



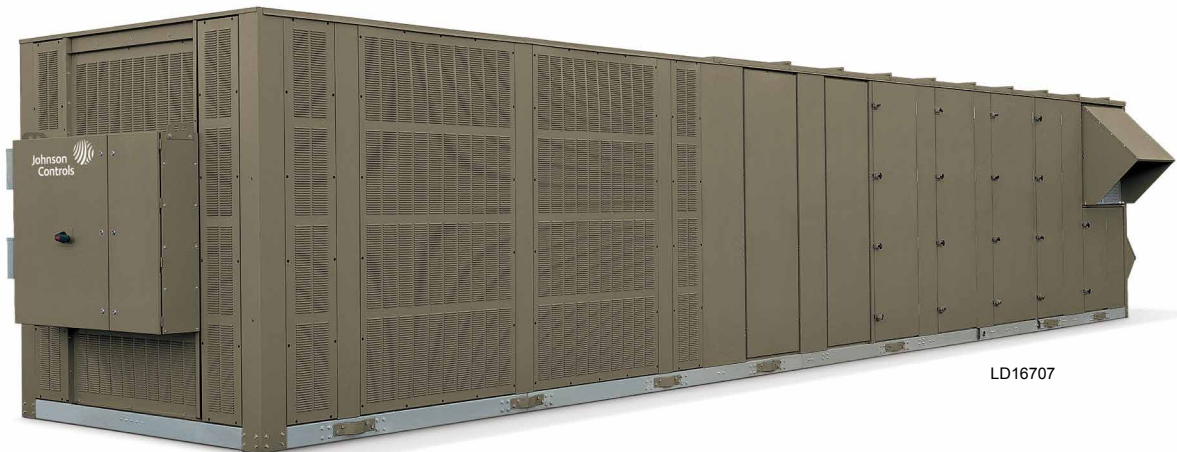
PACKAGED ROOFTOP UNITS

INSTALLATION INSTRUCTIONS

NEW RELEASE

Form 100.50-N27 (216)

SERIES 100 RETROFIT INSTRUCTIONS FOR VFD66 TO VFD68



Issue Date:
February 12, 2016



IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During rigging, installation, operation, maintenance, or service, individuals may be exposed to certain components or conditions including, but not limited to: heavy objects, refrigerants, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of rigging, installation, and operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in

which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized rigging, installation, and operating/service personnel. It is expected that these individuals possess independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood the on-product labels, this document and any referenced materials. This individual shall also be familiar with and comply with all applicable industry and governmental standards and regulations pertaining to the task in question.

SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to specific situations:



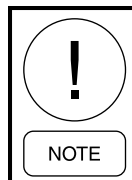
Indicates a possible hazardous situation which will result in death or serious injury if proper care is not taken.



Identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution if proper care is not taken or instructions and are not followed.



Indicates a potentially hazardous situation which will result in possible injuries or damage to equipment if proper care is not taken.



Highlights additional information useful to the technician in completing the work being performed properly.



External wiring, unless specified as an optional connection in the manufacturer's product line, is not to be connected inside the control cabinet. Devices such as relays, switches, transducers and controls and any external wiring must not be installed inside the micro panel. All wiring must be in accordance with Johnson Controls' published specifications and must be performed only by a qualified electrician. Johnson Controls will NOT be responsible for damage/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this warning will void the manufacturer's warranty and cause serious damage to property or personal injury.

CHANGEABILITY OF THIS DOCUMENT

In complying with Johnson Controls' policy for continuous product improvement, the information contained in this document is subject to change without notice. Johnson Controls makes no commitment to update or provide current information automatically to the manual or product owner. Updated manuals, if applicable, can be obtained by contacting the nearest Johnson Controls Service office or accessing the Johnson Controls QuickLIT website at <http://cgproducts.johnsoncontrols.com>.

It is the responsibility of rigging, lifting, and operating/service personnel to verify the applicability of these documents to the equipment. If there is any question

regarding the applicability of these documents, rigging, lifting, and operating/service personnel should verify whether the equipment has been modified and if current literature is available from the owner of the equipment prior to performing any work on the chiller.

CHANGE BARS

Revisions made to this document are indicated with a line along the left or right hand column in the area the revision was made. These revisions are to technical information and any other changes in spelling, grammar or formatting are not included.

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SECTION 1 - INTRODUCTION

The Series 100 unit has the option of having a low ambient kit installed on one, two, or three circuits, depending on the revision level and tonnage size of the unit. The low ambient kit consists of a condenser fan variable frequency drive (VFD) and a discharge pressure transducer. The condenser fan VFD will be connected to the A fan of each circuit that has a low ambient kit installed. The discharge pressure transducer sends a 0–5 VDC signal to the condenser fan VFD, which modulates the condenser fan speed up/down to maintain the proper discharge pressure during low ambient conditions, typically below 50 °F.

For years, the Series 100 units used the VFD66 as the condenser fan VFD. Since the VFD66 is now obsolete, the Series 100 units will now have a VFD68 installed as the condenser fan VFD.

The steps on the following pages will assist the service technician in replacing a VFD66 with a new VFD68.

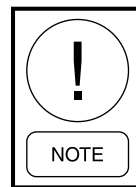
The VFD68 will be pre-programmed for proper operation if ordered from the Baltimore Parts Center by the following Part Numbers.

VFD68 Part Numbers

JCI# 024-39400-001: VFD68 3hp 230 VAC

JCI# 024-39400-002: VFD68 3hp 460 VAC

JCI# 024-39400-003: VFD68 2hp 575 VAC



All fasteners, wiring connectors, and sealing material will be field provided.

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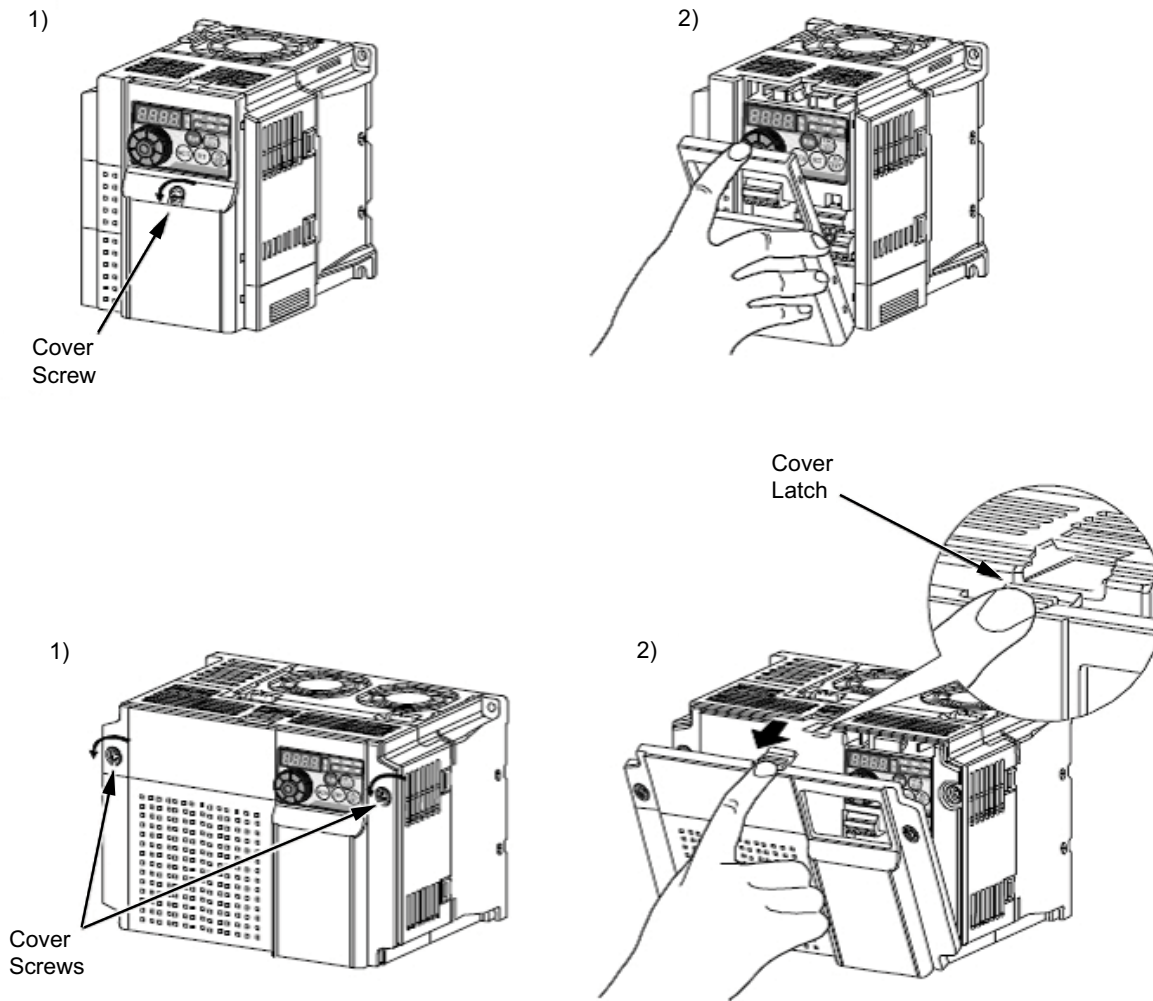
SECTION 2 - INSTALLATION

REPLACING THE VFD66 WITH A VFD68

1. Turn OFF the unit Control Switch, and allow time for all fans to stop and all cooling/heating operation to stop.
2. Turn OFF the main power to the unit, and follow proper Lockout/Tagout procedures.
3. Locate the condenser fan VFD(s). They will be located in the supply fan compartment on the fan discharge wall. The unit could have one, two, or three condenser fan VFDs.
4. If there is more than one condenser fan VFD, determine which one is defective.
5. Remove the terminal cover screw at the bottom of the VFD66, and remove the electrical connection cover.
6. Remove all wires connected to the line side terminals, load side terminals, and control board terminals. (We recommend using wire markers and making notes on which terminals of the VFD66 the wires were connected to.) Line side wires are connected to L1, L2, and L3, and load side wires are connected to T1, T2, and T3.

Controls wires are connected as listed below:

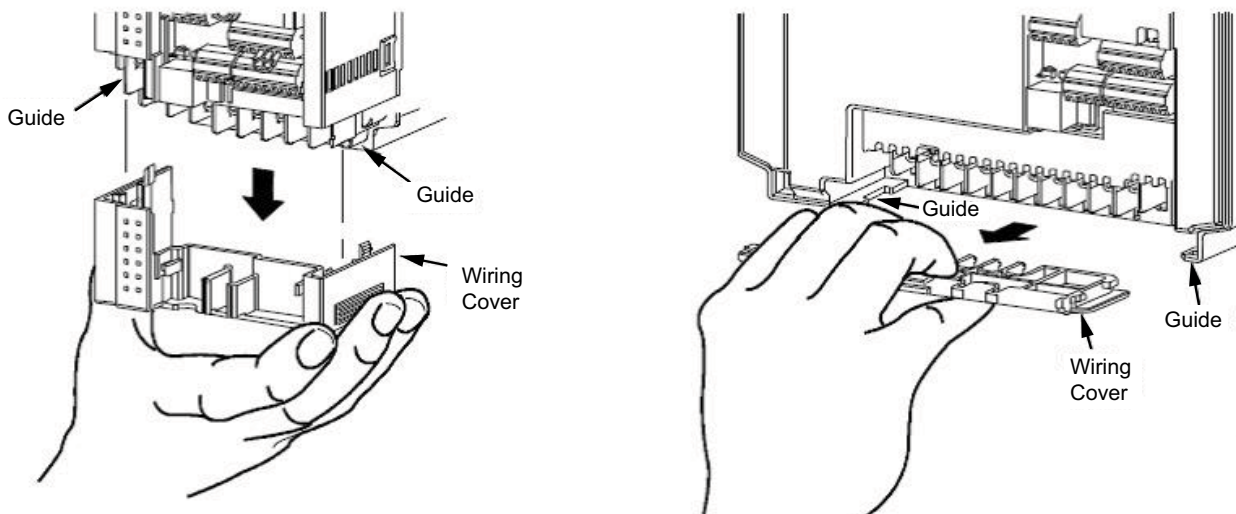
- Terminals 2 and 4: 208/230 and 460 VAC VFDs
 - Terminals 2 and 5: 575 VAC VFDs
7. After all wires have been removed and are free on the VFD66, remove the fasteners that are securing the VFD66 and then remove the VFD66 from the unit.
 8. Remove the VFD68 from the box and place it on the discharge wall where the VFD66 was installed.
 9. Using a pen, pencil, or marker, mark the location of the mounting holes on the discharge wall, keeping the VFD68 level and plumb.
 10. Using an appropriate self-tapping screw, drill out the four mounting holes. Once the holes are drilled, place the VFD68 against the discharge wall, and secure into place.
 11. Cover the holes that were used for holding the VFD66 in place using caulk, permagum, or another compound that will seal the holes and prevent air leakage.
 12. Loosen the screws on the front cover, and remove the cover. See *Figure 1 on page 10*.



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FIGURE 1 - REMOVING VFD COVER

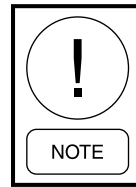
13. Remove the high-voltage wiring cover at the bottom of the VFD68. See *Figure 2 on page 10*.



LD20068

FIGURE 2 - VFD68 HIGH-VOLTAGE WIRING COVER

14. Connect the line side wiring and load side wiring to the appropriate terminals. See *Figure 3 on page 11*.
15. Connect the control wiring to the appropriate terminals, AI1 and ACOM. See *Figure 3 on page 11*.



For 208/230 and 460 VAC units, the control connections are different on the VFD 68 than they were on the VFD66. Please ensure you are connecting the controls wires properly.

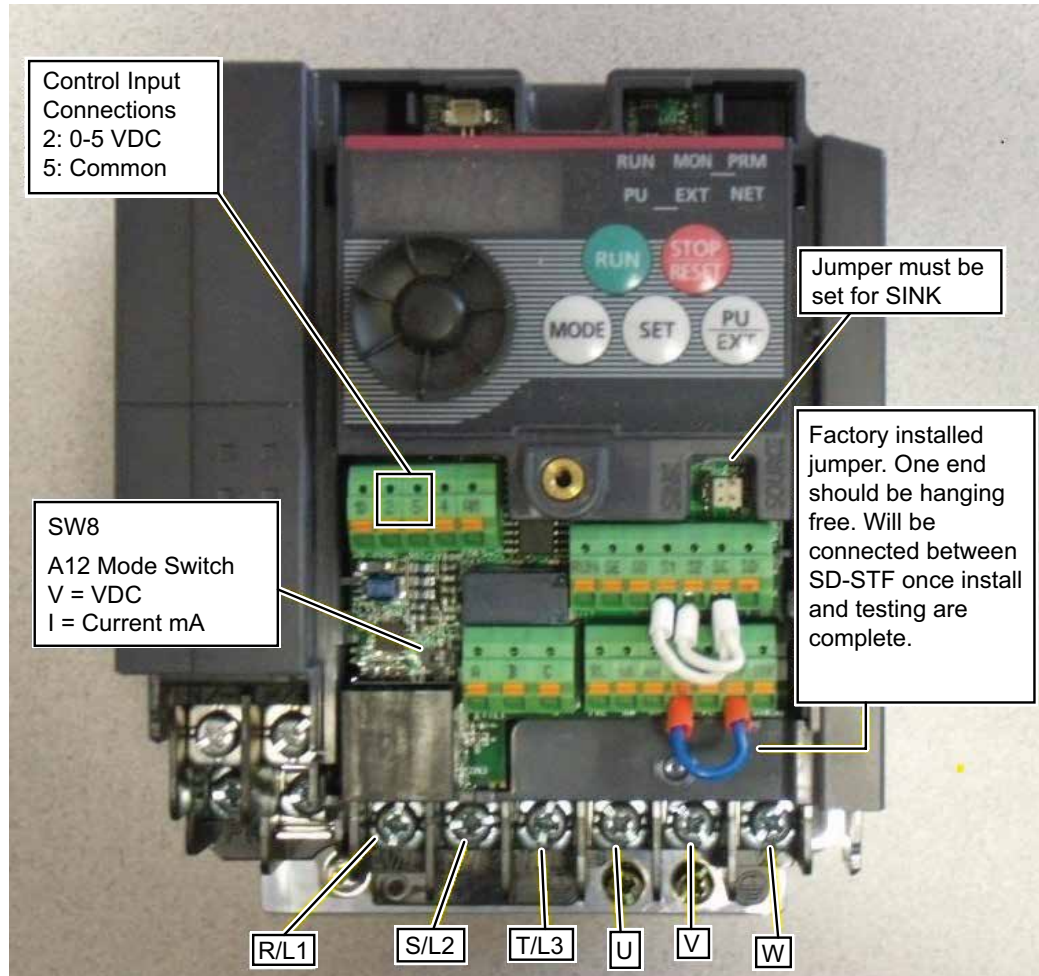
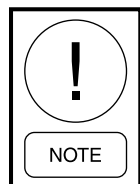


FIGURE 3 - 208/230 AND 460 VAC VFD68

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16. After all wires have been connected to the appropriate terminals, replace the high voltage cover. Do not replace the front cover at this time.

TESTING THE VFD68 (208/230 AND 460 VAC)



If the unit has a Simplicity Elite Board, the VFD68 will not be able to be manually tested. The unit will need to be operating in the cooling mode.

1. Main power will need to be turned ON to the unit in order to test the VFD68. Please ensure the fuses are pulled for the supply fan motor, or the circuit breaker is turned OFF for the supply fan motor

before turning ON the main power. Testing the VFD68 requires being inside the unit next to the supply fan assembly.



Failure to adequately disable the supply fan motor from running could result in personal injury/death.

2. Ensure the blue jumper shown in *Figure 3 on page 11* has one end disconnected and hanging free. Ensure the free end is properly protected from touching the VFD68 by covering the free end with a small piece of electrical tape.

3. With the control switch still in the OFF position, turn ON the main power to the unit.
4. The condenser fan VFDs are powered by the condenser fan contactor. The condenser fan contactor digital output (DO) will need to be energized through the unit SERVICE key.
5. Determine which condenser fan the VFD68 was installed on: 1A, 2A, or 3A. Press the SERVICE key on the unit display, enter the password 9725, and press the checkmark key.
6. Using the left/right arrows, scroll through the screens until the top line shows SERVICE DO.
7. Using the up/down arrows, find the DO that corresponds to the correct condenser fan.
8. After the correct condenser fan has been located—1A, 2A, or 3A—press the checkmark and then use the left/right arrow to change the value from OFF to ON. This will energize the condenser fan contactor for the appropriate condenser fan, 1A, 2A, or 3A.
9. The VFD68 should now be powered up.
10. If the PU LED is not illuminated, press the PU/EXT button until the PU LED comes ON.
11. Press the RUN button to start the VFD68 output to the motor.
12. Turn the dial to change motor speeds. Check the motor FLA at 60hz/100%.
13. Press the STOP/RESET button to stop the output to the motor.
14. Exit the PU mode by pressing the PU/EXT button until the EXT LED comes ON.
15. Install the blue jumper shown in *Figure 3 on page 11* between the SD and STF terminals, as shown.
6. Press the STOP/RESET button to stop the output to the motor.
7. Turn OFF the output for the condenser fan that was turned ON in Step 8 in *Testing the VFD68 (208/230 and 460 VAC)*.
8. Wait at least 30 seconds and then turn the output ON again for the condenser fan that was turned OFF in the previous step.
9. Press the MODE key until PU PU appears on the display.
10. Press the UP arrow until OP.nd EXT appears on the display.
11. Press the MODE key until 0.00 MON EXT appears on the display.
12. Install the blue jumper shown in *Figure 3 on page 11* between the SD and STF terminals, as shown.
13. Press the MODE key to return to monitor mode. 0.00 MON PU appears on the display.

COMPLETING THE RETROFIT

1. Locate the labels that came with the VFD68. Remove the proper labels and place inside the unit, being careful to not cover up any existing labels.
2. Turn OFF the output for the appropriate condenser fan that was tested.
3. Turn OFF the main power to the unit.
4. Replace the front cover on the VFD68 and fasten.
5. Replace the fuses for the Supply Fan Motor, or turn the circuit breaker back ON for the Supply Fan Motor.
6. Turn the main power back ON to the unit.
7. Turn the control switch ON.
8. The unit is now ready for normal operation.
9. When the VFD68 is powered up by a contactor pulling in, it will start at the minimum speed of 15hz.
10. When the discharges pressure reaches approximately 270 psig, the VFD68 speed will begin to increase. The VFD68 should be at full speed, 60hz, at approximately 350 psig.
 - 270 psig=2.16 VDC
 - 350 psig=2.65 VDC

TESTING THE VFD68 (575 VAC)

1. Follow Steps 1–9 as listed above for *Testing the VFD68 (208/230 and 460 VAC)*.
2. If the PU Icon is not lit, press the MODE key until OP.nd appears on the display.
3. Press the UP arrow until PU PU appears on the display.
4. Press RUN or FWD to start the VFD68 output to the motor.
5. Press the UP arrow until the motor is at the maximum speed of 60hz. Check the motor FLA.

SECTION 3 - PARAMETERS

TABLE 1 - VFD68 FACTORY PARAMETERS

PARAMETER	DESCRIPTION	SETTING	
1	MAX FREQUENCY	60	
2	MIN FREQUENCY	15	
7	ACCELERATION TIME	30	
8	DECELERATION TIME	30	
9	MOTOR RATER CURRENT (FULL LOAD AMPS)	10	208/230 VAC
		5	460 VAC
		2.7	575 VAC
19	BASE FREQUENCY VOLTAGE	230	208/230 VAC
		460	460 VAC
		575	575 VAC
22	STALL PREVENTION OUTPUT CURRENT LEVEL	115%	
32	FREQUENCY JUMP 1B	15	
65	RETRY SELECTION	2	
67	# OF RETRIES AT FAULT OCCURRENCE	10	
72	PWM FREQUENCY SELECTION	11	
73	0-5 VDC/0-10 VDC SELECTION	1	208/230 VAC
		1	460 VAC
		0	575 VAC
183	MRS TERM FUNCTION SELECTION	4	575 VAC ONLY
250	STOP SELECTION	1	208/230 VAC AND 460 VAC ONLY
902a (C2)	TERM 2 FREQ SETTING BIAS FREQ	15	
902b (C3)	TERM 2 FREQ SETTING BIAS	2.16	208/230 VAC
		2.16	460 VAC
		43.2	575 VAC
903b (C4)	TERM 2 FREQ SETTING GAIN	2.65	208/230 VAC
		2.65	460 VAC
		53	575 VAC
904a (C5)	TERM 4 FREQ SETTING BIAS FREQ	15	
904b (C6)	TERM 4 FREQ SETTING BIAS	2.16	208/230 VAC
		2.16	460 VAC
		43.2	575 VAC
905b (C7)	TERM 4 FREQ SETTING BIAS	2.65	208/230 VAC
		2.65	460 VAC
		53	575 VAC

NOTES

The following factors can be used to convert from English to the most common SI Metric values.

TABLE 2 - SI METRIC CONVERSION

MEASUREMENT	MULTIPLY ENGLISH UNIT	BY FACTOR	TO OBTAIN METRIC UNIT
Capacity	Tons Refrigerant Effect (ton)	3.516	Kilowatts (kW)
Power	Horsepower	0.7457	Kilowatts (kW)
Flow Rate	Gallons / Minute (gpm)	0.0631	Liters / Second (l/s)
Length	Feet (ft)	0.3048	Meters (m)
	Inches (in)	25.4	Millimeters (mm)
Weight	Pounds (lbs)	0.4536	Kilograms (kg)
Velocity	Feet / Second (fps)	0.3048	Meters / Second (m/s)
Pressure Drop	Feet of Water (ft)	2.989	Kilopascals (kPa)
	Pounds / Square Inch (psi)	6.895	Kilopascals (kPa)

TEMPERATURE

To convert degrees Fahrenheit (°F) to degrees Celsius (°C), subtract 32° and multiply by 5/9 or 0.5556.

Example: $(45.0^{\circ}\text{F} - 32^{\circ}) \times 0.5556 = 7.22^{\circ}\text{C}$

To convert a temperature range (i.e., a range of 10°F) from Fahrenheit to Celsius, multiply by 5/9 or 0.5556.

Example: $10.0^{\circ}\text{F range} \times 0.5556 = 5.6^{\circ}\text{C range}$



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