Spring Air

Solutions for Energy Savings

Truflow-TC Touchscreen

Installation And Operating Manual

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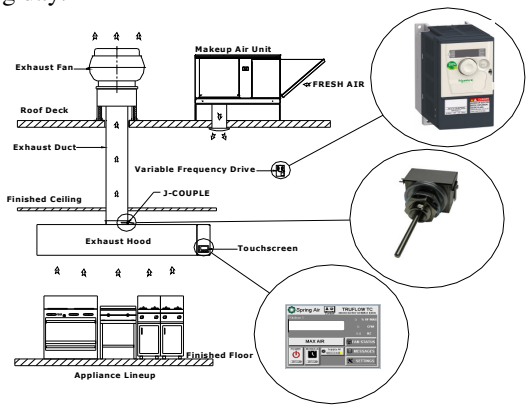
Introduction

The average commercial kitchen exhaust system operates 12 to 18 hours per day. Today's kitchen systems exhaust at 100% capacity whenever they are turned on regardless of that number of appliances or amount of cooking that is going on under the hood. The cook will arrive at 7:00 a.m. in the morning and switch the system on for the day. The system is not shut off until the last person leaves the kitchen at the end of the day. The reality is that the amount of actual high capacity cooking is a very small part of the total operating day.



The Truflow-TC System

Unfortunately when the exhaust runs continuously at full volume all day, so will the fresh air supply heating and cooling fresh air to replace the exhaust from the kitchen.

The Truflow-TC system reduces the amount of air exhausted from the kitchen to match the amount of cooking. As more appliances are used the exhaust and supply volume increases, as less appliances are used the exhaust and supply volume decreases.

What does Truflow-TC Do?

Truflow-TC will automatically reduce the exhaust and supply air into the kitchen whenever appliances are not used at full capacity. The Truflow-TC is a simple, inexpensive way to achieve energy savings by reducing the exhaust and supply volume required for your commercial kitchen. When the appliances are not used and the related heat is turned down or off, the Truflow-TC automatically senses this reduction and decreases the amount of exhaust and supply to match exactly what is happening under the exhaust hood. The Truflow-TC duct mounted J-Couple monitors the hood 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 equilibrium temperatures.

The duct temperature could reach as high as 150F and as low 65F depending on the following factors:

- Kitchen room temperature
- Total exhaust volume
- BTU rating of each appliance
- Total Volume of makeup
- Temperature of Makeup air
- Where the makeup air is introduced back into the kitchen,
- Type of hood over the appliance.

Truflow-TC automatically changes the exhaust and supply to suit the actual cooking operation at any given time during the cooking day.

Automatic Design

The TRUFLOW-TC is an automatic design that will modulate the fan speed based on the rise and fall of the duct-collar air temperature. If at any time during the cooking operation, the exhaust volume of air does not keep up to smoke generated simply touch the MAX AIR button on the DASHBOARD screen. This situation could occur when:

- Large quantities of greasy foods are tossed on the grill at one time or
- A large tilting skillet or kettle is opened quickly or
- A combination oven door is opened without releasing steam slowly at door or
- A draft from a door or window opening.

Minimum duct velocity in the Building Code

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 Mechanical Code, IMC, 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 Truflow-TC installation anywhere in North America.

NFPA-96, 2001
8.2 Airflow

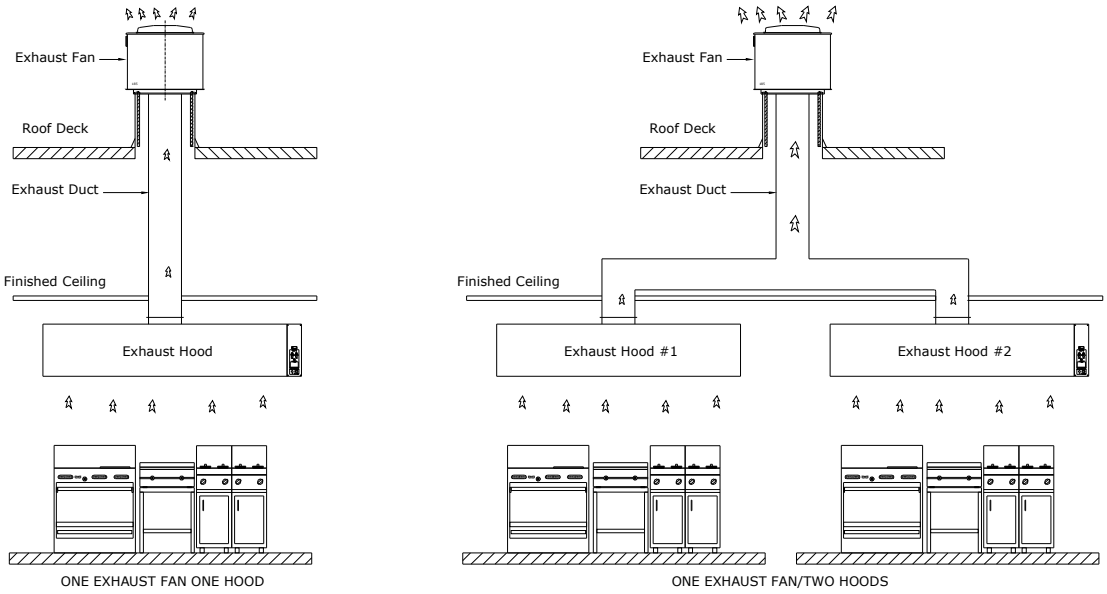
International Mechanical Code. 2003
Section 507 Commercial Kitchen Hoods

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 exhaust fan?

The Truflow-TC is available for connecting up to two exhaust fans with two supply fans and, a total of 12 exhaust hoods. You could have two fans with six hoods each or one fan with twelve hoods. Maximum energy savings will be achieved with two fans and six hoods each arrangement, because the fans would operate as independent kitchens.



One and Two hoods with one

TRUFLOW-TC MODEL NUMBER

RPD-P	1	1	W	TC	1	SC

One exhaust fan connected to panel (up to 2)

One supply fan connected to panel (up to 2)

W- Wall mounted panel
H – Hood mounted panel

TC- Truflow Cost-Effective - Variable Speed

1-Number of exhaust duct collars (up to 12 collars)

SC–Supply control signal
SV – supply variable speed drive

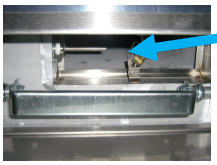
How does the Truflow-TC Work?

The Truflow-TC consists of three primary components:

1. J-Couple.
2. Micro Processor/HMI
3. Variable Frequency Drives.

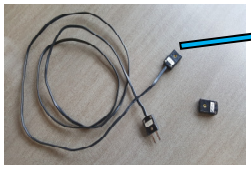
1. J-COUPLE

The J-Couple assembly is mounted in the exhaust duct collar of each hood, threaded through a UL/ULC listed hood penetration fitting in the center of the duct collar. The J-Couple wiring is terminated in a special factory supplied J-Box. Where there are multiple hoods, the J-Couples are connected in series. The last J-Couple assembly requires an EOL plug to complete the control circuit.



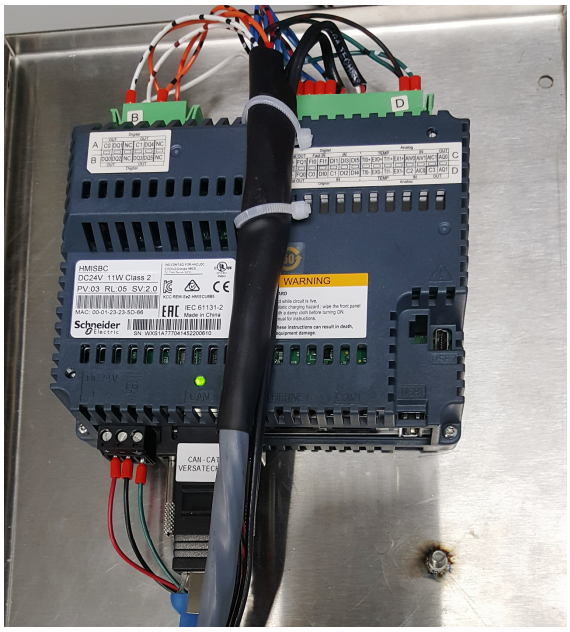
J-couple probe in exhaust duct collar as seen from below hood.

UL/ULC Listed Duct Seal Adaptor

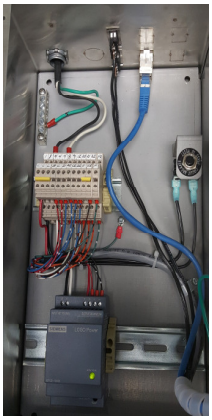


J-Couple Wire (Hood to Hood) and End of Line (EOL) plug

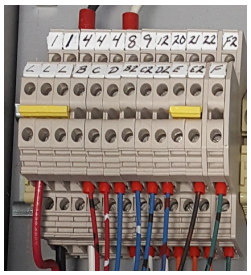
2. MICRO PROCESSOR/HMI



The Micro Processor is a programmable logic controller (PLC) located in the RPD-P-TC control panel. The sequence of operation, overrides, MAX AIR, and panel annunciation functions are all managed through the PLC. The integral HMI (Human Machine Interface) works as the command center for the TruFlow TC system.



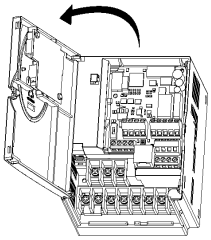
View inside RPD enclosure showing the



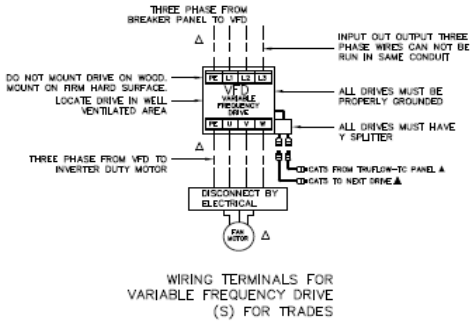
Terminal Strip and Power Supply

3. VARIBLE FREQUENCY DRIVE

The variable Frequency drives for the exhaust and/or supply fan are either located on the wall beside RPD-P-TC panel or in a cabinet mounted on the side of the hood or in the mechanical or electrical room near the roof fans. The frequency that the VFD's run at is derived from the hood temperatures as measured by the J-couples.



Variable Frequency Drive (VFD)

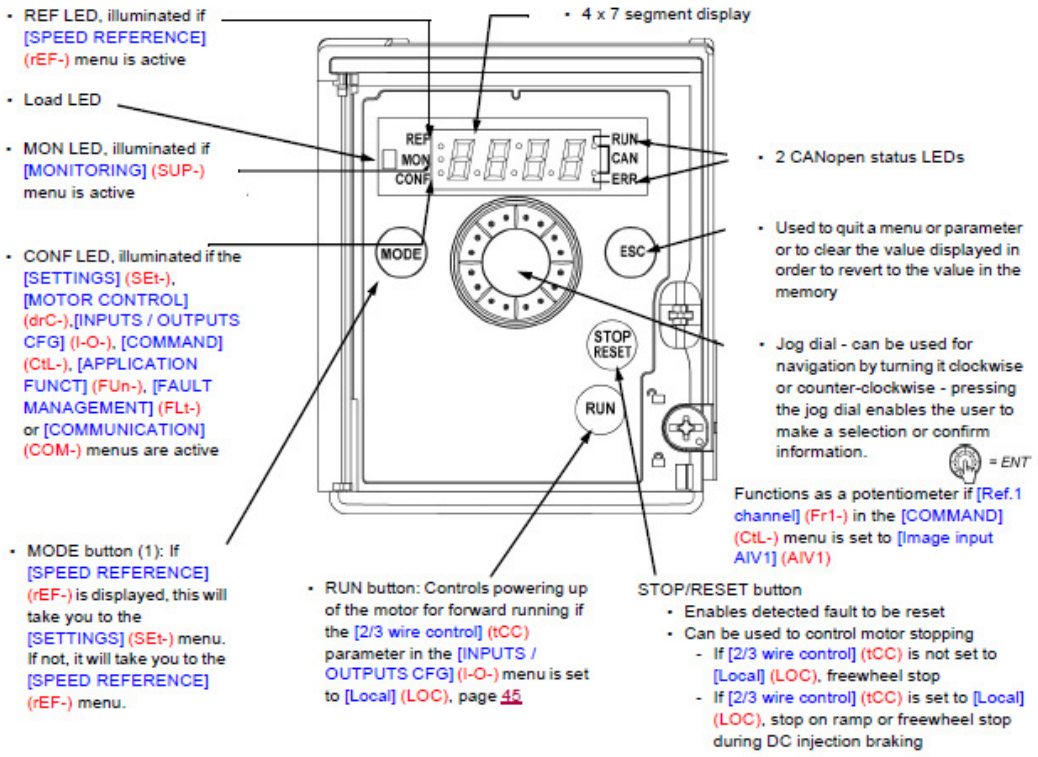


WIRING TERMINALS FOR VARIABLE FREQUENCY DRIVE (S) FOR TRADES

Variable Frequency Drive control wiring

Description of the HMI

Functions of the display and the keys



Normal display, with no fault code displayed and no startup:

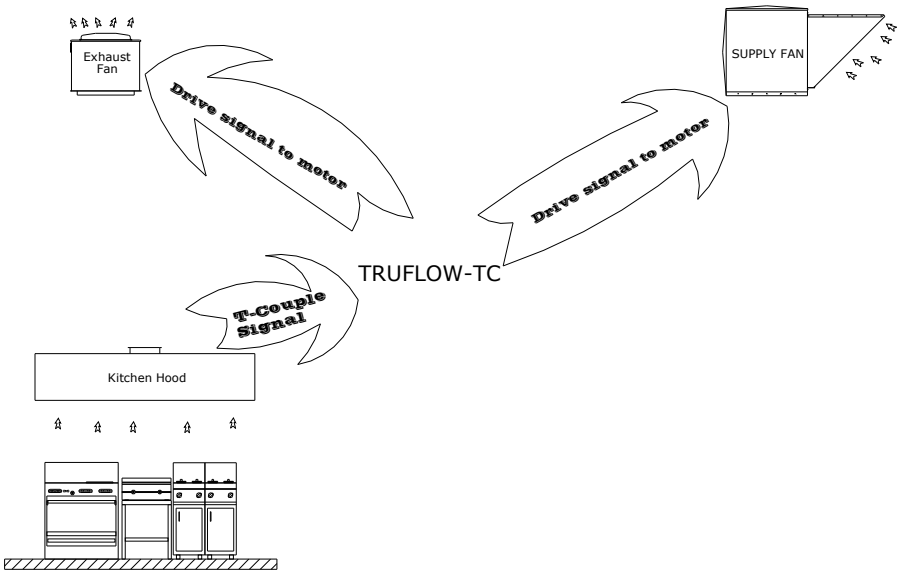
- 43.0 : Displays the parameter selected in the [MONITORING] (SUP-) menu (default: motor frequency). If the current is limited, the display flashes. In such cases, CLI will appear at the top left if an ATV61/ATV71 graphic display terminal is connected to the drive.
- InIt : Initialization sequence
- rdY : Drive ready
- dCb : DC injection braking in progress
- nSt : Freewheel stop
- FSt : Fast stop
- tUn : Auto-tuning in progress

In the event of a detected fault, the display will flash to notify the user accordingly. If an ATV61/ATV71 graphic display terminal is connected, the name of the detected fault will be displayed.

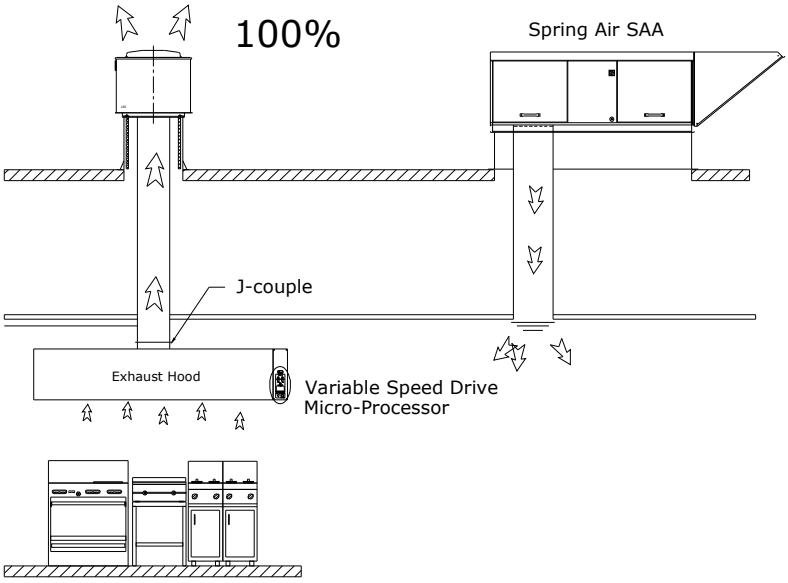
Variable Frequency Drive display and keys

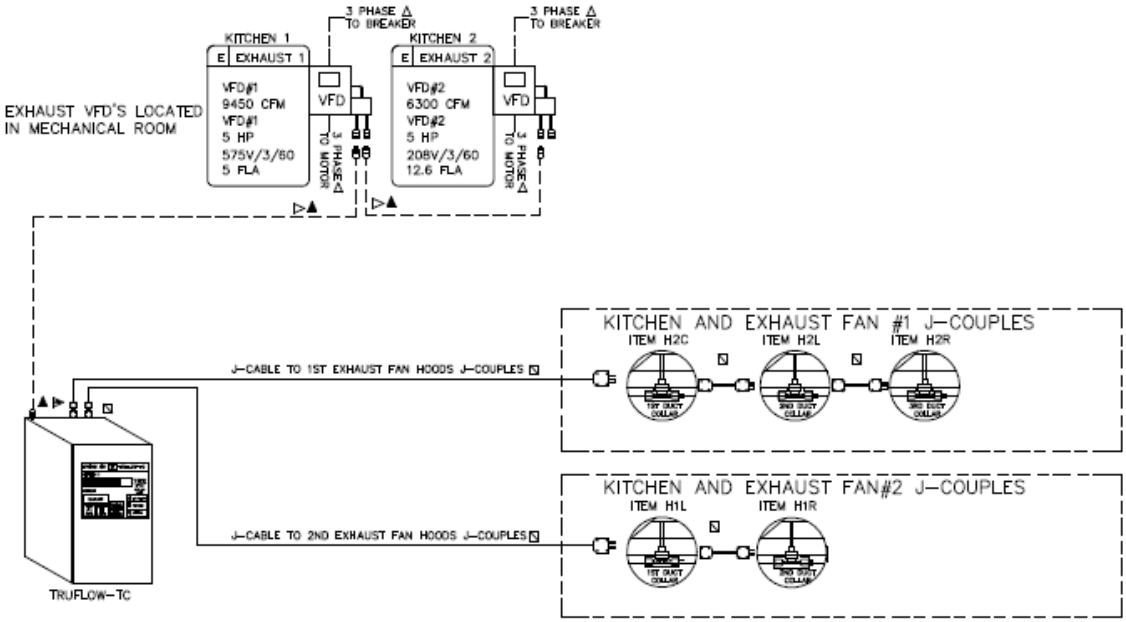
TRUFLOW-TC Operation

The Microprocessor receives signals from the duct mounted J-Couple sensor and transmits a speed signal to the VFD(s). The exhaust and supply motor Variable Frequency Drives (VFD) slows or speeds up the exhaust and supply fans to maintain the required volume depending on the amount of cooking.

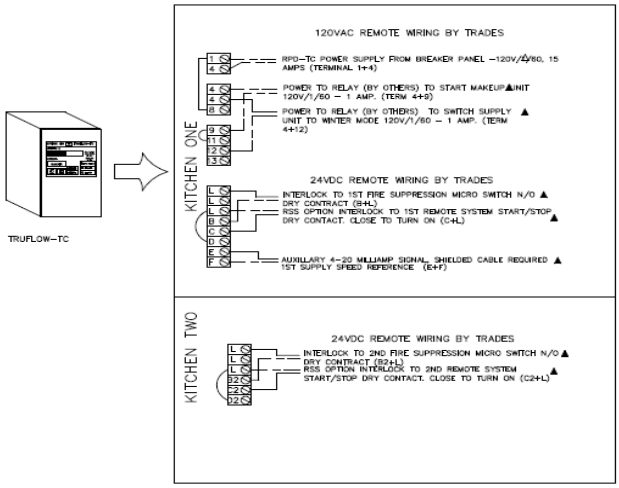


Supply Volume Control with Variable Speed Supply Drive (VFD's)

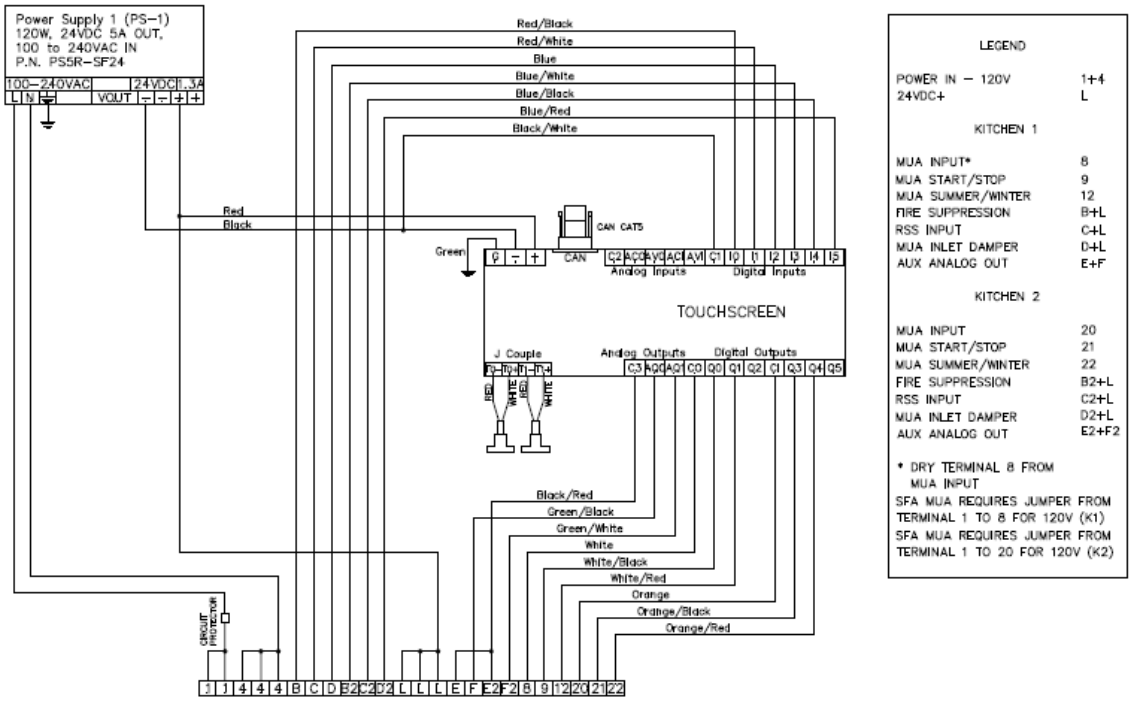




Truflow-TC panel with two kitchens, 5 hood collars, two exhaust VFD and supply fan Control signal only



Truflow-TC panel with two kitchens, two exhaust VFD and supply fan Control signal only



Factory Wiring for RPD-TC Panel

Sequence of Operation (Spring Air System supply unit- SFA)

OPERATION

At the start of the cooking day: Switch the on/off toggle switch to the ON position to activate the ventilation system.

Exhaust Fan(s): The exhaust fan(s) will start immediately in low speed

Supply Unit: The Spring Air supply unit will start after a one minute delay while the fresh air damper opens. Not all supply units have dampers. supply fan will start at low speed.

TRU-FLOW -TC Demand Ventilation: The TRUFLOW-RC adjusts the amount of exhaust automatically as more appliances are operating under the exhaust hood(s). The exhaust will increase from a mid range to high volume. The supply volume will increase as the exhaust fan(s) volume increase.. Switch the HI toggle to increase the volume of all fans to HI for 15 minutes.

At the end of the cooking day: Switch the ON/OFF toggle switch to the OFF 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.

Enclosures

Truflow-TC RPD wall mount panel

Installation and Remote Wiring

Installation

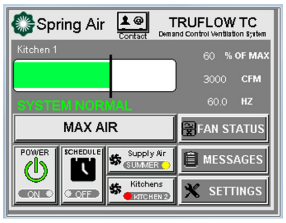
The Truflow-TC system can be easily retrofit into existing kitchens or supplied with new hoods. The recommended location for the RPD TC panel is in the kitchen within view of the cooking operation. The enclosure is typically surface mounted but can also be recessed into the wall with a wall flange. The VFD's can be located in mechanical or electrical rooms, pantries or above in the ceiling space in the kitchen.

Both VFD's and RPD-TC panels must be easily accessible for service and maintenance.

A. Electrical Requirements (RPD-P-TC) and Variable Frequency Controllers hood mounted)

- Power supply to the RPD-P-TC panel 120V/1/60- 15 amps
- Interlock to the wet chemical system Dry Contact (optional)
- Power wiring from the breaker panel to the exhaust variable Frequency drive.
- Power wiring from the breaker panel to the supply variable Frequency drive. (For SV controlled supply unit)
- Power wiring from the exhaust variable Frequency drive to the exhaust fan disconnect switch
- Power wiring from the supply variable Frequency drive to the exhaust fan disconnect switch (For SV controlled supply unit).
- Interlock (dry contract) to the supply air unit 120V/1/60 (for Spring Air supply units only for SC controlled supply unit)
- Interlock to the supply fan motor starter 120V/1/60 (for SC controlled supply units)
- Supply fan inlet damper end switch dry contact connection proving inlet damper open
- Dry contact for summer/winter switch for supply air fan
- J-Couple wires in series from RPD-P-TC to each exhaust duct collar
- Auxiliary analog output signal speed reference or by-pass damper modulation 4-20 mA
- RSS Remote Start/Stop dry contact for interlock with BMS or remote switch

B. Touch Screen Information



The HMI (Human Machine Interface) is the point of contact for operating the TruFlow TC system. The information displayed is the normal operating condition.

There are several sub-screens that provide additional information or selections.

The main screen is the DASHBOARD. It displays system status, percentage of Max system, calculated CFM's, running Hertz of the VFD along with a visual status bar. The color of the status bar indicates the amount of savings in energy that the kitchen is operating to. GREEN represents at or below the target savings setting, YELLOW indicates at or just above the target and RED indicates that the kitchen is not achieving savings but this is normally due to the cooking load that may dictate that the system is operating at peak cooking condition. However, if the cooking load is not at peak and the bar is RED, this would serve to identify that heating equipment should be turned down or off and allow for energy savings.

The lower portion of the screen has icons as follows:

a. Turning the system ON and OFF 

b. Overriding the current speed setting to MAX AIR 

c. Setting up and enabling the scheduled START/STOP function 

d. Switching between SUMMER/WINTER conditions for the Supply Air fan 

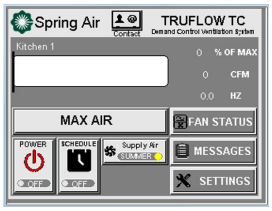
e. Toggling between Kitchen 1 and Kitchen 2 

f. FAN STATUS sub screen 

g. MESSAGES sub screen 

h. SETTINGS sub screen 

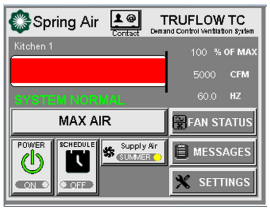
i. DASHBOARD Icons



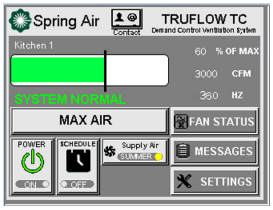
This picture shows a single kitchen TruFlow TC panel with the fan power OFF.

The SCHEDULE function for automatically starting and stopping the system is not enabled (Green).

The Supply fan is set to SUMMER condition.



This picture shows the POWER is ON for single Kitchen (Green). Systems is running at 100% speed and CFM. (Bar is RED. 100% of MAX and 60.0 Hz)



This picture shows the POWER is on for single kitchen (GREEN). Fan status is 60% of MAX.

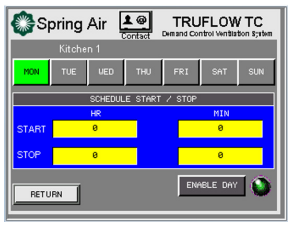
ii. Touching this icon will set the exhaust and supply fans to maximum airflow setting for an adjustable span of time. Factory setting is 20 minutes. The override can be stopped by touching the icon a second time.

Setting the automatic Opening and Closing Times

An automatic time schedule for the TruFow - TC system to turn on and off can be set up for each day of the week. The system will need to set to Automatic via the **SCHEDULE** icon for the schedule to run.

Touch **Automatic Schedule** icon to set automatic opening and closing times.

The Automatic Schedule window will become available.



Touch the **DAY** to turn on and off 

icon to set the time for the kitchen exhaust system for that day.

Touch the yellow field to open the pop-up keyboard and adjust the hour and minute for the kitchen exhaust system to turn on and off.

Press the ENABLE DAY button. 

A green line 

will be displayed under each day that has been enabled.

Continue to set start and stop time for each day of the week.

Touch **RETURN** to 

return to the **Automatic Schedule** window.

Auto schedule will be active if the schedule icon is ON  and GREEN.

Switching between SUMMER/WINTER conditions for the Supply Air fan

This button toggles between **SUMMER** with a YELLOW pilot light and

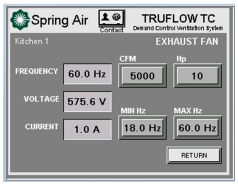
WINTER with a BLUE pilot light.

Toggling between Kitchen 1 and Kitchen 2

Touching the Kitchens button will toggle between Kitchen 1 and Kitchen 2. The number displayed on this button is for the non-active kitchen. Active kitchen is always displayed at the top of the screen over the status bar.

Secondary Screens

When you touch the **FAN STATUS** icon, the following screen is visible:



This screen displays the running frequency of the VFD, the actual voltage at the VFD and the running amps for Kitchen 1. The CFM is the design CFM and the HP is the motor size on Horse Power.

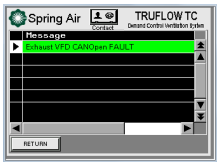
The MIN Hz and MAX Hz are the lower and upper limits for the VFD speed settings.

RETURN will return to dashboard screen.

When there is a second Kitchen, this screen is displayed for the Exhaust Fan 2 when the dashboard is in Kitchen 2.

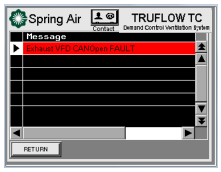
When the system has SV designation, the Supply Air fan status screen will be available for access from this screen.

The following sub-screen displays when the MESSAGES icon is touched.



Whenever there are any faults or issues with the hardware or software, this screen will display a message identifying the occurrence, along with a date and time stamp.

The message will be RED. When the cause of the message has either self-corrected or has been addressed by service technician the message turns GREEN.



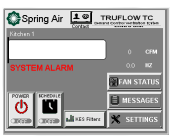
When the control panel senses an input for any reportable alarm or message, the EXCLAMATION screen  will pop up and a chirping alarm will sound.
Touching this screen will take you to the message screen. All active alarms or messages are displayed in RED. The triangular boxes allow cursor movement to read the date and time of the event and to move up or down each event or pages of events. A few of the recorded alarms are filters requiring changing, power outages, and high temperature. Users will need to go to this screen to clear an alarm.

What to do in the event of an alarm:

When an alarm occurs, the window will change to red with a yellow exclamation mark.

Touch the screen anywhere to go to the **MESSAGE STATUS** window.

To clear the variable speed drive, follow these steps:



1. Turn the disconnect on the KES unit to the OFF position.
2. Leave the disconnect off until all lights and the display on the VFD turn off.
3. Turn the disconnect back on.
4. Turn the KES unit back on using the Touchscreen.

For any messages not shown in the list please contact Spring Air Systems Service department for assistance.

Common alarms reported by Touchscreen:

Message on screen:	Cause:	What to do:
EXHT1 VFD CANOpen Fault	Communications fault between PLC and VFD.	Check CAT5 cables for proper connection and pinning.
MUA1 VFD CANOpen Fault	Communications fault between PLC and VFD.	Check CAT5 cables for proper connection and pinning.
Exhaust High Amp Alarm	Exhaust motor over maximum FLA rating.	Check motor for blockage or seized pulleys. May have burnt wirings
Exhaust Low Amp Fault	Exhaust motor under minimum amp set point.	Check circuit breaker for full voltage. Check wiring connections. Check for broken belts.
Fire Suppression Alarm	Wet Chemical fire suppression system activated.	Check Fire Suppression micro switch for annunciation to RPD panel. Should be on Normally Open contact. Reset at message screen.
Kitchen AutoStart	Exhaust fan auto starts if heat is detected under hood without turning on the system.	Touch the START icon on the dashboard to turn system ON.
J-Couple Trouble	J-couple cable may have become disconnected or has been damaged. Alarm set point has been exceeded.	Check j-couple wire connections at panel and hood exhaust collar. Possible blockage in exhaust flue. Check probe and clean.
EXHT Motor Overload Fault	Exhaust motor has exceeded maximum FLA setting.	Check for motor blockage, seized pulleys or burnt wiring.
MUA Motor Overload Fault	Supply motor has exceeded maximum FLA setting	Check for motor blockage, seized pulleys or burnt wiring.
EXHT Motor Phase Fault	Exhaust motor lost one or more phases.	Check all wiring connections between VFD and motor. Check winding continuity.
MUA Motor Phase Fault	Supply motor lost one or more phases.	Check all wiring connections between VFD and motor. Check winding continuity.

EXHT Main Overvoltage Fault	Exhaust line feed has exceeded maximum voltage allowances.	Call electrician for further investigation of overvoltage.
MUA Main Overvoltage Fault	Supply line feed has exceeded maximum voltage allowances.	Call electrician for further investigation of overvoltage.
EXHT Main Phase Fault	Exhaust fan line feed has lost one or more phases.	Call electrician for further investigation of Phase loss.
MUA Main Phase Fault	Supply fan line feed has lost one or more phases.	Call electrician for further investigation of Phase loss.
EXHT Motor Short Circuit Fault	Exhaust motor has an open disconnect or contactor or loose wiring between VFD and motor	Check motor for burnt windings, open contactors or disconnects or loose connections inside motor
MUA Motor Short Circuit Fault	Supply motor has an open disconnect or contactor or loose wiring between VFD and motor	Check motor for burnt windings, open contactors or disconnects or loose connections inside motor
EXHT Main Under voltage Fault	Exhaust fan line feed has insufficient voltage to run motor.	Call electrician for further investigation of under voltage.
MUA Main Under voltage Fault	Supply fan line feed has insufficient voltage to run motor.	Call electrician for further investigation of under voltage.

Touching this icon allows access to internal settings and adjustment features. Access to the settings and options is by user and password. The local authorized service technician has access capability. There are no settings that need to be accessed by the end user.

Logging in and out of the Touchscreen

In order to make any changes to the system setup, the service technician must log in.

Touch the ***SETTINGS*** icon.


Touch the **Login** icon. (UN-LOCKED PADLOCK)

Touch the white field beside **Name**.


Type your username in the pop-up keyboard.
Touch **Enter** key.

Screen returns to the Login window.

The login name is case sensitive. The CAPS key is on automatically.

Touch the white field beside  **Password.**

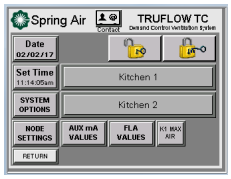
Type your password in the pop-up keyboard.
T*ouch* **Enter** key. Screen returns to Login window.

The password is also case sensitive.

Touch the **UNLOCK** icon.

Touch the word **Close** to close the login box.

You have completed the login.



This is the new screen displayed after logging in.

Logout

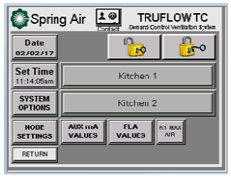
The Touchscreen will automatically log out users after a pre-set length of time. You can also manually log out with following instructions.

Touch the **Settings** window button.

Touch the **LOCK** button (LOCKED PADLOCK). Touch the **LOCK** button again to confirm.

You are now logged out.

Settings Screen - Options



This screen allows for adjustments and optional selections depending on the equipment supplied and or connected.

The date has been hard-coded and cannot be changed. It will automatically adjust for Leap Years.

The time function has been set for the time zone where the unit is to be installed. It does not automatically adjust for Daylight Savings time. This feature must be adjusted manually.

Changing Time

The Touchscreen will update itself for Leap Years; however, a user will need to adjust the time for daylight savings and the local time zone for the location that the unit is installed in.

Touch the field with the HOUR.  Enter the correct hour of day (uses 24 hour format for entry).

Touch the field with the MINUTES. Enter the correct minutes.

Touch the **CONFIRM**  button to lock in the new setting.

These icons will allow specific site designation of the two kitchens. Touching the bar, will pop-up an input screen that will allow custom labels, i.e. PREP BROILER or FRY.

From the SETTINGS screen press the SYSTEMS OPTIONS button

There are several options available; **RSS** (Remote Start Stop), **KITCHEN 2** (second kitchen), **SUPPLY 1** (Supply fan with VFD for 1st kitchen), **SUPPLY 2** (Supply fan with VFD for 2nd kitchen), **SUPPLY AVERAGE** (Averages 2 kitchens for single supply fan VFD), **AUTO START** (Thermal activation of fan system), **DFMUA** (Direct-fired make up air interlock) **MUA MS** (motor starter for MUA unit).

These options are explained in more detail below.

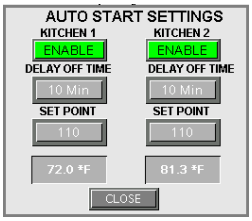
The **RSS** Remote Start/Stop icon allows the systems to be started and stopped from a location away from the panel. Touching this icon turns it GREEN and enabled.

Kitchen 2 activates the second kitchen settings and inputs for exhaust fan. Enables the Kitchen switch on the main dashboard.

This icon allows the MUA speed to be controlled by a VFD on the CANOPEN network. When this icon is enabled, the Fan Status will show Supply Fan settings.

These icons enable a **SUMMER/WINTER** switch on the touchscreen for MUA1 and MUA2

The **AUTO START** function allows the TruFlow system to activate automatically when the set temperature is reached without manually turning on the system. The activation setting is adjustable as well as the delay off timer.



Touching the ENABLE 

icon activates the Auto Start turning the button GREEN.

To set the Delay Off Time, touch the Icon. 

A pop-up screen with a number pad will appear. Enter the number of the minutes of delay so the hood will have a chance to cool down with the exhaust fan running**.**

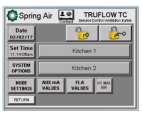
To adjust the SET POINT, touch 

button. Enter the desired temperature setting in Degrees Fahrenheit.

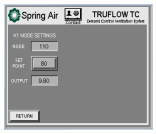
Touching this icon will ENABLE the PLC to average two exhaust fans for one output speed reference for the MUA.

This feature allows for a double interlock of the exhaust and supply fans. In this mode, the exhaust fan will not start until the supply fan proves that it is running. Once the supply and exhaust are running, the supply heater will only activate if the exhaust fan is running. This is usually only required with Direct-fired Supply heaters. To enable this feature *TOUCH* the **DOUBLE i** button and it will turn **GREEN** when active.

Temperature Node Setting



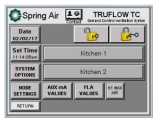
In order to access the temperature **NODE** settings you need to access the settings screen and touch the **NODE SETTINGS** icon. 



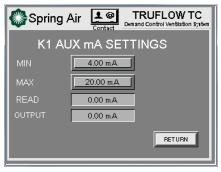
The **NODE** window displays the temperature received from the J-couple on the hood. The **SET POINT** icon is 

used to adjust the starting point for the speed to begin increasing. The set point represents 4 mA or the lowest speed for the VFD. The **OUTPUT** window displays the mA reference that is used for the VFD speed.

Setting Auxiliary mA Values



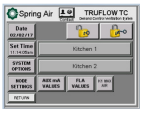
In order to access the Auxiliary mA value for output to the MUA VFD as a speed reference, you need to access the settings screen and touch the **AUX mA VALUES** icon. 



Touching the **K1 AUX mA** icon displays the setting screen. From here, you can adjust the **MIN** and **MAX** mA settings that are sent to the Auxiliary Output on terminals E and F in the RPD panel.

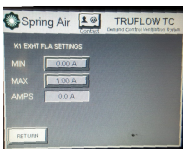
Touching the number box for **MIN** or **MAX** will open a pop-up window that will allow entering a number between 4.0 and 20.0. This will override the **READ** value and change the **OUTPUT** number.

 Setting the FLA Limits



From the **SETTINGS** screen Press the **FLA**  **VALUES** icon.

This will access the **FLA SETTINGS** screen. Settings are done for each kitchen separately.

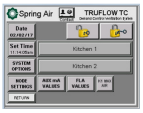


During the start-up of the exhaust fan, the minimum amps setting is to be determined by running VFD at minimum Hz. Record the actual RUNNING AMPS and enter the value recorded into the **MIN FLA**.

This setting aides in detecting the actual running of the VFD at lower than minimum set point or if the belt breaks.

The **MAX** amps should be equal to the FLA as marked on the exhaust fan motor.

 Setting MAX Air Run Time



The **MAX AIR** (override) run time is adjusted from the SETTINGS screen by touching the **K1 MAX AIR** or **K2 MAX AIR** icons.

This pop-up screen displays when you touch the **K1 MAX AIR** icon. The active box allows you to set the **MAX AIR** duration to any value. Factory setting is 20 minutes. When performing the airflow checks at startup this is usually set to 60 minutes.

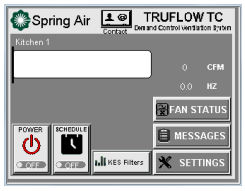
Surface Fire Alarm

In the event of the exhaust hood surface fire suppression system activating, the TC touch screen will display as shown to the left. Touching the Yellow exclamation icon will take you to the DASHBOARD.

It will show the system has shut down and a banner will read “SYSTEM ALARM”. If you touch the MESSAGES button, you will see the message “Fire Suppression Alarm**”.**

To resume normal operation, the fire suppression system and TC panel unit will need to be reset. The fire suppression contractor will need to reset the suppression release to open the micro switch that signals the tripped status. Once this has been reset, you will need to go to the MESSAGE screen.You will see the Surface Fire Suppression RESET button. Touching this button will reset and allow normal operation of the TC system.

Local Service Company Contact Information



The touchscreen has the capability of storing and displaying the contact information of the authorized local service company in the area where the KES unit is located.

On the dashboard screen touch the 

icon. This will pop up the screen shown below.

The local service company that was contracted to perform the initial start-up and any warranty work within the warranty period, should have input their company name, technician that performed the start-up, phone number and e-mail address for the service dispatcher.

The Project ID will be input at the factory and should be used whenever contacting Sparing Air Systems for information or alerting about any operating issues.

Touching the CLOSE icon returns to the dashboard.

APPENDIXES

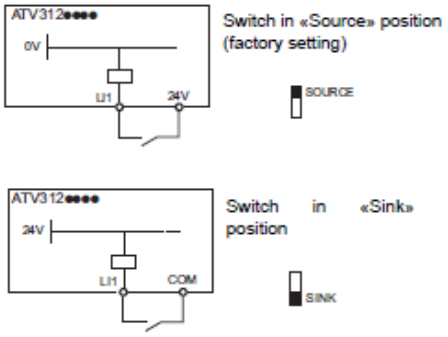
A. LOGIC CONFIGURATION SWITCH SCHEMATIC

The Logic Configuration Switch must be set to Sink.

Logic input switch

This switch (1) assigns the link to 0V, 24 V or "floating":

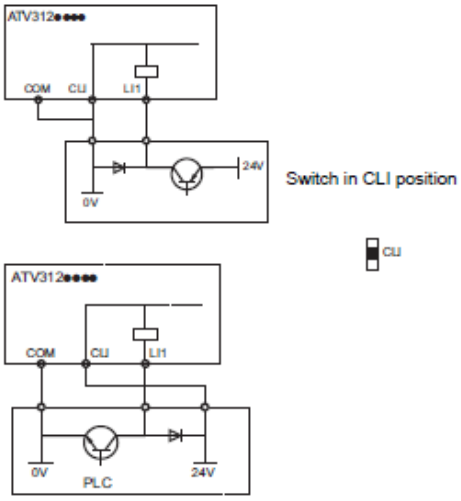
Using volt-free contacts



Switch in «Source» position (factory setting)

Switch in «Sink» position

Using PLC transistor output



Switch in CLI position

(1) See page 24 to locate the switch on the terminal board.

⚠ DANGER

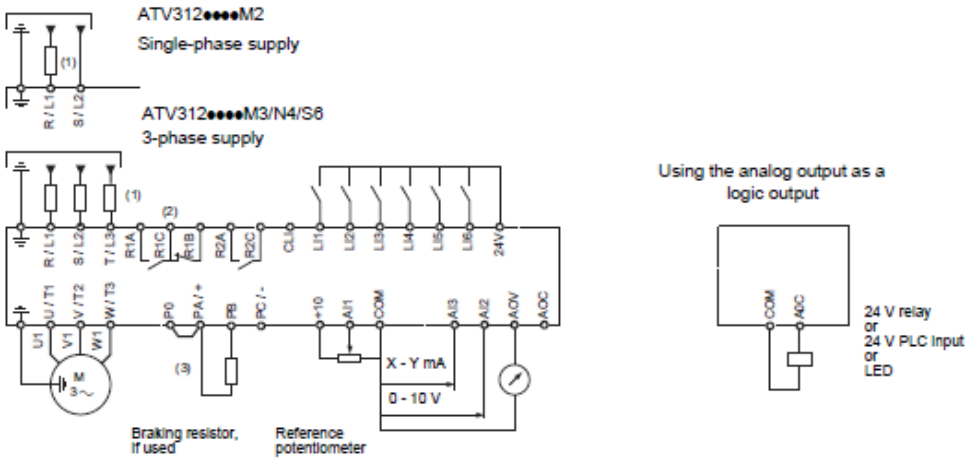
UNINTENDED EQUIPMENT OPERATION

- Prevent accidental grounding of logic inputs configured for sink logic. Accidental grounding can result in unintended activation of drive functions.
- 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 will result in death or serious injury.

B. FACTORY DRIVE TERMINAL SCHEMATIC

General wiring diagram



(1)Line choke, if used (single phase or 3-phase)
(2)Fault relay contacts, for remote indication of the drive status
(3)If a braking resistor is connected, set [Dec ramp adapt.] (brA) parameter to yes (refer to the progamming manual).

Note 1: Use interference suppressors on all inductive circuits near the drive or coupled to the same circuit (relays, contactors, solenoid valves, etc).

Note 2: This diagram is for the standard ATV312 products. Optional communication cards may change the control wiring of the product. Please see the associated documentation for the option cards for details.

Choice of associated components:
Please refer to the catalogue.

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.

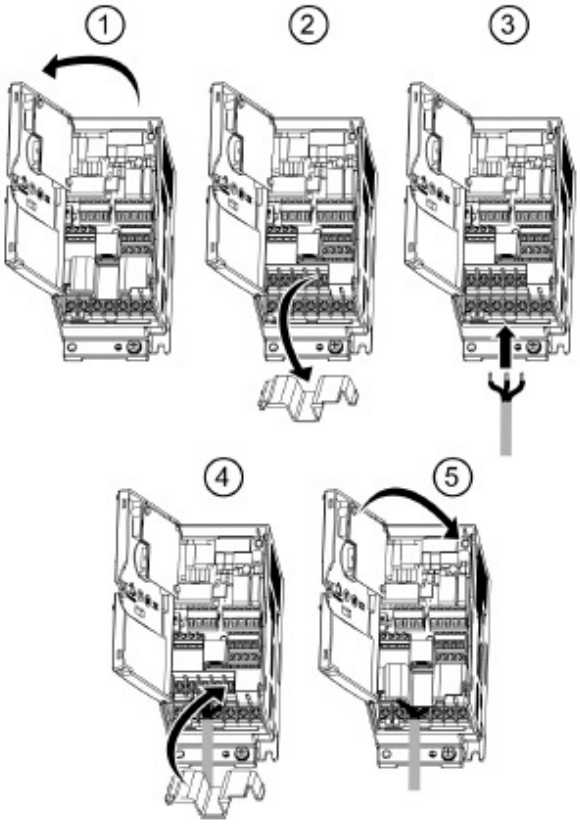
(5) Installation of a load filter is recommended for all 575 V applications. See page 22.

C. DRIVE POWER TERMINALS

Power terminals

Access to the power terminals

To access the terminals, open the cover as shown in the example below.



⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH.

Replace the cover plate on the terminals and close the door before applying power.

Failure to follow these instructions will result in death or serious injury.

Functions of the power terminals

Terminal	Function	For Altivar 312
⏚	Ground terminal	All ratings
R/L1 - S/L2	Power supply	ATV312●●●●M2
R/L1 - S/L2 - T/L3		ATV312●●●●M3 ATV312●●●●N4 ATV312●●●●S6
PO	DC bus + polarity	All ratings
PA/+	Output to braking resistor (+ polarity)	All ratings
PB	Output to braking resistor	All ratings
PC/-	DC bus - polarity	All ratings
U/T1 - V/T2 - W/T3	Outputs to the motor	All ratings

Arrangement and caracteristics of the power terminals

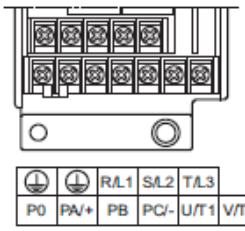
CAUTION

RISK OF DAMAGE TO THE DRIVE

- Never remove the link between PO and PA/+.
- The PO and PA/+ terminal screws must always be fully tightened as a high current flows through the link.

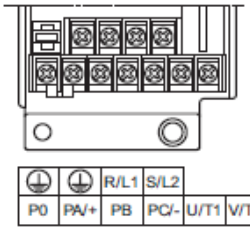
Failure to follow these instructions can result in equipment damage

ATV312H 018M3 ... 075M3



ATV312H	Applicable wire size (1) mm² (AWG)	Recommended wire size (2) mm² (AWG)	Tightening torque N·m (lb.in)
018M3, 037M3 055M3, 075M3	2.5 (14)	2.5 (14)	0.8 (7.1)

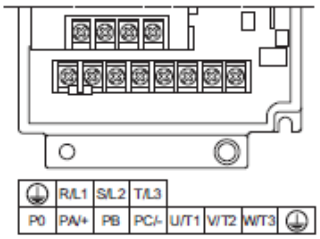
ATV312H 018M2 ...075M2



ATV312H	Applicable wire size (1) mm² (AWG)	Recommended wire size (2) mm² (AWG)	Tightening torque N·m (lb.in)
018M2, 037M2 055M2, 075M2	2.5 (14)	2.5 (14)	0.8 (7.1)

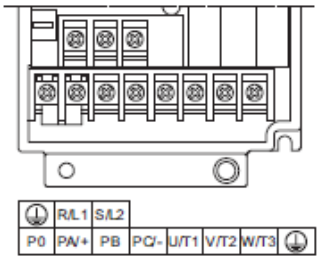
(1)The value in bold corresponds to the minimum wire gauge to permit secureness.
(2)75°C (167 °F) copper cable (minimum wire size for rated use).

ATV312H U11M3 ...U40M3
ATV312H 037N4 ... U40N4
ATV312H 075S6 ... U40S6



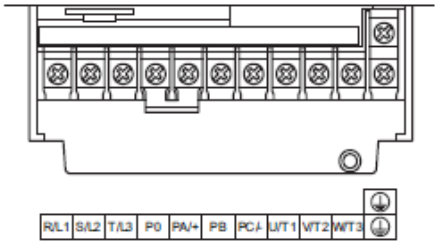
ATV312H	Applicable wire size (1) mm² (AWG)	Recommended wire size (2) mm² (AWG)	Tightening torque N·m (lb.in)
U11M3, U15M3 037N4, 055N4, 075N4, U11N4, U15N4 075S6, U15S6	**2.5** to 6 (**14** to 10)	2.5 (14)	0.8 (7.1)
U22M3	**2.5** to 6 (**12** to 10)	3.5 (12)	1.2 (10.7)
U30M3, U40M3	6 (10)	6 (10)	1.2 (10.7)
U22N4, U30N4 U22S6, U40S6	**2.5** to 6 (**14** to 10)	2.5 (14)	1.2 (10.7)
U40N4	**4** to 6 (**12** to 10)	4 (12)	1.2 (10.7)

ATV312H U11M2 ... U22M2



ATV312H	Applicable wire size (1) mm² (AWG)	Recommended wire size (2) mm² (AWG)	Tightening torque N·m (lb.in)
U11M2, U15M2	**2.5** to 6 (**12** to 10)	3.5 (12)	1.2 (10.7)
U22M2	**4** to 6 (**12** to 10)	4 (12)	1.2 (10.7)

ATV312H U55M3, U75M3
ATV312H U55N4, U75N4
ATV312H U55S6, U75S6

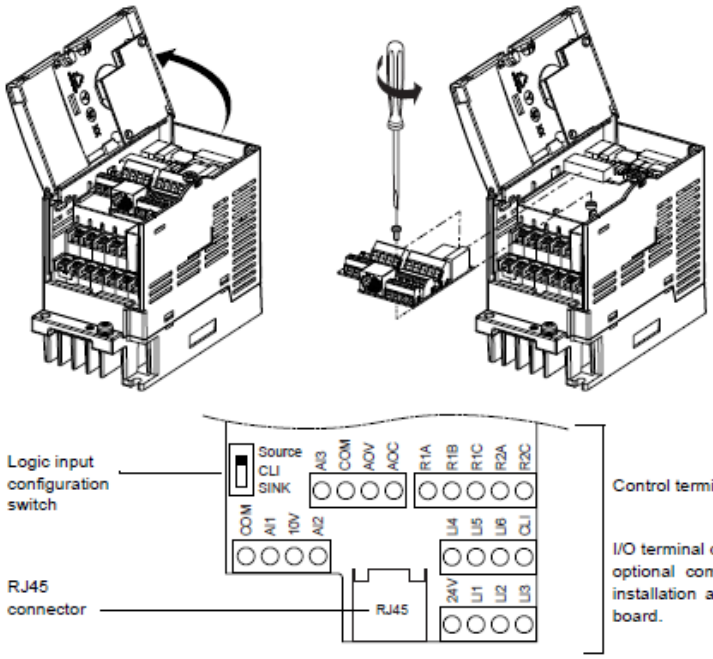


ATV312H	Applicable wire size (1) mm² (AWG)	Recommended wire size (2) mm² (AWG)	Tightening torque N·m (lb.in)
U55M3	**10** to 16 (**8** to 6)	10 (8)	2.5 (22.3)
U75M3	16 (6)	16 (6)	2.5 (22.3)
U55N4, U55S6, U75S6	**6** to 16 (**10** to 6)	6 (10)	2.5 (22.3)
U75N4	**10** to 16 (**8** to 6)	16 (8)	2.5 (22.3)

(1)The value in bold corresponds to the minimum wire gauge to permit secureness.
(2)75°C (167 °F) copper cable (minimum wire size for rated use).

D. ACCESS TO THE DRIVE CONTROL TERMINALS

Access to the control terminals



⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- Do not plug or unplug the terminal board while drive is powered.
- Check the tightening of the fixing screw after any manipulation on the terminal board.

Failure to follow these instructions will result in death or serious injury.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Do not touch the terminal board before :

- removing power on the drive,
- removing any voltage on input and output terminals.

Failure to follow these instructions will result in death or serious injury.

Arrangement of the control terminals

ATV312 Control terminals	Applicable wire size (1) mm² (AWG)	Tightening torque (2) N·m (lb.in)
R1A, R1B, R1C, R2A, R2C	**0.75** to 2.5 (**18** to 14)	0.5 to 0.6 (4.4 to 5.3)
Other terminals	**0.14** to 2.5 (**26** to 16)	

(1) The value in bold corresponds to the minimum wire gauge to permit secureness.
(2) Recommended to maximum value.

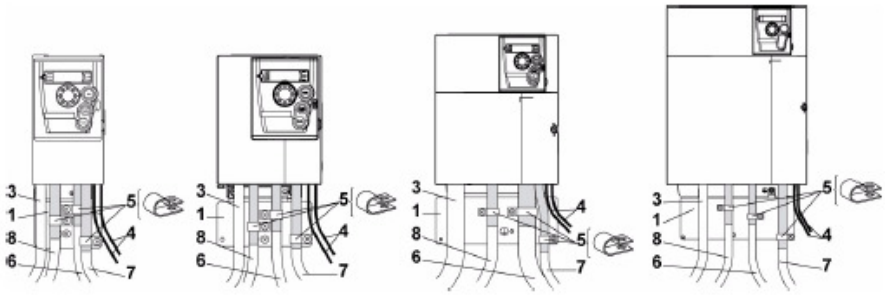
E. NEMA 1 DRIVE KIT

Optional EMC plate installation diagram and instructions (examples)

Installation depends on the drive size. The table below gives the size according to the reference.

Size 1	Size 2	Size 3	Size 4	Size 5	Size 6	Size 7	Size 8	Size 9
H018M3, H037M3	H055M3, H075M3	H018M2, H037M2	H055M2, H075M2	HU11M3, HU15M3	HU11M2, HU15M2, HU22M3, H037N4, H055N4, H075N4, HU11N4, HU15N4, H075S6, HU15S6	HU22M2, HU30M3, HU40M3, HU22N4, HU30N4, HU40N4, HU22S6, HU40S6	HU55M3, HU75M3, HU55N4, HU75N4, HU55S6, HU75S6	HD11M3, HD15M3, HD11N4, HD15N4, HD11S6, HD15S6

Sizes 1 to 4 Size 5 to 7 Size 8 Size 9



1. EMC plate supplied with the drive, to be installed as indicated on the diagram.
2. Altivar 312
3. Non-shielded power supply wires or cable
4. Non-shielded wires for relay contacts
5. Attach and ground the shielding of cables **6**, **7** and **8** as close as possible to the drive:
   - Strip the shielding.
   - Use stainless steel cable clamps of an appropriate size on the parts from which the shielding has been stripped, to attach them to the plate **1**.

   The shielding must be clamped tightly to the metal plate to improve electrical contact.
6. Shielded cable for motor connection with shielding connected to ground at both ends.
   The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.
   For 0.18 to 1.5 kW drives, if the switching frequency is higher than 12 kHz, use cables with low linear capacitance: max. 130 pF (picoFarads) per meter.
7. Shielded cable for connecting the control/signalling wiring.
   For applications requiring several conductors, use cables with a small cross-section (0.5 mm^2, 20 AWG).
   The shielding must be connected to ground at both ends. The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.
8. Shielded cable for connecting braking resistor (if used).
   The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.

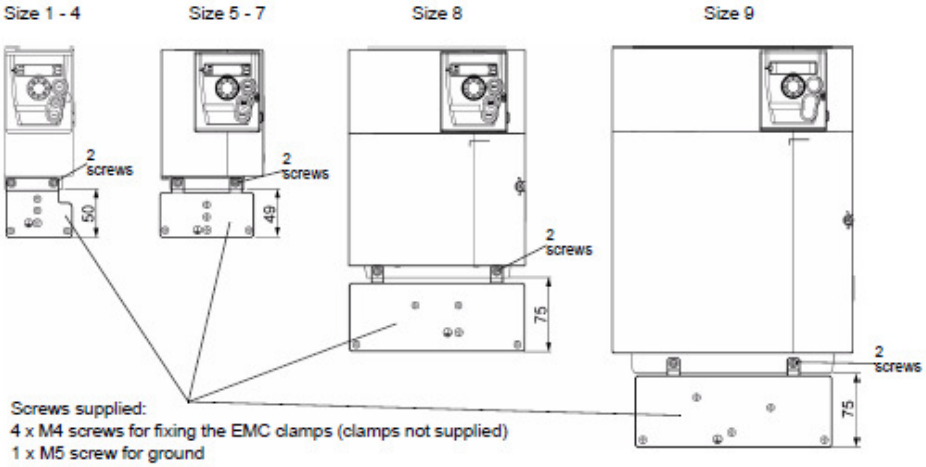
Note:

- If using an additional input filter, it should be mounted under the drive and connected directly to the line supply via an unshielded cable. Link 3 on the drive is then via the filter output cable.
- The HF equipotential ground connection between the drive, motor and cable shielding does not remove the need to connect the PE ground conductors (green-yellow) to the appropriate terminals on each unit.

Installing the EMC plates

EMC mounting plate: Supplied with the drive

Fix the EMC equipotentiality mounting plate to the holes in the ATV312 heatsink using the 2 screws supplied, as shown in the drawings below.



ATV312H	Size
018M3, 037M3	1
055M3, 075M3	2
018M2, 037M2	3
055M2, 075M2	4
U11M3, U15M3	5
U11M2, U15M2, U22M3, 037N4, 055N4, 075N4, U11N4, U15N4, 075S6, U15S6	6

ATV312H	Size
U22M2, U30M3, U40M3, U22N4, U30N4, U40N4, U22S6, U40S6	7
U55M3, U75M3, U55N4, U75N4, U55S6, U75S6	8
D11M3, D15M3, D11N4, D15N4, D11S6, D15S6	9

Bus voltage measurement procedure

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the precautions in "Before you begin" page 5 before performing this procedure.

Failure to follow these instructions will result in death or serious injury.

The DC bus voltage can exceed 933 Vdc. Use a properly rated voltage-sensing device when performing this procedure. To measure the DC bus voltage:

1. Disconnect all power.
2. Wait 15 minutes to allow the DC bus to discharge.
3. Measure the voltage of the DC bus between the PA/+ and PC/– terminals to ensure that the voltage is less than 42 Vdc.
4. If the DC bus capacitors do not discharge completely, contact your local Schneider Electric representative. Do not repair or operate the drive.

F. DRIVE MAINTENANCE

Maintenance

Servicing

The Altivar 312 does not require any preventive maintenance. However, it is advisable to perform the following checks regularly:

- The condition and tightness of connections.
- Ensure that the temperature around the unit remains at an acceptable level and that ventilation is effective. Average service life of fans: 10 years.
- Remove any dust from the drive.
- Ensure proper fan operation.
- Physical damage to covers.

Assistance with maintenance, detected fault display

If a problem arises during setup or operation, ensure that the recommendations relating to the environment, mounting and connections have been observed.

The first fault detected is stored and displayed, flashing, on the screen: the drive locks and the status relay (R1) contact opens.

Clearing the detected fault

Disconnect the drive power supply in the event of a non-resettable fault.
Wait for the display to go off completely.
Find the cause of the detected fault and correct it.
Restore power to the drive.
The detected fault will no longer be present if it's cause has been corrected.
In the event of a non resettable detected fault:

- Remove/cut the power to the drive.
- WAIT 15 MINUTES to allow the DC bus capacitors to discharge. Then follow the "Bus Voltage Measurement Procedure" page 16 to verify that the DC voltage is less than 42 V. The drive LEDs are not indicators of the absence of DC bus voltage.
- Find and correct the detected fault.
- Restore power to the drive to confirm the detected fault has been rectified.

Certain detected faults can be programmed for automatic restart after the cause has disappeared.
These detected faults can also be reset by cycling power to the drive or by means of a logic input or control bit.

Display menu

Use the display menu to show the status of the drive and it's current values as an aid for finding the causes of detected faults.

Spares and repairs

Serviceable product: replacement of spares following the catalog.

Procedure after a long time storage

⚠ WARNING

RISK OF EXPLOSION AT THE POWER UP

The capacitors after a long time storage can have issues. Following a storage time between 2 and 3 years:

- Use one AC supply variable connected between L1, L2 and L3
- Increase AC supply voltage to have:
  - 25% of rated voltage during 30mn
  - 50% of rated voltage during 30mn
  - 75% of rated voltage during 30mn
  - 100% of rated voltage during 30mn

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

G. 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.

H. 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

- 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.

Recommendations

Power and circuit protection

The drive must be grounded to conform with the regulations concerning high leakage currents (over 3.5 mA).

Where local and national codes require upstream protection by means of a residual current device, use a type A device for single-phase drives and a type B device for three-phase drives as defined in the IEC Standard 60755.
Choose a suitable model integrating:

- High frequency current filtering,
- A time delay that helps to prevent tripping caused by the load from stray capacitance on power-up.
  The time delay is not possible for 30 mA devices; in this case, choose devices with immunity against nuisance tripping.

If the installation includes several drives, provide one "residual current device" per drive.

Keep the power cables separate from circuits in the installation with low-level signals (detectors, PLCs, measuring apparatus, video, telephone).

If you are using cables longer than 50 m (164 ft) between the drive and the motor, add output filters (please refer to the catalogue).

Control

Keep the control circuits away from the power cables. For control and speed reference circuits, we recommend using shielded twisted cables with a pitch of between 25 and 50 mm (1 and 2 in.), connecting the shielding to ground at each end.

Equipment Grounding

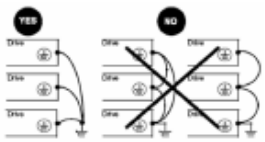
Ground the drive according to local and national code requirements. A minimum wire size of 10 mm² (6 AWG) may be required to meet standards limiting leakage current.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- The drive panel must be properly grounded before power is applied.
- Use the provided ground connecting point as shown in the figure below.

Failure to follow these instructions will result in death or serious injury.



- Ensure that the resistance of the ground is one ohm or less.
- When grounding several drives, you must connect each one directly, as shown in the figure to the left.
- Do not loop the ground cables or connect them in series.

⚠ WARNING

IMPROPER WIRING PRACTICES

- The ATV312 drive will be damaged if input line voltage is applied to the output terminals (U/T1,V/T2,W/T3).
- Check the power connections before energizing the ATV312 drive.
- If replacing another drive, verify that all wiring connections to the ATV312 drive comply with wiring instructions in this manual page 29.

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

⚠ WARNING

INADEQUATE OVERCURRENT PROTECTION

- Overcurrent protective devices must be properly coordinated.
- The Canadian Electrical Code and the National Electrical Code require branch circuit protection. Use the fuses recommended in the installation manual.
- Do not connect the drive to a power feeder whose short-circuit capacity exceeds the drive short-circuit current rating listed in this manual page 29.

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

I. 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.

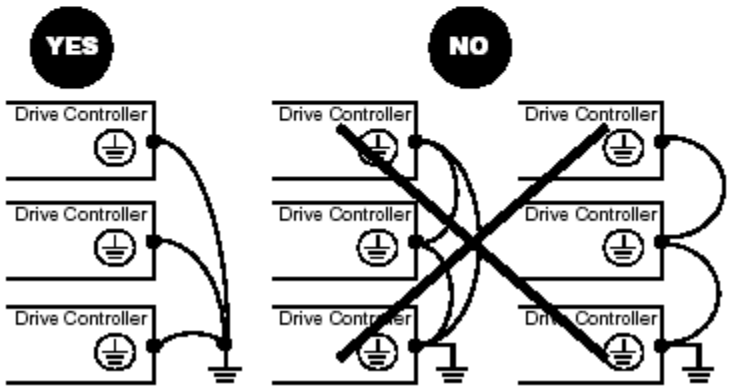
⚠ DANGER

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.



J. PROGRAMMING THE EXHAUST AND SUPPLY DRIVES

ALTIVAR VFD TruFlow PROGRAM PARAMETERS

Power the Altivar VFD and proceed to input the following settings for CANopen applications.

[bFr]	On power up select ENT –**bFr** will display, select ENT and set value to 60 Hz.
[SEt]	**Press ENT ↓or scroll down to SEt press ENT to enter Settings Menu.**
ACC = 10	Press ENT again and scroll down to **ACC**. Press ENT and set value to 10 sec. Press ENT
dEC = 10	Press ESC ↓ or scroll down to **dEC** press ENT, set value to 10 sec. Press ENT
LSP = 18	Press ESC ↓ or scroll down to **LSP** press ENT, set value to 18 Hz. Press ENT
HSP = 60	Press ESC ↓ or scroll down to **HSP** press ENT, confirm value to 60 Hz. Press ENT
ttd = 118	Press ESC ↓ or scroll down to **ttd** press ENT, set value to 118. Press ENT
SP2 = 60	Press ESC ↓ or scroll down to **SP2** press ENT, set value to 60 Hz. Press ENT
[drC]	**Press ESC twice ↑or scroll up to drC press ENT to enter Drive Control Menu.**
nCr = FLA	Press ↓ or scroll down to **nCr** press ENT, set value to 20% above the FLA rating of installed motor.
tUn = POn	Press ESC ↓ or scroll down to **tUn** press ENT, set value to POn. Press ENT
tFr = 72	Press ESC ↓ or scroll down to **tFr** press ENT, set value to 72 Hz. Press ENT
[CTL]	**Press ESC twice ↑ or scroll up to CTL press ENT to enter Control Menu.**
LAC = L3	Press ENT ↓ or scroll down to **LAC** press ENT, set value to L3. Hold ENT for 3 sec.
Fr2 = NET	Press ESC ↓ or scroll down to **Fr2** press ENT, set value to NET. Press ENT
rFC = LI5	Press ESC ↓ or scroll down to **rFC** press ENT, set value to LI5. Press ENT
[I-O]	**Press ESC twice ↑ or scroll up to IO press ENT to enter I/O Menu**
tCt = LEL	Press ENT ↓ or scroll down to **tCt** press ENT, set value to LEL. Press ENT
rrS = nO	Press ↓ or scroll down **rrS** press ENT, set value to nO. Press ENT
AOIt = 4A	Press ↓ or scroll down to **AOIt** press ENT, set value to 4A. Press ENT
dO = OFr	Press ESC ↓ or scroll down to **dO** press ENT, set value to OFr. Press ENT
r1 = rUn	Press ESC ↓ or scroll down to **r1** press ENT, set value to rUn. Press ENT
[FUn]	**Press ESC twice ↑ or scroll up to FUn press ENT enter Application Function Menu**
SA1 = nO	Press ↓ or scroll down **SA1** press ENT, SA2 will display, press ENT again and set value to nO. Press ENT
[FLt]	**Press ESC 3 times ↑ or scroll up to FLt press ENT to enter Fault Menu**
Atr = yes	Press ↓ or scroll down **Atr** press ENT, set value to yes. Press ENT
tAr = Ct	Press ESC ↓ or scroll down to **tAr** press ENT, set value to Ct. Press ENT
drn = yes	Press ESC ↓ or scroll down to **drn** press ENT, set value to yes. Hold ENT for 3 sec.
[CON]	**Press ESC twice ↑ or scroll up to CON press ENT to enter Communication Menu**
AdCO =1-8	Press ENT ↓ or scroll down to **AdCO** press ENT, set value to 1 min. Assign Drive address based on Exhaust or Supply Fan designation. Press ENT
bdCO=500	Press ↓ or scroll down **bdCO** press ENT, set value to 500. Press ENT
FCS	Under **drC** parameter block set to InI to return VFD to factory settings.

NOTE: Assigning Drive address requires power cycle to confirm settings.

K. TROUBLE SHOOTING DRIVE FAULTS

Trouble Shooting Drive Faults

a. When a drive fault occurs many will clear automatically. After a drive fault has cleared automatically reset the Truflow-TC by switching the ON/OFF toggle to off for five seconds. Then switch back to ON. The drive will reset if the fault has cleared automatically.
b. When a drive fault occurs the toggle can be switched three times and if the fault has not reset automatically the drive will lock out and display the drive fault on the drive face.
c. The drive fault must be cleared at the drive. Go to the drive, read the fault code, and using the chart below, correct the fault. Once the drive fault that did not clear automatically is rectified shut off the breaker to the drive for 30 seconds and switch the panel toggle off for 5 seconds and then back on to restart the panel.

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
bLF Brake sequence	Brake release current not reached	• Check the drive controller and motor connections. • Check the motor windings. • Check the Ibr setting in the FUn-menu. Refer to the *ATV31 Programming Manual*.
CrF Precharge circuit fault	Precharge circuit damaged	• Reset the drive controller. • Replace the drive controller.
InF Internal fault	• Internal fault • Internal connection fault	• Remove sources of electromagnetic interference. • Replace the drive controller.
OCF Overcurrent	• Incorrect parameter settings in the SEt- and drC- menus • Acceleration too rapid • Drive controller and/or motor undersized for load • Mechanical blockage	• 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.
SCF Motor short circuit	• 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	• 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.
SOF Overspeed	• Instability • Overhauling load	• Check the motor, gain, and stability parameters. • Add a braking resistor. • Check the size of the motor, drive controller, and load.
tnF Auto-tuning fault	• Motor or motor power not suitable for the drive controller • Motor not connected to the drive controller	• 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
CnF Serial link failure CANopen	Loss of communication between drive controller and communication device or remote keypad.	• Check the communication bus. • Refer to the product-specific documentation.
EPF External fault	User defined	User defined
LFF Loss of 4-20 mA follower	Loss of the 4-20 mA reference on input AI3	Check the connection on input AI3.
ObF Overvoltage during deceleration	• Braking too rapidly • Overhauling load	• Increase the deceleration time. • Install a braking resistor if necessary. • Activate the brA function if it is compatible with the application. Refer to the *ATV31 Programming Manual*.
OHF Drive overload	• 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.
OLF Motor overload	• Thermal trip due to prolonged motor overload • Motor power rating too low for the application	Check the ItH 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
OPF Motor phase failure	• Loss of phase at drive controller output • Downstream contactor open • Motor not connected • Instability in the motor current • Drive controller oversized for motor	• Check the connections from the drive controller to the motor. • If a downstream contactor is being used, set OPL to OAC. Refer to the *ATV31 Programming Manual*, FLt- menu. • Test the drive controller on a low power motor or without a motor: set OPL to nO. Refer to the *ATV31 Programming Manual*, FLt- menu. • Check and optimize the UFr (page 32), UnS (page 35), and nCr (page 35) parameters and perform auto-tuning (page 36).
OSF Overvoltage during steady state operation or during acceleration	• Line voltage too high • Line supply transients	• Check the line voltage. Compare with the drive controller nameplate rating. • Reset the drive controller.
PHF Input phase failure	• Input phase loss, blown fuse • 3-phase drive controller used on a single phase line supply • Input phase imbalance • Transient phase fault *Note: This protection only operates with the drive controller running under load.*	• Check the connections and the fuses. • Disable the fault by setting IPL to nO. Refer to the *ATV31 Programming Manual*. • Verify that the input power is correct. • Supply 3-phase power if needed.
SLF Serial link failure Modbus	Loss of connection between drive controller and communication device or remote keypad.	• Check the communication connection. • Refer to the product-specific documentation.

L. DRIVE AMP RATINGS

Drive ratings

Single phase supply voltage: 200...240 V 50/60 Hz

For three phase output 200/240 V motors

Motor		Line supply (input)					Drive (output)		Reference	Size
Power indicated on plate (1)		Max. current line (2)		Apparent power	Max. inrush current (3)	Power dissipated at nominal current	Nominal current (1)	Max. transient current (1) (4)		
		at 200 V	at 240 V							
kW	HP	A	A	kVA	A	W	A	A		
0.18	0.25	3.0	2.5	0.6	10	24	1.5	2.3	ATV312H018M2(5)	3
0.37	0.5	5.3	4.4	1.0	10	41	3.3	5.0	ATV312H037M2(5)	3
0.55	0.75	6.8	5.8	1.4	10	46	3.7	5.6	ATV312H055M2(5)	4
0.75	1	8.9	7.5	1.8	10	60	4.8	7.2	ATV312H075M2(5)	4
1.1	1.5	12.1	10.2	2.4	19	74	6.9	10.4	ATV312HU11M2(5)	6
1.5	2	15.8	13.3	3.2	19	90	8.0	12.0	ATV312HU15M2(5)	6
2.2	3	21.9	18.4	4.4	19	123	11.0	16.5	ATV312HU22M2(5)	7

Three phase supply voltage: 200...240 V 50/60 Hz

For three phase output 200/240 V motors

Motor		Line supply (input)					Drive (output)		Reference	Size
Power indicated on plate (1)		Max. current line (2)		Apparent power	Max. inrush current (3)	Power dissipated at nominal current	Nominal current (1)	Max. transient current (1) (4)		
		at 200 V	at 240 V							
kW	HP	A	A	kVA	A	W	A	A		
0.18	0.25	2.1	1.9	0.7	10	23	1.5	2.3	ATV312H018M3	1
0.37	0.5	3.8	3.3	1.3	10	38	3.3	5.0	ATV312H037M3	1
0.55	0.75	4.9	4.2	1.7	10	43	3.7	5.6	ATV312H055M3	2
0.75	1	6.4	5.6	2.2	10	55	4.8	7.2	ATV312H075M3	2
1.1	1.5	8.5	7.4	3.0	10	71	6.9	10.4	ATV312HU11M3	5
1.5	2	11.1	9.6	3.8	10	86	8.0	12.0	ATV312HU15M3	5
2.2	3	14.9	13.0	5.2	10	114	11.0	16.5	ATV312HU22M3	6
3	3	19.1	16.6	6.6	19	146	13.7	20.6	ATV312HU30M3	7
4	5	24	21.1	8.4	19	180	17.5	26.3	ATV312HU40M3	7
5.5	7.5	36.8	32.0	12.8	23	292	27.5	41.3	ATV312HU55M3	8
7.5	10	46.8	40.9	16.2	23	388	33.0	49.5	ATV312HU75M3	8
11	15	63.5	55.6	22.0	93	477	54.0	81.0	ATV312HD11M3	9
15	20	82.1	71.9	28.5	93	628	66.0	99.0	ATV312HD15M3	9

(1) These power ratings and currents are for a maximum ambient temperature of 50°C and a switching frequency of 4 kHz in continuous operation. The switching frequency is adjustable from 2 to 16 kHz.
Above 4 kHz, the drive will reduce the switching frequency in the event of excessive temperature rise. The temperature rise is controlled by a sensor in the power module. Nonetheless, the nominal drive current should be derated if operation above 4 kHz needs to be continuous.
Derating curves are shown on page 15 as a function of switching frequency, ambient temperature and mounting conditions.
(2) Current on a line supply with the "Max. prospective line Isc" indicated.
(3) Peak current on power-up, for the max. voltage (240 V + 10%).

Drive ratings (continued)

Three phase supply voltage: 380…500 V 50/60 Hz

For three phase output 380/500 V motors

Motor		Line supply (input)					Drive (output)		Reference	Size
Power indicated on plate (1)		Max. current line (2)		Apparent power	Max. inrush current (3)	Power dissipated at nominal current	Nominal current (1)	Max. transient current (1) (4)		
		at 380 V	at 500 V							
kW	HP	A	A	kVA	A	W	A	A		
0.37	0.5	2.2	1.7	1.5	10	32	1.5	2.3	ATV312H037N4(5)	6
0.55	0.75	2.8	2.2	1.8	10	37	1.9	2.9	ATV312H055N4(5)	6
0.75	1	3.6	2.7	2.4	10	41	2.3	3.5	ATV312H075N4(5)	6
1.1	1.5	4.9	3.7	3.2	10	48	3.0	4.5	ATV312HU11N4(5)	6
1.5	2	6.4	4.8	4.2	10	61	4.1	6.2	ATV312HU15N4(5)	6
2.2	3	8.9	6.7	5.9	10	79	5.5	8.3	ATV312HU22N4(5)	7
3	3	10.9	8.3	7.1	10	125	7.1	10.7	ATV312HU30N4(5)	7
4	5	13.9	10.6	9.2	10	150	9.5	14.3	ATV312HU40N4(5)	7
5.5	7.5	21.9	16.5	15.0	30	232	14.3	21.5	ATV312HU55N4(5)	8
7.5	10	27.7	21.0	18.0	30	269	17.0	25.5	ATV312HU75N4(5)	8
11	15	37.2	28.4	25.0	97	397	27.7	41.6	ATV312HD11N4(5)	9
15	20	48.2	36.8	32.0	97	492	33.0	49.5	ATV312HD15N4(5)	9

Three phase supply voltage: 525…600 V 50/60 Hz

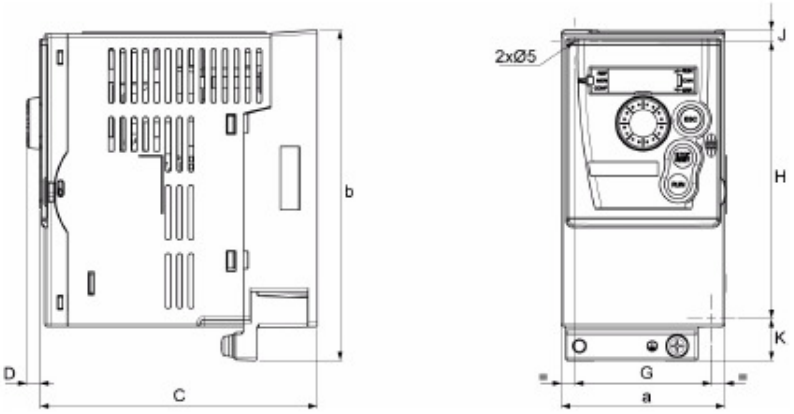
For three phase output 525/600 V motors

Motor		Line supply (input)					Drive (output)		Reference	Size
Power indicated on plate (1)		Max. current line (2)		Apparent power	Max. inrush current (3)	Power dissipated at nominal current	Nominal current (1)	Max. transient current (1) (4)		
		at 525 V	at 600 V							
kW	HP	A	A	kVA	A	W	A	A		
0.75	1	2.8	2.4	2.5	12	36	1.7	2.6	ATV312H075S6(6)	6
1.5	2	4.8	4.2	4.4	12	48	2.7	4.1	ATV312HU15S6(6)	6
2.2	3	6.4	5.6	5.8	12	62	3.9	5.9	ATV312HU22S6(6)	7
4	5	10.7	9.3	9.7	12	94	6.1	9.2	ATV312HU40S6(6)	7
5.5	7.5	16.2	14.1	15.0	36	133	9.0	13.5	ATV312HU55S6(6)	8
7.5	10	21.3	18.5	19.0	36	165	11.0	16.5	ATV312HU75S6(6)	8
11	15	27.8	24.4	25.0	117	257	17.0	25.5	ATV312HD11S6(6)	9
15	20	36.4	31.8	33.0	117	335	22.0	33.0	ATV312HD15S6(6)	9

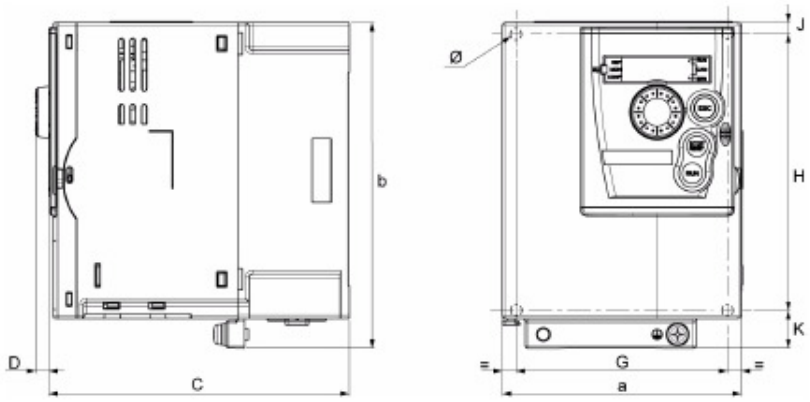
(1) These power ratings and currents are for a maximum ambient temperature of 50°C and a switching frequency of 4 kHz in continuous operation. The switching frequency is adjustable from 2 to 16 kHz.
Above 4 kHz, the drive will reduce the switching frequency in the event of excessive temperature rise. The temperature rise is controlled by a sensor in the power module. Nonetheless, the nominal drive current should be derated if operation above 4 kHz needs to be continuous.
Derating curves are shown on page 15 as a function of switching frequency, ambient temperature and mounting conditions.
(2) Current on a line supply with the "Max. prospective line Isc" indicated.
(3) Peak current on power-up, for the max. voltage (500 V + 10%, 600 V + 10%).
(4) For 60 seconds.
(5) These references can be ordered without terminal board in order to integrate an optionnal communication board. Add a B at the end of the reference. For example, ATV312H037N4 becomes ATV312H037N4B.

M. DRIVE DIMENSION AND WEIGHTS

Dimensions and weights

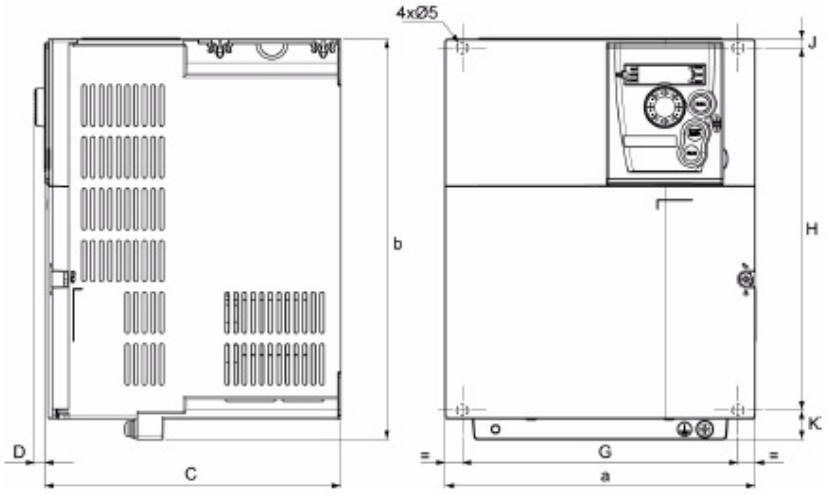


ATV312H	a mm (in.)	b mm (in.)	C mm (in.)	D mm (in.)	G mm (in.)	H mm (in.)	J mm (in.)	K mm (in.)	Ø mm (in.)	Weight kg (lb)
018M3, 037M3	72 (2.83)	145 (5.70)	122 (4.80)	6 (0.24)	60 (2.36)	121.5 (4.76)	2 x 5 (2x0.2)	18.5 (0.73)	2 x 5 (2x0.2)	0.9 (1.98)
055M3, 075M3	72 (2.83)	145 (5.70)	132 (5.19)	6 (0.24)	60 (2.36)	121.5 (4.76)	2 x 5 (2x0.2)	18.5 (0.73)	2 x 5 (2x0.2)	0.9 (1.98)
018M2, 037M2	72 (2.83)	145 (5.70)	132 (5.19)	6 (0.24)	60 (2.36)	121.5 (4.76)	2 x 5 (2x0.2)	18.5 (0.73)	2 x 5 (2x0.2)	1.05 (2.31)
055M2, 075M2	72 (2.83)	145 (5.70)	142 (5.59)	6 (0.24)	60 (2.36)	121.5 (4.76)	2 x 5 (2x0.2)	18.5 (0.73)	2 x 5 (2x0.2)	1.05 (2.31)

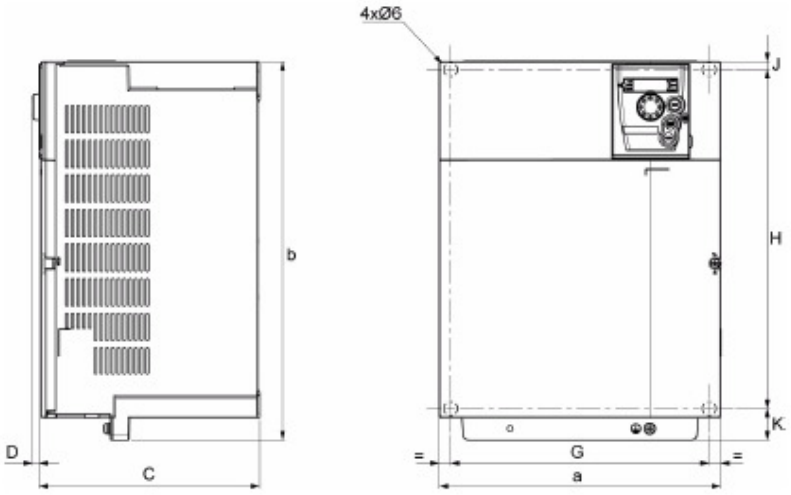


ATV312H	a mm (in.)	b mm (in.)	C mm (in.)	D mm (in.)	G mm (in.)	H mm (in.)	J mm (in.)	K mm (in.)	Ø mm (in.)	Weight kg (lb)
U1•M3	105 (4.13)	143 (5.63)	132 (5.19)	6 (0.24)	93 (3.66)	121.5 (4.76)	5 (0.2)	16.5 (0.65)	2 x 5 (2x0.2)	1.25 (2.76)
U1•M2, U22M3, 037N4 to U15N4 075S6, U15S6•	107 (4.21)	143 (5.63)	152 (5.98)	6 (0.24)	93 (3.66)	121.5 (4.76)	5 (0.2)	16.5 (0.65)	2 x 5 (2x0.2)	1.35 (2.98)
U22M2, U•0M3, U22N4 to U40N4, U22S6, U40S6	142 (5.59)	184 (7.24)	152 (5.98)	6 (0.24)	126 (4.96)	157 (6.18)	6.5 (0.26)	20.5 (0.81)	4 x 5 (4x0.2)	2.35 (5.18)

Dimensions and weights (continued)



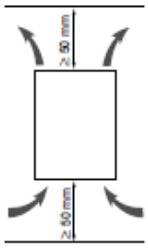
ATV312H	a mm (in.)	b mm (in.)	C mm (in.)	D mm (in.)	G mm (in.)	H mm (in.)	J mm (in.)	K mm (in.)	Ø mm (in.)	Weight kg (lb)
U55M3, U75M3, U55N4, U75N4, U55S6, U75S6	180 (7.09)	232 (9.13)	172 (6.77)	6 (0.24)	160 (6.30)	210 (8.27)	5 (0.2)	17 (0.67)	4 x 5 (4x0.2)	4.70 (10.36)



ATV312H	a mm (in.)	b mm (in.)	C mm (in.)	D mm (in.)	G mm (in.)	H mm (in.)	J mm (in.)	K mm (in.)	Ø mm (in.)	Weight kg (lb)
D1●M3, D1●N4, D1●S6	245 (9.65)	329.5 (12.97)	192 (7.56)	6 (0.24)	225 (8.86)	295 (11.61)	7 (0.28)	27.5 (1.08)	4 x 6 (4x0.24)	9 (19.84)

N. INSTALLING AND MOUNTING DRIVES

Mounting and temperature conditions

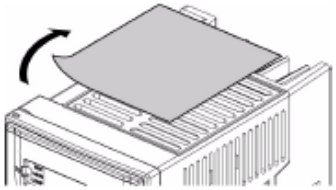


Install the unit vertically, at ± 10°.
Do not place it close to heating elements.
Leave sufficient free space so that the air required for cooling purposes can circulate from the bottom to the top of the unit.

Free space in front of unit: 10 mm (0.39 in.) minimum.

When IP20 protection is adequate, we recommend that the vent cover on the top of the drive be removed, as shown below.

Removing the vent cover

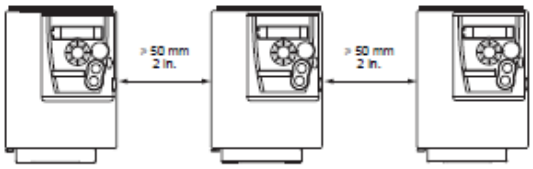


Example ATV312HU11M3

Mounting types

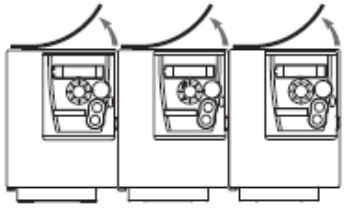
3 types of mounting are possible:

Type A mounting:



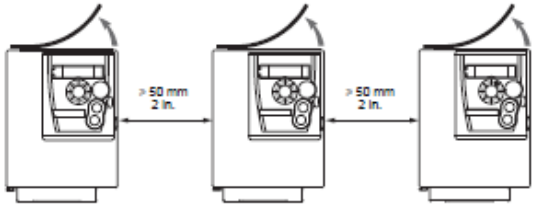
Free space ≥ 50 mm (2 in.) on each side, with vent cover fitted. Mounting type A is suitable for drive operation at surrounding air temperature less or equal to 50°C (122°F).

Type B mounting:



Drives mounted side-by-side, vent cover should be removed (the degree of protection becomes IP20).

Type C mounting:



Free space ≥ 50 mm (2 in.) on each side. Vent cover should be removed for operation at surrounding air temperature above 50°C (122°F). The degree of protection becomes IP20

Note: For switching frequencies above 4 kHz and derating conditions, please refer to the derating curves for guidelines.

Flow of air

If you are installing the drives in enclosures, make provision for a flow of air at least equal to the value given in the table below for each drive.

ATV312H	Flow rate	
	m^3/hour	ft^3/min
018M2, 037M2, 055M2, 018M3, 037M3, 055M3, 037N4, 055N4, 075N4, U11N4 075S6, U15S6	18	11
075M2, U11M2, U15M2 075M3, U11M3, U15M3 U15N4, U22N4 U22S6, U40S6	33	19
U22M2, U22M3, U30M3, U40M3 U30N4, U40N4 U55S6, U75S6	93	55
U55M3 U55N4, U75N4 D11S6	102	60
U75M3, D11M3, D11N4, D15N4 D15S6	168	99
D15M3	216	127

O. TRUFLOW-TC STARTUP REPORT

TRUFLOW-TC –TS 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	

Truflow Model No.	
Number of Hood connected	
Supply SVor SC	

Variable Frequency Exhaust Drive #1 Kitchen 1

Exhaust Fan #1 Model No.				
Exhaust Fan #1 Manufacturer				
Exhaust Fan #1 HP				
Up blast Discharge	**YES**		**NO**	

Variable Frequency Exhaust Drive #2 or Kitchen 2 (If applicable)

Exhaust Fan #2 Model No.				
Exhaust Fan #2 Manufacturer				
Exhaust Fan #2 HP				
Up blast Discharge	**YES**		**NO**	

Variable Speed Supply Drive Kitchen 1 and 2

Supply inlet 10' clear from exhaust discharge	**YES**		**NO**	
Supply Fan Model No.				
Supply Fan Manufacturer				
Supply fan HP				

Variable Speed Supply Drive Kitchen 2 (If applicable)

Supply inlet 10' clear from exhaust discharge	**YES**		**NO**	
Supply Fan Model No.				
Supply Fan Manufacturer				
Supply fan HP				

Fan Site Data Chart

Fan Item #	L1 Voltage	L2 Voltage	L3 Voltage	Design CFM	Design HP	Motor FLA	Verify Fan Rotation
Kitchen 1							
EF-1							
EF-2 (Optional)							
MUA-1							
Kitchen 2							
EF-2							
MUA-2							

Startup Procedure

Item	Description	Y / N
1	Turn off all Cooking equipment	
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 as per the wiring drawing provided.	
5	Check power wiring from breaker to exhaust fan variable speed drive(s).	
6	Check power wiring from exhaust fan variable speed drive(s) to exhaust fan disconnect(s)	
7	Check the CAT5 shielded cable from the Truflow-TC panel to the Kitchen 1 Exhaust VFD. Ensure it is **shielded** cable. Pinning is to T568B standard.	
7a	Check the CAT5 shielded cable from the Kitchen 1 Exhaust VFD to Kitchen 2 exhaust VFD. Ensure it is **shielded** cable. Pinning is to T568B standard. (If applicable)	
8a	For DFMUA supplied by SAS: Check power wiring from breaker to supply fan disconnect switch. VFD has been factory wired.	
8b	For IDFMUA supplied by SAS: Check power wiring from breaker to supply fan disconnect switch.	
8c	For all MUA units supplied by others: It is very important when adding a VFD to MUA units by others to ensure that the VFD is connected to the fan motor after any control transformers. **DO NOT MODULATE THE FREQUENCY OF THE POWER SUPPLY TO ANY CONTROL TRANSFORMERS ON MUA.**	
9	Turn on power to all exhaust and MUA fan units. Take voltage readings on all phases either at VFD inputs or disconnects and record in **FAN SITE DATA** chart above.	
10	Check for wiring to surface fire suppression - Normally Open contact to terminals B and L on RPD panel.	
11	Check for wiring connections for Remote Start Stop switch to terminals C and L on RPD panel. (Optional)	
12	Check J-Couples are installed at each hood exhaust duct collar	
13	Connect J-Couple from each duct-to-duct collar in each Kitchen to the RPD panel with J-couple wire provided. Confirm the EOL (End of Line) plug is installed on the last J-couple.	
14	Confirm the breakers for all exhaust and MUA units are off.	
15	Turn on breaker to the Truflow-TC control panel	
16	Turn on exhaust fan(s) disconnect switches	
17	Turn on supply fan disconnect switch	

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

Item	Description	Y / N
18	Turn on the exhaust fan Kitchen1 breaker for the variable frequency drive.	
19	Turn on the exhaust fan Kitchen 2 breaker for the variable frequency drive. (If applicable).	
20	Turn on the supply fan breaker for the Kitchen 1supply unit and/or drive.	
21	Turn on the supply fan breaker for the Kitchen 2supply unit and/or drive.(If applicable)	
22	**Touch SETTINGS button**	
23	Log into Settings/Options section. a) Touch **UNLOCKED** padlock. b) Touch **USERNAME** box. c) Confirm that keyboard is in LOWER CASE (CAPS button is not GREEN). d) Enter service username as provided by SAS Service Coordinator and press **ENTER** e) Touch **PASSWORD** box	

	f) Enter password as provided by SAS Service Coordinator and press **ENTER**. g) Touch unlocked padlock in middle of screen and then touch **CLOSE**. New access buttons should appear.	
24	Touch **SET TIME** button and enter current local time. Press **CONFIRM** to set and exit box.	
25	Return to **MAIN** screen. Touch KITCHENS button to toggle between Kitchen 1 and 2. Make sure "**Kitchen 1**" is displaying above the status bar. Touch the **FAN STATUS** button	
26	Confirm **CFM** and **HP** values are the same as the design CFM's and HP from the project drawing.	
27	Enter the Motor FLA value as displayed on the motor nameplates for both exhaust and supply units on the **FAN SITE DATA CHART** above.	
28	Repeat steps 25 to 27 for Kitchen 2.	
29	Check fan rotation as follows: a) Turn on the main disconnect to the Ex Fan VFD b) Open the fan access door and prop open. c) Touch the "System ON" button on the RPD-TC panel. d) Touch the Off button. e) Go to fan box and observe direction of rotation. *Note: You may need an assistant to observe the fan wheel rotation. You must see the fan wheel direction.* f) If rotation is backwards, turn off disconnect at fan and change two of the output leads on the VFD. If using magnetic contactors, switch any two leads on the contactor output wires. Repeat steps a) through e). g) Repeat for all exhaust and supply fans. h) If all fan rotations are correct, continue with start up.	

Max Hertz Setting for Kitchen 1 Exhaust VFD/Motor

Item	Description	Y / N
30	Check the ***Motor nameplate MAX FLA*** rating and record value here	**A**
31	Make sure "**Kitchen 1**" is displaying above the status bar. Press Kitchens button to alternate between kitchens. Press SYSTEM ON button. Allow 1 minute for systems to stabilize.	
32	Press FAN STATUS button. Record actual running Hz.	**Hz**
33	Record actual running amps.	**A**
34	Set MAX HZ to 70.0. Press MIN HZ and change to running Hz (Step 32) + 10 Hz. Check Running Amps.	
35	If lower than MAX FLA from motor nameplate, increase MIN HZ by 1.0 Hz increments until running amps equals MAX FLA.	
36	If higher than MAX FLA from motor nameplate, decrease MIN HZ by 1.0 Hz increments until running Amps equals MAX FLA.	
37	When Running Amps equals MAX FLA record the MIN HZ value here.	**Hz**
38	Set MIN HZ back to 18.0 and MAX HZ to 2 Hz lower than the recorded Hz in Step 37	
39	Record Final MAX HZ setting Return to Main Screen.	**Hz**

Max Hertz Setting for Kitchen 2 VFD/Motor (If applicable)

Item	Description	Y / N
40	Check the ***Motor nameplate MAX FLA*** rating and record value here	**A**
41	Make sure "**Kitchen 2**" is displaying above the status bar. Press Kitchens button to alternate between kitchens. Press **SYSTEM ON** button. Allow 1 minute for systems to stabilize.	
42	Press **FAN STATUS** button. Record actual running Hz.	**Hz**
43	Record actual running amps.	**A**
44	Set **MAX HZ** to 70.0. Press **MIN HZ** and change to running Hz (Step 42) + 10 Hz. Check Running Amps.	
45	If lower than **MAX FLA** from motor nameplate, increase **MIN HZ** by 1.0 Hz increments until running amps equals **MAX FLA**.	
46	If higher than **MAX FLA** from motor nameplate, decrease **MIN HZ** by 1.0 Hz increments until Running Amps equals **MAX FLA**.	
47	When Running Amps equals **MAX FLA** record the **MIN HZ** value here.	**Hz**

48	Set **MIN HZ** back to 18.0 and **MAX HZ** to 2 Hz lower than the recorded Hz in Step 46.	
49	Record Final **MAX HZ** setting Return to Main Screen.	**Hz**

SETTING MAXIMUM and MINIMUM AMPS LOAD POINT - Kitchen 1 Exhaust

Item	Description	Y / N
50	Make sure "**Kitchen 1**" is displaying above the status bar. Press **Kitchens** button to alternate between kitchens. Press **SYSTEM ON** button. Allow 1 minute for systems to stabilize.	
51	Press **FAN STATUS**	
52	Touch **Max Hz** box and set to 0.1 Hz higher than Minimum setting.	
53	Record actual running Minimum Amps	**A**
54	Re-set **Max Hz** to value from Step 39	
55	Touch **Min FLA** and set to 2.0 Amps lower than value in Step 53. Return to **MAIN** screen.	**A**
56	Press **SETTINGS** button	
57	Press **FLA VALUES** button	
58	Touch **MAX AIR** button on main screen. Status bar should increase and change to **RED**.	
59	Press **SETTINGS**.	
60	Press **FLA VALUES** and enter **MAX amps** value plus 2.0 amps for Kitchen 1	**A**

SETTING MAXIMUM and MINIMUM AMPS LOAD POINT - Kitchen 2 Exhaust

Item	Description	Y / N
61	Make sure "**Kitchen 2**" is displaying above the status bar. Press **Kitchens** button to alternate between kitchens. Press **SYSTEM ON** button. Allow 1 minute for systems to stabilize.	
62	Press **FAN STATUS**	
63	Touch **Max Hz** and set to 0.1 Hz higher than **Minimum** setting.	
64	Record actual running Minimum Amps	**A**
65	Touch **Min FLA** and set to 2.0 Amps lower than value in Step 64. Return to **MAIN** screen.	**A**
66	Re-set **Max Hz** to value from Step 49	
67	Press **SETTINGS** button	
68	Press **FLA VALUES** button	
69	Touch **MAX AIR** button on **MAIN** screen. Status bar should increase and change to **RED**.	
70	Press **SETTINGS**.	
71	Press **FLA VALUES** and enter **MAX amps** value plus 2.0 amps for Kitchen 2	**A**

SETTING MAX AIR DURATION TIMER

Item	Description	Y / N
72	From **MAIN** screen, touch **SETTINGS** button.	
73	Touch K1 or K2 MAX AIR button.	
74	Touch the box with the number in it. Change to 60. This will keep the Kitchen 1 or 2 exhaust and supply fans running at maximum speed for 60 minutes.	
75	Take airflow readings for both exhaust and supply as indicated in the Hood start up report portion of this start up.	
76	If the hood airflows are higher or lower than the design, press FAN STATUS and increase or decrease Max Hz by 2 Hz to raise or lower the fan speed.	
77	Enter final MAX Hz value for Kitchen 1 Exhaust fan here.	**Hz**
78	Enter final MAX Hz value for Kitchen 2 Exhaust fan here.	**Hz**
79	If the max FLA of the motor has been reached and airflows remain low, call **Spring Air Systems Service for further instructions. 1-866-874-4504 or 1-905-338-2999 ext 28**	
80	Reset the K1 and K2 MAX AIR back to 20 minutes when airflow readings are completed.	

ALL FANS SHOULD BE RUNNING AT LOW SPEED BEFORE YOU PROCEED TO TEST THE J-COUPLE MODULATION OPERATION.

Item	Description	Y / N
81	Check J-couple wires from Kitchen 1 hoods are connected and the End of Line plug is installed on the last J-couple.	
82	Plug the Kitchen 1 J-couple plug into the RPD panel in the K1 receptacle. From the main screen, touch the SETTINGS button. Log in if necessary. Touch the NODE SETTINGSS button.	
83	If NODE box is reading 0, Touch the number button beside SET POINT and lower the set point to 55.	
84	The SET POINT value should be at or lower than ambient temperature.	
85	Turn on cooking equipment. The NODE value should increase with temperature. The OUTPUT value will also increase. This will cause the corresponding Exhaust and supply VFD's to speed up.	
86	Turn off cooking equipment. VFDs should slow down as cooking equipment cools off.	
87	Record the SET POINT value for Kitchen 1	
88	Repeat steps 81 to 87 for Kitchen 2 (If applicable).	
89	Record the SET POINT value for Kitchen 2	

SETTING SCHEDULED START/STOP FUNCTIONS (OPTIONAL)

Item	Description	Y / N
90	Press SCHEDULE button.	
91	Press SETTINGS button.	
92	Touch each day that you want to set a scheduled start and stop time. Press ENABLE DAY button. A GREEN line will appear under all selected days.	
93	Touch the HOUR and MINUTE boxes to change the start and stop times to desired settings. (Clock function is 24 Hour format). When complete press RETURN.	
94	To activate the schedule, touch the CONFIRM button.	
95	The SCHEDULE button should change to GREEN and say ON if enabled. You cannot shut off system if the time of day is between the START and STOP times.	

SETTING AUX mA TRIM VALUES

Item	Description	Y / N
	Use this feature to alter the minimum or maximum speed reference sent to the MUA VFD or modulating damper.	
96	From the MAIN screen, touch SETTING button.	
97	Press AUX mA Values button.	
98	Adjust MIN or MAX setting by touching box beside the limit you want to change.	
99	Enter new value. Depending on what the trimmed setting is for, OUTPUT value should be altered to either a new minimum or maximum milliamp value.	
100	Press RETURN.	

SETTING AND TESTING AUTO START FEATURE

Item		Y / N
	This feature allows the TruFlow TC system to start automatically in the event of cooking equipment being turned on and the TruFlow TC system has not been activated either manually or outside of the scheduled start/stop times.	
101	Turn system off	
102	Press SETTINGS button	
103	Press SYSTEMS OPTION button	
104	Press AUTO START button	
105	Press SET POINT button. Enter value that is 5 degrees lower than the bottom displayed value and press ENABLE	
106	Check that ENABLE button is GREEN. If not Press ENABLE again.	
107	Press DELAY TIME OFF button. Set to **1.0** minute and close screen to return to start screen	
108	Wait 1 minute. Unit should start running and message will read "THERMAL START ACTIVE"	
109	To remove this message Press START button.	

110	Re-set SET POINT to **110.0** and DELAY TIME OFF to **30** minutes.	

ENTERING LOCAL SERVICE COMPANY CONTACT INFORMATION

Item	Description	Y / N
111	Touch Service @ button at top center of touchscreen	
112	Touch **LOCAL COMPANY NAME** box and Enter your company name	
113	Touch **TECH NAME** box and enter primary contact name	
114	Touch **PHONE #** box and enter local phone number for service company	
115	Touch **E-MAIL** box and enter e-mail address for primary contact for local company	
116	Confirm that the **PROJECT ID #** is the same number as the File No at top of this form.	
117	Close Service Contact Information screen.	

You have completed the start up of the TruFlow TC system.

Please record any site conditions and/or any concerns about installation or operation in space provided below.

Comments:

Service Technician:_____

Company: _____

Other Fine Products From

Spring Air
Solutions for Energy Savings

- RevLow Hoods
- DynaFlow Hoods
- TruFlow Energy Management Systems
- UL/ULC Listed Pollution Control Systems
- Dry Extractor Hoods
- Cartridge Hoods
- Filter Hoods
- Water Wash Ventilators
- Surface Fire Suppression
- Commercial Kitchen Exhaust Fans
- Commercial Kitchen Supply Units
- Utility Distribution Systems

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