



An ISO 9001:2015 Registered Company

CVC501-A HVAC & Fast Idle CAN Vehicle Controller
CVC502-A HVAC Control without Fast Idle
2011-2016 Ford F250-F550 (CVC501/502-A)
2017-2020 Ford F250-F550 (B-CVC501/502-A)
2021 Ford F250-F550 with Gasoline Engines Only (B-CVC501/502-A)
Contact InterMotive for additional vehicle applications

System Overview

The CVC501/502 are designed to activate the OEM air conditioning system based on aftermarket equipment requests (typically rear auxiliary AC systems), even when the front AC is turned off. This allows the rear AC on ambulances and transit buses to operate even if the front AC is off. The CVC501/502 monitors two "Rear AC Request" inputs: one active low (ground) and one active high (12V). When the engine is running and either of these inputs are active, the CVC501/502 will activate the OEM AC system to provide air conditioning for the rear. The OEM AC system monitors pressures and temperatures as originally designed.

Whenever the rear AC system asserts the AC request signal, the CVC501/502 will engage the OEM clutch/compressor. As defaulted from the factory*, the CVC501/502 will cycle the clutch/compressor on/off based on both the front evaporator temperature and rear freeze switch (if used). This prevents freezing of the front evaporator. In climates where front evaporator freezing is not an issue, this default setting can be modified such that clutch cycling is only based on the rear system requirements. This will provide maximum cooling for the rear system.

The OEM Ford system has conditions & safety overrides which may shut the clutch/compressor off (pressure, outside air temp too cold, etc.). When the rear AC is off, the front AC system works as intended from the factory.

The CVC501/502 also monitors an active high (12V) "Front AC Off Request" input. This can be used to prevent rear evaporator freeze up. If this input activates with the engine running and the front AC on, the CVC501/502 will deactivate the OEM AC compressor clutch. This input must be grounded in order for the OEM AC system to turn on. Leaving it floating or applying 12V causes the CVC501/502 to request the front AC off. If a rear evaporator freeze switch is not used, this wire must be permanently grounded.

The CVC501/502 also provides an auxiliary fan control output which may be used if desired to control fans on a supplementary condenser system.

Fast Idle—The CVC501 also provides an engine Fast Idle capability with an external request input. Fast Idle is useful to protect the vehicle battery from becoming discharged, and is also helpful to increase the AC system's output. When the external Fast Idle input is activated and all safety conditions are met, CVC501 will increase engine idle speed to 1400 RPM. The Battery Charge Protect feature will automatically increase idle speed and maintain Fast Idle whenever the charging system voltage falls below 12.7V. After the battery voltage increases above 13.5V for one minute, or the safety conditions are no longer met, idle speed will return to normal. In all cases, the Park Brake must be set for any Fast Idle to occur. The external Fast Idle input can be wired to the Park Brake switch, which will cause the system to Fast Idle whenever Park Brake is set.

Review Ford SVE Bulletin Q-195 and ensure final system wiring complies with all of Ford's requirements.

* Firmware version 4.03 (August 2015) and later defaults the system to monitor front evaporator temperature and cycle the compressor as needed to prevent front evaporator freeze up. This can be disabled with a special procedure outlined in these instructions.

Installation Instructions

Disconnect vehicle battery before proceeding with installation.



WARNING
Disconnect the battery to
prevent setting a check engine
light.

IMPORTANT—READ BEFORE INSTALLATION

It is the installer's responsibility to route and secure all wiring harnesses where they cannot be damaged by sharp objects, mechanical moving parts and high heat sources. Failure to do so could result in damage to the system or vehicle and create possible safety concerns for the operator and passengers.

Avoid placing the module where it could encounter strong magnetic fields from high current cabling connected to motors, solenoids, etc. Avoid radio frequency energy from antennas or inverters next to the module. Avoid high voltage spikes in vehicle wiring by always using diode clamped relays and solenoids when installing upfitter circuits.

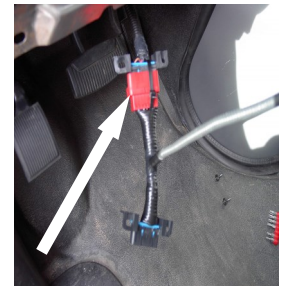
CVC501/502 Module

Remove the lower dash panel below the steering column area and find a suitable location to mount the module. Locate the module in an area away from any high heat sources (engine heat, heater ducts, etc.). Do not actually mount the module until all wire harnesses are routed and secure. Leave enough 'take out harness' to allow dropping the module down for observation of the diagnostic LEDs. The last step of the installation is to mount the module.

Data Link Harness

CVC501/502-A (2011-2016 Ford F250-F550)

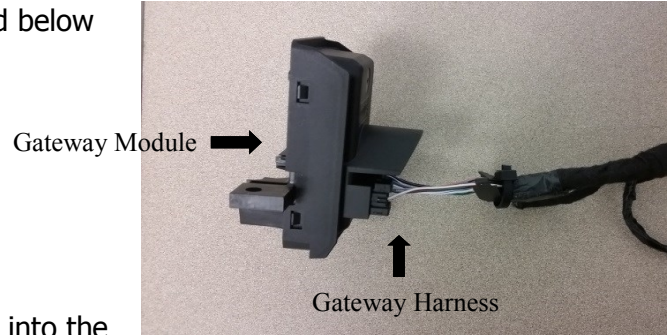
1. Locate the vehicle's OBDII Data Link Connector. It will be located below the lower left dash panel.
2. Remove the mounting screws for the OBDII connector. Plug the red connector from the CVC501/502 Data Link T-Harness into the vehicle's OBDII connector. Ensure the connection is fully seated and secured with the supplied wire tie.
3. Mount the black connector from the CVC501/502 Data Link Harness in the former location of the vehicle OBD II connector.
4. Connect the 6-pin Data Link Connector Pin #1 Red wire to a +12v Hot in Run and Crank power source.
5. Secure the CVC501/502 harness so that it does not hang below the lower dash panel.
6. Plug the 6-pin connector from the Data Link Harness into the 6-Pin connector on the module.



Data Link Harness (Continued)

B-CVC501/502-A (2017-2021 Ford F-250-F550)

1. Locate the vehicles Gateway Module. It will be mounted below the lower left dash panel.
2. Remove the harness behind the Gateway module by pressing the locking tab and pulling outward.
3. Plug the Female side of the Intermotive Gateway Harness into the back of the Gateway module. Ensure the connection is fully seated and secured by the locking tab.
4. Plug the Male side of the Intermotive Data Link Harness into the Gateway harness.
5. Secure the CVC Gateway harness so that it does not hang below the lower dash panel.

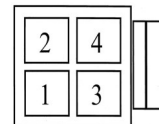


Rear AC Request Input(s)

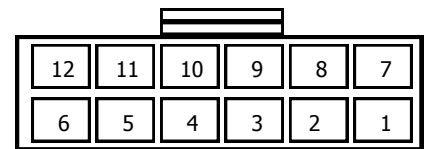
Note: The following connections must be made using solder and heat shrink or tape.

1. Determine the type of signal for the Rear AC System Request (active high-12V or active low-Ground).
2. If signal is active low: Connect the 4-pin connector pin #3 Gray wire to the Rear AC system's active low request wire.
3. If signal is active high: Attach the 12-Pin connector Pin #1 Blue wire to the Rear AC system's active high request.

Only one of these inputs will be used. The unused input can be left unconnected.



Back of connector



Back of Connector

Front AC Off Request Input

Used to prevent the rear AC evaporator from freezing

1. For applications which control this CVC501/502 input, remove the eyelet from the 4 Pin connector Pin 1 White wire and connect to the rear AC system evaporator freeze switch. This provides a ground until the evaporator temperature approaches freezing. This input must be grounded in order for the OEM AC system to turn on. Leaving it floating or applying a +12V causes the CVC501/502 to turn off the front AC clutch/compressor.
2. For applications not requiring this input, the installer must permanently ground this input using the eyelet on the end of the wire.

Aux Fan output (optional)

Capable of sourcing 12V @ 1/2amp, this signal is intended to drive a relay coil to power fans on an auxiliary condenser. This signal goes active (12V) when the front clutch/compressor turns on and will shut off 30 seconds after the front clutch/compressor shuts off. It also activates when either rear request input is active. Normal clutch/compressor cycling will not shut this signal off and it does not matter which AC system (front or rear) is causing the clutch/compressor to be on. This signal stays on regardless of the "Front Off Request" signal.

Connect the 12-pin connector pin #8 Orange wire to the relay coil which controls the auxiliary condenser fan(s). Ground the other side of the relay coil.

Fast Idle (CVC501 only)

Grounding the 12 pin connector Pin #5 Green wire will increase the engine RPM to 1400 (both gas and diesel engines) when the Park Brake precondition and other safety conditions are met.

Charge Protect is a feature that maintains battery voltage by increasing engine RPM's when necessary, boosting the alternator output. This feature will initialize Fast Idle whenever the charging system voltage falls below 12.7V. The voltage must be above 13.5V for one minute before Fast Idle is shut off.

Safety conditions that must be met to engage or maintain Fast Idle operation

Parking Brake must be set
Vehicle NOT moving
Service Brake NOT pressed
Vehicle Transmission Range in Park

RPM inside of safe operating range.
Transmission Fluid Temperature below 250° F
Engine Coolant Temperature below 230° F

CVC501/502 Module

Ensure all harnesses are properly connected and routed, and are not hanging below the dash area. Mount the CVC501/502 module as described on page 2 and secure using screws or double sided tape.

Reconnect the vehicle battery

VIN Capture

Every time the module is powered up (first install, battery or fuse change, etc.) it will automatically acquire the vehicle VIN. If for some reason it does not recognize the chassis, engine, or model year, the LED's will 'VIN scroll'. Contact Intermotive if you experience this. (Early firmware versions, prior to v4.0, use a special procedure to acquire VIN—contact factory).

Post Installation Check List

Start the engine

Rear AC Test

1. Set Front (OEM) AC off.
2. Confirm the OEM AC clutch engages with rear AC on.
3. Confirm the OEM AC clutch disengages with rear AC off.

Front AC Test (If Front AC Off Request Input used—rear evaporator freeze switch)

1. Turn on both Front and Rear AC systems.
2. Confirm both the Front and Rear AC systems are on.
3. Request Front AC off from the Rear AC system and confirm the OEM AC clutch turns off.

Fast Idle Function (CVC501 only)

1. Ensure Fast Idle safety conditions met (see previous page).
2. Activate the Fast Idle input wire & confirm Fast Idle engaged.
3. De-activate Fast Idle input & confirm Fast Idle disengages.

Diagnostic LEDs can be enabled by momentarily shorting the two gold TEST pads together. The on-board LED's will illuminate as described below. Exit this mode by shorting the TEST pads again or cycling the key.

STATUS: 2 Digit Diagnostic Code

LED10: Controlling front AC clutch

LED9: Fast Idle Engaged

LED8: Aux fan output active

LED7: Front AC Request Off input true (J6 p1)

LED6: Fast Idle Request is true (J5 p5)

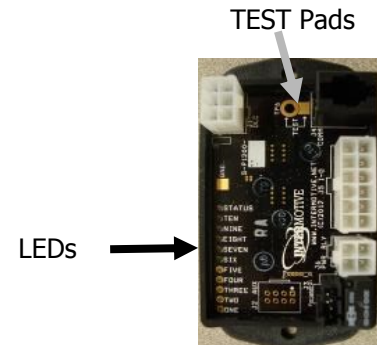
LED5: Front evap being monitored/cycles clutch

LED4: Active high Rear AC Request is true (J5 p1)

LED3: Active low Rear AC Request is true (J6 p3)

LED2: Internal use

LED1: Internal use



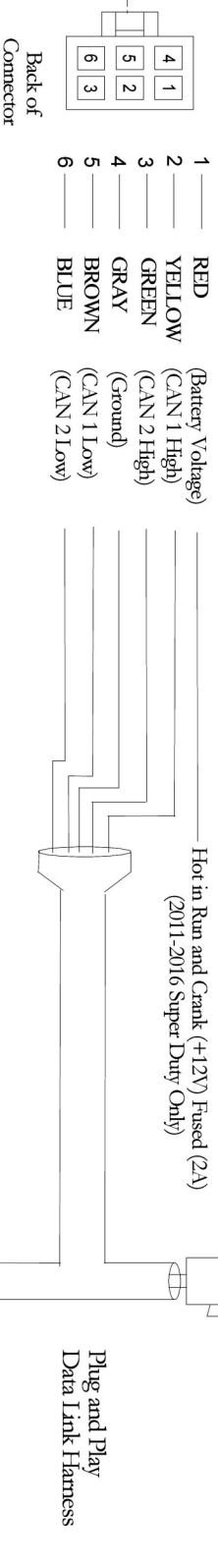
Disabling Front Evaporator Monitoring— From the factory, the CVC501/502 monitors the front OEM evaporator, and will cycle the AC compressor clutch off/on to prevent freezing. This can be disabled as follows.

1. Start the engine
2. Place transmission in neutral
3. Apply and hold the Service Brake
4. Cycle the Park Brake on/off 4 times in 5 seconds
5. Upon success the on-board LEDs will all flash in unison. At this point, a key cycle causes the new setting to take effect and be stored in permanent memory. Repeating this procedure will re-enable front evaporator monitoring.
6. In Diag Mode, (above) LED5 indicates the status of this option.

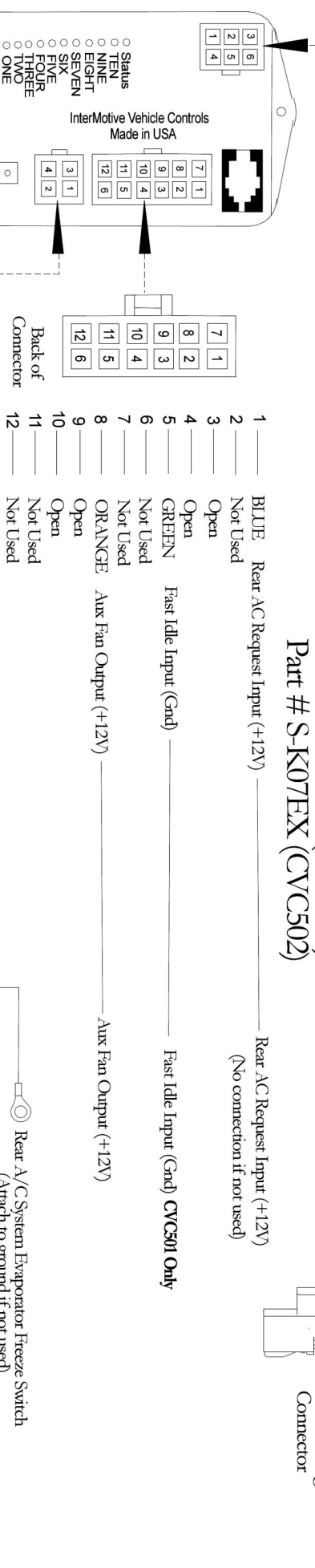
If the CVC501/502-A fails any step in the Post Installation review the installation instructions and check all connections.

Reinstall the lower dash panel

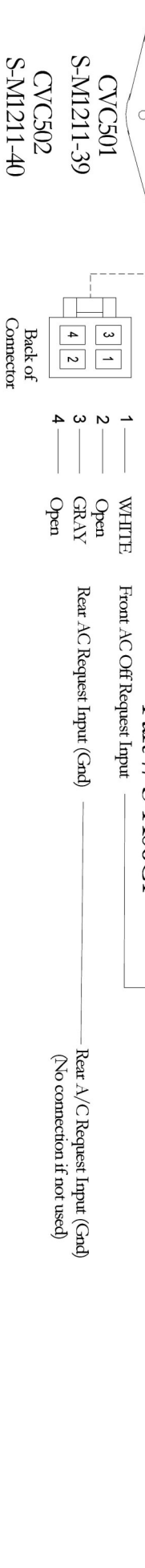
Part # S-H33BX (2011-2016 Ford F250-F550)
Part # S-H133AX (2017-Present Ford F250-F550 and 2016-2017 F-150)



Part # S-K07D1 (CVC501)
Part # S-K07EX (CVC502)



Part # S-K06C1



If the CVC501/502-A1 fails any step in the Post Installation Check List, review the installation instructions and check all connections.
 If necessary, call InterMotive Technical Support at (530) 823-1048.

Submit product registration at www.intermotive.net