

Operating Manual
BVC-650 Ventilation Controller
Temperature Based Demand Control Ventilation



Order No.: H3015-6350/00

Print Spec: 10000005389 (A)

CR: 800000057184

WARNING!

These instructions must be provided to users before use of the product and retained for ready reference by the user. Read this manual carefully before using or maintaining the device. The device will perform as designed only if it is used and maintained in accordance with the manufacturer's instructions. Otherwise, it could fail to perform as designed, and persons who rely on this device could sustain serious injury or death.

The warranties made by MSA with respect to the product are voided if the product is not installed and used in accordance with this manual and the Installation Instructions (P/N H3015-6360). This product should only be installed by a trained professional or certified electrician.

Please read and observe the WARNINGS and CAUTIONS inside.

WARNING!

Ensure trained professionals who will be installing, using, or maintaining this device have access to the user manual. If electronic access to the user manual is not possible, print a copy of the manual and keep it in an accessible location near the device.

Failure to obey the following guidelines and/or incorrect installation, operation, servicing, or maintenance of the device can cause incorrect operation of the device possibly resulting in serious injury or death.



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1 Safety Information

WARNING!

- Please read these instructions carefully and have easily accessible for the operation of the product.
- The information contained within this manual should be referenced for typical installation and operation only.
- For site specific requirements that may deviate from the information in this guide – contact MSA. If the equipment is used in a manner not specified by the manufacturer, the safety/protection provided by the equipment may be impaired.
- This device is designed for indoor operation only.
- Never ignore the device when in alarm or displays a fault condition.
- This device requires a continual supply of electrical power – it will not work without power.
- This device is not a substitute for proper installation, use and/or maintenance of fuel burning appliances including appropriate ventilation and exhaust systems.
- The device is not intended for use in potentially explosive atmospheres.
- This device is not a fire suppression or safety system. Fire suppression or safety systems must be used as the primary safety system for fire and smoke alarms.

Failure to follow these warnings can result in serious personal injury or death.

Information on Waste Disposal for Consumers of Electrical & Electronic Equipment:



When this product has reached the end of its life, treat as Waste Electrical & Electronics Equipment (WEEE).

Any WEEE marked products must not be mixed with general household waste, but kept separate for the treatment, recovery and recycling of the materials used. Please contact your supplier or local authority for details of recycling schemes in your area.

1.1 Warranty Statement

MSA, the Safety Company, warrants that these products will be free from mechanical defect or faulty workmanship for a period of three (3) years from the date of delivery, provided it is maintained and used in accordance with MSA's instructions and/or recommendations.

This warranty does not apply to expendable or consumable parts whose normal life expectancy is less than three (3) year, such as, but not limited to, nonrechargeable batteries, filament units, filter, lamps, fuses, etc. MSA shall be released from all obligations under this warranty in the event that repairs or modifications are made by persons other than its own or authorized service personnel or if the warranty claim results from physical abuse or misuse of the product. No agent, employee, or representative of MSA has any authority to bind MSA to any affirmation, representation, or warranty concerning the goods sold under this contract. MSA makes no warranty concerning components or accessories not manufactured by MSA, but will pass on to the Purchaser all warranties of manufacturers of such components.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, AND IS STRICTLY LIMITED TO THE TERMS HEREOF. SELLER SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

Exclusive Remedy

It is expressly agreed that the Purchaser's sole and exclusive remedy for breach of the above warranty, for any tortious conduct of the Seller, or for any other cause of action, shall be the repair and/or replacement at the Seller's option of any equipment or parts thereof, which after examination by the Seller is proven to be defective. Replacement equipment and/or parts will be provided at no cost to the Purchaser, F.O.B. Seller's Plant. Failure of the Seller to successfully repair any nonconforming product shall not cause the remedy established hereby to fail of its essential purpose.

Exclusion of Consequential Damage

The Purchaser specifically understands and agrees that under no circumstances will the Seller be liable to the Purchaser for economic, special, incidental, or consequential damages or losses of any kind whatsoever, including but not limited to,

loss of anticipated profits and any other loss caused by reason of nonoperation of the goods. This exclusion is applicable to claims for breach of warranty, tortious conduct, or any other cause of action against the Seller.

Liability Information

MSA accepts no liability in cases where the device has been used inappropriately or not as intended. The selection and use of the device are the exclusive responsibility of the individual operator. Product liability claims, warranties, and guarantees made by MSA with respect to the device are voided if the device is not operated, serviced, and/or maintained in accordance with the instructions in this manual.

The warranties made by MSA with respect to the product are voided if the product is not used and serviced in accordance with the instructions in this manual. Please protect yourself and others by following them. We encourage our customers to write or call regarding this equipment prior to use or for any additional information relative to use or repairs.

2 Product Introduction

MSA's BVC-650 Control System has been specifically designed for new and retrofit Quick Serve Restaurant and Kitchen applications, providing automated control over the ventilation system by adjusting exhaust and kitchen HVAC inlet air in response to the presence and level of cooking activity.

Based on the temperature inside the exhaust hoods, the BVC-650 Control System maximizes kitchen ventilation energy efficiency and reduces energy waste while improving kitchen comfort. Stores are running industrial exhaust fans continuously throughout operating hours. Conditioned air is exhausted out of the building at rapid rates, resulting in increased emissions and energy use.

2.1 Kit Part Numbers

Part Number	Description
H3015-6352	BVC-650 Kit, AT&T Network
H3015-6365	BVC-650 Kit, Verizon Network
H3015-6366	BVC-650 Kit, Vodafone Network

3 Installation

3.1 Typical Location

⚠ WARNING!

- Installation must be in accordance with local jurisdiction, regulations or standard authority in the country the product is installed.
- Access to the interior of the controller, when carrying out any work, must only be conducted by trained professional or certified electrician.

Failure to follow these warnings can result in serious personal injury or death.

The controller must be located in a secure location. Place the controller in accordance with applicable regulations. Easy accessibility is recommended for both status observation and alarm/fault purposes. Refer to the installation guide and wiring diagram (P/N H3015-6360) for proper location of the BVC-650 controller relative to sensors and other connections within the facility.

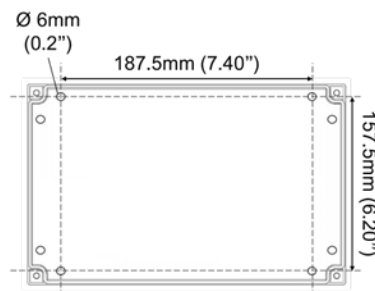
3.2 Mounting

NOTICE

- Where cable glands are used for wire entry, use no bigger than 20mm (3/4").
- Designed for surface mounting, it must be installed by a licensed, insured contractor.
- Prior to drilling any gland or conduit holes in the enclosure, please remove the cover and main power board.

Failure to follow this notice can result in damage to the device or improper functionality.

1. Carefully remove the front cover from the unit by unscrewing the four M6 hex bolts located at each corner. To do this, use a socket wrench.
2. Ensure the wall surface is solid and flat to prevent base distortion and mark the four 6mm (0.236") screw holes located on the back of the enclosure to the wall.
3. Use a suitable screw/bolt (M4x30min) and appropriate expanding plug to fix the back of the enclosure to the wall surface.
4. After executing the mounting and the electrical connections – replace the front cover and insert the security caps over the four M6 hex bolts.



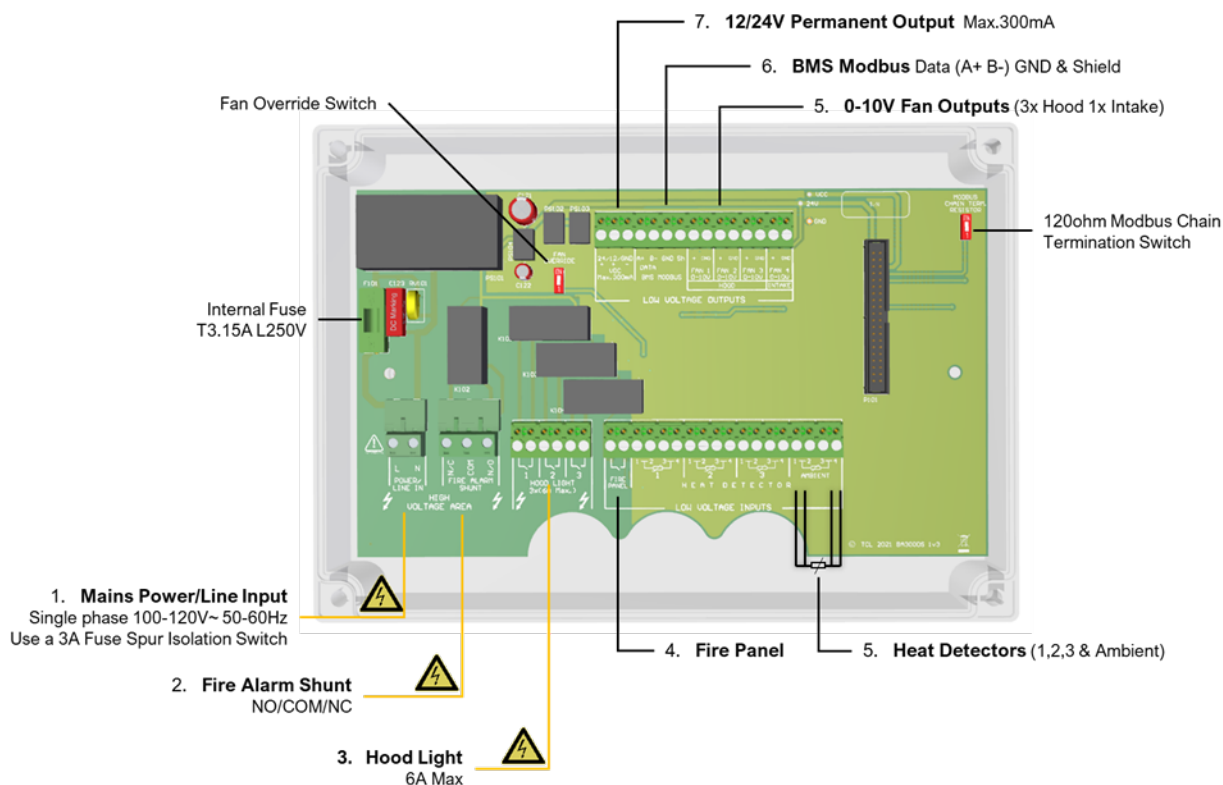
NOTE: To decrease the risk of damaging the Power Board while mounting the controller, the Power Board can be removed by removing the four screws located on the board. Place the power board in a location safe location.

3.3 Power Board Connections Overview

⚠ WARNING!

- Access to the interior of the controller, when carrying out any work, must be conducted by a trained professional or certified electrician.
- Devices must be grounded for electrical safety and to limit the effects of R/F & EMC interference.
- Where cable glands are used for wire entry, use no bigger than 20mm (3/4").
- For field connections, other than connected heat detectors, use wires suitable for at least 167° F (75° C) .
- Heat detectors must use wires rated from sub-zero to 400° F (200° C).

Failure to follow these warnings can result in serious personal injury or death.

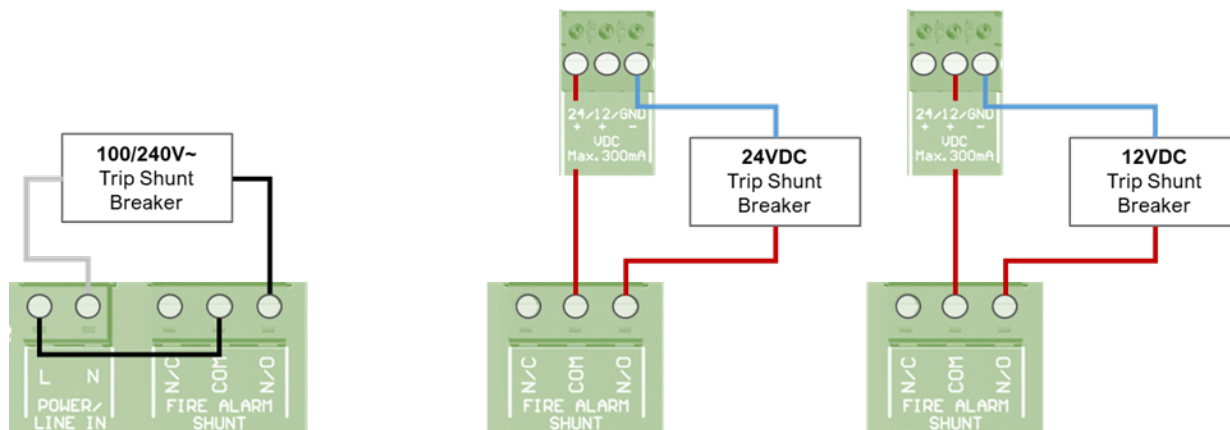


1. POWER/ LINE IN

The BVC-650 requires an AC power supply rating of 100-240V~ connected to the [POWER/LINE IN] connector using a 3A switched fused spur. When power is connected to the controller, the home screen will be displayed.

2. FIRE ALARM SHUNT

This dry contact will switch with a fire alarm activation. 100/240VAC, 24VDC or 12VDC should be routed through [FIRE ALARM SHUNT] to provide the required voltage to trip a shunt breaker (not supplied).



3. HOOD LIGHT

This dry contact switches line voltage to hood lighting. The line wire to each light should be run through the [HOOD LIGHT] terminal. The lighting is separated into three areas, one per hood. Rated at 6A Max per hood.

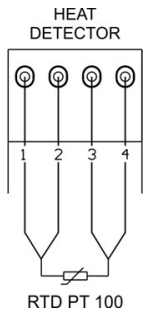
4. FIRE PANEL

A volt free open/close switch input from a fire panel in the event of a fire alarm.

5. HEAT DETECTOR 1,2,3 & AMBIENT

You must use a 4-wire PT100 sensor and wire all 4 cores!

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These are inputs for PT100 duct heat/temperature sensors.

Numbers 1 to 3 refers to the location/zone the sensor is installed. Ambient is for connecting and monitoring ambient room temperature outside of heat zones. Each terminal has a 4-wire signal from the PT100. Terminals 2 & 3 are for resistance and terminals 1 & 4 are for cable length resistance compensation.

6. 0-10V FAN OUTPUTS

3x 0-10V outputs to control the hood fans either EC fans or via an inverter or VFD/VSD. Each hood fan 0-10V is separated into its respective zone matching the heat detector inputs. A single 0-10V output is for control of the main intake fan. 0V is standby/off for the fans. Minimum and maximum fan speeds are set up in the menu.

7. BMS MODBUS

Connections for Master/Slave protocols used in Building Management Systems to communicate between devices including this panel are used with [BMS MODBUS]. For more information see section BMS Data.

8. 12VDC or 24VDC OUTPUT

A permanent 12 or 24vdc output for external auxiliary devices. Max output: 300mA.

NOTE: This output is used to power the available wireless gateway to provide remote communications and control of the BVC-650 controller.

3.4 Display Board Overview / Configuration

WARNING!

The following work must be performed with the cover open and the device energized. As a result, there is a risk for electric shock. A trained professional and/or qualified electrician must perform the work. Avoid contact with energized components.

Failure to follow this warning can result in serious personal injury or death.

The display board is located on the back of the front cover. Switch settings can be changed on the back of the display board when power is live.

1. Touch Calibration Header

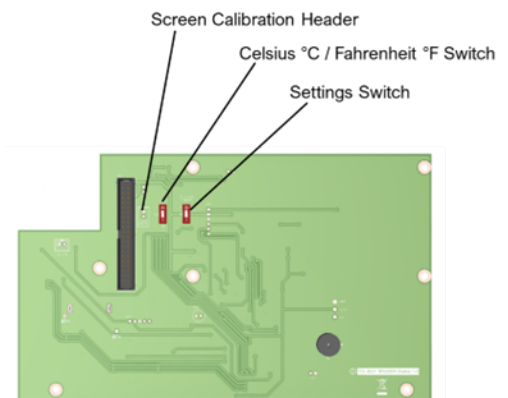
Settings switch must be on (in the UP position). Short out the two headers marked [Touch Calib.] to re calibrate the touch sensitivity / accuracy on the display screen.

2. Celsius °C / Fahrenheit °F Switch

Select °C or °F to automatically adjust any temperature values in the system configuration menu.

3. Settings (Menu) Switch

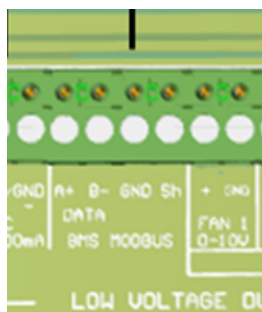
Turn on to access system configuration menu.



3.5 BMS Modbus - Wiring

NOTE: If you are encountering noise or irregular problems with a Modbus link, the problem is likely related to grounding, incorrect shielding or wiring mains power next to Modbus wiring. Reversing the [+] and [-] connection can lead to the system to stop working owing to reverse polarity found on the terminals.

BMS MODBUS for master/slave protocols used in building management systems to communicate between devices. A 3 core cable with shield is used to wire the MODBUS terminals [A+ & B-]. BMS MODBUS for master/slave protocols used in building management systems to communicate between devices. A 3 core cable with shield is used to wire the MODBUS terminals [A+ & B-].



3.6 BMS Modbus - 120ohm Termination Wiring Resistance



Signal communication issues may occur where the bus length is too long, high baud rates are used or signal reflections are occurring. To avoid this, terminating at each end of a chain may help the quality of the data signal by turning on the 120-ohm BMS terminal resistor switch. Terminate the first and last device in each chain.

3.7 Configuration and Modbus RTU Data Points

Explanation	Description / Value
HEAT DETECTOR 1	Temperature value rounded to nearest degree. Unit follows the settings. Default is °F
HEAT DETECTOR 2	
HEAT DETECTOR 3	
HEAT DETECTOR 4 (AMBIENT)	
TEMPERATURE UNIT	0=°C, 1=°F
SOFTWARE VERSION 1st DIGIT	0-9 (123 = 1v23)
SOFTWARE VERSION 2nd DIGIT	
SOFTWARE VERSION 3rd DIGIT	
Not Used	
Not Used	
Not Used	
FAN 1 (0-10V) HOOD	Divide the number by 10 to get the voltage value For Example: 56 = 5.6V
FAN 2 (0-10V) HOOD	
FAN 3 (0-10V) HOOD	
FAN 4 (0-10V) INTAKE	
LIGHT ENABLE RELAY 1	0 = OFF 1 = ON
LIGHT ENABLE RELAY 2	
LIGHT ENABLE RELAY 3	
BOOST ON / OFF	
FIRE PANEL INPUT	1 = OFF 0 = ON

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Explanation	Description / Value
TIMER POWER ON / OFF	0 = OFF 1 = ON
HEAT DETECTOR 1 CONNECTION	0 = CONNECTED 1 = NOT CONNECTED
HEAT DETECTOR 2 CONNECTION	
HEAT DETECTOR 3 CONNECTION	
HEAT DETECTOR A CONNECTION	
SHUNT RELAY	0 = OFF
F1 ROC OVERRIDE FLAG	1 = ON
F2 ROC OVERRIDE FLAG	
F3 ROC OVERRIDE FLAG	
F1 TEMP. OVERRIDE FLAG	
F2 TEMP. OVERRIDE FLAG	
F2 TEMP. OVERRIDE FLAG	
F1 AMBIENT OVERRIDE FLAG	
F2 AMBIENT OVERRIDE FLAG	
F3 AMBIENT OVERRIDE FLAG	
MAIN TEMP. OVERRIDE FLAG	
F1 MAIN TEMP. OVERRIDE FLAG	
F2 MAIN TEMP. OVERRIDE FLAG	
F3 MAIN TEMP. OVERRIDE FLAG	
F1 COOLING TIMER (min.)	(1 min = 1m 00s – 1m 59s)
F2 COOLING TIMER (min.)	
F3 COOLING TIMER (min.)	

3.8 Access System Configuration Settings

⚠ WARNING!

- To view, change and save settings, mains power must be provided.
- The following work must be performed with the cover open and the device energized. As a result, there is a risk for electric shock. A trained professional and/or qualified electrician must perform the work. Avoid contact with energized components.

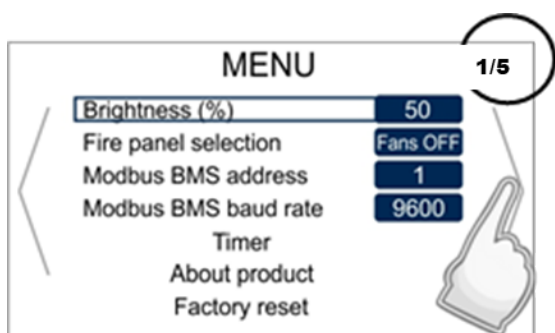
Failure to follow these warnings can result in serious personal injury or death.

Access system settings by turning the dip switch on marked [SETTINGS] on the backside of the cover while the device is open. The BVC-650 has a touch screen, which allows the user to configure the system. There are multiple menu screens, selectable by touching either side of the screen.

When the system is configured, turn the [Settings] switch off and the system will automatically save settings and restart.

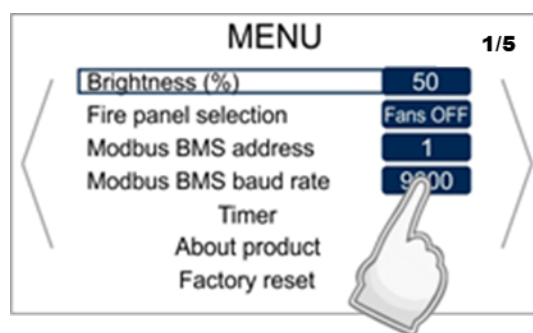
Scroll Screen Pages

Press the arrow at the side of the screen.



Select / Change Option

Press the blue option box or press and hold.



3.9 System Configuration Options

Function	Option	Explanation
Brightness (%)	0 - 100 Increments of 10	Screen backlight brightness
Fire Panel Selection	F. OFF F. ON I. ON H. ON	The BVC-650 needs a closed contact from an external fire panel (where used) in order to operate. This setting tells the BVC-650 what to do when the contact from the fire panel goes open circuit: F. OFF Turn All Hood & Intake Fans OFF. F. ON Turn All Hood & Intake Fan ON at 10V. I. ON Turn Hood Fan OFF /Turn Intake Fan ON at 10V. H. ON Turn Intake Fan OFF/Turn Hood Fan ON at 10V.
Modbus Address	1-32	BVC-650 Panel address from master BMS Modbus.
Modbus Baud Rate	9600 19200 38400 57600 115200	Modbus Data Exchange Speed (bit per second).
Timer	Controller auto on/off settings. See section 'Timer Configuration'	
About product	Press for system details.	
Factory reset	Resets the BVC-650 to a factory set condition.	
FAN 1 Min. speed	1 - 9 (Volts)	Set the Minimum Speed for HOOD FAN 1. The BVC-650 will not drive the fan below this speed unless it's OFF

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Function	Option	Explanation
FAN 1 Max. speed	1 - 10 (Volts)	Maximum Speed for HOOD FAN 1. The BVC-650 will not drive the fan above this speed unless in remote override
FAN 2 Min. speed	1 - 9 (Volts)	Minimum Speed for HOOD FAN 2. The BVC-650 will not drive the fan below this speed unless it's OFF
FAN 2 Max. speed	1 - 10 (Volts)	Maximum Speed for HOOD FAN 2. The BVC-650 will not drive the fan above this speed unless in remote override
FAN 3 Min. speed	1 - 9 (Volts)	Minimum Speed for HOOD FAN 3. The BVC-650 will not drive the fan below this speed unless it's OFF
FAN 3 Max. speed	1 - 10 (Volts)	Maximum Speed for HOOD FAN 3. The BVC-650 will not drive the fan above this speed unless in remote override
Intake FAN Min. speed	1 - 9 (Volts)	Minimum Speed for INTAKE FAN. The BVC-650 will not drive the fan below this speed unless it's OFF
Intake FAN Max. speed	1 - 10 (Volts)	Maximum Speed for INTAKE FAN. The BVC-650 will not drive the fan above this speed unless in remote override
Fan Differential (%)	OFF 10 to 90 Increments of 10	Differential between Intake and Hood Fans as a percentage reduction of the Intake. So, on 100% Exhaust, 10% setting would mean the Intake ran at 10% slower than exhaust and will sop on the MIN or MAX speeds as set above.
Boost time (min.)	1-30	Pressing the 'Boost' button will drive all fans at 100% capacity for time selected. (Disabled by re-pressing the button).
FAN 1 Min. temp	4 - 119°C (40 - 247°F)	The minimum temperature at which the controller will start driving HOOD FAN 1. This is the temperature at which it is determined by site and usage analysis that the fan should switch on and be running at MIN set speed as above. DEFAULT setting of this is a generalisation and may not be optimised for your kitchen specifically.
FAN 1 Max. temp	5 - 120°C (41 - 248°F)	The temperature at which the controller will be outputting MAX PRESET VOLTAGE (Set Above) to Hood FAN 1. This is the temperature at which it is determined by site and usage analysis that the fan should be running at MAX set speed as above. DEFAULT setting of this is a generalisation and may not be optimised for your kitchen specifically.
FAN 2 Min. temp	4 - 119°C (40 - 247°F)	The minimum temperature at which the controller will start driving HOOD FAN 2. This is the temperature at which it is determined by site and usage analysis that the fan should switch on and be running at MIN set speed as above. DEFAULT setting of this is a generalisation and may not be optimised for your kitchen specifically.
FAN 2 Max. temp	5 - 120°C (41 - 248°F)	The temperature at which the controller will be outputting MAX PRESET VOLTAGE (Set Above) to Hood FAN 2. This is the temperature at which it is determined by site and usage analysis that the fan should be running at MAX set speed as above. DEFAULT setting of this is a generalisation and may not be optimised for your kitchen specifically.
FAN 3 Min. temp	4 - 119°C (40 - 247°F)	The minimum temperature at which the controller will start

Function	Option	Explanation
		driving HOOD FAN 3. This is the temperature at which it is determined by site and usage analysis that the fan should switch on and be running at MIN set speed as above. DEFAULT setting of this is a generalisation and may not be optimised for your kitchen specifically.
FAN 3 Max. temp	5 - 120°C (41 - 248°F)	The temperature at which the controller will be outputting MAX PRESET VOLTAGE (Set Above) to Hood FAN 3. This is the temperature at which it is determined by site and usage analysis that the fan should be running at MAX set speed as above. DEFAULT setting of this is a generalisation and may not be optimised for your kitchen specifically.
F1 Cool Down Timer	0-60	Select the minutes to keep the fan ON to cool down the hood after the BVC moves to OFF
F2 Cool Down Timer	0-60	Select the minutes to keep the fan ON to cool down the hood after the BVC moves to OFF
F3 Cool Down Timer	0-60	Select the minutes to keep the fan ON to cool down the hood after the BVC moves to OFF
FAN 1 Average over time	5-120	Select the SECONDS that the BVC will average over for the 0-10V output. Makes for a smoother fan control curve. The longer the time, the less reactive the fan is to fluctuations in temperature. Shorter times make for more reactive fan control.
FAN 2 Average over time	5-120	Select the SECONDS that the BVC will average over for the 0-10V output. Makes for a smoother fan control curve. The longer the time, the less reactive the fan is to fluctuations in temperature. Shorter times make for more reactive fan control.
FAN 3 Average over time	5-120	Select the SECONDS that the BVC will average over for the 0-10V output. Makes for a smoother fan control curve. The longer the time, the less reactive the fan is to fluctuations in temperature. Shorter times make for more reactive fan control.
Intake Average over time	5-960	Select the SECONDS that the BVC will average over for the 0-10V output. Makes for a smoother fan control curve, The longer the time, the less reactive the fan is to fluctuations in temperature. Shorter times make for more reactive fan control.
Intake band step	0-30	Creates dead bands/steps in the intake fan output for damper control. 0 is full 0-10V control for a fan, 20 is 5 clear steps of movement (Range from 0.0 to 3.0V). Write 10 times higher integer value to Modbus register to get float in the menu.
Ambient Temp. Installed?	NO YES	Select YES if a temperature sensor is installed in a typical location for an ambient temperature reference. Wired into [Heat Detector Ambient]
<i>If Ambient Temperature Sensor is not installed.</i>		
F1 R.O.C. Over: (min.)	1-14	This is the time range in minutes for the temperature rate of change. Rate of change is used when the BVC-650 is OFF and heat is detected in the hood from cooking. This

3 Installation

Function	Option	Explanation
		can be used to bring the BVC-650 ON if cooking is started out of hours of the timer. Only the relevant hood zone and the intake will switch on.
F2 R.O.C. Over: (min.)	1-14	This is the time range in minutes for the temperature rate of change. Rate of change is used when the BVC-650 is OFF and heat is detected in the hood from cooking. This can be used to bring the BVC-650 ON if cooking is started out of hours of the timer. Only the relevant hood zone and the intake will switch on.
F3 R.O.C. Over: (min.)	1-14	This is the time range in minutes for the temperature rate of change. Rate of change is used when the BVC-650 is OFF and heat is detected in the hood from cooking. This can be used to bring the BVC-650 ON if cooking is started out of hours of the timer. Only the relevant hood zone and the intake will switch on.
F1 R.O.C. – Rise of: (Temp.)	5-50	Use this option to select the temperature rise over the [period of time in the previous setting] that will automatically activate the BVC-650 fan 1 as above
F2 R.O.C. – Rise of: (Temp.)	5-50	Use this option to select the temperature rise over the [period of time in the previous setting] that will automatically activate the BVC-650 fan 2 as above
F3 R.O.C. – Rise of: (Temp.)	5-50	Use this option to select the temperature rise over the [period of time in the previous setting] that will automatically activate the BVC-650 fan 3 as above
<i>If Ambient Temperature Sensor is installed.</i>		
F1 ON – Ambient Differential (%)	10-200	Select the % over the actual AMBIENT temperature reading that the HOOD temperature sensors must reach to automatically activate the BVC-650 fan 1. Ambient can be used instead of the Rate of Change (R.O.C) above to determine if cooking is taking place out of hours of the timer and bring the relevant hood fan(s) on along with the intake.
F1 OFF – Ambient Differential (%)	5-150	Select the % over the AMBIENT temperature reading that the HOOD temperature sensors must reach to automatically disable the BVC-650 fan 1. This works in reverse to the ON procedure detailed above to turn the BVC-650 OFF once cooking has ceased out of hours of the timer.
F2 ON – Ambient Differential (%)	10-200	Select the % over the AMBIENT temperature reading that the HOOD temperature sensors must reach to automatically activate the BVC-650 fan 2. Ambient can be used instead of the Rate of Change (R.O.C) above to determine if cooking is taking place out of hours of the timer and bring the relevant hood fan(s) on along with the intake.
F2 OFF – Ambient Differential (%)	5-150	Select the % over the AMBIENT temperature reading that the HOOD temperature sensors must reach to automatically disable the BVC-650 fan 2. This works in reverse to the ON procedure detailed above to turn the BVC-650 OFF once cooking has ceased out of hours of the timer.

Function	Option	Explanation
F3 ON – Ambient Differential (%)	10-200	Select the % over the AMBIENT temperature reading that the HOOD temperature sensors must reach to automatically activate the BVC-650 fan 3. Ambient can be used instead of the Rate of Change (R.O.C) above to determine if cooking is taking place out of hours of the timer and bring the relevant hood fan(s) on along with the intake.
F3 OFF – Ambient Differential (%)	5-150	Select the % over the AMBIENT temperature reading that the HOOD temperature sensors must reach to automatically disable the BVC-650 fan 3. This works in reverse to the ON procedure detailed above to turn the BVC-650 OFF once cooking has ceased out of hours of the timer.

3.10 Manual Timer Configuration: Date & Time

If modifying the factory default setting of permanently on, ensure that the modified on/off times correspond to the times that the monitored equipment may be used. Ensure controls are in place to update the on/off times for the device when there are changes to the schedule for use of the monitored equipment.

When setting the current date and time, ensure that the date and time are accurate.

Only disable the automatic daylight savings time if you are in a location that does not follow daylight savings time.

Set the date and clock (24hour) by selecting [Timer] in the settings menu.

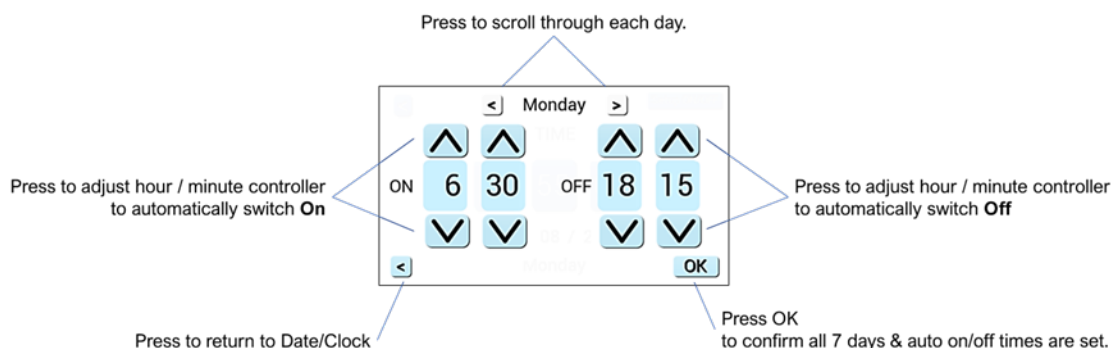
The clock start of the day is 00:00:00 and 23:59:59 represents the end of the day.



3.11 Manual Timer Configuration: Auto On/Off Setup

Set the BVC-650 Controller to switch on and off at set times throughout a 7-day week. Press [Setup ON/OFF].

To return back to factory default settings, you must first enter the display menus by switching the settings switch to the up position. Tap the factory reset selection on the touch screen and the unit will reset to factory defaults. If the unit is shut down in a timer schedule you can still reset to defaults by going into the settings menu and doing a factory reset.



3.12 Modbus Timer Configuration: Date & Time

When setting the current date and time, ensure that the date and time are accurate.

Only disable the automatic daylight savings time if you are in a location that does not follow daylight savings time.

The BVC-650 will remain ON when start times and end times are the same value – this is the factory set condition.

Function	Option	Explanation
Monday	0 - 23 Increments of 1	BVC-650 switch ON Hour Default is 12
Monday	0 - 59 Increments of 1	BVC-650 switch ON Minute Default is 0
Monday	0 - 23 Increments of 1	BVC-650 switch OFF Hour Default is 12
Monday	0 - 59 Increments of 1	BVC-650 switch OFF Minute Default is 0
Tuesday	0 - 23 Increments of 1	BVC-650 switch ON Hour Default is 12
Tuesday	0 - 59 Increments of 1	BVC-650 switch ON Minute Default is 0
Tuesday	0 - 23 Increments of 1	BVC-650 switch OFF Hour Default is 12
Tuesday	0 - 59 Increments of 1	BVC-650 switch OFF Minute Default is 0
Wednesday	0 - 23 Increments of 1	BVC-650 switch ON Hour Default is 12
Wednesday	0 - 59 Increments of 1	BVC-650 switch ON Minute Default is 0
Wednesday	0 - 23 Increments of 1	BVC-650 switch OFF Hour Default is 12
Wednesday	0 - 59 Increments of 1	BVC-650 switch OFF Minute Default is 0
Thursday	0 - 23 Increments of 1	BVC-650 switch ON Hour Default is 12
Thursday	0 - 59 Increments of 1	BVC-650 switch ON Minute Default is 0
Thursday	0 - 23 Increments of 1	BVC-650 switch OFF Hour Default is 12
Thursday	0 - 59 Increments of 1	BVC-650 switch OFF Minute Default is 0
Friday	0 - 23 Increments of 1	BVC-650 switch ON Hour Default is 12
Friday	0 - 59 Increments of 1	BVC-650 switch ON Minute Default is 0
Friday	0 - 23 Increments of 1	BVC-650 switch OFF Hour Default is 12
Friday	0 - 59 Increments of 1	BVC-650 switch OFF Minute Default is 0
Saturday	0 - 23	BVC-650 switch ON Hour

Function	Option	Explanation
	Increments of 1	Default is 12
Saturday	0 - 59 Increments of 1	BVC-650 switch ON Minute Default is 0
Saturday	0 - 23 Increments of 1	BVC-650 switch OFF Hour Default is 12
Saturday	0 - 59 Increments of 1	BVC-650 switch OFF Minute Default is 0
Sunday	0 - 23 Increments of 1	BVC-650 switch ON Hour Default is 12
Sunday	0 - 59 Increments of 1	BVC-650 switch ON Minute Default is 0
Sunday	0 - 23 Increments of 1	BVC-650 switch OFF Hour Default is 12
Sunday	0 - 59 Increments of 1	BVC-650 switch OFF Minute Default is 0

3.13 Day Off Setup

Function	Explanation
Monday OFF	0 = NO 1 = YES (off)
Tuesday OFF	
Wednesday OFF	
Thursday OFF	
Friday OFF	
Saturday OFF	
Sunday OFF	

3.14 Fan Override

Function	Option	Explanation
Override	ON OFF	This function will drive all fans with maximum speed of 10V ignoring any Min and Max 0-10V values, temperatures, and boost.

3.15 Timer Configuration: Date & Time

Function	Option	Explanation
Year	2000-2099	Set YEAR
Month	1-12	Set MONTH
Day	1-31	Set DAY
Hour	0-23	Set HOUR
Minute	0-59	Set MINUTE
Second	0-59	Set SECOND

3 Installation

3.16 Factory Set Timer

Auto ON/OFF Timer	CONDITION	Day OFF Setup	
(Day) ON h	12	All Days	OFF
(Day) ON m	0		
(Day) OFF h	12		
(Day) OFF m	0		

3.17 Factory Set Condition

Function	Condition	Function	Condition	Function	Condition
Brightness (%)	100	Fan Differential (%)	OFF	FAN 1 Average over time	5 sec
Fire panel selection	H. ON	Boost time (min.)	10	FAN 2 Average over time	5 sec
Modbus Address	1	FAN 1 Min. temp.	25°C (77°F)	FAN 3 Average over time	5 sec
Modbus Baud Rate	9600	FAN 1 Max. temp.	100°C (212°F)	Intake Average over time	5 sec
FAN 1 Min. speed	5	FAN 2 Min. temp.	25°C (77°F)	Intake band step	0.0 (0)
FAN 1 Max. speed	10	FAN 2 Max. temp.	100°C (212°F)	Ambient Temp. Installed?	NO
FAN 2 Min. speed	5	FAN 3 Min. temp.	25°C (77°F)	F1 R.O.C. Over: (min.)	3
FAN 2 Max. speed	10	FAN 3 Max. temp.	100°C (212°F)	F2 R.O.C. Over: (min.)	3
FAN 3 Min. speed	5	F1 Cool Down Timer	10 min	F3 R.O.C. Over: (min.)	3
FAN 3 Max. speed	10	F2 Cool Down Timer	10 min	F1 R.O.C. – Rise of: (Temp.)	20
Intake FAN Min. speed	5	F3 Cool Down Timer	10 min	F2 R.O.C. – Rise of: (Temp.)	20
Intake FAN Max. speed	10			F3 R.O.C. – Rise of: (Temp.)	20

If Ambient Temperature Sensor installed:

F1 ON – Ambient Differential (%)	50	F2 ON – Ambient Differential (%)	50	F3 ON – Ambient Differential (%)	50
F1 OFF – Ambient Differential (%)	25	F2 OFF – Ambient Differential (%)	25	F3 OFF – Ambient Differential (%)	25

4 Operation

4.1 First Power Up / Main Screen

When electrical power is supplied and the BVC-650 is switched on, the main screen displays a visual representation of the three Hood Fan 0-10V outputs (green bars) and 0-10V intake fan (blue bars).

Each bar represents a ~one (1) volt output to the fan.

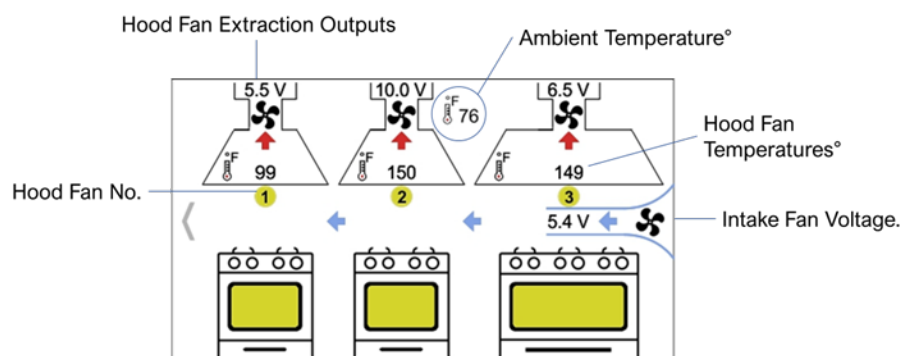


The burger icon (top left of screen) appears when the system is working, and no-fault conditions are present.

The fan icon (bottom left of screen) is for boosting the fans manually. See Section [4.3 Boost & Boost Overrun \(Maximum Ventilation Output\)](#).

4.2 Diagnostic Screen

By pressing the screen arrow to the left of the screen, you access a visual diagnostic detailing the 0-10V hood fan extraction outputs, the temperature of each hood fan, ambient temperature if installed and the voltage of the intake fan.



Press the screen scroll arrow to return to the main page.

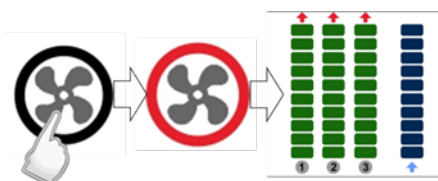
4.3 Boost & Boost Overrun (Maximum Ventilation Output)

Pressing the Boost icon will switch all fans on 100%, irrespective of the maximum fan speeds configured upon installation.

The boost will stay active until either the configured boost timer elapses or the boost icon is pressed again.

Boost: If the panel is in on (normal operation within the times configured), then Boost may be activated. All fan outputs will be driven at maximum capacity (10V).

Boost Overrun: When the panel is off (timer off/ temperature override off) press the screen to wake up the panel. Press the boost icon and the Boost Overrun indication will appear.



4.4 Fire Panel Alarm

NOTICE

The Fire Panel Alarm has priority over Boost and Modbus override actions. Ensure the proper Fire Panel Alarm settings are set to drive the hood fans properly.

Failure to follow this notice can result in improper functionality of the device.

Fire Panel Alarm will drive the fans in one of four (4) ways (configured in the menu on installation) either:



- F. OFF** (Hood & Intake Fans both OFF) or
- F. ON** (Hood & Intake Fans ON at 10V) or
- I. ON** (Hood Fan OFF / Intake Fan ON at 10V) or
- H. ON** (Intake Fan OFF / Hood Fan ON at 10V).

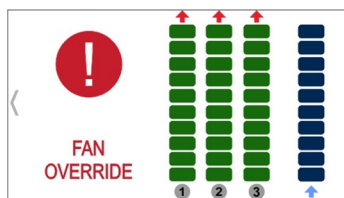
The [SHUNT RELAY] output will switch with the Fire Panel Alarm. The fire panel alarm is reset by restarting the controller using the ON/OFF switch and only if the fire panel alarm has been cleared.

4.5 Fan Override

NOTICE

Fan Override has priority over the Boost Overrun and is only enabled/disabled via external Modbus control. Be aware of this condition if you chose to disable the Fan Override function.

Failure to follow this notice can result in improper functionality of the device.



When the fan override is enabled via an external Modbus connection all fan outputs are driven at maximum capacity (10V).

The override will stay active until the configured override timer elapses.

4.6 Fault Condition

WARNING!

If a faulty or disconnected sensor is detected, the respective zone will run the hood fan at the maximum speed configured in the settings on installation. Ensure the maximum speeds are set appropriately to run the hood fans at the proper setting during this condition.

Failure to follow this warning can result in serious personal injury or death.



If any of the heat sensors loses connection or detects a temperature below 14°F (-10°C) or above 302°F (150°C), then main screen will display a fault icon.

When the fault icon is displayed, scroll to the diagnostics screen.

A red "X" replaces the heat sensor temperature to indicate the faulty or disconnected sensor.

5 Maintenance

5.1 Cleaning

Keep the BVC-650 controller in good working order

- Remove any dust/debris from the outer enclosure regularly using a slightly damp cloth.
- Never use detergents or solvents to clean your device(s).
- Never paint the device(s). Paint may interfere with the equipment.

6 Technical Specification

General	
Model:	BVC-650
Size: (H x W x D)	7.08 x 10.03 x 3" (180 x 255 x 77 mm)
Housing Material:	ABS Polylac - PA765 (Flame Rating UL94 V-1)
Mounting:	Indoor use - Wall Mounting
Weight:	1.14kg (2.51lb)
User Interface	
Display:	4.3" TFT Touch Screen
Screen Brightness:	Adjustable 0-100%
Audible Alarm:	>60dB @ 3.28ft (1m). Quiet conditions.
Language:	English
Power Supply	
Power Consumption:	14.8W max.
AC Power:	100-240V~ 50/60Hz
Internal Fuse:	T3.15A L250V
Equipment	
Overvoltage Category:	II
Pollution Degree:	2
Equipment Class:	2
I/O	
Relay Output:	Hood Light: Volt Free Relay Outputs x3 (non-latching). 6A max @ 240V~ Fire Alarm Shunt: NO/C/NC 6A max @ 240V~
Common Output:	12/24VDC Permanent. 0-10VDC Variable.
Environmental	
Ingress Protection:	Not Formally Evaluated
Operating:	-10 ~ 50°C / 14 ~ 122°F 30 ~ 80% RH (non-condensing)
Storage:	-25 ~ 50°C / -13~122°F up to 95% RH (non-condensing)
Altitude Rating:	2000m
Wiring	
Typical:	Screw Terminals x44. Power & Fire Alarm Shunt: #18-12AWG-Tinned Copper Other: #18-14AWG-Tinned Copper. For field connections use wires suitable for at least 75°C (167°F)
Heat Detectors:	Sub Zero to 400°F (200°C)
Approvals	
Electromagnetic Compatibility and Electrical Safety:	EMC EN 61326-1:2013 UL61010-1/2012/R:2019-07; CAN CSA C22.2 No. 61010-1-12/A1:2018-11
Other	
Communication:	RS485 MODBUS RTU