



Truflo

Maintenance and

Operating Manual

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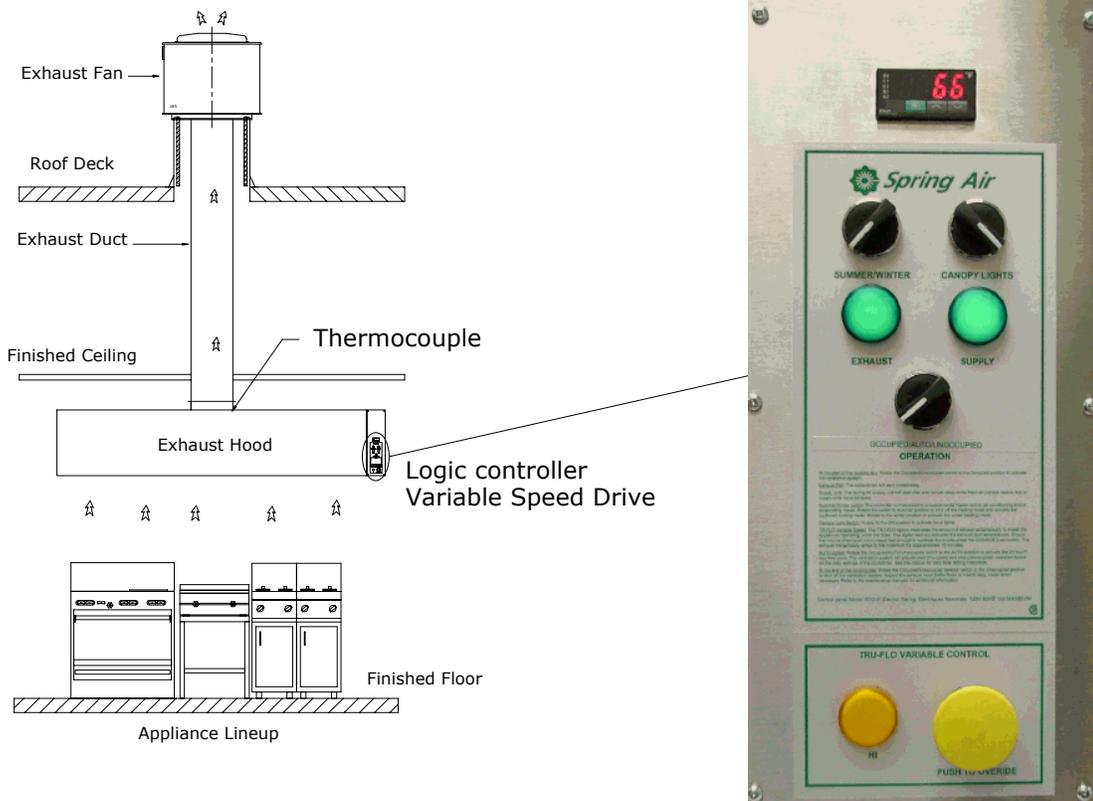
November 2006

Truflo Maintenance and Operating Manual

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Truflo Maintenance and Operating Manual



*The Truflo System
Figure 1*

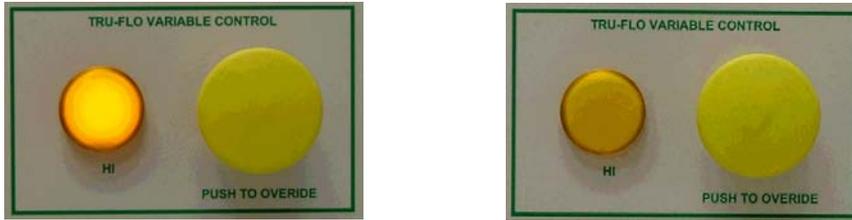
INTRODUCTION

Thank you for purchasing a Spring Air Systems Truflo system. The Truflo commercial kitchen variable exhaust/supply control has been designed to change kitchen ventilation forever. Truflo automatically reduces the exhaust and supply air into the kitchen whenever appliances are not used at full capacity. When the appliances are not used and the heat is turned down and/or off the Truflo automatically senses this reduction and decreases the amount of exhaust and supply to match exactly what's happening under the exhaust hood. The Truflo duct mounted J-Couple monitors the exhaust temperature, which fluctuates based on the amount of appliances operating under the exhaust hood. As the amount of cooking increases the exhaust duct temperature rises and reaches an equilibrium temperature during each hour of the day.

SEMI AUTOMATIC DESIGN

The TRUFLO is a semi automatic design because of the manual OVERRIDE pushbutton. If at any time during the cooking operation smoke fills the hood canopy the chef/operator just simply presses the OVERRIDE pushbutton to drive the exhaust volume to 100% for 15 minutes. The smoke generated from appliances sometimes lags the duct temperature rise because of the following:

- Large quantities of greasy foods are tossed on the grille at one time.
- A large tilting skillet or kettle is opened quickly or
- A draft from a door or window opening.



OVERIDE Control activates for 15 minutes
Figure 2

CODE CHANGES

The National Fire Protection Association, NFPA-96 2001, code changed to provide for a reduction of the exhaust air from a commercial kitchen during low demand periods. The minimum duct velocity in the NFPA-96 2001 has been reduced from 1500 fpm to 500 fpm. In addition the International Building Code, IBM, was change in 2003 to allow for the reduction in exhaust from a commercial kitchen during low demand periods. The building and fire departments have these codes in their possession and will have no reason not to allow a Truflo installation anywhere in North America.

NFPA-96, 2001

8.2 Airflow

8.2.1 Air Velocity

8.2.1.1 The air velocity through any duct shall be not less than 152.1m/min (500 ft/min)

International Mechanical Code. 2003

Section 507 Commercial Kitchen Hoods

507.1 General

Exceptions:

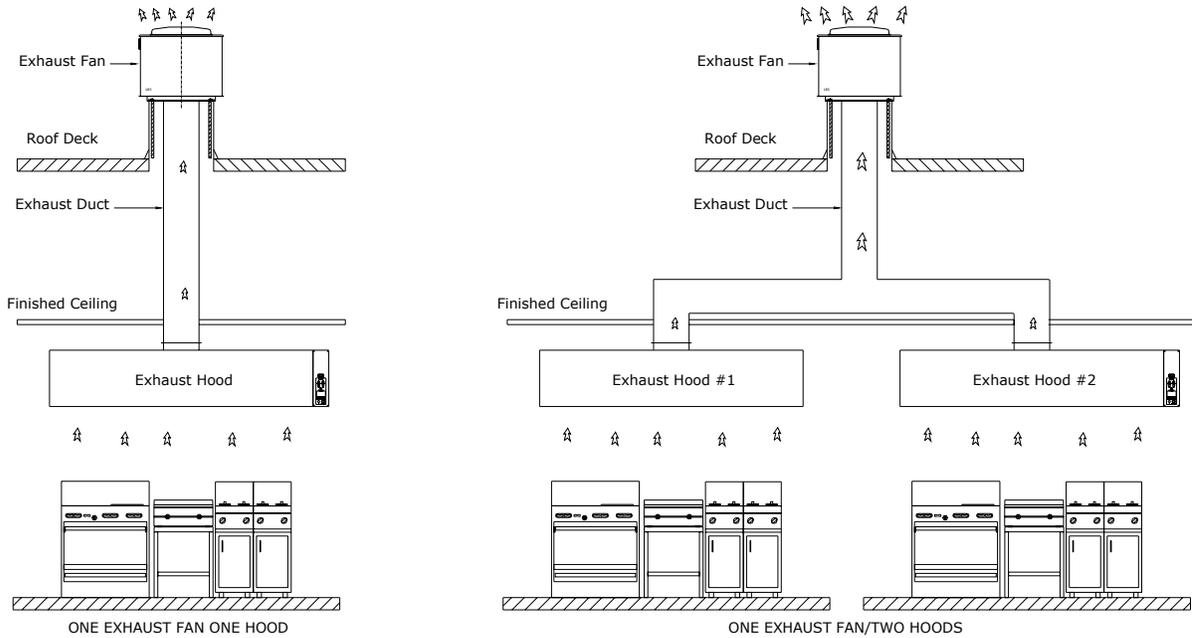
3. Net exhaust volumes for hoods shall be permitted to be reduced during no-load cooking conditions, where engineered or listed multi-speed or variable-speed controls automatically operate the exhaust system to maintain capture and removal of cooking effluents as required by this section.

SIZING THE EXHAUST DUCTWORK

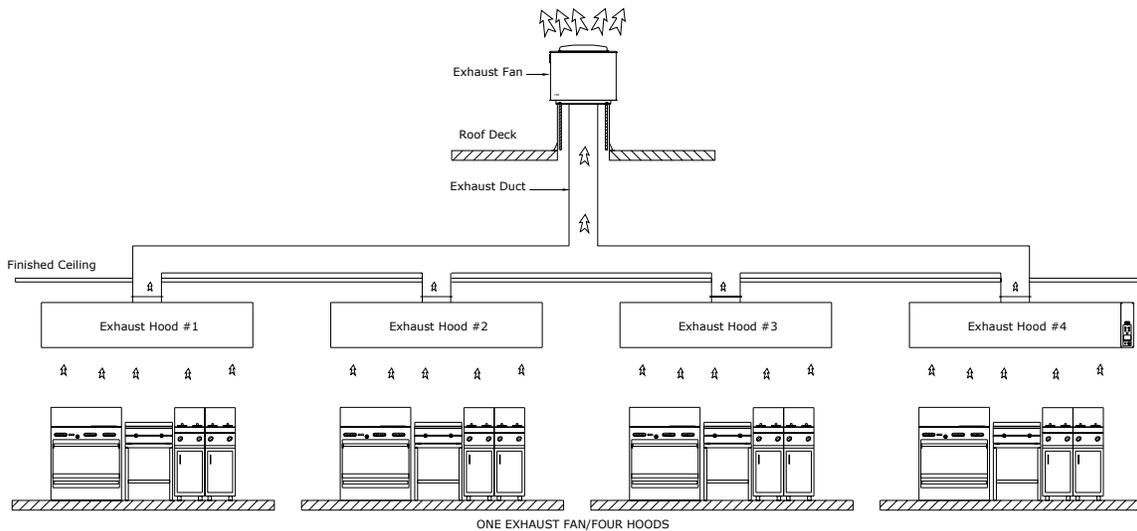
We recommend that the engineer size the exhaust ductwork for 1670 fpm velocity. The NPFA-96 code allows for a reduction in duct velocity to 500 fpm. By sizing the ductwork at 1670 for 100% exhaust and duct velocity will be 500 fpm at 30% exhaust volume.

HOW MANY HOODS CAN BE CONNECTED TO EACH TRUFLO PANEL?

The Truflo is available for connection to one exhaust/supply fan and up to four hoods. The number of exhaust fans is determined by the operational requirements of the kitchen appliances under each hood.



*One and Two hoods with one exhaust/supply fan
Figure 3*



*Four Exhaust hoods with one exhaust/supply fan
Figure 4*

TRUFLO RPD-P PANEL MODEL NUMBER

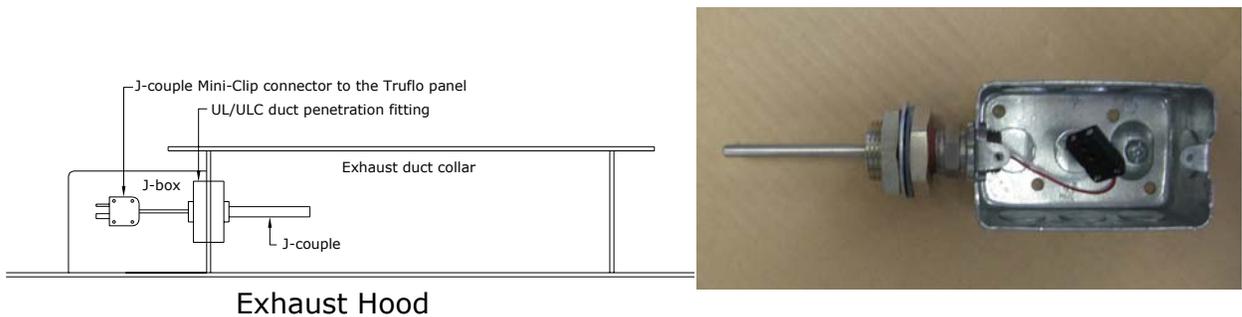
RPD-P	1	1	M	W	SW	LS	TF	1	SC
One exhaust fan connected to panel									
One supply fan connected to panel (up to one (1) fan)									
A- Automatic Panel with 24 hour clock B- Panel controlled by building management system.									
W- Wall mounted panel H – Hood mounted panel									
SW- Summer/winter switch option									
LS- Hood light switch									
TF- Truflo Variable Speed									
1-Number of exhaust duct collars (up to 4 collars)									
SC–Supply control signal (SV – supply variable speed drive)									

THE TRUFLO SYSTEM COMPONENTS

The Truflo consists of four primary components:

- D. J-couple,
- D. Micro-controller,
- D. Logic Controller.
- D. Variable Speed Drives

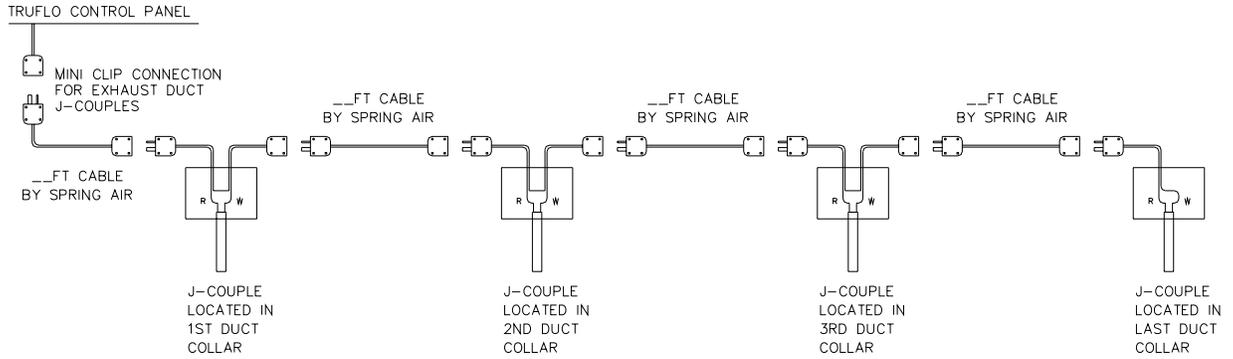
1. J-COUPLE



J-couple located in exhaust duct collar

Figure 5

The J-couple is mounted in the center of each exhaust duct collar of each hood. The J-couple threads into a UL/ULC listed hood penetration fitting. The J-couple wiring is terminated in a factory supplied J-Box to a Mini-clip connector. The connectors are plugged into the factory supplied male min-clip connectors from duct collar to duct collar and then back to the TRUFLO panel.

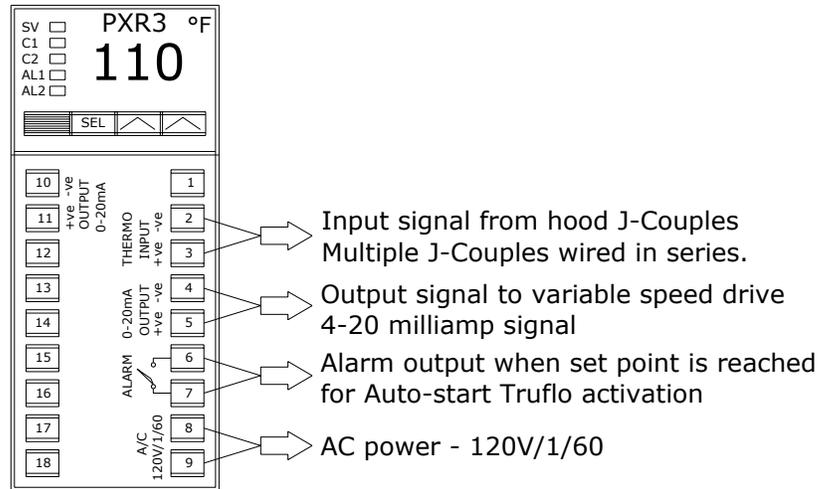


*Remote J-Couple min-clip wiring for four hoods
Figure 6*

2. MICRO-CONTROLLER

The signal from the J-couple is fed to the temperature transducer. A 4-20 milliamp signal is then sent to the exhaust fan variable speed drive in the CAT5 plenum cable.

The Micro-Controller is positioned on the face of the Truflo stainless steel control panel. The Truflo, RPD-P-TF, panel is normally located on the end of the hood. The Micro-controller constantly displays a digital readout of the exhaust duct temperature. A green flickering LED indicates a rising or falling duct temperature and steady light indicates the system has reaches equilibrium temperature.



*Micro-controller Functional Wiring
Figure 7*

The Micro-Controller provides a 4-20 milliamp signal to the exhaust fan variable speed drive. The (SV) supply variable speed drive 4-20-milliamp signal is provided from the exhaust fan variable speed drive auxiliary output. The (SC) 10-20-milliamp-supply signal, with modulating bypass damper motor, is also provide by the exhaust variable speed drive auxiliary output. The Micro-controller also provides a temperature alarm point for Auto-start override activation.



*Micro-controller readout on panel face
Figure 8*

3. LOGIC CONTROLLER

The logic controller is a microprocessor located inside the Truflo control panel. The sequence of operation, overrides, alarms and panel annunciation is provided through the logic controller.

The Logic Controller has two adjustable features:

- 24 hour 7day time clock on/off operation.
- Length of the override time

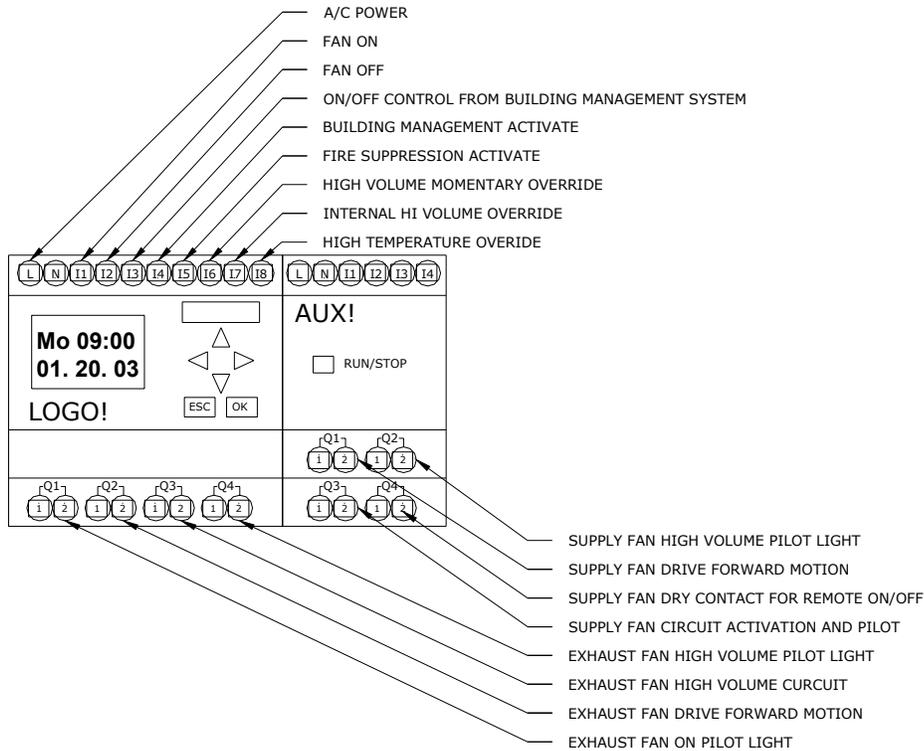
The Logic Controller also has three text annunciations.

- High Temp Override
- Surface Fire Suppression Activated
- High Volume Override.

All of these features will be described in more detail further in manual.



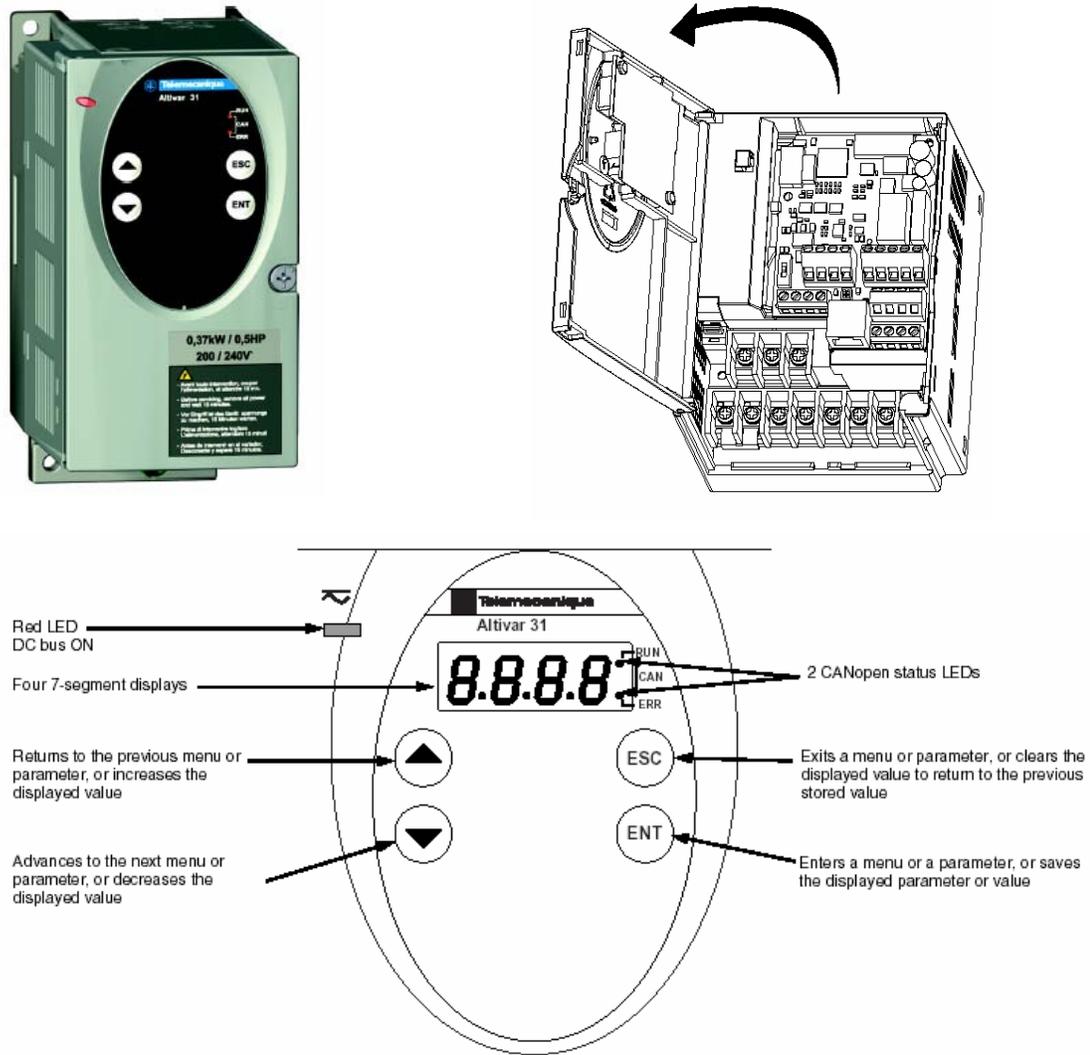
*Logic Controller Front Face
Figure 9*



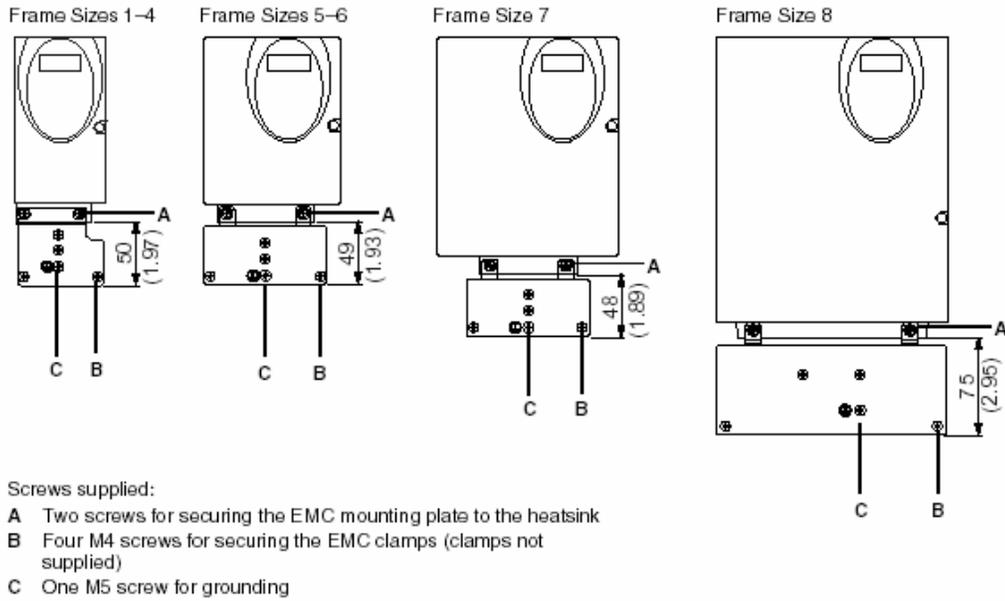
*Logic Controller I/O functions
Figure 10*

4. VARIABLE SPEED DRIVES

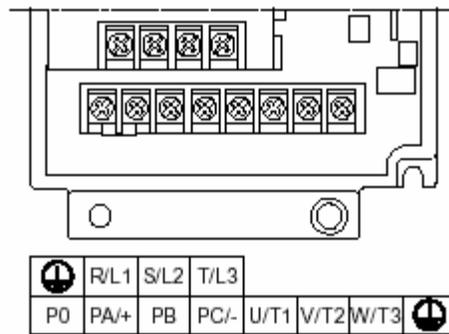
The variable speed drives for the exhaust and/or supply fan are located in an stainless steel enclosure attached to the Truflo panel. A control signal is sent to the drive from the Logic controller and Micro-controller. As soon as the Truflo panel is activated the exhaust and/or supply drive starts at 30% capacity. The exhaust and/or supply drive then ramp up depending on the signal from the J-couple. A signal is sent to the drive from the Logic controller and Micro-controller. The drive changes the frequency to the exhaust motor. Low speed is 18Hz and high speed is 60Hz.



*Variable speed drive and front face
Figure 11*



*Variable Speed Drive frame sizes and EMC mounting plate
Figure 12*



*Variable speed drive terminal locations
Figure 13*

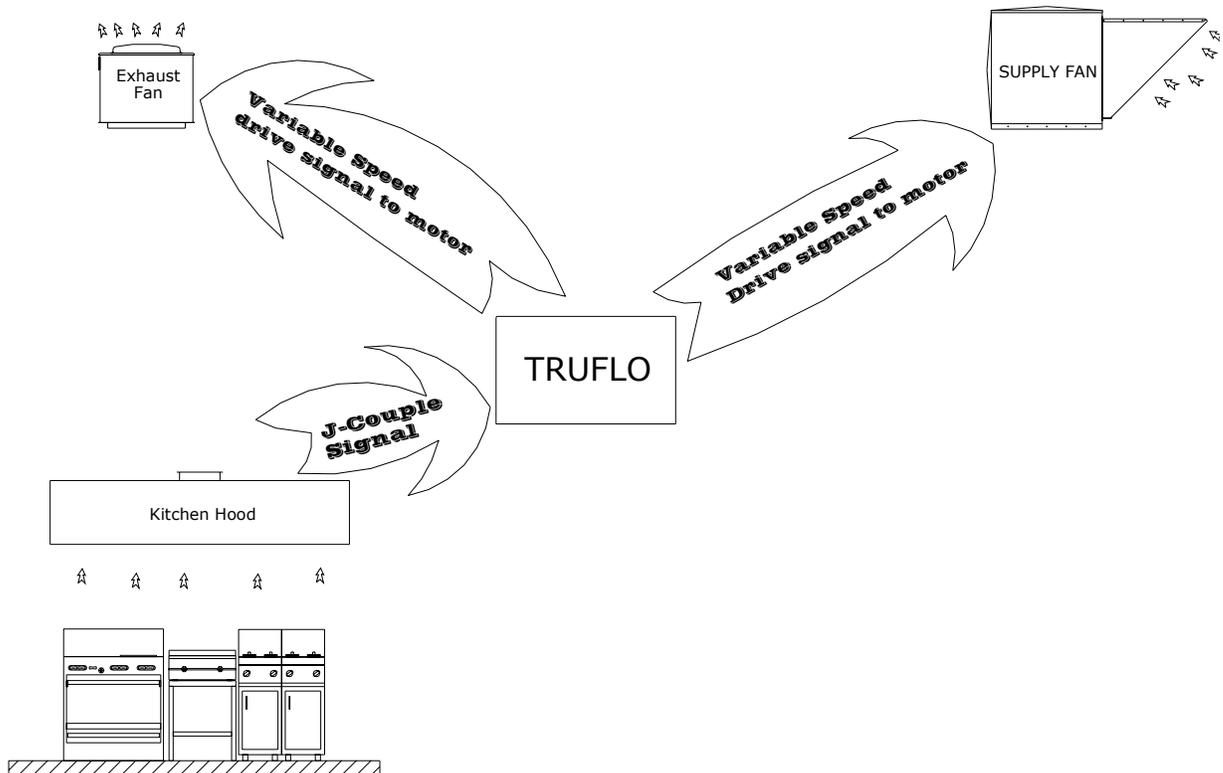
The figure 13 indicates where the three-phase power supply from breaker panel connects to terminals R/L1, S/L2 and T/L3 on the drive. The three-phase power from the variable speed drive to the motor connects to terminals U/T1, V/T2, and W/T3.

SV SUPPLY CONTROL

TRUFLO Operation with SV Control

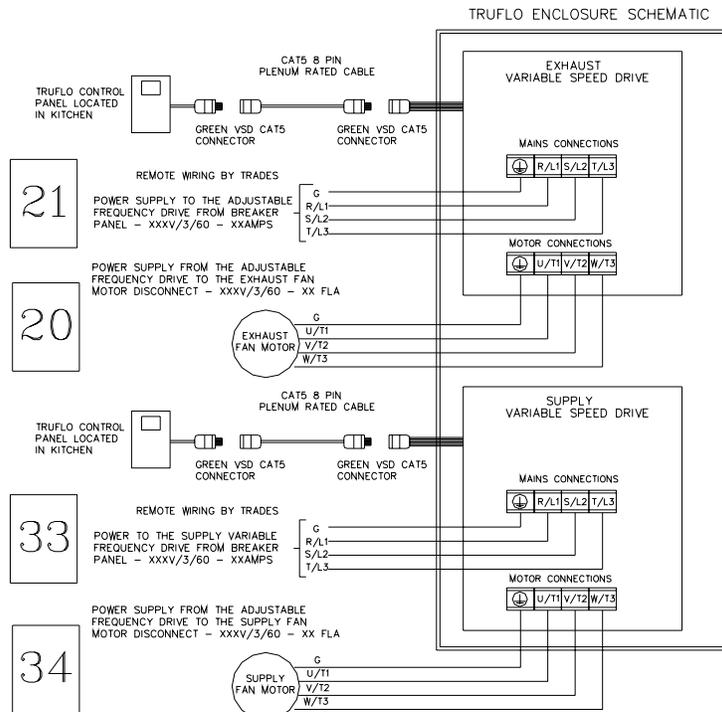
Used with Spring Air Systems SAA, SFA, SFM, and SFI, SFB, SFD units and other supply units where the motor speed will be varied to control supply volume.

The Micro-controller receives signals from the duct mounted J-couple sensor and transmits a regenerated signal to the exhaust motor variable speed drive. The exhaust motor variable speed drive slows or speeds up the exhaust fan to maintain the required exhaust volume depending on the amount of cooking. At the same time the exhaust fan variable speed drive sends a signal to the Spring Air (or other supply fan motors) SFA supply motor variable speed drive. The supply variable speed drive changes the frequency of the supply fan motor to modulate the supply air into the kitchen space proportionally to the exhaust air volume.

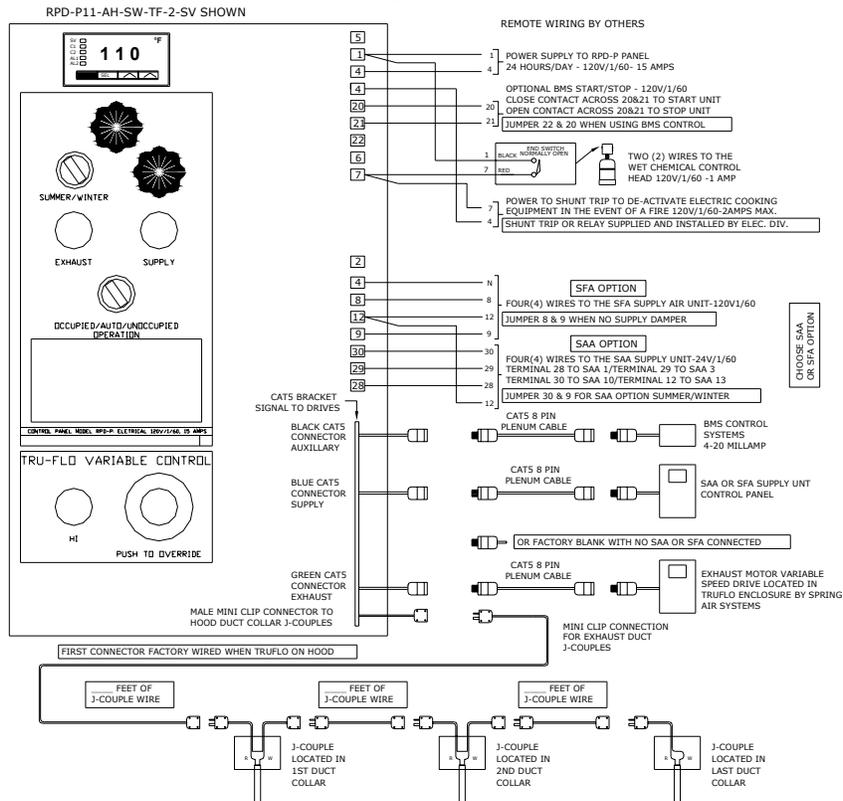


*SV- Supply Volume Control with Variable Speed Supply Drive
Figure 14*

The lowest possible exhaust volume is 30% of the maximum to meet the existing code and ensure that the products of combustion are always adequately exhausted. At 30% exhaust the drive is operating at 18HZ.



TruFlo Enclosure panel wiring to the variable speed drives for SV Supply
Figure 15

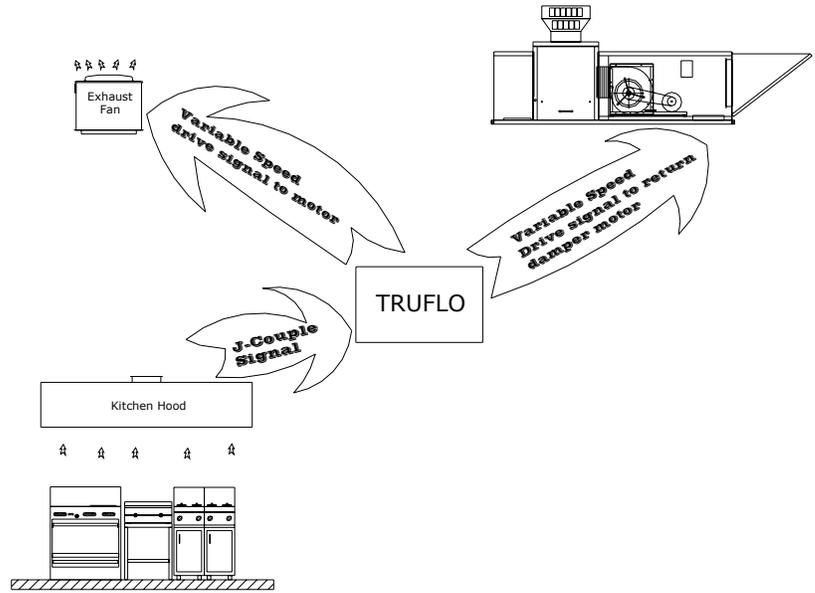


TruFlo RPD-P panel wiring for SV supply variable speed drive
Figure 16

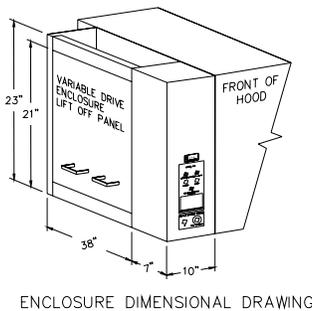
SC SUPPLY CONTROL

TRUFLO Operation with SC Control

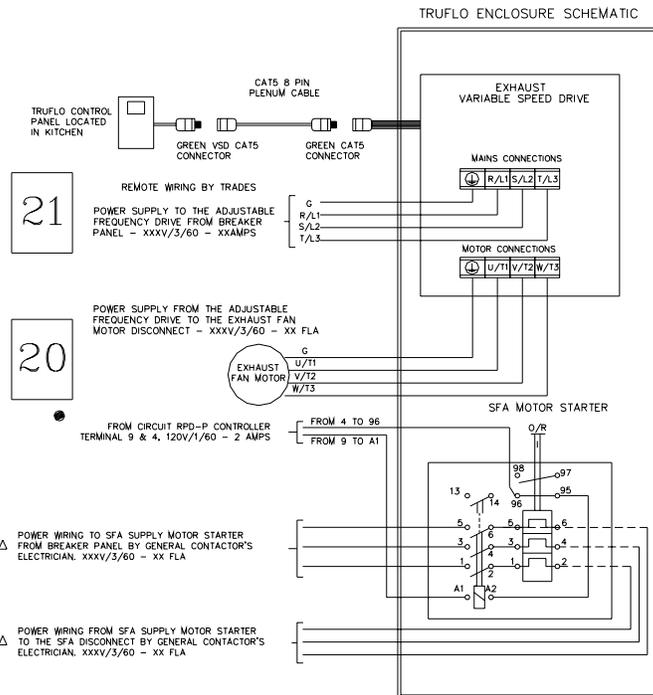
The Micro-controller receives signals from the duct mounted J-couple sensor and transmits a regenerated signal to the exhaust motor variable speed drive. The exhaust motor variable speed drive slows or speeds up the exhaust fan to maintain the required exhaust volume depending on the amount of cooking. At the same time the exhaust fan variable speed drive sends a signal to the Spring Air SFA supply unit modulating bypass air damper. The bypass damper modulates to provide blend return air with the fresh air to reduce the amount of supply air discharged in the kitchen space. The lowest possible exhaust volume is 30% of the maximum to meet the existing code and ensure that the products of combustion are always adequately exhausted.



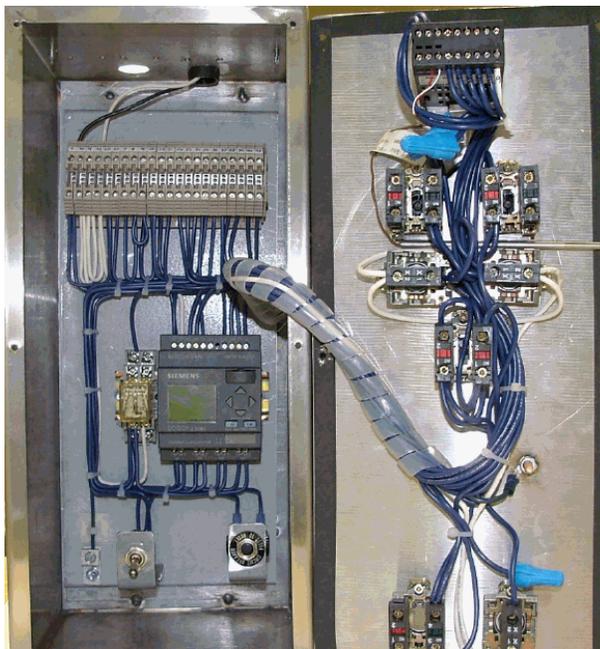
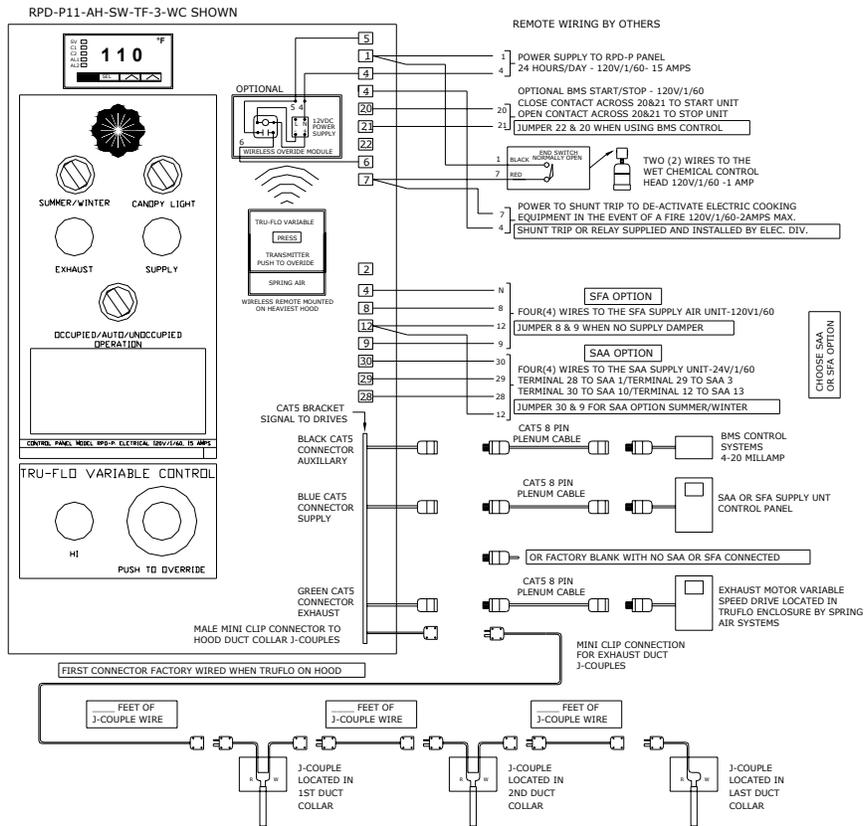
SV- Supply Volume Control with Variable Speed Supply Drive
Figure 17



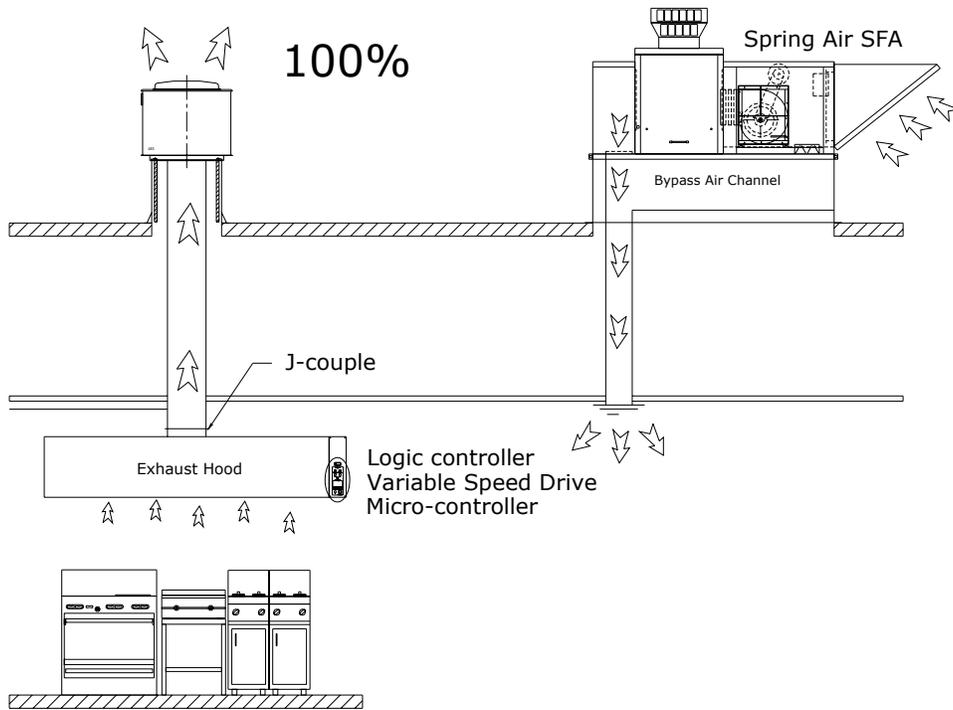
ENCLOSURE DIMENSIONAL DRAWING



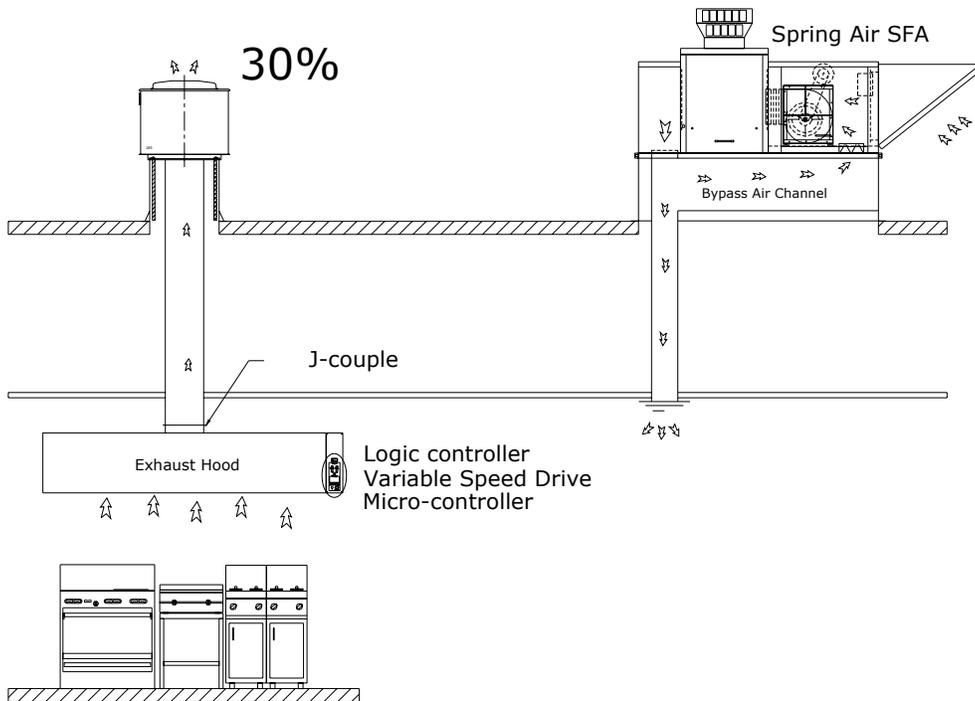
Truflo Enclosure panel wiring to the variable speed drive for SC Supply
Figure 18



Tru-flo control wiring schematic and photo with SC supply control
Figure 19



*Schematic showing Truflo SC System operating at 100%.
No bypass air required on Spring Air SFA-IGO makeup unit
Figure 20*



*Schematic showing Truflo SC System operating at 30%.
Bypass air required from Spring Air SFA-IGO makeup unit
Figure 21*

ON/OFF CONTROL OPTIONS

1. Manual: Switch the control occupied and unoccupied manually from the front panel.
2. Auto: Turn selector switch to Auto position. Panel unoccupied/occupied operation is controlled by microprocessor time clock. See Appendix N for instructions to set clock.
3. BMS: Jumper two terminals in panel and the on/off operation are controlled by n/o dry contact from building management system.



*Occupied/Auto/Unoccupied Selector Switch
Figure 22*

A. Sequence of Operation (Spring Air System - SFA-IGO or SAA)

- a) At the start of the cooking day:
The TRUFLO panel has three modes of operation. “Manual”, “Auto” and “BMS”.
- b) Manual
To manually start the TRUFLO, rotate the Occupied/Unoccupied switch to the Occupied position.
- c) Auto Option
Rotate the Occupied/AUTO/Unoccupied switch to the AUTO position to activate the 24-hour/7 day command center. The ventilation system will provide start (Occupied) and stop (Unoccupied) operation based on daily settings of the clock/timer.
- d) BMS Option
To activate the BMS option, place a jumper between terminal 20 and 22. With the switch in the Auto position the “Building Management System” will control the TRUFLO on/off function. The BMS must close a contact across terminals 20 and 21 will start the system. (The same effect as rotating the Occupied/Unoccupied switch to the Occupied position). The BMS opens the dry contact between terminals 20 and 21 the system will stop (The same as rotating the Occupied/Unoccupied switch to the Unoccupied position).
- e) Exhaust Fan:
With the selector switch in the Occupied position the exhaust fan will start immediately. The logic controller sends a signal to the exhaust variable speed drive to forward start at low speed.
- f) Spring Air Supply Unit:



*Operational TRUFLO panel
Figure 23*

SC Supply Control Type: Spring Air SFA-IGO supply units with indirect gas heating or DX cooling.

The Spring Air SFA supply unit will start after a one-minute time delay while the fresh air damper opens. Once the damper is open an end switch signals the logic controller through terminals 9 and activates the supply motor starter through the same terminal. When the supply unit does not have a motorized damper a jumper must be placed across terminals 8 & 9. Then supply fan will start immediately.

SV Supply Control Type: Spring Air SAA direct gas supply units or a SFA, SFB or SFM with no gas heating or with evaporative cooling.

The logic controller sends a signal to the supply variable speed drive to forward start at low speed. The damper opens at the same time. The variable speed drive is in the TRUFLO control for the SFA, SFB and SFM. The variable speed drive is in the control panel of the SAA.

- g) Summer/Winter Switch:
The controller is interlocked to a supplemental heater and/or air conditioning and/or evaporative cooler. Rotate the switch to summer position to shut off the heating mode and activate the cooling mode. Rotate to the winter position to activate the winter heating mode.
- h) Canopy Light Switch:
Rotate to the ON position to activate hood lights
- i) TRUFLO Variable Speed:
The TRUFLO Micro-controller operates as soon as the RPD-P-TR panel is powered with a 120V/1/60 – 15 amps service. As long as there is power to the panel the red LED displays the exhaust duct temperature regardless of the main selector switch setting. The TRUFLO modulates the amount of exhaust automatically to match the appliances operating under the hood. The digital readout continuously indicates an exhaust duct temperature. When the exhaust and/or supply fan must be increased, the Micro-controller sends a signal to the variable speed drive to increase the motor frequency. The motor frequency is adjustable from 18 to 60 Hz. The motor runs at 18 Hz at low speed for 30% exhaust and supply volume and 60 Hz at high speed for 100% exhaust and supply volume. Change the motor frequency has no effect on motor efficiency or motor life. The exhaust duct J-couples are wired in series from the RPD-P-TR panel.
- j) Override:
Should the volume of exhaust not increase fast enough, via the Micro-controller signal to ventilate the smoke, press the OVERRIDE push button. The exhaust immediately ramps to maximum for approximately 15 minutes. This time is adjustable on the logic controller. Press the button again and hold for 4 seconds and the exhaust returns to normal operation. See the maintenance manual for adjustment.
- k) At the End of the Cooking Day
Rotate the Occupied/Unoccupied selector switch to the unoccupied position to shut off the ventilation system. Inspect the exhaust hood baffle filters or inserts daily. Clean when necessary. Refer to the maintenance manuals for additional information.
- l) Auto-start override activation:
The RPD-P-TF panel and its' components are continuously power from the circuit breaker. The Micro-controller is constantly monitoring the exhaust duct temperature. In the event that the system has not been turned by on by the operator and someone has turned on appliances and started to cook the TRUFLO will automatically activate the exhaust and/or supply fans when the exhaust duct collar temperature reaches 90F. The TRUFLO will activate the exhaust and/or supply at low speed and increase depending on the cooking appliance load.



*Auto-start override activation on panel
Figure 24*

B. Sequence of Operation (With other supply units)

- a) At the start of the cooking day:
The TRUFLO panel has three modes of operation. “Manual”, “Auto” and “BMS”.
- b) Manual
To manually start the TRUFLO, rotate the Occupied/Unoccupied switch to the Occupied position.
- c) Auto Option
Rotate the Occupied/AUTO/Unoccupied switch to the AUTO position to activate the 24-hour/7 day command center. The ventilation system will provide start (Occupied) and stop (Unoccupied) operation based on daily settings of the clock/timer.
- d) BMS Option
To activate the BMS option, connect a jumper between terminal 20 and 22. With the switch in the Auto position the “Building Management System” will control the TRUFLO on/off function. The BMS must close a contact across terminals 20 and 21 will start the system. (The same effect as rotating the Occupied/Unoccupied switch to the Occupied position). The BMS opens the dry contact between terminals 20 and 21 the system will stop (The same as rotating the Occupied/Unoccupied switch to the Unoccupied position).
- e) Exhaust Fan:
With the selector switch in the Occupied position the exhaust fan will start immediately. The logic controller sends a signal to the exhaust variable speed drive to forward start at low speed.
- f) Supply Fan:
Supply fan on/off. Terminals 28 & 29 are dry contact that closes to start supply fan.
Connect the blue CAT5 connector to the supply variable speed drive located in the TRUFLO stainless steel enclosure **OR**
Connect the black auxiliary CAT5 connector to building management controller to modulate the supply fresh air with 4-20 milliamp signal.
- g) Summer/Winter Switch:
Place a jumper between terminals 9 & 30. Terminals 12 & 30 are a dry contract that closes when panel is in the winter mode and opens when the panel is in the summer mode.
- h) Canopy Light Switch:
Rotate to the ON position to activate hood lights
- i) TRUFLO Variable Speed:
The TRUFLO Micro-controller operates as soon as the RPD-P-TR panel is powered with a 120V/1/60 – 15 amps service. As long as there is power to the panel the red LED displays the exhaust duct temperature regardless of the main selector switch setting. The TRUFLO modulates the amount of exhaust automatically to match the appliances operating under the hood. The digital readout continuously indicates the exhaust duct temperature. When the exhaust and/or supply fan must be increased, the Micro-controller sends a signal to the variable speed drive to increase the motor frequency. The motor frequency is adjustable from 18 to 60 Hz. The motor runs at 18 Hz at low speed for 30% exhaust and supply volume and 60 Hz at high speed for 100% exhaust and supply volume. Change the motor frequency has no effect on motor efficiency or motor life. The exhaust duct J-couples are wired in series from the RPD-P-TR panel.
- j) Override:
Should the volume of exhaust not increase fast enough, via the Micro-controller signal to ventilate the smoke, press the OVERRIDE push button. The exhaust immediately ramps to maximum for approximately 15 minutes. This time is adjustable on the logic controller. Press the button again and hold for 4 seconds and the exhaust returns to normal operation. See the maintenance manual for adjustment.



*Operational Truflo panel
Figure 25*

- k) At the End of the Cooking Day
Rotate the Occupied/Unoccupied selector switch to the unoccupied position to shut off the ventilation system. Inspect the exhaust hood baffle filters or inserts daily. Clean when necessary. Refer to the maintenance manuals for additional information.
- l) Auto-start override activation:
The RPD-P-TF panel and its' components are continuously power from the circuit breaker. The Micro-controller is constantly monitoring the exhaust duct temperature. In the event that the system has not been turned by on by the operator and someone has turned on appliances and started to cook the TRUFLO will automatically activate the exhaust and/or supply fans when the exhaust duct collar temperature reaches 90F. The TRUFLO will activate the exhaust and/or supply at low speed and increase depending on the cooking appliance load.

C. Optional Low Override

1. The TRUFLO panel is supplied with two mushroom pushbuttons, one labeled high and one labeled LOW. Pressing the HI pushbutton activates the high volume per the description on the standard SC and SC panels above.
2. Pressing the LOW pushbutton reduces the exhaust volume to 30% for 10 minutes. This is ideal for cooking applications where the teacher wants to address the class. The lower volume will reduce the exhaust and supply noise in the teaching kitchen.
3. The Low Override is also available with a wireless remote when the TRUFLO can not be located on the teachers exhaust hood.

D. Optional Wireless Remote

1. The standard TRUFLO systems can be supplied with a wireless remote to provide a remote HI push button from another location in the kitchen then the TRUFLO panel.
2. Panel in the Occupied position the wireless remote operates as follows:
 - a) Press the wireless remote once and the exhaust immediately ramps to 100% for approximately 15 minutes.
 - b) Press the wireless remote again and hold for two (2) seconds the exhaust returns to normal operation.
3. Panel in the Unoccupied position the remote operates as follows:
 - c) Press the wireless remote once and the exhaust immediately ramps to 100% for approximately 15 minutes.
 - d) Press the wireless remote again and hold for two (2) seconds and the exhaust and supply return to normal operation.
 - e) Press the wireless remote again and hold for four (4) seconds and the exhaust and supply shut off.



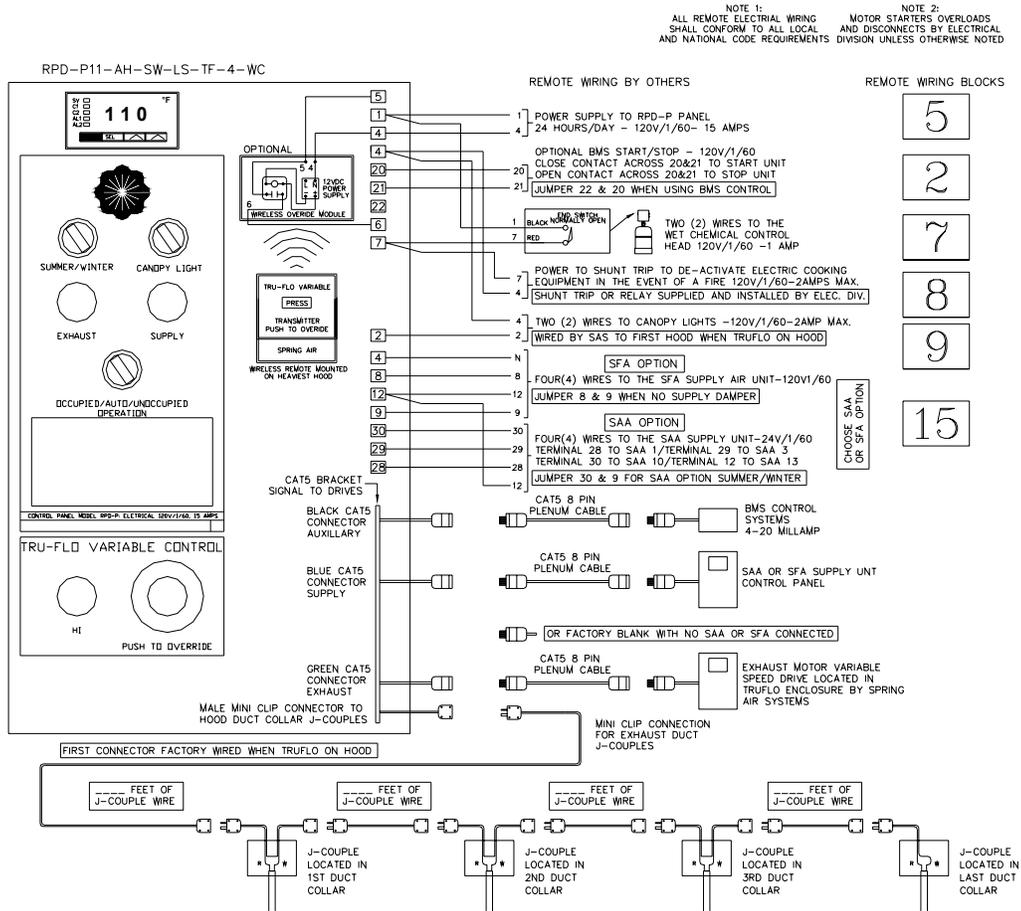
E. Logic Controller LED Temperature Readout

- a) One Hood Connected:
When one hood is connected the Truflo the Logic Controller LED displays the actual exhaust duct temperature.
- b) Two Hoods Connected:
When two hoods are connected to the Truflo the Logic Controller LED displays a temperature that is approximately 8 to 10F above the average duct temperature of the two hoods.
- c) Three Hoods Connected:
When three hoods are connected to the Truflo the Logic Controller LED displays a temperature that is approximately 10-13F above the average duct temperature of the three hoods.
- d) Four Hoods Connected:
When three hoods are connected to the Truflo the Logic Controller LED displays a temperature that is approximately 13-16F above the average duct temperature of the three hoods.

Installation and Remote Wiring

Installation

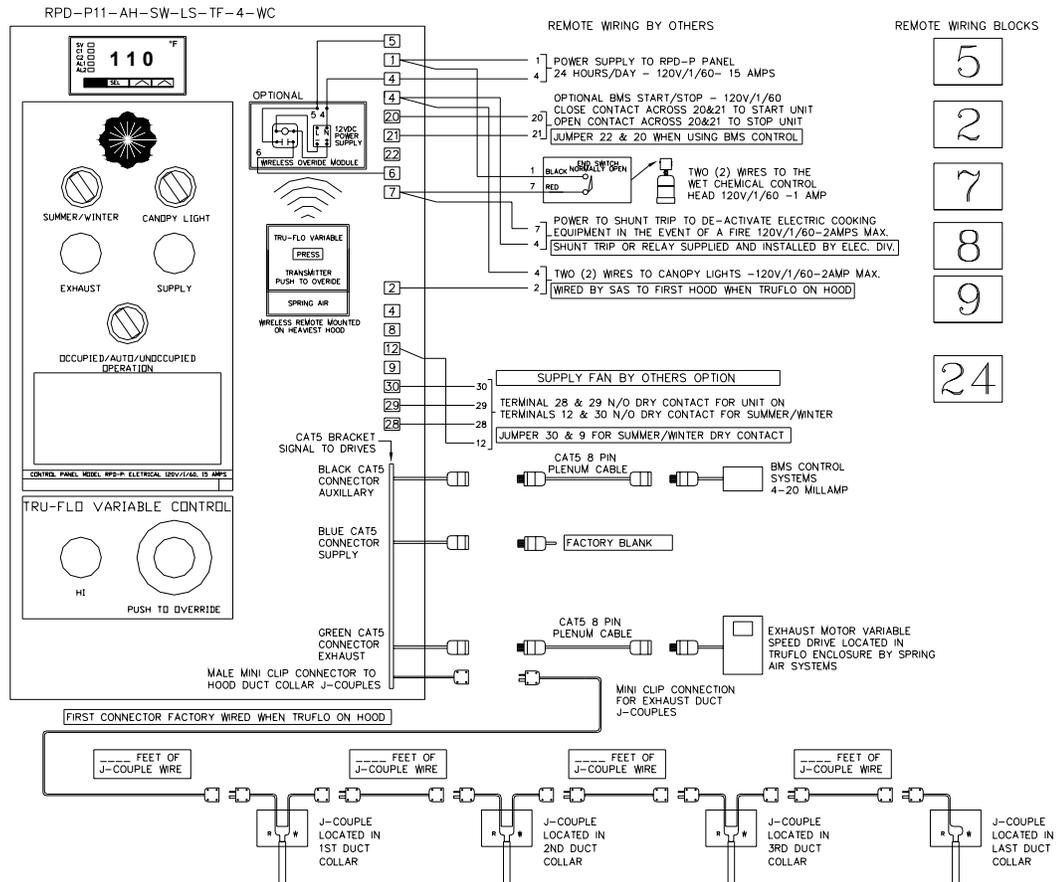
The TRUFLO system can be easily retrofitted to existing kitchen hoods or supplied with new hoods. When supplied with a new Spring Air Systems hood it is recommended that the TRUFLO panel and stainless steel drive enclosure be factory mounted in an enclosure at the end of the hood. This minimizes field wiring and reduces installation cost. By installing these components on the hood there is no extra field wiring required over a standard kitchen exhaust system other than connecting the J-Couple min-clips at each exhaust duct collar.



TRUFLO Control panel wiring with Spring Air SAA or SFA-IGO unit
Figure 23

NOTE 1: ALL REMOTE ELECTRICAL WIRING SHALL CONFORM TO ALL LOCAL AND NATIONAL CODE REQUIREMENTS UNLESS OTHERWISE NOTED

NOTE 2: MOTOR STARTERS OVERLOADS AND DISCONNECTS BY ELECTRICAL DIVISION UNLESS OTHERWISE NOTED

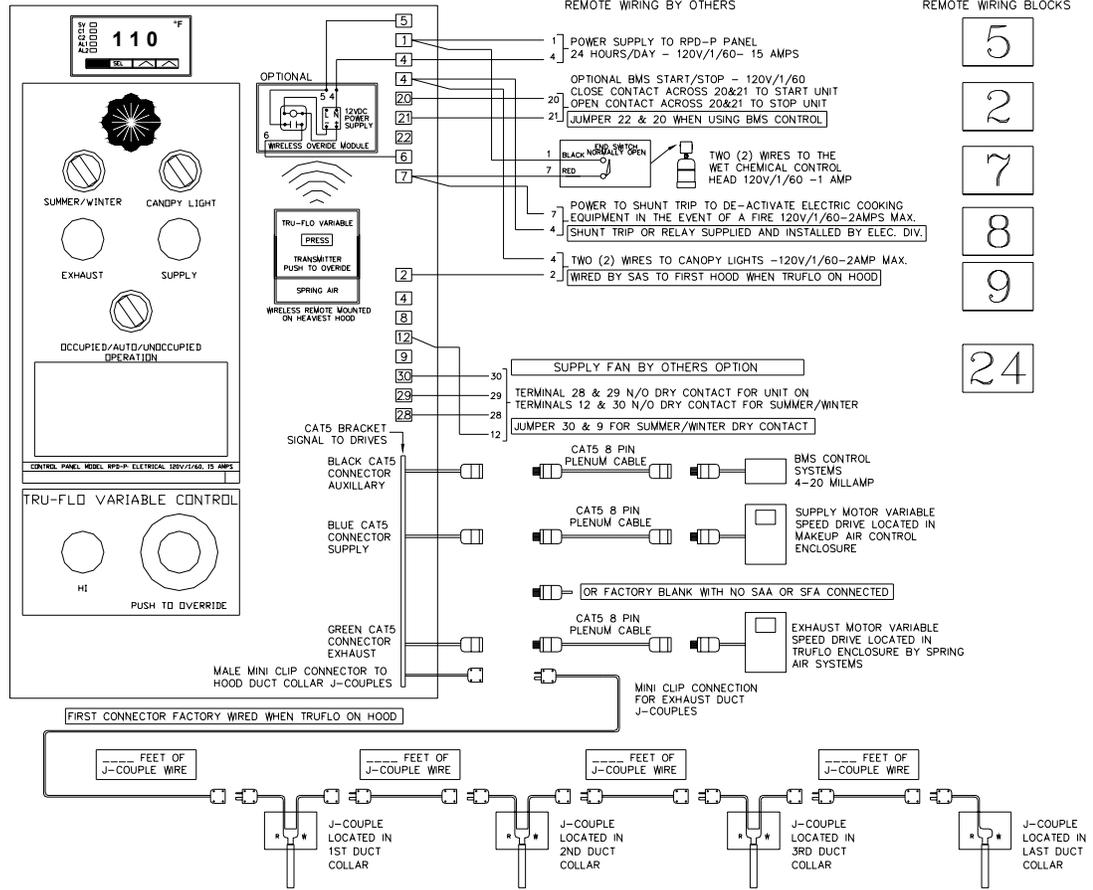


TRUFLO Control panel wiring with supply fan and 4-20 milliamp control to BMS system
Figure 24

NOTE 1:
ALL REMOTE ELECTRICAL WIRING
SHALL CONFORM TO ALL LOCAL
AND NATIONAL CODE REQUIREMENTS

NOTE 2:
MOTOR STARTERS OVERLOADS
AND DISCONNECTS BY ELECTRICAL
DIVISION UNLESS OTHERWISE NOTED

ITEM XX, RPD-P11-AH-SW-LS-TF-4-WV



TRUFLO Control panel wiring with supply fan with variable speed drive control
Figure 25

Remote Wiring:

A. Electrical Requirements TRUFLO Control Panel.

- Power supply to the RPD-P-TF panel 120V/1/60- 15 amps
- Interlock to the Building Management System for remote on/off. (Optional)
- Interlock to the wet chemical system 120V/1/60 (optional)
- Power to electric shunt trip or relay contactor 120V/1/60 (shut trip or relay contactor supplied and installed by electrical division)
- Power to hood canopy lights 120V/1/60 (optional)
- Spring Air Systems SFA-IGO indirect gas fired unit option. Four wires to SFA-IGO control panel 120V/1/60.
- Spring Air Systems SAA direct gas fired unit option. Four wires to SAA control panel 24V/1/60.
- Option two wires for dry contact on/off of supply unit control circuit. 5 amps maximum
- Optional two wires for dry contact summer/winter for supply unit heating and/or cooling circuit. 5 amps maximum.
- Exhaust VFD Control: CAT5 plenum cable from GREEN CAT5 connector to Exhaust variable speed drive GREEN CAT5 connector.
- Auxiliary Control: CAT5 plenum cable from BLACK CAT5 connector to Auxiliary control device. 4-20 milliamp signal.
- J-Couple cable from TRUFLO mini-clip to each exhaust duct collar min-clip connector

B. Electrical Requirements SFA-IGO Option.

- Power wiring from the breaker panel to the exhaust variable speed drive located in the stainless steel enclosure attached to the TRUFLO panel mounted on the hood or wall.
- Power wiring from the breaker panel to the SFA-IGO motor starter located in the stainless steel enclosure attached to the TRUFLO panel mounted on the hood or wall.
- Power wiring from the exhaust variable speed drive to the exhaust fan disconnect switch.
- Power wiring from the supply motor starter in the Truflo enclosure to the SFA-IGO unit disconnect switch.
- Supply VFD Control: CAT5 plenum cable from BLUE CAT5 connector to SFA-IGO control panel BLUE CAT5 connector located in the SFA-IGO unit.

C. Electrical Requirements SAA Option.

- Power wiring from the breaker panel to the exhaust variable speed drive located in the stainless steel enclosure attached to the TRUFLO panel mounted on the hood or wall.
- Power wiring from the breaker panel to the SAA supply unit disconnect switch.
- Power wiring from the exhaust variable speed drive to the exhaust fan disconnect switch.

- Supply VFD Control: CAT5 plenum cable from BLUE CAT5 connector to Supply variable speed drive BLUE CAT5 connector located in the SAA Unit.

D. Electrical Requirements OTHER supply units.

- Power wiring from the breaker panel to the exhaust variable speed drive located in the stainless steel enclosure attached to the TRUFLO panel mounted on the hood or wall.
- Power wiring from the breaker panel to the supply variable speed drive located in the stainless steel enclosure attached to the TRUFLO panel mounted on the hood or wall.
- Power wiring from the exhaust variable speed drive to the exhaust fan disconnect switch.
- Power wiring from the supply variable speed drive to the supply fan disconnect switch.
- Supply VFD Control: CAT5 plenum cable from BLUE CAT5 connector to Supply variable speed drive BLUE CAT5 connector located in TRUFLO Enclosure.



TRUFLO - STARTUP REPORT

BEFORE ATTEMPTING TO SERVICE THE VARIABLE SPEED DRIVES PLEASE READ APPENDIX J CAREFULLY.

General Information

Job Name	
Date	
Customer	
Location	
Spring Air Service Company	

Truflo Model No.	
Number of Hood connected	
Supply SV	Supply SC

Exhaust Air Design (CFM)	
Exhaust Fan Model No.	
Exhaust Fan Manufacturer	
Exhaust Fan HP	
Exhaust Fan Voltage	
Up blast Discharge	YES NO

Supply SV –Variable Speed Supply Drive

Supply Air Design (CFM)	
Supply inlet 10' clear from exhaust discharge	YES NO
Supply Fan Model No.	
Supply Fan Manufacturer	
Supply fan HP	
Supply fan voltage	

Supply SC – Modulating Damper Control

Supply Air Design (CFM)	
Supply inlet 10' clear from exhaust discharge	YES NO
Supply Fan Model No.	
Supply Fan Manufacturer	

Startup Procedure

Item	Description	Y / N
1	Turn off all Cooking equipment. Check all electrical connections. Tighten as necessary	
2	Check all electrical connections. Tighten as necessary	
3	Check for power to the RPD-P panel on terminals 1 & 4 from breaker panel	
4	Check all remote wiring to ensure it has been connected	
5	Check power wiring from breaker to exhaust fan variable speed drive	
6	Check power wiring from exhaust fan variable speed drive to exhaust fan disconnect	
7	Check CAT5 plenum cable is connected from Truflo panel green CAT5 connector to Exhaust Variable Speed Drive green CAT5 connector	

SV Model Only

Item	Description	Y / N
8SV	Check power wiring from breaker to supply fan variable speed drive	
9SV	Check power wiring from supply fan variable speed drive to supply fan disconnect	
10SV	Check CAT5 plenum cable is connected from Truflo panel blue CAT5 connector to Supply Variable Speed Drive blue CAT5 connector	

SC Model Only with Spring Air SFA-IGO

Item	Description	Y / N
8SC	Check control wiring to the supply unit from terminals 4,8,9, &12	
9SC	Check CAT5 plenum cable is connected from Truflo panel blue CAT5 connector to SFA control panel blue CAT5 connector	
10SC	Check power wiring from breaker to SFA motor starter	
11SC	Check power wiring from SFA motor starter SFA unit disconnect	

BMS Control System Only

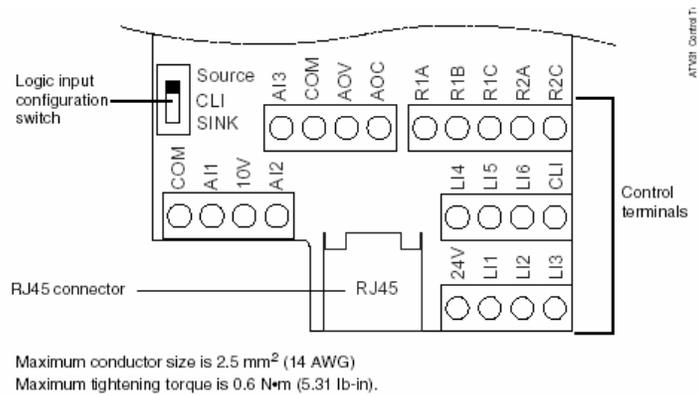
Item	Description	Y / N
12	Check for wiring from Building Management System to terminals 20 & 21	
13	Check for jumper between terminal 20 and 22 in Truflo panel. Add jumper.	
14	Put the selector switch in Auto position after startup is complete	

Item	Description	Y / N
15	Check for wiring to surface fire suppression on terminals 7 & 1 (Optional)	
16	Check for wiring to shunt trip device on terminals 4 & 7. (Optional)	
17	Connect J-Couple Mini-clip connectors from Truflo panel to each exhaust duct collar J-Couple Mini-Clip connectors. All exhaust duct collar Mini-clip connectors should be connected in series. Male Mini-clip to Female Mini-clip.	
18	Check J-Couple wiring from duct collar of each hood. One J-Couple is required for each duct collar. (Up to four duct collars) Spring Air plugs in the first J-Couple Mini-clips if the Truflo panel is mounted on a hood. All other J-Couples are field connected.	
19	Turn off breakers for the supply and exhaust fan	
20	Turn on breaker to the RPD-P-TRU Truflo control panel	
21	Turn the OFF/Auto/On selector switch to off	
22	The PXR should display a temperature reading. If no temperature is indicated then the J-Couple(s) may not be connected properly or there may be a break in the J-Couple line. If an unusual temperature appears above 110F then the J-Couple may be wired in parallel. If the wiring is correct then check the PXR internal program setting. See Appendix A to set the program for one, two or three hood systems.	
23	Turn the OFF/AUTO/ON switch to the ON position. The Exhaust fan ON light turns on.	
24	Press the yellow Override pushbutton. The HI light should Turn ON	
25	Press the yellow Override pushbutton and hold for 2 seconds. The HI light should turn OFF	

IT IS VERY IMPORTANT TO TURN THE EXHAUST FAN DISCONNECT ON BEFORE THE BREAKER. TURNING THE EXHAUST FAN DISCONNECT SWITCH ON OR OFF WHILE THE EXHAUST FAN DRIVE IS POWERED MAY CAUSE DAMAGE TO THE VARIABLE SPEED DRIVE

26	Turn on the exhaust fan disconnect switch	
27	Turn on the exhaust fan breaker for the variable speed drive. The exhaust fan should start at low speed. 18Hz with no appliances operating. The RUN LED's on the face of the exhaust variable speed drive should be on. If the LED's is not on refer to the chart below (Trouble Shooting) to determine reason for fault. After the fault is corrected and the fan still does not operate refer the sketch below to set the logic configuration dip switch. If the RUN light still fails to turn on refer to Appendix G to check the variable speed drive parameter settings.	

28	<p>Check the rotation of the exhaust fan. Switch the fan off from the control panel by rotating the selector switch to the unoccupied position. A technician at the fan must verify rotation as fan wheel slows to a stop. DO NOT SHUT OFF DISCONNECT SWITCH AT FAN TO CHECK ROTATION.</p> <p>To correct fan rotation switch two of the high voltage wires on terminals V/T1, U/T2 or W/T3 on the drive or switch two wires at the motor disconnect.</p>	
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SV Model Only

29SV	Turn on the supply fan disconnect switch.	
30SV	Turn the breaker on to the supply fan unit. The supply fan should operate	
30SV	Turn on the supply fan breaker for the variable speed drive. The supply fan should start at low speed. 18Hz with no appliances operating. The RUN LED's on the face of the supply variable speed drive should be on. If the LED's is not on refer to the chart below (Trouble Shooting) to determine reason for fault. After the fault is corrected and the fan still does not operate refer the sketch below to set the logic configuration dip switch. If the RUN light still fails to turn on refer to Appendix G to check the variable speed drive parameter settings.	
31SV	Check the rotation of the supply fan. Switch the fan off from the control panel by rotating the selector switch to the unoccupied position. A technician at the fan must verify rotation as fan wheel slows to a stop. DO NOT SHUT OFF DISCONNECT SWITCH AT FAN TO CHECK ROTATION. To correct fan rotation switch two of the high voltage wires on terminals V/T1, U/T2 or W/T3 on the drive or switch two wires at the motor disconnect.	
32SV	With both supply and exhaust fans running and no appliances on both fans should be at low volume. The frequency will be 18HZ on both drives.	
33SV	Turn one appliance on full.	
34SV	The PXR digital temperature readout should increase. If the digital readout decreases either the polarity of the J-Couple is reversed or the PXR is not programmed correctly. Switch the PXR polarity or See Appendix A for PXR settings.	
35SV	The supply and exhaust fan volume should increase as the digital temperature readout increases. If the fans do not increase with a digital temperature increase check the following. <ul style="list-style-type: none"> 1. Check the continuity of the CAT5 Plenum cable to the supply and exhaust variable speed drive. 2. Check the variable speed drive parameter settings. See Appendix G 	
36SV	Continue with standard SFA, SFI, SFM or SAA startup	

SC Model Only

29SC	Turn the breaker on to the supply fan unit.	
30SC	Turn on the supply fan disconnect switch. The supply fan should operate. Continue with the standard Spring Air Systems SFA startup procedure.	
31SC	With both supply and exhaust fans running and no appliances on both fans should be at low volume. The frequency will be 18HZ on the exhaust fan drive and the SFA supply modulating bypass damper should be 100% open.	
31SC	Turn one appliance on full.	
32SC	The PXR digital temperature readout should increase. If the digital readout decreases either the polarity of the J-Couple is reversed or the PXR is not programmed correctly. Switch the PXR polarity or See Appendix A for PXR settings.	
32SC	The exhaust fan volume should increase as the digital temperature readout increases. If the fans do not increase with a digital temperature increase check the following. <ol style="list-style-type: none"> 1. Check the continuity of the CAT5 Plenum cable to the exhaust variable speed drive. 2. Check the variable speed drive parameter settings. See Appendix G 	
33SC	The supply fan volume should increase as the digital temperature readout increases. If the supply fan volume does not increase with a digital temperature increase check the following. <ol style="list-style-type: none"> 1. Check the continuity of the CAT5 Plenum cable to the modulating bypass damper in the SFA supply unit. 2. Check that the SFA supply fan modulating bypass damper is being powered. 3. Check the modulating bypass damper in the SFA unit that it is rotating in the correct direction. A rise in display temperature should cause the damper to drive close. If reversed switch the direction of rotation. 4. Check the exhaust fan variable speed drive parameter settings. See Appendix G - Section 6. Setting up an analog signal. 	
33SC	Continue with standard SFA-IGO startup	
37	Press the OVERRIDE pushbutton. The HI pilot light should turn on and the supply and exhaust air volume should increase to 100%. The variable speed drives should be at 60Hz	
38	Hold the OVERRIDE pushbutton on for 2 seconds. The variable speed drives will reduce to the normal operation air volume.	
39	Turn on all appliances and record the digital temperature readout	F
40	Check the temperature set point on the PXR readout. Press SEL once. Use V and ^ to adjust the set point. Press SEL. The one hood temperature setting is factory set at 70F. Set the set point as follows: One hood system = temperature with all appliances on less 25F Two hood systems = temperature with all appliance on less 30F Three hood systems = temperature with all appliance on less 35F Three hood systems = temperature with all appliance on less 40F	F

Comments:

Service

Technician: _____

Company: _____

Yes I have received a set of Spring Air Systems Inc. maintenance manuals.

Signature _____ Print Name _____

APPENDIX

A. SETTING THE MICRO CONTROLLER SV

	Set Point (SV parameter) - Factory setting ONE Duct Collar
SV=70	Press SEL once. Use ∇ and ▲ to adjust the set point to 70. Press SEL. The factory setting is 70F.
	Set Point (SV parameter) - Factory setting TWO Collar
SV=80	Press SEL once. Use ∇ and ▲ to adjust the set point to 80. Press SEL. The factory setting is 70F.
	Set Point (SV parameter) - Factory setting Three Collar
SV=85	Press SEL once. Use ∇ and ▲ to adjust the set point to 850. Press SEL. The factory setting is 70F.
	Set Point (SV parameter) - Factory setting Four Collar
SV=90	Press SEL once. Use ∇ and ▲ to adjust the set point to 90. Press SEL. The factory setting is 70F.



PXR3 Micro-controller: Factory setup

Power the Truflo panel and proceed to input the following setting.

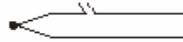
	2nd Block Parameters
	Press SEL and hold for about 3 seconds until P appears on the display. Release SEL.
P=28	Press SEL again to set the Proportional Band. Use the ▲ to increase parameter set value and ∇ to decrease parameter set value. Set P = 28 and then press SEL.
∫=0	Press ∇ to next parameter, integral time, ∫. Press SEL and set value to 0. Press SEL
d=0	Press ∇ to next parameter, derivative action time, d. Press SEL and set value to 0. Press SEL.
hys=0	Press ∇ to next parameter, hysteresis, hys. Press SEL and set value to 0. Press SEL
CTrL=PID	Press ∇ three times to next parameter, Control algorithm, CTrL. Press SEL and check that the setting is PID. If is not us the ∇ and ▲ to set to PID and then press SEL.
P-n2=2	Press ∇ three times to next parameter, input type code, P-n2. Press SEL and adjust setting to 2. Press SEL.
P-SL=55	Press ∇ to next parameter, Lower limit of input range, P-SL. Press SEL and adjust setting to 55. Press SEL.
P-SU=200	Press ∇ to next parameter, Upper limit of input range, P-SU. Press SEL and adjust setting to 200. Press SEL.
ALN1=1	Press ∇ five times to next parameter, Type of alarm 1, ALN1. Press SEL and adjust setting to 1. Press SEL.
	Press SEL and hold for about 2 seconds to return to set point.

	3rd Block Parameters
	Press SEL and hold for about 5 seconds until P-n1 appears on the display. Release SEL.
P-n1=3	Press SEL again to set the Control Action, P-n1. Use the ^ and v to adjust the value to 3. Press SEL.
SV-L=55	Press v to next parameter, Lower limit of SV, SV-L. Press SEL and adjust setting to 55. Press SEL.
SV-H=120	Press v to next parameter, Upper limit of SV, SV-H. Press SEL and adjust setting to 120. Press SEL.
	Press SEL and hold for about 2 seconds to return to set point.

	1st Block Parameters
	Press SEL and hold for about 1 second until STbY appears on the display. (or LACH)
AT=1	Press v until AT appears on display. Press SEL and set the Auto-tuning to 1. using v and ^. Press SEL.
AL1=90	Press v three times until AL1 appears on the display. Press SEL and set the Alarm1 set value to 90. Press SEL.
StbY	Set to off
Prog	Set to off

[8] Sensor fault operation

• Thermocouple

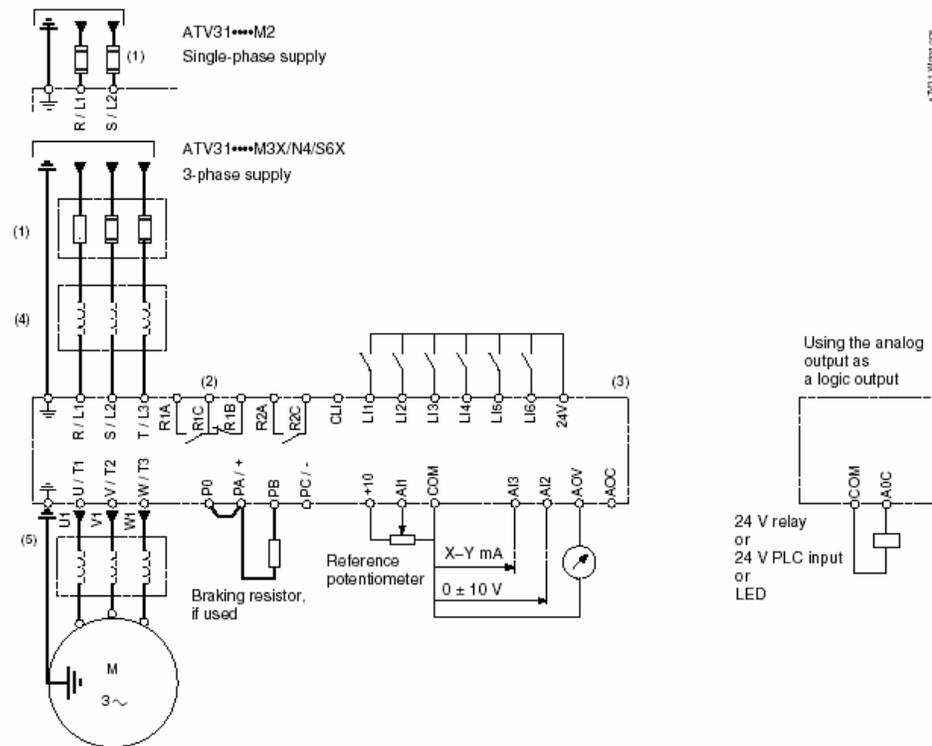
Condition	Display	Control output
Break 	UUUU	ON or more than 20mA (Note) OFF or less than 4mA
Short circuit 	short-circuit point Temperature display	Input is controlled as short-circuit point temperature. (Note)

• 4-20mA DC

Over-range	UUUU	OFF or less than 4mA (Note)
Under-range	LLLL	ON or more than 20mA

B. TELE FACTORY DRIVE TERMINAL SCHEMATIC

Wiring Diagram for Factory Settings



NOTE: The line supply terminals are shown at the top and the motor terminals are shown at the bottom. Connect the power terminals before connecting the control terminals. Install surge suppressors on all inductive circuits located near the drive controller or coupled to the same circuit.

- (1) Refer to the drive controller nameplate or to the tables on pages 34–35 for recommended fuses. Fast acting or time delay Class J fuses can be used.
- (2) Fault relay contacts for remote indication of drive controller status.
- (3) Internal +24 V. If an external source is used (30 V max.), connect the 0 V terminal of the source to the 0 V (COM) terminal, and do not use the +24 V terminal on the drive controller for any purpose.
- (4) Line reactor, if used. All 575 V installations must include a line reactor. See page 21.
- (5) Installation of a load filter is recommended for all 575 V applications. See page 22.

LOGIC INPUT SWITCH

The logic input switch assigns the logic input common link to 0 V (Source logic), 24 V (Sink logic), or floating.

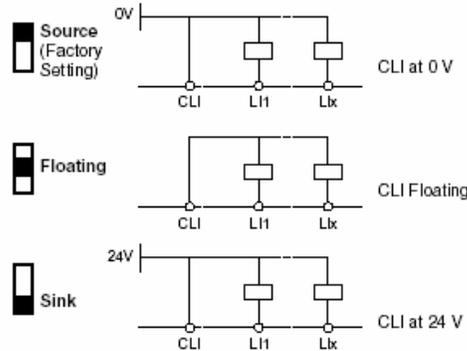
NOTE: When the logic input is configured for Sink logic, grounding the input signals can result in unintended activation of drive controller functions.

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- Protect the signal conductors against damage that could result in unintentional conductor grounding.
- Follow NFPA 79 and EN 60204 guidelines for proper control circuit grounding practices.

Failure to follow these instructions can result in death, serious injury, or equipment damage.



DRIVE TECHNICAL SPECIFICATIONS FOR LOCATING DRIVE PANELS

Table 2: Environment

Degree of Protection	<ul style="list-style-type: none"> • IP20 without protective vent cover, NEMA 1, UL open type. • IP21 on wiring terminals • IP31 and IP41 all other areas • UL Type 1 without removal of the protective vent cover from the top of the controller and with the addition of the Conduit Entry Kit (see page 14).
Resistance to vibrations	Conforming to IEC/EN 60068-2-6: 1.5 mm peak to peak from 3 to 13 Hz, 1 gn from 13 to 150 Hz
Resistance to shocks	15 gn for 11 ms conforming to IEC/EN 60068-2-27
Pollution degree	Pollution degree 2 according to UL 940. Protect the drive controller against dust, corrosive gas, and falling liquid.
Maximum relative humidity	96% maximum, non-condensing and without dripping (provide heating system if there is condensation) Conforms to IEC 60068-2-3
Maximum ambient temperature	Storage: -13 to +158 °F (-25 to +70 °C) Operation: +14 to +122 °F (-10 to +50 °C) without vent cover removed and without derating +14 to +140 °F (-10 to +60 °C) with vent cover removed and with derating. Refer to derating curves on page 15.
Altitude	Up to 3,300 ft (1,000 m) without derating; derate by 1% for each additional 330 ft (100 m)

C. HAZARDOUS WARNING

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand this manual before installing or operating the Altivar 31 drive controller. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- For more information on Altivar 31 drive controllers, see the *Altivar 31 Start-Up Guide*, VVDED303043US, and the *Altivar 31 Programming Manual*, VVDED303042US. Both manuals are shipped with the drive controller. They are also available from www.us.SquareD.com or from your Schneider Electric representative.
- The user is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. **DO NOT TOUCH**. Use only electrically insulated tools.
- **DO NOT** touch unshielded components or terminal strip screw connections with voltage present.
- **DO NOT** short across terminals PA and PC or across the DC bus capacitors.
- Install and close all covers before applying power or starting and stopping the drive controller.
- Before servicing the drive controller:
 - Disconnect all power.
 - Place a "DO NOT TURN ON" label on the drive controller disconnect.
 - Lock the disconnect in the open position.
- Disconnect all power including external control power that may be present before servicing the drive controller. **WAIT 3 MINUTES** for the DC bus capacitors to discharge. Then follow the DC bus voltage measurement procedure on page 20 to verify that the DC voltage is less than 45 Vdc. The drive controller LEDs are not accurate indicators of the absence of DC bus voltage.

Electric shock will result in death or serious injury.

D. GOOD WIRING PRACTICE

Good wiring practice requires the separation of control circuit wiring from all power (line) wiring. In addition, power wiring to the motor must have the maximum possible separation from all other power wiring, whether from the same drive controller or other drive controllers; **do not run in the same conduit**. This separation reduces the possibility of coupling electrical transients from power circuits into control circuits or from motor power wiring into other power circuits.

▲ CAUTION
IMPROPER WIRING PRACTICES
<ul style="list-style-type: none">• Follow the wiring practices described in this document in addition to those already required by the National Electrical Code and local electrical codes.• The drive controller will be damaged if input line voltage is applied to the output terminals (U, V, W).• Check the power connections before energizing the drive controller.• If replacing another drive controller, verify that all wiring connections to the ATV31 drive controller comply with all wiring instructions in this manual.
Failure to follow this instruction can result in injury or equipment damage.

Follow the practices below when wiring ATV31 drive controllers:

- Verify that the voltage and frequency of the input supply line and the voltage, frequency, and current of the motor match the rating on the drive controller nameplate.
- Use metallic conduit for all drive controller wiring. Do not run control and power wiring in the same conduit.
- Separate the metallic conduits carrying power wiring from those carrying control wiring by at least 76 mm (3 in.).

- Separate the non-metallic conduits or cable trays used to carry power wiring from the metallic conduit carrying control wiring by at least 305 mm (12 in.).
- Whenever power and control wiring cross, the metallic conduits and non-metallic conduits or trays must cross at right angles.
- Equip all inductive circuits near the drive controller (such as relays, contactors, and solenoid valves) with noise suppressors, or connect them to a separate circuit.

E. GROUNDING

Ground the drive controller according to the National Electrical Code and all local codes to ensure safe, dependable operation. To ground the drive controller:

- Connect a copper wire from the equipment ground lug or terminal to the power system ground conductor. Size the wire according to the drive controller rating and national and local codes.
- Verify that resistance to ground is one ohm or less. Improper grounding causes intermittent and unreliable operation.

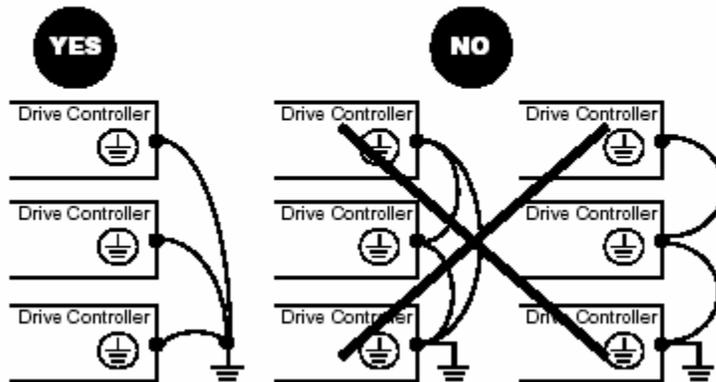
⚠ DANGER

HAZARDOUS VOLTAGE

Ground equipment using the provided ground connecting point as shown in the figure below. The drive controller panel must be properly grounded before power is applied.

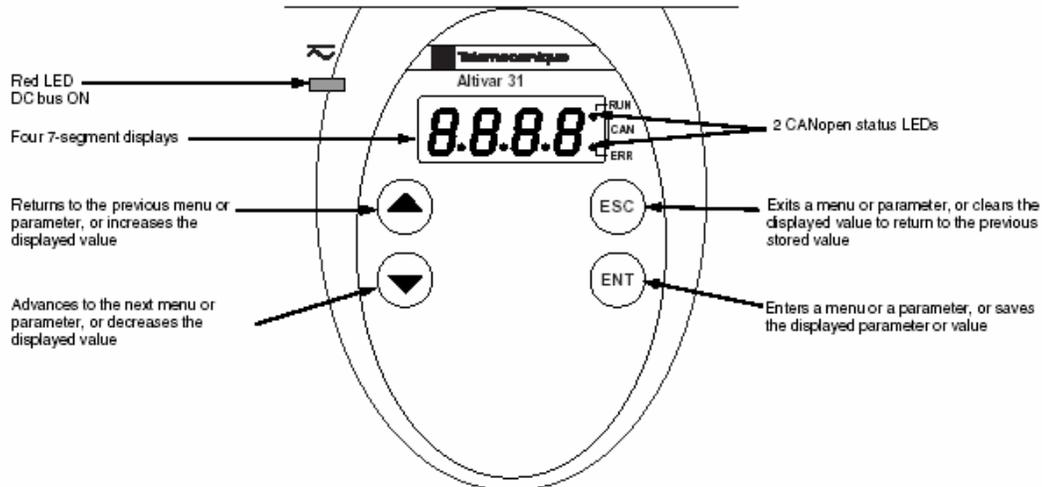
Electric shock will result in death or serious injury.

Ground multiple drive controllers as shown in the figure below. Do not loop the ground cables or connect them in series.



F. STARTING THE DRIVE

ATV31..... Controllers



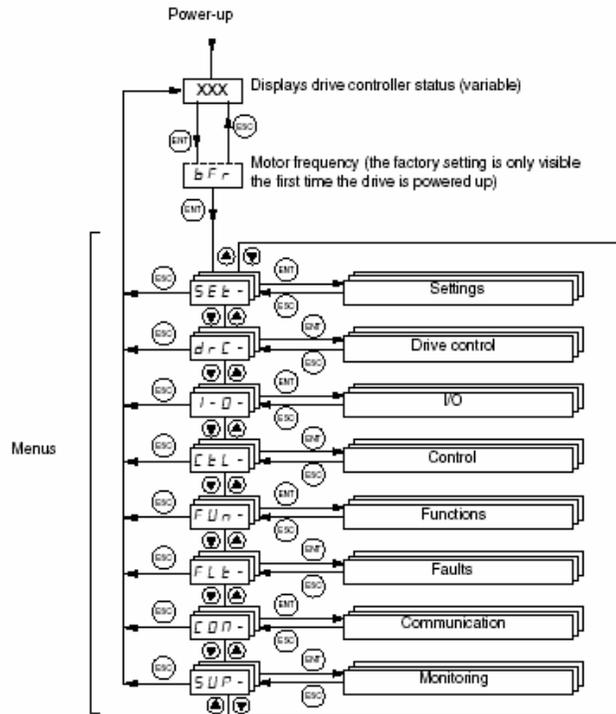
- Press and hold down (longer than 2 seconds) the ▲ or ▼ keys to scroll through the data quickly.
- Pressing ▲ or ▼ does not store the selection.
- To store the selection, press the ENT key. The display flashes when a value is stored.

A normal display with no fault present and no run command shows:

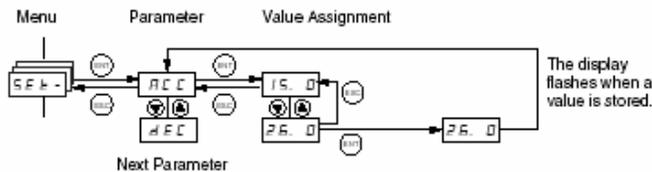
- The value of one of the display parameters (see page 80). The default display is motor frequency, for example 43.0. In current limiting mode, the display flashes.
- init: Initialization sequence
- rdY: Drive ready
- dcb: DC injection braking in progress
- nSt: Freewheel stop
- FSt: Fast stop
- tUn: Auto-tuning in progress

If a fault is present, the display flashes.

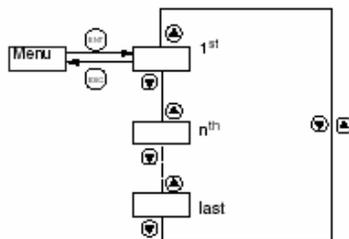
G. ACCESSING THE DRIVE PROGRAM MENU



The following figure illustrates how to access parameters and assign their values. To store the parameter value, press the **ENT** key. The display flashes when a value is stored.



All of the menus are drop-down type menus. Once you have reached the last parameter in a list, press the **▼** key to return to the first parameter. From the first parameter in the list, press the **▲** key to jump to the last parameter.



If you have modified a parameter in a menu and you return to that menu without accessing another menu in the meantime, you will be taken directly to the parameter you last modified. See the illustration below. If you have accessed another menu or have restarted the drive controller since the modification, you will be taken to the first parameter in the menu. See the illustration above.

H. PROGRAMMING THE TELE DRIVE

Programming the variable speed Tele drive

Code	Long Label	Factory Setting	Tele Default
Fast Settings			
ACC	Acceleration ramp time	10.0s	3.0s
BFR	Standard motor frequency	60HZ	50HZ
DEC	Deceleration ramp time	10s	3s
ITH	Motor thermal current	Motor FLA	0.0A
*LSP	Low Speed	18HZ	0.0HZ
Motor Control			
NSP	Nominal Motor Speed	1725 rpm of motor	1715tr/min
TUN	Automatic Tuning	Autotune on Power up	Not Assigned
Terminal Configuration			
AOIT	Configuration of AOI	4-20mA	0-20mA
DO	AOC/AOV Assignment	Motor Frequency	Not Assigned
R1	Relay R1	Drive Running	Drive Fault
***RRS	Reverse	Not Assigned	Logic Input LI2
Control Command			
FR1	Configuration reference 1	Analog Input AI3	Analog input AI1
LAC	Function Access Level	Advance Function & Mixed ctrl	Access to Std. Function
Input Summary			
AI1A	Configuration of AI1	CH. In forced local Mode	Configuration ref. 1
AI2A	Configuration of AI2	Not Assigned	Summing Input 2
AI3A	Configuration of AI3	Configuration ref. 1	Not Assigned
LI2A	Config. Logic Input 2	Select 2 Preset Speed	Reverse
LI3A	Config. Logic Input 3	Select 3 Preset Speed	Select 3 Preset Speed
LI4A	Config. Logic Input 4	Select 4 Reset Speed	Select 4 Preset Speed
Fault Behavior			
ATR	Automatic Restart	YES	NO
DRN	Derating for Undervoltage	YES	NO
Application Functions			
SA2	Summing Input 2	Not Assigned	Analog Input AI2
SA3	Summing Input 3	Not Assigned	Not Assigned
SDC2	DC Current at Standstill 2	Motor Amp	0.0A
SP2	Preset Speed 2	60HZ	15HZ
SP3	Preset Speed 3	30 HX(optional)	15HZ
**SP4	Preset Speed 4	50HZ (optional)	20HZ

Device Reference must be observed when programming

Parameter list based on ALTIVAR31

Motor Characteristics must be inputted (ie FLA, RPM)

Preset Speeds are adjustable.

* LSP Configured to 30HZ with KES unit

** Optional

*** Can be configured for MUA interlock

I. MAINTENANCE AND TROUBLE SHOOTING

PRECAUTIONS

Read the following safety statements before proceeding with any maintenance or troubleshooting procedures.

 DANGER
HAZARDOUS VOLTAGE <ul style="list-style-type: none">• Disconnect all power before servicing the drive controller.• Read and understand these procedure and the precaution on page 13 of this manual before servicing the ATV31 drive controllers.• Installation, adjustment, and maintenance of these drive controllers must be performed by qualified personnel. Failure to follow this instruction will result in death or serious injury.

ROUTINE MAINTENANCE

Perform the following steps at regular intervals:

- Check the condition and tightness of the connections.
- Make sure that the ventilation is effective and that the temperature around the drive controller remains at an acceptable level.
- Remove dust and debris from the drive controller, if necessary.

FAULT DISPLAY

If a problem arises during setup or operation, ensure that all ambient environment, mounting, and connection recommendations have been followed.

The first fault detected is stored and displayed, flashing, on the screen. The drive controller locks and the fault relay (RA-RC) contact opens, if it has been configured for this function.

Drive Controller Does Not Start, No Fault Displayed

If the drive controller will not start and there is no display indication, consider the following:

1. Check the power supply to the drive controller.
2. The assignment of the fast stop or freewheel stop functions prevents the drive controller from starting if the corresponding logic inputs are not powered up. In this case, the drive controller displays nSt in freewheel stop mode and FSt in fast mode. This is normal, since these functions are active at zero speed so that the drive controller will stop safely if there is a wire break.
3. Ensure that the run command inputs have been actuated in accordance with the chosen control mode (ICC parameter in the I-O- menu. See page 29).
4. If an input is assigned to the limit switch function and this input is at state 0, the drive controller can only be started by sending a command for the opposite direction (see page 72).
5. If the reference channel (page 37) or the control channel (page 38) is assigned to Modbus or CANopen, the drive controller displays nSt on power up and remains stopped until the communication bus sends a command.

Trouble Shooting Drive Faults

1. When a fault occurs many will clear automatically. After a drive fault has cleared automatically reset the Truflo by rotating the Occupied/Auto/ Unoccupied switch to the Unoccupied position for five seconds. Then rotate back to the Occupied position. The drives will reset if the fault has cleared.
2. When a drive fault occurs the switch can be rotated three times and if the fault has not reset automatically the drive will lock out and display the drive fault.
3. Once the drive fault is rectified that did not clear automatically shut off the breaker to the drive for 30 seconds and rotate the Occupied/Auto/ Unoccupied switch to the Unoccupied position for five seconds to restart systems.

If a problem occurs during setup or operation, ensure that all ambient environment, mounting, and connection recommendations have been followed.

The first fault detected is stored and displayed, flashing, on the screen. The drive controller locks and the fault relay (R1A-R1C or R2A-R2C) contact opens.

Drive Controller Does Not Start, No Display

If the drive controller will not start and there is no display indication, check the power supply to the drive controller. Refer to the *ATV31 Programming Manual* for more troubleshooting information.

Faults Which Cannot be Automatically Reset

Faults which cannot be automatically reset are listed in the table beginning on page 44. To clear these faults:

1. Remove power from the drive controller.
2. Wait for the display to go off completely.
3. Determine the cause of the fault and correct it.
4. Reapply power.

CrF, SOF, tnF, bLF, and OPF can also be reset remotely via a logic input (rSF parameter in the FLt-menu, see the *ATV31 Programming Manual*).

Faults Which Cannot be Automatically Reset

Fault	Probable Cause	Remedy
<i>b L F</i> Brake sequence	Brake release current not reached	<ul style="list-style-type: none"> • Check the drive controller and motor connections. • Check the motor windings. • Check the Ibr setting in the FUn-menu. Refer to the <i>ATV31 Programming Manual</i>.
<i>C r F</i> Precharge circuit fault	Precharge circuit damaged	<ul style="list-style-type: none"> • Reset the drive controller. • Replace the drive controller.
<i>I n F</i> Internal fault	<ul style="list-style-type: none"> • Internal fault • Internal connection fault 	<ul style="list-style-type: none"> • Remove sources of electromagnetic interference. • Replace the drive controller.
<i>O C F</i> Overcurrent	<ul style="list-style-type: none"> • Incorrect parameter settings in the SEt- and drC- menus • Acceleration too rapid • Drive controller and/or motor undersized for load • Mechanical blockage 	<ul style="list-style-type: none"> • Check the SEt- and drC- parameters. • Ensure that the size of the motor and drive controller is sufficient for the load. • Clear the mechanical blockage.
<i>S C F</i> Motor short circuit	<ul style="list-style-type: none"> • Short circuit or grounding at the drive controller output • Significant ground leakage current at the drive controller output if several motors are connected in parallel 	<ul style="list-style-type: none"> • Check the cables connecting the drive controller to the motor, and check the motor insulation. • Reduce the switching frequency. • Connect output filters in series with the motor.
<i>S O F</i> Overspeed	<ul style="list-style-type: none"> • Instability • Overhauling load 	<ul style="list-style-type: none"> • Check the motor, gain, and stability parameters. • Add a braking resistor. • Check the size of the motor, drive controller, and load.
<i>t n F</i> Auto-tuning fault	<ul style="list-style-type: none"> • Motor or motor power not suitable for the drive controller • Motor not connected to the drive controller 	<ul style="list-style-type: none"> • Use the L or the P ratio (see UfT on page 36). • Check the presence of the motor during auto-tuning. • If a downstream contactor is being used, close it during auto-tuning.

Faults Which Can be Reset With the Automatic Restart Function

After the cause of the fault has been removed, the following faults can be reset:

- With the automatic restart function (Atr parameter in the FLt- menu, see the *ATV31 Programming Manual*),
- Via a logic input (rSF parameter in the FLt- menu, see the *ATV31 Programming Manual*),
- By cycling power to the drive controller.

Faults Which Can be Reset With Automatic Restart

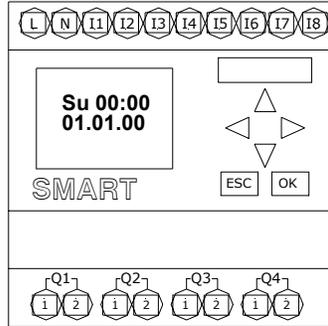
Fault	Probable Cause	Remedy
<i>LDL</i> Serial link failure CANopen	Loss of communication between drive controller and communication device or remote keypad.	<ul style="list-style-type: none"> • Check the communication bus. • Refer to the product-specific documentation.
<i>EPF</i> External fault	User defined	User defined
<i>LF</i> Loss of 4-20 mA follower	Loss of the 4-20 mA reference on input AI3	Check the connection on input AI3.
<i>DBF</i> Overvoltage during deceleration	<ul style="list-style-type: none"> • Braking too rapidly • Overhauling load 	<ul style="list-style-type: none"> • Increase the deceleration time. • Install a braking resistor if necessary. • Activate the brA function if it is compatible with the application. Refer to the <i>ATV31 Programming Manual</i>.
<i>DHF</i> Drive overload	<ul style="list-style-type: none"> • Drive controller or ambient temperature are too high. • Continuous motor current load is too high. 	Check the motor load, the drive controller ventilation, and the environment. Wait for the drive controller to cool before restarting.
<i>DLF</i> Motor overload	<ul style="list-style-type: none"> • Thermal trip due to prolonged motor overload • Motor power rating too low for the application 	Check the lth setting (motor thermal protection, page 32), check the motor load. Allow the motor to cool before restarting.

Faults Which Can be Reset With Automatic Restart (Continued)

Fault	Probable Cause	Remedy
<p><i>O P F</i> Motor phase failure</p>	<ul style="list-style-type: none"> • Loss of phase at drive controller output • Downstream contactor open • Motor not connected • Instability in the motor current • Drive controller oversized for motor 	<ul style="list-style-type: none"> • Check the connections from the drive controller to the motor. • If a downstream contactor is being used, set OPL to OAC. Refer to the <i>ATV31 Programming Manual</i>, FLt-menu. • Test the drive controller on a low power motor or without a motor: set OPL to nO. Refer to the <i>ATV31 Programming Manual</i>, FLt- menu. • Check and optimize the UFr (page 32), UnS (page 35), and nCr (page 35) parameters and perform auto-tuning (page 36).
<p><i>O S F</i> Overvoltage during steady state operation or during acceleration</p>	<ul style="list-style-type: none"> • Line voltage too high • Line supply transients 	<ul style="list-style-type: none"> • Check the line voltage. Compare with the drive controller nameplate rating. • Reset the drive controller.
<p><i>P H F</i> Input phase failure</p>	<ul style="list-style-type: none"> • Input phase loss, blown fuse • 3-phase drive controller used on a single phase line supply • Input phase imbalance • Transient phase fault <p><i>Note: This protection only operates with the drive controller running under load.</i></p>	<ul style="list-style-type: none"> • Check the connections and the fuses. • Disable the fault by setting IPL to nO. Refer to the <i>ATV31 Programming Manual</i>. • Verify that the input power is correct. • Supply 3-phase power if needed.
<p><i>S L F</i> Serial link failure Modbus</p>	<p>Loss of connection between drive controller and communication device or remote keypad.</p>	<ul style="list-style-type: none"> • Check the communication connection. • Refer to the product-specific documentation.

J. PROGRAMMING THE SMART CLOCK

Setting the Day and Time



- | | |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Su 00:00
01.01.00</p> | 1. When power is first applied to the wash panel the following display will blink. |
| <p>>Stop
Set Parma
Set Clock
Prg Name</p> | 2. Press OK and the following screen will appear. |
| <p>Stop
Set Parma
>Set Clock
Prg Name</p> | 3. Press ▽ twice. |
| <p>Set Clock
■Su 00:00
MM.DD.YY
01. 01. 00</p> | 4. Press OK and the following screen will appear. |
| <p>Set Clock
■Th 00:00
MM.DD.YY
01. 01. 00</p> | 5. To change the day press △ until the correct day appears. |
| <p>Set Clock
Th ■0:00
MM.DD.YY
01. 01. 00</p> | 6. To change the time press ▷ once. The hour will be highlighted. Press △ or ▽ until the correct hour appears. Press ▷ to move to minutes. Adjust the minutes by pressing △ or ▽ until correct minutes appears. |
| <p>Set Clock
Su 06:16
MM.DD.YY
■1. 01. 00</p> | 7. To change the date press ▷ again. The month will be highlighted. Press △ or ▽ until the correct month appears. Press ▷ to move to day. Adjust the day by pressing △ or ▽ until correct day appear. Press ▷ to move to year. Adjust the year by pressing △ or ▽ until correct year appears. |
| <p>Set Clock
Su 06:16
MM.DD.YY
01. 06. 03</p> | 8. You have finished setting the clock. |
| <p>Su 06:16
01. 06. 03</p> | 7. Press OK and ESC to return to the operating screen. |

Setting Weekly Fan "ON" and "OFF" times

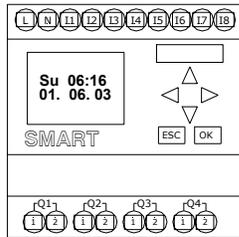
- | |
|-----------------------|
| Su 06:16
01. 06.03 |
|-----------------------|
1. Press
- | |
|---------------------------------------------|
| >Stop
Set Parma
Set Clock
Prg Name |
|---------------------------------------------|
2. Press once.
- | |
|---------------------------------------------|
| Stop
>Set Parma
Set Clock
Prg Name |
|---------------------------------------------|
3. Press
- | |
|-------------------------------------------------------|
| B04: No1
D =MTWTFSS
On = 06: 00
Off = 23: 00 |
|-------------------------------------------------------|
4. Press until the B04: No1 timer appears. This is the time setting for start and stop each weekday.
- | |
|-------------------------------------------------------|
| B04: No1
D =MTWTFSS
On = 06: 00
Off = 23: 00 |
|-------------------------------------------------------|
5. The clock has been factory set to turn the fan on at 6:00 a.m. and off at 23:00 hours or 11:00 p.m.
- | |
|-------------------------------------------------------|
| B04: No1
D =■TWTFSS
On = 06: 00
Off = 23: 00 |
|-------------------------------------------------------|
6. To change the above settings press The cursor will move to M = Monday.
- | |
|--------------------------------------------------------|
| B04: No1
D = MTWTF-S
On = 06: 00
Off = 23: 00 |
|--------------------------------------------------------|
7. Press to remove Monday from the weekly schedule. The - dash indicates the fan will not start automatically any given day.
- | |
|----------------------------------------------------------|
| B04: No1
D = - TWTF- -
On = 06: 00
Off = 23: 00 |
|----------------------------------------------------------|
8. Press to move to the next day of the week. Press each time the fan is not required to operate on that given day. The screen on the left indicates the fan will not automatically operate on Monday, Saturday or Sunday.
- | |
|----------------------------------------------------------|
| B04: No1
D = - TWTF- -
On = ■6: 00
Off = 23: 00 |
|----------------------------------------------------------|
9. Press to move to the hour that the fan will start in the morning. Press to change the hour you want the fan to start in each morning. Press to move to the minute the the fan will start in the morning. Press to change the minutes.
- | |
|----------------------------------------------------------|
| B04: No1
D = - TWTF- -
On = 06: 30
Off = ■3: 00 |
|----------------------------------------------------------|
10. Press to move to the hour that the fan will stop in the evening. Press to change the hour you want the fan to stop each evening. Press to move to the minute the fan stop in the evening. Press to change the minutes.
- | |
|---------------------------------------------------------|
| B04: No1
D = MTWTF- -
On = 06: 30
Off = 22: 30 |
|---------------------------------------------------------|
11. Press
- | |
|-----------------------|
| Su 06:16
01. 06.03 |
|-----------------------|
12. If your selection is complete press and to return to the operating screen. You have completed programming one weekly fan "On" and "Off" cycling. If you wish to program a second (Weekend Operation) or third weekly setting go to the section "Setting Weekend Operation"

Setting Weekend Operation

- | | |
|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Su 06:16
01. 06. 03 | 1. Press <input type="button" value="ESC"/> |
| >Stop
Set Parma
Set Clock
Prg Name | 2. Press <input type="button" value="▽"/> once. |
| Stop
>Set Parma
Set Clock
Prg Name | 3. Press <input type="button" value="OK"/> |
| B04: No2
D = - - - - -
On = - : - -
Off = - : - - | 4. Press <input type="button" value="△"/> until the B04: No1 timer appears. This is the time setting for start and stop each weekday. |
| B04: No2
D = ■ - - - - -
On = - : - -
Off = - : - - | 5. Press <input type="button" value="OK"/> to program the weekend operation. |
| B04: No2
D = - - - - - SS
On = - : - -
Off = - : - - | 6. Press <input type="button" value="▷"/> five times to move to Saturday. Press <input type="button" value="△"/> to turn fan on Saturday. Press <input type="button" value="▷"/> once to move to Sunday. Press <input type="button" value="△"/> to turn fan on Sunday. |
| B04: No2
D = - - - - - SS
On = ■ - : - -
Off = - : - - | 7. Press <input type="button" value="▷"/> to move to the hour that the fan will start in the morning. Press <input type="button" value="△"/> to change the hour you want the fan to start in each morning. Press <input type="button" value="▷"/> to move to the minute the the fan will start in the morning. Press <input type="button" value="△"/> to change the minutes. |
| B04: No2
D = - - - - - SS
On = 10: 00
Off = ■ - : - - | 8. Press <input type="button" value="▷"/> to move to the hour that the fan will stop in the evening. Press <input type="button" value="△"/> to change the hour you want the fan to stop each evening. Press <input type="button" value="▷"/> to move to the minute the fan stop in the evening. Press <input type="button" value="△"/> to change the minutes. |
| B04: No2
D = - - - - - SS
On = 10: 00
Off = 23: 30 | 9. Press <input type="button" value="OK"/> If your selection is complete press <input type="button" value="ESC"/> and <input type="button" value="ESC"/> to return the operating screen. |
| Su 06:16
01. 06. 03 | 10. You have completed programming weekend fan "On" and "Off" cycling. |

Changing the OVERRIDE Time

Setting the OVERRIDE timer



Logo controller located in the Truflo panel electrical section

Su 06:16
01. 06. 03

1. Press **ESC**

>Stop
Set Parma
Set Clock
Prg Name

2. Press **▽** once.

Stop
>Set Parma
Set Clock
Prg Name

3. Press **OK**

B01: T
T = 01:30m
Ta = 01:30m

4. Press **△** until the B06 timer appears. This is the OVERRIDE time

B01: T
T = 01:30m
Ta = 01:30m

5. To change OVERRIDE setting press **OK**

B01: T
T = 02:30m
Ta = 02:30m

6. The first two digits are minutes and the two digits to the right are seconds. Press **△** to change the OVERRIDE length in minutes. Press **▷** to move to the the OVERRIDE time in seconds. Press **△** to change the seconds.

B01: T
T = 02:00m
Ta = 02:00m

7. Press **OK** if the OVERRIDE time is correct.

Su 06:16
01. 06. 03

12. Press **ESC** and **ESC** to return to the operating screen.

K. THE WIRELESS REMOTE OPTION

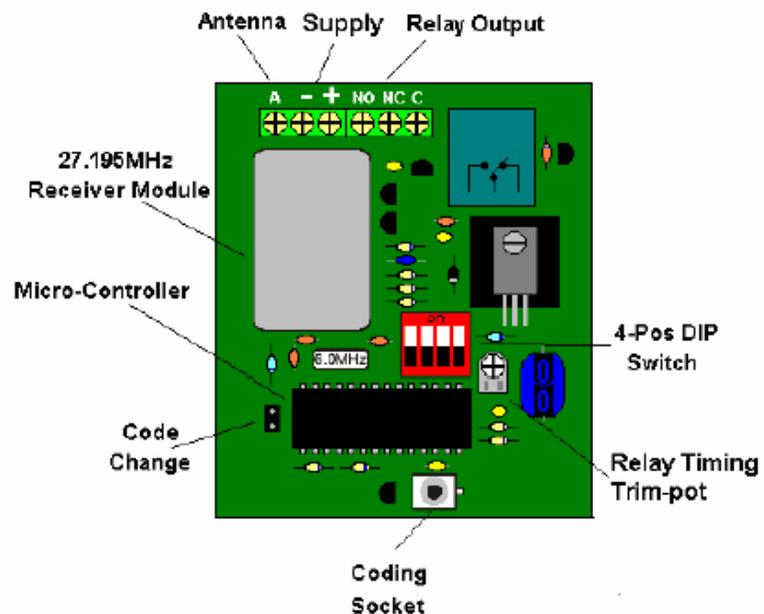
Remote Switch System 1 Installation Guide

Check all wiring connections before applying power!

The Remote Switch System 1 features include multiple relay output modes and a simple to program transmitter. Multiple transmitters can be programmed to one receiver and a single transmitter can operate multiple receivers. A Micro-controller in the receiver randomly generates one of over 4 billion security code combinations. This code is then programmed into the transmitter via a link cable, which is also used for programming multiple receivers to operate from one transmitter. A 4 position DIP switch on the receiver is used to select the mode of the receiver relay output. The receiver has eight modes that control how the relay output function. The relay is a SPDT Class C rated for 5 amps @ 250VAC with Normally Open (NO), Normally Closed (NC), and a Common (C) contact.

The Remote Switch System 1 GL receiver is the key to setting up the system to run properly. The receiver is used to program the transmitter and to select how the relay outputs function when selected by the transmitter. Key components of the receiver are:

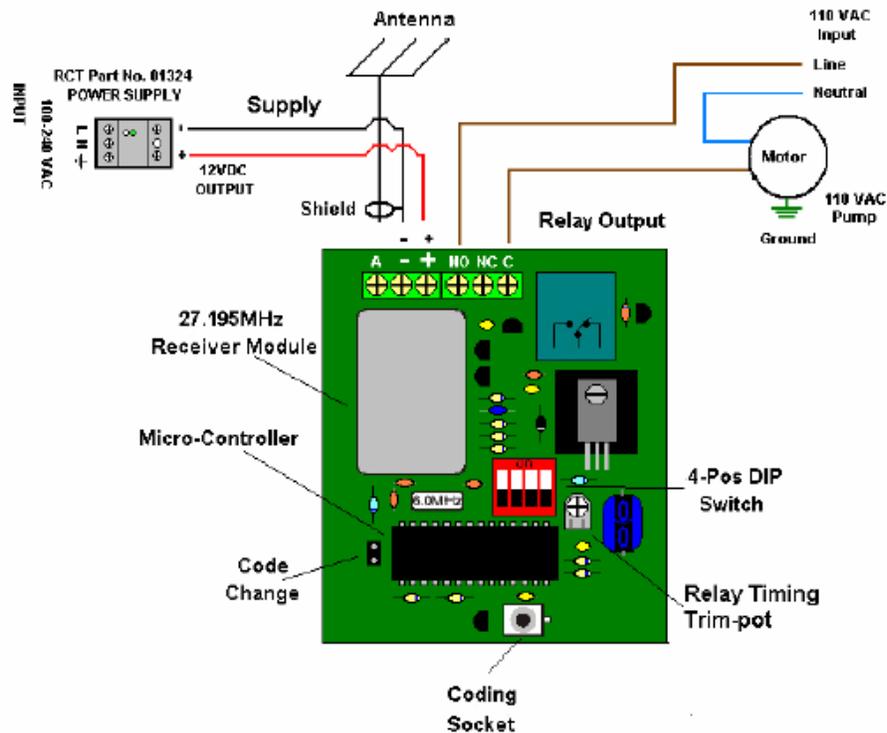
1. Supply Connections
2. Antenna Connections
3. 4 Position DIP Switch
4. Relay Timing Trim-pot
5. Coding Socket
6. Code Change Pins
7. Relay Connections



Receiver Installation Continued

RSS 1 GL Receiver Installation Instructions:

1. Open the door of the enclosure.
2. Connect the 12 VDC to the terminal block at the bottom of the receiver. Neg. 12VDC connects to the outer-right terminal marked with the "-" symbol. Pos 12VDC connects to the center terminal marked with the "+" symbol.
3. Connect your device to the output relay.
4. "NO" = a normally open contact, "C" = the common contact, "NC" = a normally closed contact.
5. Attach your antenna to the connector at the top of the receiver.
6. Double check all connections made to the receiver. Pay special attention to the polarity of power connections and the position of the relays to ensure the receiver is set up correctly.
7. Apply 12 VDC to the receiver.
8. Using a flat bladed screwdriver, short the code change pins marked by the "CC" symbol. This will randomly change the receiver security code.
9. Remove the battery cover of the transmitter to reveal the transmitter's coding socket.
10. Program the transmitter push button operation. (See Transmitter Programming)
11. Install a 9 VDC Alkaline battery and reinstall battery cover.
12. Using the 4 position DIP switch select the mode of operation for the relay. (See Receiver Relay Operation Modes)
13. Mount the RSS 1 GL Receiver inside of a larger enclosure, on a wall, or to a pole.



Antenna Directions

Antenna Directions:

Mount antenna outside of buildings, in a high location, away from V.F.D.'s, large electric motors or any obstructions. Use only high quality coaxial cable and antennas, which RCT can provide. (Do not loop excess coaxial cable into a coil. This will cause a RF (radio frequency) choke and reduce your signal range. If you can, loosely route it back and forth in an "S" configuration).

Transmitter Programming

RSS 1 GL Transmitter Programming:

The RSS 1 GL transmitter is a simple to operate single push button transmitter. The transmitter uses a red LED to display the status of the transmitter.

Transmitter LED Definitions	
Flashing when push button is pressed.	The LED will flash when a Push button on the transmitter is pressed. Indicating that the transmitter is transmitting.
Flashing when push button is not pressed.	This indicates that the battery is low.
Solid (ON)	Indicates the transmitter is connected to the receiver and is ready to be programmed via the link cable
Two Flashes	The LED will flash twice when the transmitter has successfully accepted the receiver programming
No LED (OFF) When Pressing Push Button	If the transmitter battery is completely dead or the transmitter is malfunctioning. The LED will not Flash. Replace Battery with a new 9 VDC Alkaline

Other features include multi-transmitter programming and multi-receiver programming. These features allow the user program multiple transmitters to control one receiver. Once a transmitter has been programmed, it can be used to program additional receivers. A red LED will blink repeatedly indicating a low battery condition.

Single Transmitter Programming:

1. Apply 12VDC to the receiver (See Receiver Installation Instructions)
2. Momentarily short the two code change pins marked with the symbol "CC" on the receiver. This will randomly change the current security code of the receiver. (Skip this step if adding additional transmitters to an existing system.)
3. Connect one end of the link cable (RED) to the coding socket of the receiver. (See Receiver Installation Instructions)
4. Remove the battery cover of the transmitter.
5. Connect the opposite end of the link cable to the coding socket just above the battery of the transmitter. Observe the LED on the keypad of the transmitter. It should be solid red. This indicates a properly installed link cable.
6. Press the push button on the transmitter keypad. Observe the LED on the keypad of the transmitter. The LED will blink twice to indicate the program is complete.
7. Disconnect the link cable from the coding socket on the transmitter, and reinstall the battery cover.
8. Disconnect the link cable from the coding socket on the receiver.
9. Using the 4 position DIP switch on the receiver, select the mode of operation for the relays. (See Receiver Relay Operation Modes)



**RSS 1 GL Transmitter
PN: 5109T**

Other Fine Products From

SPRING AIR SYSTEMS...

- Water Wash Ventilators
 - ◆ Hot Water Wash
 - ◆ Cold Water Spray/Hot Water Wash
 - ◆ Water Wash Control Panels
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- Cartridge Hoods
- Filter Hoods
- Surface Fire Suppression
- Commercial Kitchen Exhaust Fans
- Kitchen Enviro Systems
 - ◆ KES - 100% Exhaust
- Commercial Kitchen Supply Units
- Compensating Hoods
- Exhaust Fans
- Supply Fans
- Commercial Kitchen Control Panels
- Truflo & Melink Variable Speed Exhaust/Supply Systems
- Utility Distributions Systems