATS is healthy and in normal / automatic mode. Refer to ATS manual for further information. Check ATS monitoring signal is connected correctly.
Gas Sensor Fault	Gas detection system or gas sensor has a fault. Check the power supply to the gas controller is healthy. Check for gas sensor disconnections, damage or wiring faults. Check each gas sensor power supply is healthy and within limits. Check gas sensors addressing and end of line resistors are terminated correctly.
MCC(n) Offline	Check power supply to remote panels is healthy. Recycle power to panels. Check for data cable disconnection, damage or wiring faults between master panel and remote panels. Check addressing & configuration of remote panels
Maintenance Mode Enabled	Switch off maintenance mode or reset system.
Service Due	Service timer elapsed. Reset service.

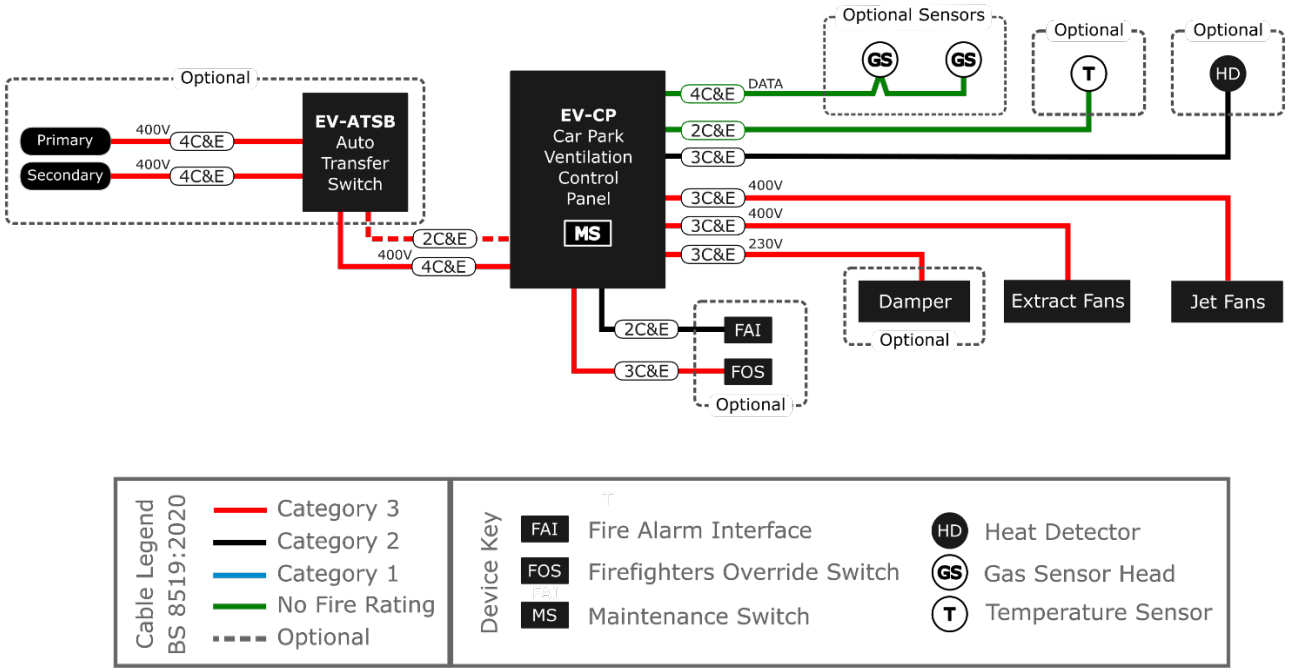
9.2. Fan Faults

Faults with the fan inverters are reported on the HMI. Additional fault codes will be displayed on the inverter and referenced in the inverter manual for more information.

Active Alarms
Fan (n): Fault
Fan (n): Failed to Start
Fan (n): Damper Failed

Fault	*Possible Cause & Action*
Fan Fault	Fan inverter in fault or supply failure. Check fan circuit breaker is on. Check inverter for fault codes and refer to inverter manual. Recycle power on inverter and reset fault on keypad. Check inverter motor data correct to fan motor rating plate. Check the inverter ramp up and ramp down time are not too short. Check fan blades are free of movement with no mechanical obstruction. Check vents and dampers open to provide free movement of air. Check fan running in correct direction. Check fan motor cabling, connections and windings.
Fan Failed to Start	Fan running feedback signal not detected. Check fan motor isolators are switched on. Check fan motor cable for disconnections or damage. Check fan motor for winding failures or disconnections. Check fan inverter configuration and operating mode is set to Auto.
Fan Damper Failed	Fan shut-off damper open position feedback signal not received. Check fanset damper feedback installed setting is correct. Check mechanical operation of the damper. Check correct motor supply wiring to the damper. Check damper open position feedback input connection and wiring.

10. Appendix A - Example Single Line Diagram



11. Appendix B – Standard Cause & Effect

Priority	Cause	Activation	Extract Dampers	Extract Fans	Jet Fans
	Override switches				
1	Override Off	Override Switch	Closed	Off	Off
1	Override Run	Override Switch	Open	100%	100%
	Smoke and/or heat detection				
2	Fire Alarm	Fire Alarm Input	Open	100%	100% after a 2-minute delay
	Ventilation modes				
3	High Pollution Level 3	Any Sensor	Open	100%	50%
4	High Pollution Level 2	Any Sensor	Open	60%	50%
5	Low Pollution Level 1	Any Sensor	Open	30%	50%
6	No Pollution - Normal ventilation	Time Switch & Ventilation Input	Open	30%	Off
7	No Pollution – Standby	All Sensors	Closed	Off	Off