Installation, Operation and Maintenance Manual

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with these instructions will result in voiding of the product warranty and may result in personal injury and/or property damage.

KVS v3.00

General Safety Information

Only qualified personnel should install this product. Personnel should have a clear understanding of these instructions and should be aware of general safety precautions. Improper installation can result in electric shock, possible injury due to coming in contact with moving parts, as well as other potential hazards. If more information is needed, contact a licensed professional engineer before moving forward.

1. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the latest edition of the National Fire Protection Agency Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations (NFPA 96). Follow the Canadian Electrical Code (CEC) and ULC-S650 if installing this product in Canada.

2. Do not allow the electrical components of this unit to come in contact with oil, grease, hot surfaces, water, or chemicals. Replace cord immediately if damaged.

3. Verify the site can supply the necessary power for each fan and for the control panel.

WARNING

Electrical shock hazard. Can cause equipment damage, personal injury or death. Service must only be performed by personal that are knowledgeable in the operation of the equipment being controlled.

DANGER

Always disconnect power before working on or near the product. Lock and tag the disconnect switch or breaker to prevent accidental power up.

CAUTION

When servicing the product, variable frequency drives may be hot enough to cause pain or injury. Allow motor to cool before servicing.

CAUTION

It is the responsibility of the installer to make sure both electrical and gas appliances shut down in the event of a fire or in the event of a power loss to the building when this sequence is required by the authority having jurisdiction.
Receiving and Handling

Receiving
Upon receiving the product, check to make sure all items are accounted for by referencing the bill of lading to ensure all items were received. Notify the carrier if any damage is noticed. The carrier will make notification on the delivery receipt acknowledging any damage to the product. All damage should be noted on all of the copies of the bill of lading which is countersigned by the delivering carrier. If damaged upon arrival, file a claim with the carrier. Any physical damage to the unit after acceptance is not the responsibility of the manufacturer.

Unpacking
Verify that all required parts and the correct quantity of each item have been received. If any items are missing, report shortages to your local representative to arrange for obtaining missing parts.

Storage
If a vari-flow control panel must be stored prior to installation, it must be protected from dirt and moisture. Indoor storage is highly recommended.

NOTE
Improper storage which results in damage to the unit will void the warranty.

Handling
Make sure the equipment does not suffer any heavy vibration or knocks.
Installation

Control Box Mounting

1. Locate an area with enough space to mount the control box and fasten to the wall.

NOTE
Control box may be factory mounted. If so, continue to the next section.

NOTE
If the Vari-Flow is equipped with static pressure control, it will be located in the panel. Therefore, this control box should be mounted in the space to be controlled. Refer to the Pneumatic Static Pressure Kit section for installation instructions of the pressure sensor kit on page 4.

Temperature Sensor(s) Mounting

NOTE
Temperature sensor(s) may be factory installed. If so, continue to the next section.

1. Locate flat area(s) at the top interior of the hood in front of the filters, towards the front of the hood.

2. Find a suitable location for the sensor in the flat space which will not interfere with the fire suppression nozzles and is not within 12 inches (304.8 mm) of any light fixtures. Cut a 3/4 to 7/8-inch (19.0 to 22.2 mm) diameter hole in the flat spot of the capture tank.

3. Center the octagon extension over the hole on the hood surface.

4. Insert the compression seal into the hole from the inside of the hood making sure the gasket is placed on the fitting before inserting it into the hole. Place the octagon box and J-box plate provided over the fitting on the top of the hood, keeping the fitting centered in the box. Install the lock washer and 1-1/2 inch (38.1 mm) nut on the threaded portion of the compression seal and tighten securely.

5. Insert the temperature sensor into compression seal and tighten to 35 ft-lbs (47.5 Nm).

6. Place octagon cover onto J-box plate and fasten it.

NOTE
All field installation and wiring of electrical equipment must be done to meet NEC and local codes.
Pneumatic Static Pressure Kit
- if equipped

1. Locate the Kele® static pressure sensor outside of the building in a secure location free from as many obstructions as possible.
2. Refer to the instruction manual with the static pressure sensor for installation and operation details.
3. Once the static pressure probe is mounted, run vinyl tubing from the probe back to the control panel and coil the excess tubing. Do not kink or trim the tubing.
4. If the control panel is located in the space to be controlled, go to the next section. If the control panel is mounted remotely from the space to be controlled, continue to step 5.
5. Run 1/4 inch virgin poly tubing (by others) from the sensor in the control panel to a secure location in the space to be controlled.

**NOTE**
The Vari-Flow system may not be provided with the static pressure controls. If not, move onto the next section.

Keypad Mounting - if equipped

**NOTE**
The keypad may be factory mounted. If so, continue to the Electrical Connections section.

1. For systems with remote controls or keypad, a 35, 75, or 150 foot RJ25 cable is supplied to connect the keypad to the controls. The cable is plenum rated and does not need to be run through conduit unless required by local codes. If the keypad is to be mounted further away than the cable that is received, additional cable will be needed. Additional cable is available at the lengths mentioned above.

**Keypad Mounting Diagram**

**Keypad Dimensions**

![Keypad Dimensions Diagram]

- Top View
- Front View
- Side View
**Touch Screen Mounting - if equipped**

**NOTE**
The touch screen may be factory mounted. If so, continue to the Electrical Connections section.

1. For systems with remote controls or touch screen, two 35, 75, or 150 foot sets of cables are supplied to connect the touch screen to the controls. The cables are plenum rated and do not need to be run through conduit unless required by local codes. If the keypad is to be mounted further away than the cable that is received, additional cable will be needed. Additional cables are available at the lengths mentioned above.

**Touch Screen Mounting Diagram**

**Touch Screen Dimensions**

**Electrical Connections**

**NOTE**
All wiring of electrical equipment must be done to meet NEC and local codes.

**NOTE**
It is recommended that shielded wire be used for all low voltage connections (24V or less) to prevent signal interference with other high voltage circuits.

**NOTE**
All 115 VAC field wiring (or higher) must be routed through hard or flex conduit. All low voltage field wiring should be plenum rated if not routed through conduit. Field wiring should not come in contact with the surface of the hood. To reduce the likelihood of electromagnetic disturbance, avoid routing high and low voltage cables in the same conduit.

**Power for Vari-Flow Cabinet**

- 115 VAC, power for controls (Terminals H and N)

**Power for Lights**

- 115 VAC, power for hood lights, one per light circuit (Terminals H1, N1 | H2, N2 | H3, N3 | H4, N4)
- 115 VAC, power to lights, one per light circuit (Terminals B1, W1 | B2, W2 | B3, W3 | B4, W4)

**EACH CANOPY LIGHTING CIRCUIT MUST NOT EXCEED 15A TOTAL CURRENT**

- **LIGHT CIRCUIT 1:** 115 VAC, 15 AMPS FROM BREAKER
  - H1
  - BK 14GA 15
  - HOOD LIGHT RELAY 1
  - H2
  - BK 14GA
  - HOOD LIGHT RELAY 1
  - H3
  - BK 14GA
  - HOOD LIGHT RELAY 1
  - H4
  - BK 14GA
  - HOOD LIGHT RELAY 1

- **LIGHT CIRCUIT 2:** 115 VAC, 15 AMPS FROM BREAKER
  - SO
  - BK 14GA 15
  - HOOD LIGHT RELAY 2
  - SO
  - BK 14GA
  - HOOD LIGHT RELAY 2
  - SO
  - BK 14GA
  - HOOD LIGHT RELAY 2
  - SO
  - BK 14GA
  - HOOD LIGHT RELAY 2

- **LIGHT CIRCUIT 3:** 115 VAC, 15 AMPS FROM BREAKER
  - SO
  - BK 14GA 15
  - HOOD LIGHT RELAY 3
  - SO
  - BK 14GA
  - HOOD LIGHT RELAY 3
  - SO
  - BK 14GA
  - HOOD LIGHT RELAY 3
  - SO
  - BK 14GA
  - HOOD LIGHT RELAY 3

- **LIGHT CIRCUIT 4:** 115 VAC, 15 AMPS FROM BREAKER
  - SO
  - BK 14GA 15
  - HOOD LIGHT RELAY 4
  - SO
  - BK 14GA
  - HOOD LIGHT RELAY 4
  - SO
  - BK 14GA
  - HOOD LIGHT RELAY 4
  - SO
  - BK 14GA
  - HOOD LIGHT RELAY 4
Variable Frequency Drives (VFD) - if equipped

**NOTE**

If electrically commutated motors are being used, VFDs will not be needed.

1. Bring power to the input of each VFD from a dedicated power source using conduit to the NEMA-1 enclosure on the bottom of the drive. Each power source shall be of the same voltage as the respective fan and of a high enough amp rating to handle the full load amp draw of the respective fan.

2. To avoid interference between the conductors, separate conduit from the VFD output to the input power of the fan must be used for each fan.

Vari-Green® Fan Wiring - if equipped

- 0-10 VDC Speed Reference from Vari-Flow to Vari-Green motor control wire, red (Terminal E__S+)
- Common from Vari-Flow to Vari-Green motor control wire, white (Terminal E__S-)

Vari-Green® Drive Wiring - if equipped

- 0-10 VDC Speed Reference from Vari-Flow to Vari-Green Drive terminal AI (Terminal E__S+)
- Common from Vari-Flow to Vari-Green Drive terminal SG (Terminal E__S-)

VFD Provided by Others, Control Wiring - if equipped

- Fault contact from VFD provided by others to Vari-Flow (input) (Terminal E__-FA, E__-FB)
- Run command from Vari-Flow to VFD provided by others (Terminal E__-RA, E__-RB)
- Speed reference from Vari-Flow to VFD provided by others (Terminal E__S+, E__S-)
- Line power to VFD
- Load power from VFD to fan

Make-Up Air VFD in Vari-Flow Wiring - if equipped

- Run command from Vari-Flow to make-up air unit (Terminals S_-R, S_-G)
- Line power to VFD input, bottom left of VFD (Terminals L1, L2, L3)
- Load power from VFD output, bottom right of VFD to make-up air disconnect (Terminals T1, T2, T3)

Make-up air unit requires separate 115 VAC or 3-phase control power circuit. See the MUA wiring diagram for details.
**Make-Up Air VFD in Make-Up Air Wiring - if equipped**
- Run command from Vari-Flow to make-up air unit (Terminals S_-R, S_-G)
- 0-10 VDC speed reference from Vari-Flow to make-up air unit (Terminals S_-46, S_-47)

Power for make-up air goes directly to make-up air unit.

**Temperature Sensor(s)**
Wire the two leads of the sensors to be designated terminals in the control panel as shown below. This is determined by the number of temperature sensors on the job (1-10 sensors). The two wires of the sensor are not polarity sensitive. If more than one hood is being controlled, be sure that the appropriate sensor is wired to the appropriate terminals as depicted on the job specific wiring diagram.

**CAUTION**
Each sensor is a low voltage, resistive temperature detector. They are not a high voltage switch/thermostat. Do not connect temperature sensors in series/parallel with high voltage. This can result in damage to the temperature sensor and will require replacement.

**NOTE**
Each temperature sensor is rated up to 250°F (121.1°C) and therefore should not be exposed to direct flame. Exposing sensors to direct flame may render the sensor inoperable and replacements will not be covered under warranty.

**Auto Tempering - if equipped**
- Auto Heat/Cool enable (Terminals S1-R, S1-W1, S1-Y1)

**Fire System Microswitch**
- Fire system microswitch common to Vari-Flow (Terminal C1)
- Fire system microswitch normally closed contact to Vari-Flow (Terminal NC1)
NOTE: The Vari-Flow job specific temperature sensor table is found in the wiring diagram located on the Vari-Flow panel door. This table is an example, do not use for your specific job.

<table>
<thead>
<tr>
<th>Sensors (Field Wiring)</th>
<th>Related Fans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor</td>
<td>Hood Mark</td>
</tr>
<tr>
<td>T1</td>
<td>Hood Mark Name 1</td>
</tr>
<tr>
<td>T2</td>
<td>Hood Mark Name 2</td>
</tr>
<tr>
<td>T3</td>
<td>Hood Mark Name 3</td>
</tr>
<tr>
<td>T4</td>
<td>Hood Mark Name 4</td>
</tr>
<tr>
<td>T5</td>
<td>Hood Mark Name 5</td>
</tr>
<tr>
<td>T6</td>
<td>Hood Mark Name 6</td>
</tr>
<tr>
<td>T7</td>
<td>Hood Mark Name 7</td>
</tr>
<tr>
<td>T8</td>
<td>Hood Mark Name 8</td>
</tr>
<tr>
<td>T9</td>
<td>Hood Mark Name 9</td>
</tr>
<tr>
<td>T10</td>
<td>Hood Mark Name 10</td>
</tr>
</tbody>
</table>

**Keypad - if equipped**
- Connect factory provided cable from back of keypad to CAREL® PCO5+ controller (Port J10)

**Touch Screen - if equipped**
**Power Wiring**
- Connect provided 2-wire cable from Vari-Flow (Terminals TS24, TSC) to touch screen (Terminals G, GO)

**Control Wiring**
- Connect provided 3-wire cable from CAREL® PCO5+ controller (Port J25) to touch screen (Terminals -, +, GND)

**Remote Enable - if equipped**
- Connect remote enable common and normally open from BMS to Vari-Flow (Terminals RE-1A, RE-1B)
  - An open contact that closes will signal controller to turn on all fans.
  - A closed contact that opens will signal controller to turn off all fans.

**Shunt Trip - if equipped**
- 115 VAC from Vari-Flow to shunt trip breaker coil (provided by others) (Terminals STH, STN)
  Voltage across STH, STN when in fire will be 115 VAC
  Voltage across STH, STN when not in fire will be 0 VAC

**NOTE**
Shunt trip contacts will lose voltage during momentary losses in power to the Vari-Flow control cabinet, tripping the connected shunt trip breaker. If installed in areas with frequent losses in power, it is recommended that all shunt trip breakers be wired through a normally open (N.O.) contact of an additional fire system microswitch instead.

**Electric Gas Valve with Gas Reset - if equipped**
- 115 VAC from Vari-Flow to gas solenoid (Terminals SVH, SVN)
  Voltage across SVH, SVN when in fire will be 0 VAC
  Voltage across SVH, SVN when not in fire and turn on will be 115 VAC

**Spare Fire Relay Contacts - if equipped**
- Power to common (Terminal C3)
- Power out, normally open, closed in fire (Terminal NO3)
- Power out, normally closed, open in fire (Terminal NC3)
  - Power to common (Terminal C4)
  - Power out, normally open, closed in fire (Terminal NO4)
  - Power out, normally closed, open in fire (Terminal NC4)

**NOTE:** The Vari-Flow job specific temperature sensor table is found in the wiring diagram located on the Vari-Flow panel door. This table is an example, do not use for your specific job.

**Remote Enable - if equipped**
- Connect remote enable common and normally open from BMS to Vari-Flow (Terminals RE-1A, RE-1B)
  - An open contact that closes will signal controller to turn on all fans.
  - A closed contact that opens will signal controller to turn off all fans.

**NOTE**
Temperature interlock will override the remote enable input.
Grease Trapper Pollution Control Unit (PCU) Filter Status - if equipped
- PCU filter 24VAC hot from terminal FH in enclosure on the access side of the unit to Vari-Flow (Terminal FH)
- PCU filter 1 module status from terminal F1 in enclosure on access side of the unit to Vari-Flow (Terminal PCF1)
- PCU filter 2 module status from terminal F2 in enclosure on access side of the unit to Vari-Flow (Terminal PCF2)
- PCU filter 3 module status from terminal F3 in enclosure on access side of the unit to Vari-Flow (Terminal PCF3)

High Temperature Alarm Contacts - if equipped
- Power to common (Terminal HT-C)
- Power out, normally closed, open in high temperature alarm (Terminal HT-NC)
- Power out, normally open, closed in high temperature alarm (Terminal HT-NO)

Airflow Proving Switch(es) (provided by others) - if equipped
- Common and normally open from supply fan 1 air proving switch to Vari-Flow (Terminals AP-1A, AP-1B)
- Common and normally open from supply fan 2 air proving switch to Vari-Flow (Terminals AP-2A, AP-2B)
- Common and normally open from supply fan 3 air proving switch to Vari-Flow (Terminals AP-3A, AP-3B)
- Common and normally open from supply fan 4 air proving switch to Vari-Flow (Terminals AP-4A, AP-4B)

NOTE: Airflow proving switch(es) are not provided with the Vari-Flow system.

Grease Trapper ESP Linked - if equipped
- E1-RA & E1-RA provides a dry contact closure for the run command on RE-1A & RE-1B of the ESP.
- E1-S+ provides 0-10 VDC speed reference on SPD+ of the ESP
- E1-S- provides common reference on SPD-C of the ESP
Vari-Flow Connection Checklist

Power for Vari-Flow Cabinet

☐ Connect 115 VAC power for controls (Terminals H, N)
☐ Connect 115 VAC power for hood lights, one per light circuit (Terminals H1, N1 | H2, N2 | H3, N3 | H4, N4)
☐ Connect 115 VAC power to lights, one per light circuit (Terminals B1, W1 | B2, W2 | B3, W3 | B4, W4)

Power to Variable Frequency Drives (VFD)*

☐ Line power to VFD input, bottom left of VFD (Terminals L1, L2, L3)
☐ Load power from VFD output, bottom right of VFD (Terminals T1, T2, T3)

Vari-Green® Fan Wiring* - if equipped

☐ 0-10 VDC Speed Reference from Vari-Flow to Vari-Green motor control wire, red (Terminal E__S+)
☐ Common from Vari-Flow to Vari-Green motor control wire, white (Terminal E__S-)

Vari-Green® Drive Wiring

☐ 0-10 VDC Speed Reference from Vari-Flow to Vari-Green Drive AI (Terminal E__-S+)
☐ Common from Vari-Flow to Vari-Green Drive SG (Terminal E__-S-)

VFD Provided by Others, Control Wiring* - if equipped

☐ Fault command from Vari-Flow to VFD provided by others (Terminal E_-FA, E_-FB)
☐ Run command from Vari-Flow to VFD provided by others (Terminal E_-RA, E_-RB)
☐ Speed reference from Vari-Flow to VFD provided by others (Terminal E__S+, E__S-)
☐ Line power to VFD
☐ Load power from VFD to fan

Make-Up Air VFD in Vari-Flow Wiring* - if equipped

☐ Run command from Vari-Flow to make-up air unit (Terminals S_R, S_G)
☐ Line power to VFD input, bottom left of VFD (Terminals L1, L2, L3)
☐ Load power from VFD output, bottom right of VFD to make-up air disconnect (Terminals T1, T2, T3)

Make-Up Air VFD in Make-Up Air Wiring* - if equipped

☐ Run command from Vari-Flow to make-up air unit (Terminals S_R, S_G)
☐ 0-10 VDC speed reference from Vari-Flow to make-up air unit (Terminals S__-46, S__-47)

Auto Tempering - if equipped

☐ Auto Heat/Cool enable (Terminals S1-R, S1-W1, S1-Y1)

Fire System Microswitch

☐ Fire system microswitch common to Vari-Flow (Terminal C1)
☐ Fire system microswitch normally closed contact to Vari-Flow (Terminal NC1)

Resistive Temperature Sensors* - installed in hood

☐ Temperature Sensor T1 (Terminals T1-A, T1-B)
☐ Temperature Sensor T2 (Terminals T2-A, T2-B)
☐ Temperature Sensor T3 (Terminals T3-A, T3-B)
☐ Temperature Sensor T4 (Terminals T4-A, T4-B)
☐ Temperature Sensor T5 (Terminals T5-A, T5-B)
☐ Temperature Sensor T6 (Terminals T6-A, T6-B)
☐ Temperature Sensor T7 (Terminals T7-A, T7-B)
☐ Temperature Sensor T8 (Terminals T8-A, T8-B)
☐ Temperature Sensor T9 (Terminals T9-A, T9-B)
☐ Temperature Sensor T10 (Terminals T10-A, T10-B)

Keypad - if equipped

☐ Connect factory provided RJ25 cable from back of keypad to CAREL® PCO5+ (Port J10).

Touch Screen - if equipped

☐ Connect provided 2-wire cable from Vari-Flow to touch screen (Terminals G, GO)
☐ Connect provided 3-wire cable from CAREL® PCO5+ to touch screen (Terminals -, +, GND)

Remote Enable - if used

☐ Connect remote enable common and normally open from BMS to Vari-Flow (Terminals RE-1A, RE-1B)

Shunt Trip - if used

☐ 115 VAC from Vari-Flow to shunt trip breaker coil (provided by others) (Terminals STH, STN)

Electric Gas Valve with Gas Reset - if equipped

☐ 115 VAC from Vari-Flow to gas solenoid (Terminals SVH, SVN)

Spare Fire Relay Contacts - if equipped

☐ Power to common (Terminal C3)
☐ Power out, normally open, closed in fire (Terminal NO3)
☐ Power out, normally closed, open in fire (Terminal NC3)
☐ Power to common (Terminal C4)
☐ Power out, normally open, closed in fire (Terminal NO4)
☐ Power out, normally closed, open in fire (Terminal NC4)

Grease Trapper Pollution Control Unit (PCU)

Filter Status - if equipped

☐ PCU filter status 24 VAC hot (FH)
☐ PCU filter 1 module status (PCF1)
☐ PCU filter 2 module status (PCF2)
☐ PCU filter 3 module status (PCF3)

High Temperature Alarm Contacts - if equipped

☐ Power to common (Terminals HT-C)
☐ Power out, normally closed, open in high temperature alarm (Terminal HT-NC)
☐ Power out, normally open, closed in high temperature alarm (Terminal HT-NO)

Air Proving Switch(es) (provided by others) - if equipped

☐ Common and normally open from supply fan 1 air proving switch to Vari-Flow (Terminals AP-1A, AP-1B)
☐ Common and normally open from supply fan 2 air proving switch to Vari-Flow (Terminals AP-2A, AP-2B)
☐ Common and normally open from supply fan 3 air proving switch to Vari-Flow (Terminals AP-3A, AP-3B)
☐ Common and normally open from supply fan 4 air proving switch to Vari-Flow (Terminals AP-4A, AP-4B)

Grease Trapper ESP Linked

☐ E1-RA & E1-RA provides a dry contact closure for the run command on RE-1A & RE-1B of the ESP
☐ E1-S+ provides 0-10 VDC speed reference on SPD++ of the ESP
☐ E1-S- provides common reference on SPD-C of the ESP

*Wiring repeated based on the number of fans of that type. This is based on the job specific Vari-Flow wiring diagram.
Sequence of Operation

Normal Operation

1. Press the ALL HOODS button on the keypad or the ALL HOODS ON/OFF button on the touch screen to turn the fans on (manual mode).
   a. Vari-Flow will turn on all exhaust and supply fans.
   b. The Vari-Flow system starts the fans at idle speeds between the low speed setpoint (50% default) and high speed setpoint (100% default) based on actual cooking loads as sensed by the temperature sensors mounted in the hood capture area. This is determined by the low temperature setpoint (90°F default) and high temperature setpoint (115°F default).
   c. The Vari-Flow system adjusts the supply speed based on a weighted average of the exhaust fan speed. If static pressure sensor is used for supply airflow control it will adjust the supply speed based on static pressure.
   d. If the keypad was configured for individual fan/light control, pressing the HOODS button (or INDIVIDUAL HOOD SYSTEM ON/OFF button on the touch screen) will navigate to screens where individual hood system control will be available.

2. Press the ALL HOODS button on the keypad or the ALL HOODS ON/OFF button on the touch screen again to turn off the fans.
   a. Only if all of the fans are on will pressing the ALL HOODS or ALL HOODS ON/OFF button shut off all of the fans.
   b. The Vari-Flow system may go into auto mode if conditions 3.a-3.c are met.

3. Temperature interlock mode (auto mode).
   a. If the temperature in the hood goes above the temperature interlock on setpoint (115°F default) and the fans are currently off, the Vari-Flow will automatically turn on the associated exhaust and/or supply fans.
   b. If the temperature in the hood goes below the temperature interlock off setpoint (90°F default) and the fans are not currently turned on manually the fans will turn off after the temperature interlock off delay time setpoint (10 minute default).
   c. If the fans were turned on manually and the user attempts to turn off the fans with the hood temperature not meeting condition b the fan(s) will remain on until such conditions are met.

4. With the fan(s) on via manual or auto mode, pressing the FAN 100% button on the keypad (100% OVERRIDE ON/OFF button on the touch screen) will force the exhaust fan(s) that are currently on to full speed for the 100% override off delay setpoint. The supply fan will adjust speed the same as 1.c.

5. Pressing the FAN 100% button on the keypad (100% OVERRIDE ON/OFF button on the touch screen) will turn the 100% override off and return the fans to the speed as discussed in 1.b.

6. Pressing the ALL LIGHTS button on the keypad or the ALL LIGHTS ON/OFF on the touch screen will turn on all the hood lights.
   a. If the keypad was configured for individual fan/light control, pressing the LIGHTS button (or INDIVIDUAL LIGHT ON/OFF button on the touch screen) will navigate to screens where individual light circuit control will be available.

7. Pressing the LIGHTS button on the keypad or ALL LIGHTS ON/OFF button on the touch screen again will turn off all of the hood lights.
   a. Only if all the hood lights are currently on will pressing the LIGHTS or ALL LIGHTS ON/OFF button shut off all of the hood light circuits.

8. If equipped, on the keypad, pressing the MORE button will navigate to additional screens. Pressing the BACK button will navigate back to the previous screen.

9. If equipped, pressing the GAS RESET button on the keypad (or GAS RESET ON/OFF button on the touch screen) will open the electric gas valve to allow gas to flow to the appliances. Once gas has been reset, it cannot be manually shut off by this button. It will remain enabled until an alarm condition such as high temperature or fire is detected, or the control panel power is reset.

10. If equipped, pressing the AUTO TEMP button on the keypad (or AUTO TEMPERING ON/OFF button on the touch screen) will enable automatic tempering of the MUA unit. When this is on, the make-up air will heat/cool the air as determined by the inlet air sensors. When this is off, the make-up air heating/cooling will be disabled.

WARNING
Make sure after opening the electric gas valve that all pilot lights (if appliances have standing pilots) are lit. Failing to relight pilots will cause gas to flow into the kitchen.
Sequence of Operation, continued

Fire Operation:
1. With the fire system microswitch wired to terminal C1 and NC1 (normally closed contact) and the fire system in a fire state, the following will occur:
   a. System alarm will appear on keypad or touch screen.
   b. Vari-Flow will force the exhaust fan(s) to full speed. (Factory default, but can be adjusted in the service menu).
   c. Vari-Flow will force the supply fan(s) off. (Factory default, but can be adjusted in the service menu).
   d. Vari-Flow will send 115 VAC signal to shunt trip breaker coil (Breaker provided by others).
   e. Vari-Flow will force the lights off. (If selected with lights out in fire option).
   f. Vari-Flow will force the electric gas valve off. (If selected with gas valve reset option).

Alarm Operation:
Upon any system alarm, the red system fault LED will flash on the keypad (red alarm indicator will flash on the touch screen). Once the alarm is corrected, the LED/indicator will stop flashing. A list of alarms is shown below:
1. Kitchen fire alarm.
2. Temperature sensor fault.
   a. Associated fan(s) will be turned on and forced to full speed until fault is rectified.
3. Exhaust or supply VFD alarm - if equipped.
   a. Exhaust fans will not turn on until supply airflow has been proven. It will remain this way until the fault is rectified.
5. Pressure sensor fault - if equipped.
   a. Supply fan speed will automatically be controlled via weighted average until the fault is rectified.
6. High temperature alarm - if equipped.
   a. Vari-Flow will send 115 VAC signal to shunt trip breaker coil (breaker provided by others).
   b. Vari-Flow will force the electric gas valve off (if selected with gas valve reset option).
7. PCU filter status alarm - if equipped.

System Optimization

Setting the Low Temperature Set Point
(90°F default)
NOTE: If the system is provided with a keypad, press the Prg button (©) for 5 seconds to enter the main menu.
1. Go to the Service menu. Press Enter button.
2. Go to the Setpoints menu. Press Enter button.
3. Insert service password (default 1000).
4. Press down until you find the Exhaust Fan Setpoints.
5. Current temp that is controlling that fan will be displayed at the bottom of the screen. Adjust the Low Temp to be 5 - 10 degrees above this temperature.

Setting the High Temperature Set Point
(115°F default)
1. Turn the fans on via the keypad.
2. Turn on all cooking appliances (on highest setting) and allow them to reach normal cooking temperatures.
3. Go to the Service menu. Press Enter button.
4. Go to the Setpoints menu. Press Enter button.
5. Insert service password (default 1000).
6. Press down until you find the Exhaust Fan Setpoints.
7. Current temp that is controlling that fan will be displayed at the bottom of the screen. Adjust the High Temp to be 5 - 10 degrees below this temperature.

NOTE
When initially triggered, all alarms will be logged into the alarm logger on the controller.
Controller Setup and Tutorial

The user can access the main menu by pressing the ◎ button.

Within the programmable logic controller, factory set points can be modified to configure the system for specific functions if necessary. All parameters are shown in this section.

Some of the menus require the user to enter a password in order to enter the menu. The service password is 1000 and is entered by pressing the ↑↓ and ◄ buttons.

### Keypad Navigation

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>◐</td>
<td>Escape</td>
</tr>
<tr>
<td>↑↓</td>
<td>Up</td>
</tr>
<tr>
<td>!</td>
<td>Alarm</td>
</tr>
</tbody>
</table>
| ◄ | Enter | A. In screens with adjustable parameters, pressing the Enter button moves the cursor from the upper left corner of the screen to the parameter. The arrow buttons can then be used to adjust the parameter.  
B. To move to the next parameter on the same screen, press the Enter button.  
C. To save the change, press the Enter button until the cursor moves back to the upper left corner of the screen. |
| ◎ | Program | Pressing the Program button allows the user to enter the Main Program Menu. |

### Example of Parameter Adjustment

#### Exhaust 1 Setpoints

<table>
<thead>
<tr>
<th>Temp</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low: 90.0°F</td>
<td>50.0%</td>
</tr>
<tr>
<td>High: 115.0°F</td>
<td>100.0%</td>
</tr>
<tr>
<td>Current Temp: 70.0°F</td>
<td></td>
</tr>
</tbody>
</table>

- Once you enter into a menu that has adjustable parameters, the cursor always begins in the upper left corner of the display and will be blinking. Press the ◄ button to move the cursor down for parameter adjustment.

- Once the cursor has reached the desired parameter, press the ↑↓ buttons to adjust the value.

- When satisfied with the adjustment, press the ◄ button to save the parameter. **When finished, make certain the cursor is in the upper left corner. If the cursor is not in the upper left corner, the changes will not be saved.** The cursor must be in the upper left corner to enable screen advancement.
Main Menu Overview

If the Vari-Flow panel is configured with a touch screen, the controller will revert back to a kitchen hood status loop. This loop includes several screens to view the operating conditions of the unit. If configured, scroll through the menu screens by using ↑ ↓ buttons. Screens with a dashed line border are dependent upon the configuration and may not appear for every system.

### KITCHEN HOOD #1 STATUS:

The temperature on this screen displays real-time conditions from the sensors located in the hood. The speed on this screen displays the real-time conditions of the fans exhausting this hood.

“Hood System 1” describes the hood system that this particular hood is part of; hoods that are exhausted from the same exhaust fan will be linked to a hood “system”.

The “Status” indicator will display the following hood statuses:

- **ON**: Hood has been turned on; fans controlling the hood are operational.
- **ON by Temp**: Hood has been turned on by temperature interlock/high temperatures in the hood.
- **ON by Alarm**: Hood has been turned on due to an alarm.
- **OFF**: Hood is off; fans controlling the hood are not running.
- **FIRE**: Kitchen fire has been detected under one of the hoods.

If the airflow proving option is included, the hoods have been turned on, and supply airflow is not detected, “No Supply Airflow” will be displayed on the screen (see example).

#### Example of Alarms

If an alarm occurs, the ![triangle] button will flash red on the controller and the keypad (if connected).

To navigate to the alarm menu, press the ![triangle] button once. Press the ↓ button to scroll through any current alarms. Once the problem causing the alarm has been corrected, the alarm will automatically clear. If the alarm cannot be cleared, the cause of the alarm has not been fixed.

This is an example of a hood temperature sensor failure.

This screen appears if there are no active alarms.

To view all saved alarms, press the ![rectangle] button to enter the DATA LOGGER. For more information, see the Data Logger menu.

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Alarm Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust Fan Alarm</td>
<td>Failure of an exhaust VFD</td>
</tr>
<tr>
<td>Supply Fan Alarm</td>
<td>Failure of a supply VFD</td>
</tr>
<tr>
<td>Hood Sensor Input Failure</td>
<td>Failure of a hood temperature sensor</td>
</tr>
<tr>
<td>High Temperature Alarm</td>
<td>Indicates a high hood temperature</td>
</tr>
<tr>
<td>Pressure Sensor Input Failure</td>
<td>Indicates a pressure that is out of range</td>
</tr>
<tr>
<td>Supply Airflow Alarm</td>
<td>Indicates a loss of airflow in the supply fan</td>
</tr>
<tr>
<td>Kitchen Fire Detected/Alarm</td>
<td>Indicates a kitchen fire</td>
</tr>
<tr>
<td>YASKAWA V1000 ALM</td>
<td>Indicates a specific fault of factory provided VFD</td>
</tr>
<tr>
<td>Exhaust/Supply Fan Offline Alarm</td>
<td>Indicates a loss of communication to the VFD(s)</td>
</tr>
<tr>
<td>Grease Trapper PCU Filter Status Alarm</td>
<td>Indicates filter change required on Grease Trapper PCU</td>
</tr>
</tbody>
</table>
The controller is equipped with several menus to help guide users with altering program parameters. The following menus can be accessed by pressing the button. To enter the desired menu, press the button.

**A. Fan Status**

The **Fan Status** menu allows the user to view real-time fan statuses on the system.

**This screen is an example of the status of Exhaust Fan #1**

<table>
<thead>
<tr>
<th>TIME</th>
<th>DATE</th>
<th>UNIT##</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exh Fan 1: OFF</td>
<td>Speed</td>
<td>XXX°F</td>
</tr>
<tr>
<td>*No Supply Airflow</td>
<td></td>
<td>XXX%</td>
</tr>
<tr>
<td>VFD Off-Line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan in Balancing Mode</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The temperature on this screen displays real-time temperatures from the sensors linked to the exhaust fan. The speed on this screen displays the real-time speed of the exhaust fan.

If equipped with the airflow proving option, the fan has been turned on and supply airflow has not been detected, “No Supply Airflow” will be displayed.

If the exhaust fan is being controlled from a factory-provided VFD, but the VFD is not communicating back to the controller, “VFD: Off-Line” will be displayed.

If the exhaust fan has been turned on in the balancing menu, “Fan in Balancing Mode” will be displayed.

Depending on the number of exhaust fans, navigate to other exhaust fan status pages by using the buttons.

**This screen is an example of the status of Supply Fan #1 - if equipped**

<table>
<thead>
<tr>
<th>TIME</th>
<th>DATE</th>
<th>UNIT##</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sup Fan 1: OFF</td>
<td>Speed</td>
<td>XXX%</td>
</tr>
<tr>
<td>VFD Off-Line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan in Balancing Mode</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The speed on this screen displays the real-time speed of the supply fan.

If the supply fan is being controlled from a factory provided VFD, but the VFD is not communicating back to the controller, “VFD: Off-Line” will be displayed.

If the supply fan has been turned on in the balancing menu, “Fan in Balancing Mode” will be displayed.

Depending on the number of supply fans, navigate to other supply fan status pages by using the buttons.
**B. Clock**

The **Clock** menu allows the user to view and alter the time and date. The user can also adjust the daylight savings time setting.

<table>
<thead>
<tr>
<th>Clock</th>
<th>Date: MM/DD/YY</th>
<th>Hour: 15:30</th>
<th>Day: Monday</th>
</tr>
</thead>
</table>

**The Clock screen allows the user to adjust the time and date.**

The time/date will not be adjustable on the controller if the user interface is the touch screen.

<table>
<thead>
<tr>
<th>Clock</th>
<th>DST: Enable</th>
<th>Transition time: 60min</th>
<th>Start: LAST SUNDAY in MARCH at 2.00</th>
<th>End: LAST SUNDAY in OCTOBER at 3.00</th>
</tr>
</thead>
</table>

**This screen allows the user to adjust daylight savings time setting.**

The Daylight Savings time feature can be adjusted to meet the current daylight savings time requirements.

**C. Input/Output**

The **Input/Output** menu allows the user to quickly view the status of the controller inputs and outputs.

**Analog Input**

- Temperature Sensor 1
  - Input Ch: U1
  - Value: 95.0°F

To manually control I/O values, go to the **Service menu > Service settings > I/O Manual Control.** Similar screens appear for all controller inputs and outputs.

**Your controller may not utilize the input shown. See unit wiring diagram for your specific configuration.**

**Digital Input**

- Remote On/Off
  - Input Ch: ID1
  - Status: Open

**Relay Output**

- Lights 1
  - Output Ch: NO1
  - Status: OFF

**Analog Output**

- Exhaust Fan 1
  - Output Ch: Y1
  - Value: 5.00vdc

**Your controller may not utilize the output shown. See unit wiring diagram for your specific configuration.**
The **Service** menu allows the user to access several sub-menus regarding controller information, controller overrides, operating hours, BMS configuration, I/O manual management and Probe Adjustment. By accessing the **BMS Configuration** sub-menu, the user can adjust BMS protocol settings. (BACnet®, LonWorks®, Modbus)

**D. Service**

- **a. System Information**

  **Information**
  - Accurex, LLC
  - Code: Version: 3.00 05/20/20
  - Bios: 6.40 11/17/15
  - Boot: 5.02 09/30/13

**This screen shows version, boot and bios information. Bios and boot pertain to the controller’s firmware and operating system.**

- **b. VFD Status**

  **Yaskawa VFD Status**
  - Exhaust VFD1
    - Speed: 0.0Hz
    - Ref Frequency: 0.0Hz
    - Volts out: 0.0V
    - Rated Current: 0.0A
    - Amps out: 0.0A
    - Power out: 0.0kW

  **This screen allows the user to view the current status of the Yaskawa VFD. There will be additional VFD screens based on the number of exhaust and supply VFDS provided with the system.**

    - **Speed:** This is the actual speed of the Yaskawa VFD in Hertz.
    - **Ref Frequency:** This is the reference speed signal sent to it from the Vari-Flow controls.
    - **Volts out:** The voltage on the output side of the Yaskawa VFD.
    - **Rated Current:** This is the maximum rated current of the Yaskawa VFD.
    - **Amps out:** This is the current amperage that the Yaskawa VFD is providing to the motor.
    - **Power out:** This is the current power (kW) that the Yaskawa VFD is providing to the motor.

- **c. Setpoints**

  **Temperature Interlock**
  - Enable: On
  - Temp On: 115.0°F
  - Temp Off: 90.0°F
  - Delay Off: 600s

**This screen displays the current set points for the Temperature Interlock feature.**

The user can use the default exhaust fan temperature set points or configure them using the system optimization process. This option satisfies IMC. Fan(s) must automatically activate when cooking operations occur.

- **Temp On Set Point:** The temperature at which the fan(s) automatically turn on based on the temperature of the associated hood. The default is 115°F and is adjustable.
- **Temp Off Set Point:** The temperature at which the fan(s) automatically turn off based on the temperature of the associated hood. It must also satisfy the requirement of the Minimum Off Delay set point. The default is 90°F and is adjustable.
- **Off Delay Set Point:** The amount of time the temperature must remain below the Minimum Off set point before the fan(s) will turn off. The default is 10 minutes and is adjustable.
THIS SCREEN ALLOWS THE USER TO SELECT THE BMS PROTOCOL. ALL BMS PROTOCOLS REQUIRE A COMMUNICATIONS CARD INSTALLED IN THE SERIAL CARD PORT, LOCATED ON THE FACE OF THE CONTROLLER.

If the protocol is BACnet MSTP or BACnet IP/Eth, the user must enter into the operating systems (BIOS) screens to adjust BACnet parameters.

### Exhaust 1 Setpoints

<table>
<thead>
<tr>
<th>Temp</th>
<th>CFM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low: 90.0°F</td>
<td>1500</td>
</tr>
<tr>
<td>High: 115.0°F</td>
<td>3000</td>
</tr>
</tbody>
</table>

Current Temp: 70.1°F

Current CFM: 1500

### High Temperature Alarm

<table>
<thead>
<tr>
<th>Enable</th>
<th>Temp On</th>
<th>Temp Off</th>
<th>Highest Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>210.0°F</td>
<td>205.0°F</td>
<td>70.0°F</td>
</tr>
</tbody>
</table>

### D. Service

d. Fan Balancing

**Fan Balancing**

Exhaust Fan 1

Balance: OFF

Minimum %: 50.0

Maximum %: 100.0

Minimum Hz: 30.0

Maximum Hz: 60.0

**THIS SCREEN DISPLAYS EXHAUST FAN SETUP.**

**Low Temp:** Temperature that the fan will start to increase in speed from the low CFM value (min CFM not adjustable via this menu).

**High Temp:** Temperature that the fan will be at the high CFM value (max CFM not adjustable via this menu).

Depending on the number of exhaust fans, other exhaust fan setup pages will appear. CFM values may differ based on configuration.

**THIS SCREEN DISPLAYS THE HIGH TEMPERATURE ALARM SETTINGS.**

When enabled and the temperature reaches the Temp On set point, the shunt trip output will become active, forcing the electric equipment off. If there is an electric gas valve and it is wired into the VAV system, it will also turn that off. Once the temperature is below the Temp Off set point, the shunt trip output and gas valve will return to normal state.

Remember that the shunt trip breaker will have to be manually reset as well as the electric gas valve.

The **Fan Balancing** sub-menu allows the user to balance exhaust and supply fans easily.

### D. Service
e. Wash Settings

**E. Service**
f. BMS Configuration

**BMS Configuration**

Protocol: BACnet MSTP

To adjust BACNET settings press & hold ALARM & ENTER keys to access BIOS screens.

**THIS SCREEN ALLOWS THE USER TO SELECT THE BMS PROTOCOL. ALL BMS PROTOCOLS REQUIRE A COMMUNICATIONS CARD INSTALLED IN THE SERIAL CARD PORT, LOCATED ON THE FACE OF THE CONTROLLER.**

If the protocol is BACnet MSTP or BACnet IP/Eth, the user must enter into the operating systems (BIOS) screens to adjust BACnet parameters.

**THIS SCREEN ALLOWS THE USER TO BALANCE THE EXHAUST AND SUPPLY FANS.**

There will be additional fans listed based on the number of exhaust and supply fans on this system.

**Balance:** When it is in the OFF position, fans will work in normal operation. When set to MAX the fan will be forced to full speed. When set to MIN the fan will be forced to minimum speed.

**Minimum:** Based on the setting of Balance, the user can adjust the minimum speed percentage/frequency to meet the requirements for the design of the system (frequency only visible and adjustable if VFD in Vari-Flow controlling the fan).

**Maximum:** Based on the setting of Balance, the user can adjust the maximum speed percentage/frequency to meet the requirements for the design of the system (frequency only visible and adjustable if VFD in Vari-Flow controlling the fan).

Make sure to return the mode of operation to OFF when balancing is complete. If the mode of operation is left in either MIN or MAX, the fan will not turn off.

Unless the panel is an Auto Scrubber Control Panel (ASCP), no wash setting pages will be visible. If information on these menus is needed, please reference the ASCP Control Panel Installation, Operation and Maintenance Manual which is available on our website, greenheck.com

The **BMS Configuration** sub-menu allows the user to view and alter BMS protocol settings. If the BMS protocol is BACnet or Modbus, additional screens allow further configuration. See below for details. To access the **BMS Configuration** sub-menu, enter the service password (Default=1000).
**THIS SCREEN ALLOWS THE USER TO ADJUST Modbus PARAMETERS.**

This screen only appears if the selected BMS protocol is set to Modbus.

The address is the Modbus address of the card installed in the SERIAL CARD port located on the face of the controller. (Factory Default = 1).

The Baud Rate should be set to the BMS baud rate. (Factory Default = 19200).

---

**TO ACCESS/ADJUST BACnet MSTP AND IP PARAMETERS, PERFORM THE FOLLOWING STEPS…**

1. Press together for 3 seconds the \( \uparrow \) (alarm) and \( \downarrow \) (enter) to enter the BIOS menu. Press \( \downarrow \) (down) arrow to select OTHER INFORMATION and press \( \downarrow \) (enter) to confirm.

2. Press \( \downarrow \) (down) arrow to select PCOWEB/NET CONFIG and press \( \downarrow \) (enter) to confirm.

3. Select either PCOWEB Settings for BACnet IP or PCONET Settings for BACnet MSTP and press \( \downarrow \) (enter) to confirm.

4. Once reaching the PCO Settings, adjust each BMS parameters and press enter to cycle through them all. Once finished adjusting all the parameters, be sure to have save the parameters by navigating to the screen that shows “PCONET CONFIG ENABLE” and changing “NO” to “YES” next to “Update pCOnet?”. Then follow the prompts on the screen to cycle power on the controller.

Make sure to cycle power when prompted to cycle power to the controller by unplugging the G/GO orange plug on the bottom of the controller, then plugging it back in. Skipping this step will not save parameters that were adjusted.

---

**MODBUS SETUP**

- **BMS Card**
  - **Address**: 1
  - **Baudrate**: 19200

---

**SYSTEM INFORMATION**

- **LOG DATA**
  - **OTHER INFORMATION**
  - **FLASH/USB MEMORY**

---

**ID/PRODUCT CODE**

- **PCOWEB/NET CONFIG**
  - **MEMORIES STATUS**
  - **CHIP IO VERSION**

---

**PCOWEB Settings**

- **PCONET Settings**

---

**BACNET ID**: (instance) 77000

**BACnet Baud**: 38400

**BACKnet MAC**: 127

**Max Masters**: 20

**Max Frames**: 20

**DNS1**: -0.0.0.0

**DNS2**: -0.0.0.0

---

**BACnet CONFIG ENABLE**

**Update pCOnet?** YES
The Service Settings sub-menu allows the user to adjust fan operation, manually enable/disable inputs and outputs, hoods, and lights, calibrate sensors, create or restore user settings, and reset the alarm history log.

In Fan Operation, the user will be able to adjust full speed override settings, kitchen fire settings and exhaust/supply fan operation settings.

### Full Speed Settings
- **Full Speed Override Duration:** 10min
- **Full Speed Status:** OFF

### Kitchen Fire Settings
- **Exhaust fan operation during fire:** Fans On - Full Speed
- **Supply fan operation during fire:** Fans Off

### Exhaust Fan Operation
- **Minimum On:** 1s
- **Minimum Off:** 1s

### Supply Prop Tracking
- Proportional tracking calculation based on: Avg. Exh Fan Spd

### Supply Prop Tracking
- Proportional tracking calculation based on: Avg. Exh Fan Spd
WHEN ONE SUPPLY FAN SPEED IS CONTROLLED VIA STATIC PRESSURE, THESE SETTINGS WILL BE VISIBLE AND ADJUSTABLE.

Supply fan speed can be controlled via a pressure differential between two spaces. Pressure setpoints and different PID loop settings can be adjusted with this option. It is recommended to contact the factory for assistance before adjusting these settings.

D. Service

b. I/O Manual Control

These screens allows the user to set up a fan on/off daily schedule. Each hood system will have its own screen to adjust the scheduling for that hood system. Image to the left is an example of Hood System 1 Scheduling screen.

Hood System On: Changing this to ON will create a trigger to start all fans associated with hood system based on time (adjustable) below that. (Default = OFF, 8:00 AM)

Hood System Off: Changing this to ON will create a trigger to stop all fans associated with hood system based on time (adjustable) below that. (Default = OFF, 10:00 PM)

Days/Week: Filling in the boxes will perform the “Hood System On” and “Hood System Off” for that specific day. To fill the boxes, press ENTER key until flashing on a specific box, then press UP/DOWN to adjust, and ENTER to store/move to the next day.

In I/O Manual Control, the user will be able to manually adjust inputs/outputs.

NOTE: The manual adjustment of these input and/or outputs should only be adjusted in the event of troubleshooting. We suggest these parameters only be changed with the advice of factory personnel.

Manual Control: Allows the user to override the analog input for troubleshooting.

Manual Value: The value to force the input to when in an override state.

Value: The current value of the analog input.

Similar screens appear for all additional controller analog inputs.

Manual Control: Allows the user to override the digital input for troubleshooting.

Manual Position: The value to force the input to when in an override state.

Status: The current state of the digital input.

Similar screens appear for all additional controller digital inputs.

Manual Control: Allows the user to override the digital input for troubleshooting.

Manual Position: The value to force the output to when in an override state.

Status: The current state of the relay output.

Similar screens appear for all additional controller relay outputs.

Manual Control: Allows the user to override the analog output for troubleshooting.

Manual Value: The value to force the input to when in an override state.

Value: The current value of the analog output.

Similar screens appear for all additional controller analog inputs.
In **Hood Manual Control**, the user will be able to manually turn on/off individual hood systems (turn on/off individual fans).

Depending on how many hood systems there are, the user may see less/more hoods that can be controlled.

In **Light Manual Control**, the user will be able to manually turn on/off individual light circuits.

Depending on how many light circuits were configured on the system, the user may see less/more lights that can be controlled.

Unless the panel is an Auto Scrubber Control Panel (ASCP), no manual wash control pages will be visible in the **Wash Manual Control** sub-menu as there are no hoods to wash. If information on these menus is needed, reference the ASCP Control Panel Installation, Operation and Maintenance Manual available on accurex.com

In **Sensor Calibration**, the user will be able to create temperature offsets for hood sensors and/or static pressure supply sensors, *if equipped*.

**Offset**: This adjustable value can be used to calibrate the sensor with an offset value. (Factory Default = 0.0°F)

**Value**: This is the current value of the probe. (offset adjustment is added). *Similar screens are available for the remaining probes and static pressure sensor, if equipped.*

In **User Save/Restore**, the user will be able to save and restore the default parameters stored in memory.

If the user would like to save their settings, move the cursor to the SAVE position and change to ON. This will save all of the current parameters into memory as Service Settings. If the user would like to restore to these values at some point in the future, moving the cursor to the RESTORE position and selecting ON, will restore the controller to the user saved defaults.
In **Alarm History Reset**, the user will be able reset the alarm history log.

![Alarm History Reset](image)

- **This screen allows the user to CLEAR the alarm from memory.**
  - If the user would like to clear the alarm log, move the cursor to the OFF position and change to ON.

The **Manufacturer** menu allows the user to access several sub-menus regarding controller configuration, I/O configuration, factory settings, controller initialization pages, and factory save/restore pages. These changes are to be completed under factory advisement only!

### Configuration

- **Unit Address:** 1
- **Temperature Units:** °F
- **Force Clock Enable:** OFF
- **Clock Mode:** 12h
- **Disable Buzzer:** ON
- **Startup Delay:** 5s

- **Configuration**

  - **Disable Fan Button:** No
  - **Backlight Timer:** 300s

- **Configuration**

  - **Analog Input Filtering**
    - **Enable:** OFF
    - **Input 1:** 19s
    - **Input 2:** 19s
    - **Input 3:** 19s
    - **Input 4:** 19s
    - **Input 5:** 19s

- **Configuration**

  - **Manual Control Reset**
    - **Enable:** OFF
    - **Time:** 0min

**Configuration**

- **Unit Address:** This is a reference to the unit address of the controller. It cannot be adjusted here.
- **Temperature Units:** The temperature units can be adjusted between Celsius and Fahrenheit.
- **Force Clock Enable:** This provides the ability to enable a clock for the controller without clock device on board. This should remain set at OFF.
- **Clock Mode:** 12 hour or 24 hour.
- **Disable Buzzer:** When turned to ON, the on-board buzzer is disabled. (Buzzer will still sound when gas is reset if the system was configured with the gas reset option).
- **Startup Delay:** This is the time delay added at start-up. This should remain set at 5 seconds.

**Configuration**

- **Disable Fan Button:** No
- **Backlight Timer:** 300s

**Configuration**

- **Analog Input Filtering**
  - **Enable:** OFF
  - **Input 1:** 19s
  - **Input 2:** 19s
  - **Input 3:** 19s
  - **Input 4:** 19s
  - **Input 5:** 19s

**Configuration**

- **Manual Control Reset**
  - **Enable:** OFF
  - **Time:** 0min

Changing the Enable parameter to ON will reset all of the manual I/O settings after the time (Factory Default = 0 minutes expires).
This screen displays the VFD Modbus settings

This screen will only be visible if at least one Modbus VFD is controlled by the controller.

This screen displays the static pressure control settings.

This screen will only be visible if one supply fan is configured on the system and the supply fan speed is controlled via static pressure.

This screen allows the user to change the Service (PW1) and Manufacturer Password (PW2).

This default service (PW1) password is 1000.

The I/O Configuration sub-menu allows adjustment of all controller inputs and outputs. These screens are available to provide further information and allow for more adjustments on all inputs and outputs on the controller. However, these changes are to be done under factory advisement only!

These are examples of analog input screens. Similar screens appear for all additional controller analog inputs used.

This is an example of a digital output screen. Similar screens appear for all additional controller digital inputs used.

This is an example of a relay output screen. Similar screens appear for all additional controller relay outputs used.
This is an example of an analog output screen. Similar screens appear for all additional controller analog outputs used.

The Factory Settings sub-menu allows adjustments to the overall system setup. Adjusting any of these settings will affect basic functions of the controller. Upon adjusting any of these settings, the controller power should be cycled. Changes are to be done under factory advisement only!

This is an example of the first factory settings screen. Additional screens will be accessible.

The Initialization sub-menu allows the user to reinitialize the controller. Reinitializing the controller will result in a non-customized controller and is to be done under factory advisement only!

Shown here is the default installation screen. To initialize, move the cursor to NO using the enter button, press the up button to change to YES, and press the enter button.

The Factory Save/Restore sub-menu allows the user to save or restore the factory parameters. This is to be done under factory advisement only!

**This screen allows the user to SAVE and RESTORE the factory default parameters stored in memory.**

The Factory Settings include the Factory default parameters and the unit setup code. If the user would like to restore to these parameters, move the cursor to the Restore position and change to ON.

**This screen allows the user to clear all saved data.**
Keypad Navigation

When ‘BUTTON(S)’ are mentioned in the description below, we are referring to the ‘squares’ on the keypad.

The following information details the Daily Operations of the Vari-Flow System keypad buttons and their functions.

**HOODS/ALL HOODS** - Momentarily pressing the ‘ALL HOODS’ button will turn on all hoods (fans) associated with the system. If all of the hoods (fans) are on, the background behind ‘ALL HOODS’ text will be dark. Pressing the same button again will turn off all hoods. If ‘HOODS’ is displayed instead of ‘ALL HOODS’, individual hood system control is available. Pressing the ‘HOODS’ button accesses another screen where individual hoods (fans) can be turned on and off. Press the button next to each hood system identified to enable/disable that hood/fan. Press the ‘MORE’ button (if applicable) to access additional hood systems. Press the ‘BACK’ button to return to the previous screen.

**ALL LIGHTS/LIGHTS** - Momentarily pressing the ‘ALL LIGHTS’ button will activate all the lights for hoods associated with the system. If all hood lights are on, the background behind the ‘ALL LIGHTS’ text will be dark. Pressing the button again turns off the lights for all hoods. If ‘LIGHTS’ is displayed instead of ‘ALL LIGHTS’, individual light control is available. Pressing ‘LIGHTS’ button will access another screen where individual light circuits can be turned on and off. Press the light button next to each light circuit identified to enable/disable the lights for the hood(s). Press the ‘MORE’ button (if applicable) to access additional hood light circuits. Press the ‘BACK’ button to return to the previous screen.

**MORE, if equipped** - Momentarily pressing the ‘MORE’ button will navigate to an additional screen where the user will be able to enable/disable heating or cooling on the make-up air unit (if equipped with the auto tempering option) and/or reset the gas valve (if equipped with gas reset option).

**BACK, if equipped** - Momentarily pressing ‘BACK’ button will navigate to the previous screen.

**AUTO TEMP, if equipped** - Momentarily pressing the ‘AUTO TEMP’ button will enable the make-up air unit to heat and cool the air based on heating/cooling inlet air sensors. If auto tempering is on, the background behind ‘AUTO TEMP’ will be dark. Pressing the same button again will turn off auto tempering and therefore prevent your make-up air unit from heating/cooling the air.

**GAS RESET, if equipped** - Momentarily pressing the ‘GAS RESET’ button will turn open the electric gas valve and allow gas to flow to the appliance(s). If the gas valve is on, the background behind the ‘GAS RESET’ text will be dark. Once this is turned on, the gas reset will be permanently enabled. Only when a high temperature alarm or a kitchen fire is detected will close the gas valve again.

**NOTE**
Immediately after resetting gas valve, make sure relight all standing pilot lights to prevent gas from flowing into the kitchen. As a reminder, the controller will beep three times upon resetting the value.

**Display functionality and control:**

To change the display contrast, hold the buttons next to the Alarm ! and Program ☺ icons simultaneously while pressing the buttons next to the ↓ and ↑ arrows. The down arrow will make the screen lighter and the up arrow will make the screen darker.

Upon any alarm, the ‘SYSTEM FAULT’ red LED light on the face of the keypad starts flashing. Once all alarms are corrected, this LED will stop flashing and no longer be illuminated.

Through the middle of the screen, system status messages will be displayed as a reference. These system statuses will include:

- Current alarms
- Time remaining on fan 100% override timer (if on)
- Hoods that are on by temperature interlock
- Hoods that are on by the user interface
- Lights that are on by the user interface
- Fans that are in balancing mode

The keypad also includes indicators next to buttons that correspond to help the buttons on the controller. These can be used to navigate through the controller using the keypad. To access the main menu, simply press and hold the button next to the Program ☺ icon for **five seconds** or until the screen changes to the main menu.
Touch Screen Navigation

Momentarily press or tap to access the menu or enable or disable the action of the associated icon. All icons surrounded by blue are momentarily push buttons.

ALL LIGHTS ON/OFF (if equipped) - turns on all hood lights associated with the system. When all hood lights are activated, the light bulbs within the icon illuminate. Tapping the icon again will turn off the lights.

INDIVIDUAL LIGHT ON/OFF - access a secondary screen menu whereby control over individual light circuits is available. Tap the icon next to each light circuit identified to enable/disable. Press the back arrow to return to the home screen.

ALL HOODS ON/OFF - turns on all hoods (fans) associated with the system. If all hoods are operating, the fan propellers in the icon starts spinning. Press again to turn off all hoods.

INDIVIDUAL HOOD SYSTEMS ON/OFF (if equipped) - allows control over multiple fans that are not tied to the same hood. Access to a secondary menu screen allowing the ability to enable/disable individual hood systems. Press the back arrow to return to the home screen.

100% OVERRIDE ON/OFF (if equipped) - forces the fans that are currently operating to full speed. (This icon will only be visible if at least one exhaust fan is running). When turned on, the third bar on the icon blinks green. Fans will return to the speed determined by the hood temperature after the timer has expired (default time is 10 minutes). Pressing this icon when 100% OVERRIDE is on, will also return the fans to the speed determined by the hood temperature.

AUTO TEMPERING ON/OFF (if equipped) - enables the make-up air unit to automatically heat and/or cool the air based on the inlet air temperature. When auto tempering is enabled, the thermometer illuminates. Pressing the icon again disables auto tempering, the make-up air unit’s heat and/or cooling capabilities.

GAS RESET ON/OFF (if equipped) – turns on the gas to the appliance(s); opens the electric gas valve. The gas valve will close (gas will be shut off) if a fire occurs or high temperature is detected in any hood. When the gas is on, the icon will show ‘ON’.

PCU FILTER STATUS (if equipped) – indicates loaded/clogged filter(s) in the Pollution Control Unit (PCU). If filters are satisfactory, filter image will remain gray. The image of the affected filter(s) will flash red. Once clogged, the filter(s) must be replaced.

TEMP INTERLOCK INDICATOR – indicates if at least one hood is operating in temperature mode. If the fan(s) were not turned on via the ALL HOODS ON/OFF or INDIVIDUAL HOOD SYSTEMS ON/OFF and the temperature in the hood is above the temperature interlock setpoint, this icon will animate. The fan(s) will continue to operate until the temperature is below the set point for the amount of time in the temperature interlock settings.

ENERGY SAVINGS INDICATOR – this appears if at least one fan is operating. Displays real-time electrical energy savings due to reducing fan speeds.

NOTE
This percentage does not take into consideration additional savings from lowering the airflow requirements for tempered make-up air and building HVAC air.

HELP – this will display a help menu and navigation tips.

NAVIGATION BAR (arrow at bottom of the screen) – pulls up the hidden NAVIGATION menu allowing access to alarms, home, and settings/configuration/information screens. This is available on every screen.
The alarm icon directs you to the alarms screen. **This icon will illuminate red and blink when an alarm has been triggered.**

The middle icon directs you to the home screen.

The icon on the far right allows navigation to the settings/configuration/information menu screen.

Pressing either of the black arrows to the right and left of these three buttons will hide the navigation menu bar.

**Service Password Screen**

![Service Password Verification Required]

For technical support, please call: 1-800-371-6858. Have your serial number ready.

**Active Alarms Example**

**Settings**

- **Fire**

**General Information**

Any field surrounded by a box with a white fill indicates that it is editable.

If an editable field displays a numerical value and the user taps the field, a number keypad will display. After entering the desired value, press the Enter button.

If the editable field is an alphanumeric value, a standard keyboard will display. After entering the desired value, press the Enter button.

The field may also display a multiple choice ON/OFF, or a checkmark box. For the ON/OFF fields, press the box opposite of the checked box to change the option from either OFF to ON or visa versa. For checkmark boxes, to unlink an item momentarily press on the box to remove the checkmark or conversely, to link an item, press the box to add a checkmark.

**Settings, Configuration & Information**

**Fire**

**Lights Out in Fire**: Changing this setting to ON will turn all hood lights off during a fire.

**Exhaust On in Fire**: Changing this setting to ON will turn all exhaust fans controlled by the system to full speed during a fire.

**Supply On in Fire**: Changing this setting to ON will turn all supply fans controlled by the system to full speed during a fire.

**Electric Gas Valve Present**: Changing this setting to ON will enable the gas reset option; provides a means of manually resetting an electric gas valve.
**Settings - continued**

- **Exhaust Fans**

  **Fan Name:** User can adjust the “nickname” of the fan to something such as “FRYER FAN”.
  
  **Control Temp:** Highest current temperature controlling this fan.
  
  **Current CFM:** Current CFM exhausted from the fan.
  
  **Low Temp Setpoint:** Temperature at or below this setpoint will cause the fan to run at the low speed.
  
  **High Temp Setpoint:** Temperature at or above this setpoint will cause the fan to run at the high speed.
  
  **Min CFM:** Minimum volume of air this fan can exhaust.
  
  **Max CFM:** Maximum (design) volume of air this fan can exhaust.

  **NOTE**
  
  The fans will modulate speed when the temperature is between the low and high temp setpoints.

- **Supply Fans**

  **Fan Name:** User can adjust the “nickname” of the fan to something such as “HOOD1 SUPPLY”.
  
  **Current CFM:** Current CFM supplied from the fan.
  
  **Min CFM:** Minimum volume of air this fan can supply.
  
  **Max CFM:** Maximum (design) volume of air this fan can supply.

- **Lights**

  **Light Circuit Name:** User can adjust the nickname of each light circuit.
  
  **Temperature Interlock & Override**

  **Temperature Interlock Enabled:** User can enable or disable temperature interlock.

  **WARNING**
  
  Temperature interlock (2015 IMC Section 507.1.1) is a requirement in most jurisdictions. DO NOT DISABLE THIS OPTION UNLESS INSTRUCTED BY THE FACTORY OR AUTHORITY HAVING JURISDICTION. DO NOT CHANGE THIS SETTING ONCE THE SYSTEM HAS PASSED INSPECTION.

  **Temperature On Setpoint:** The temperature at which the fan(s), if off, will automatically turn on.

  **Temperature Off Setpoint:** Temperature at which the fan(s) will turn off once the time delay setpoint is reached - assuming the fan(s) have not been turned on manually by the touch screen.

  **Time Delay Off Setpoint:** Amount of time the fan(s) need to be below the temperature off setpoint before the fan(s) will shut off.

  **100% Override Button Timer:** Amount of time the fans are at full speed when the 100% override button is pressed.
**Configuration**

- **Date / Time**

  Adjust Date: Adjust the date. DD/MM/YY format.
  Adjust Time: Adjust the time.

  To store the adjusted date and time in both the touch screen and the main controller, press ‘UPDATE DATE/TIME’.

- **Hoods**

  Associated Temperature Sensors: Link sensors to the hood by checking or unchecking the boxes.
  Associated Exhaust Fans: Link exhaust fans to the hood by checking or unchecking the boxes.
  Associated Supply Fans: Link supply fans to the hood by checking or unchecking the boxes.
  Hood System: Based on the selections on the screen, this provides the hood system that the hood currently is linked to.

**Hood System Scheduling**

Allows the user to set up a scheduled time each hood system should turn on/off during the day. Can adjust the occurrence, time on and time off. In order for the scheduling to be used, the Enable check box must be selected.

**Fan Balancing**

Balancing allows the user to easily balance the exhaust and supply fans.

**Mode of Operation:** Normal Operation

Fans operate based off the fans on/off buttons and temperatures.

**Mode of Operation:** Balance Minimum

Forces the fans on and at the speed shown in the minimum speed box.

**Mode of Operation:** Balance Maximum

Forces the fans on and at the speed shown in the maximum speed box.

Minimum % / HZ: Adjust the minimum speed / frequency as necessary for the design of the system.

Maximum % / HZ: Adjust the maximum fan speed / frequency as necessary for the design of the system.

**NOTE**

Make sure to return the mode of operation to ‘NORMAL OPERATION’ when balancing is complete. If the mode of operation is left in Balance Minimum or Balancing Maximum, the fan(s) will not turn off.

**NOTE**

Min/Max Hz (Frequency) only visible and adjustable if a VFD provided in Vari-Flow is controlling the fan.
Information

• System Information
   Displays important system information including firmware and software versions.

• Alarms
   Alarms will show all current alarms. In the event of an alarm, the alarm page will automatically be displayed. The alarm description, date and time will be displayed for each current fault. If no faults exist, ‘No Active Alarms’ will be displayed. Once a fault is corrected, it will automatically be cleared.

• Temperature Sensors
   All current sensor temperatures are shown on this information screen.

Trending

Trending provides additional information that shows history trending for exhaust fans, supply fans and temperature sensors. Scrolling forward or backward in time can be done using the orange colored arrow buttons.
## Troubleshooting

### Problem: Smoke spilling out of hoods at 100% operation.
- **Cause:** Maximum fan speed has been scaled down from 100%
- **Solution:** Increase exhaust fan maximum speed to 100%. Refer to information provided on page 18 to adjust setpoints.
- **Cause:** Improper hood design
- **Solution:** Check hood overhang, cross drafts or proper make-up air.

### Problem: Smoke spilling out of hood(s) at lowest speeds.
- **Cause:** Fan minimum speed is set too low
- **Solution:** Increase exhaust fan minimum speeds. Refer to information provided on page 18 to adjust setpoints.
- **Cause:** Improper hood design
- **Solution:** Check hood overhang, cross drafts or proper make-up air.

### Problem: Fans do not turn up to maximum speed.
- **Cause:** Dirty temperature sensor
- **Solution:** Clean grease from temperature sensor.
- **Cause:** High temperature set point is set too high
- **Solution:** Decrease the high temperature set point (115°F default). Refer to information provided on page 18 to adjust setpoints.
- **Cause:** Fans are in balancing mode
- **Solution:** Check balancing menus to determine if fans are in balancing mode. Refer to information provided on page 18 to adjust setpoints.
- **Cause:** Fan 100% button is activated
- **Solution:** Check 100% timer setting.

### Problem: Fans do not turn down to minimum speed.
- **Cause:** Dirty temperature sensor
- **Solution:** Clean grease from temperature sensor.
- **Cause:** Low temperature set point is set too low
- **Solution:** Increase the low temperature set point (90°F default).
- **Cause:** Fans are in balancing mode
- **Solution:** Check balancing menus to determine if fans are in balancing mode.

### Problem: Exhaust fan on and supply fan off.
- **Cause:** Broken supply fan belt
- **Solution:** Replace fan belt.
- **Cause:** Fire fault
- **Solution:** Check fire suppression microswitch connection.
- **Cause:** Exhaust fan VFD in local control
- **Solution:** Put exhaust fan VFD back into remote control.
- **Cause:** Supply fan breaker tripped
- **Solution:** Reset breaker.

### Problem: Supply fan on and exhaust fan off.
- **Cause:** Broken exhaust fan belt
- **Solution:** Replace fan belt.
- **Cause:** Supply fan VFD in local control
- **Solution:** Put supply fan VFD back into remote control.
- **Cause:** Exhaust fan breaker tripped
- **Solution:** Reset breaker.

### Problem: Fan wheel rotates in wrong direction.
- **Cause:** VFD output wiring incorrect
- **Solution:** Switch any two leads on the hood side of the VFD to the fan motor **OR** change PAR b1-14 from 00 to 01 on the VFD.

### Problem: 100% override does not increase exhaust speed.
- **Cause:** Exhaust already at 100% due to hood temperature
- **Solution:** Proper operation.

### Problem: Fan button is on, but fans do not turn on.
- **Cause:** Broken fan belt
- **Solution:** Replace fan belt.
- **Cause:** VFD fault
- **Solution:** Check VFD for faults.

### Problem: Fan button is off, but the fans will not turn off.
- **Cause:** Vari-Flow is operating in temperature interlock mode. Temperature interlock indicator on keypad or touch screen will be on.
- **Solution:** The temperature in the hood is still above the temperature interlock off set point. It will automatically turn off once below the setpoint and off delay time has expired.

### Problem: Hood light(s) button on, but actual lights are not on.
- **Cause:** Light bulbs are burned out
- **Solution:** Replace hood light bulbs.
- **Cause:** Bad wiring connection
- **Solution:** Verify lights are wired to the correct terminals. Refer to the lights wiring instructions on page 5.
## Troubleshooting

### Problem: Fans do not turn on automatically

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature interlock is disabled</td>
<td>Enable the temperature interlock option (default is enabled) in the set point menu</td>
</tr>
<tr>
<td>Interlock set point set too high</td>
<td>Decrease the temperature interlock on set point</td>
</tr>
</tbody>
</table>

### Problem: Pressure sensor alarm

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinked hose</td>
<td>Remove kink or replace hose</td>
</tr>
<tr>
<td>Controlled space not holding pressure</td>
<td>Adjust the static pressure set point or change supply mode</td>
</tr>
</tbody>
</table>

### Problem: Kitchen fire alarm

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchen fire is in progress; fire suppression has dumped</td>
<td>Evacuate the facility immediately and contact your local fire department</td>
</tr>
<tr>
<td>Fire system microswitch is in the fire position</td>
<td>Check the fire suppression microswitch connections</td>
</tr>
</tbody>
</table>

### Problem: Temperature sensor input failure

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty wiring to temperature sensor</td>
<td>Check wiring at Vari-Flow control panel and at hood connection</td>
</tr>
<tr>
<td>Incorrect programming</td>
<td>Check the temperature sensor settings (consult factory)</td>
</tr>
<tr>
<td>Dirty/Faulty sensor</td>
<td>Clean or replace sensor</td>
</tr>
</tbody>
</table>

### Problem: Exhaust / supply VFD fault - general

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Look at the VFD for fault identification</td>
<td>Refer to the Yaskawa Quick Start Guide for fault and tips to correct. Once corrected, recycle power to the VFD via the breaker. Wait until all power is drained from the VFD before turning power back on.</td>
</tr>
</tbody>
</table>

### Problem: Exhaust / supply VFD fault. Fault code “CE” or “CALL”

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty communication wiring between VFD and controller</td>
<td>Check all communication wiring between VFD and the Vari-Flow controller. Confirm all wiring corresponds with factory wiring diagram.</td>
</tr>
<tr>
<td>Incorrect programming in VFD</td>
<td>Check VFD communication parameters</td>
</tr>
<tr>
<td>Incorrect programming in Vari-Flow controller</td>
<td>Check Vari-Flow controller factory settings pages (consult factory)</td>
</tr>
</tbody>
</table>

### Problem: Fan is making grinding/winding noise and/or appears to struggle to operate

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrier frequency on VFD needs adjustment</td>
<td>Change parameter C6-02 on the VFD anywhere between values 01 and 06, testing the fan at maximum speed with each adjustment. Set this parameter at whichever value corrects this issue.</td>
</tr>
<tr>
<td>Issue with fan bearings/drive components</td>
<td>Check fan bearings and fan drive components. Replace if necessary.</td>
</tr>
</tbody>
</table>

### Problem: Keypad connected via factory-supplied RJ25 cable to J10 port on main controller, but keypad displays a blank screen

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vari-Flow controller/panel is off</td>
<td>Turn panel on</td>
</tr>
<tr>
<td>Contrast on keypad has been adjusted</td>
<td>Press and hold top left button and top middle hidden button on the keypad overlay. While holding these buttons down, repeatedly press the bottom left button (makes the screen darker) or bottom right button (makes the screen lighter) until suitable to read.</td>
</tr>
<tr>
<td>Faulty keypad</td>
<td>Replace keypad</td>
</tr>
</tbody>
</table>

### Problem: Touch screen displaying “Communication Error” screen

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication to touch screen is faulty</td>
<td>Check communication wiring from bottom of touch screen (-, +, O) and confirm this is connected back to main CAREL® controller on the J25 port (-, +, O)</td>
</tr>
</tbody>
</table>

### Problem: Fault light flashing red on the keypad; alarm button red on touch screen

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault has been detected in Vari-Flow system</td>
<td>Clear the faults. If the faults will not clear, there is a current fault on system. Correct the fault and then proceed to clear the fault.</td>
</tr>
</tbody>
</table>

### Problem: Pollution control unit (PCU) filter status alarm

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCU filter is clogged/full</td>
<td>Replace filter</td>
</tr>
</tbody>
</table>
Variable Frequency Drive (VFD) Information

Yaskawa V1000 (200-230 VAC and 460 VAC) or Yaskawa A1000 (575 VAC) variable frequency drives (VFDs) will be provided if the Vari-Flow is configured to use VFDs to control the fans. These drives will come programmed from the factory, and little to no adjustment will be necessary in most cases. For more in-depth information on wiring and programming these drives, please utilize the Quick Start Guide provided with the package. This quick start guide and other technical manuals can also be found on the Yaskawa website at www.yaskawa.com.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
<th>Factory Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>b1-01</td>
<td>Reference Source Speed Control Method</td>
<td>01</td>
<td>02</td>
</tr>
<tr>
<td>b1-02</td>
<td>Run Source – Start/Stop Control Method</td>
<td>01</td>
<td>02</td>
</tr>
<tr>
<td>b1-07</td>
<td>LOCAL/REMOTE Run Selection</td>
<td>00</td>
<td>01</td>
</tr>
<tr>
<td>b1-17</td>
<td>Run Command at Power Up</td>
<td>00</td>
<td>01</td>
</tr>
<tr>
<td>C1-01</td>
<td>Acceleration Time 1</td>
<td>10.00 seconds</td>
<td>30.00 seconds</td>
</tr>
<tr>
<td>C1-02</td>
<td>Deceleration Time 1</td>
<td>10.00 seconds</td>
<td>30.00 seconds</td>
</tr>
<tr>
<td>E1-01</td>
<td>Input Voltage</td>
<td>Dependent on drive type</td>
<td>Dependent on motor voltage*</td>
</tr>
<tr>
<td>E2-01</td>
<td>Motor Rated Current</td>
<td>Dependent on drive type</td>
<td>Dependent on motor FLA (full load amperage)*</td>
</tr>
<tr>
<td>H5-01</td>
<td>Drive Node Address</td>
<td>1F</td>
<td>Dependent on VFD address*</td>
</tr>
<tr>
<td>H5-02</td>
<td>Communication Speed Selection</td>
<td>03</td>
<td>04</td>
</tr>
<tr>
<td>H5-09</td>
<td>CE Detection Time</td>
<td>2.0 seconds</td>
<td>10.0 seconds</td>
</tr>
<tr>
<td>L2-01</td>
<td>Momentary Power Loss Operation Selection</td>
<td>00</td>
<td>02</td>
</tr>
<tr>
<td>L5-01</td>
<td>Number of Auto Restart Attempts</td>
<td>00</td>
<td>10</td>
</tr>
</tbody>
</table>

*See Vari-Flow wiring diagram for more information.

Resetting the VFD Faults

Upon a VFD fault, first determine the cause of the fault and correct. Typically, if the drive detects a fault, it will remain inoperable until that fault has been corrected and the drive has been reset.

Once a fault has been corrected, the easiest way to clear the displayed fault on the VFD is to shut off power to the drive from the power source (breaker). Wait for the VFD to fully discharge and then restore the power.

Upon correcting a minor fault, recycling power may not be necessary. Simply press \( \text{RESET} \), then press \( \text{LO} \) twice.

Once the fault has been corrected and the drive has been reset, the main controller alarm should automatically be cleared. See page 14 for details.
Model V1000

Changing Parameters
Step 1: V1000 Digital Operator power-up state.

Step 2: Select Parameter Menu
Press \( \text{V} \) two times until the digital operator shows the parameter menu (PAr) then press \( \text{ESC} \).

Step 3: Select Parameter
Press \( \text{ESC} \) to select the digit you would like to change. Next use \( \text{A} \) and \( \text{V} \) to select the parameter group, sub-group or number.

Once the parameter you wish to change is displayed on the screen and the digit furthest to the right is flashing, press \( \text{ESC} \).

Step 4: Change Parameter Value
Press \( \text{ESC} \) to select the digit of the parameter value you would like to change.

Modify the parameter value using \( \text{A} \) and \( \text{V} \) and press \( \text{ESC} \) to save the new value.

Model A1000

Changing Parameters
Step 1: A1000 Digital Operator power-up state.

Step 2: Select Parameter Menu
Press \( \text{V} \) two times until the digital operator shows the programming menu, then press \( \text{ESC} \).

Step 3: Select Parameter
Press \( \text{ESC} \) to select the digit you would like to change. Next use \( \text{A} \) and \( \text{V} \) to select the parameter group, sub-group or number.

One the parameter you wish to change is displayed on the screen and the digit furthest to the right is flashing, press \( \text{ESC} \).

Monitor Motor Frequency and Motor Current
Step 1: V1000 Digital Operator power-up state:

Step 2: Output Frequency
Press \( \text{A} \) until the \text{FOUT} LED turns on. The display now shows the actual drive output frequency in hertz (Hz).

Step 3: Motor Current
Press \( \text{A} \) again will show the motor output current. The ‘A’ behind the value means ‘Amps’.

Step 4: Change Parameter Value
Press \( \text{ESC} \) to select the digit of the parameter value you would like to change.

Modify the parameter value using \( \text{A} \) and \( \text{V} \) and press \( \text{ESC} \) to save the new value.

Monitor Motor Frequency and Motor Current
With the drive running, press \( \text{A} \) until reaching the Monitor Menu. This will display output frequency and amperage of the motor.
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