Analog Differential-Pressure VAV Controller/Actuator

CSP-4702

Installation Guide

Mounting

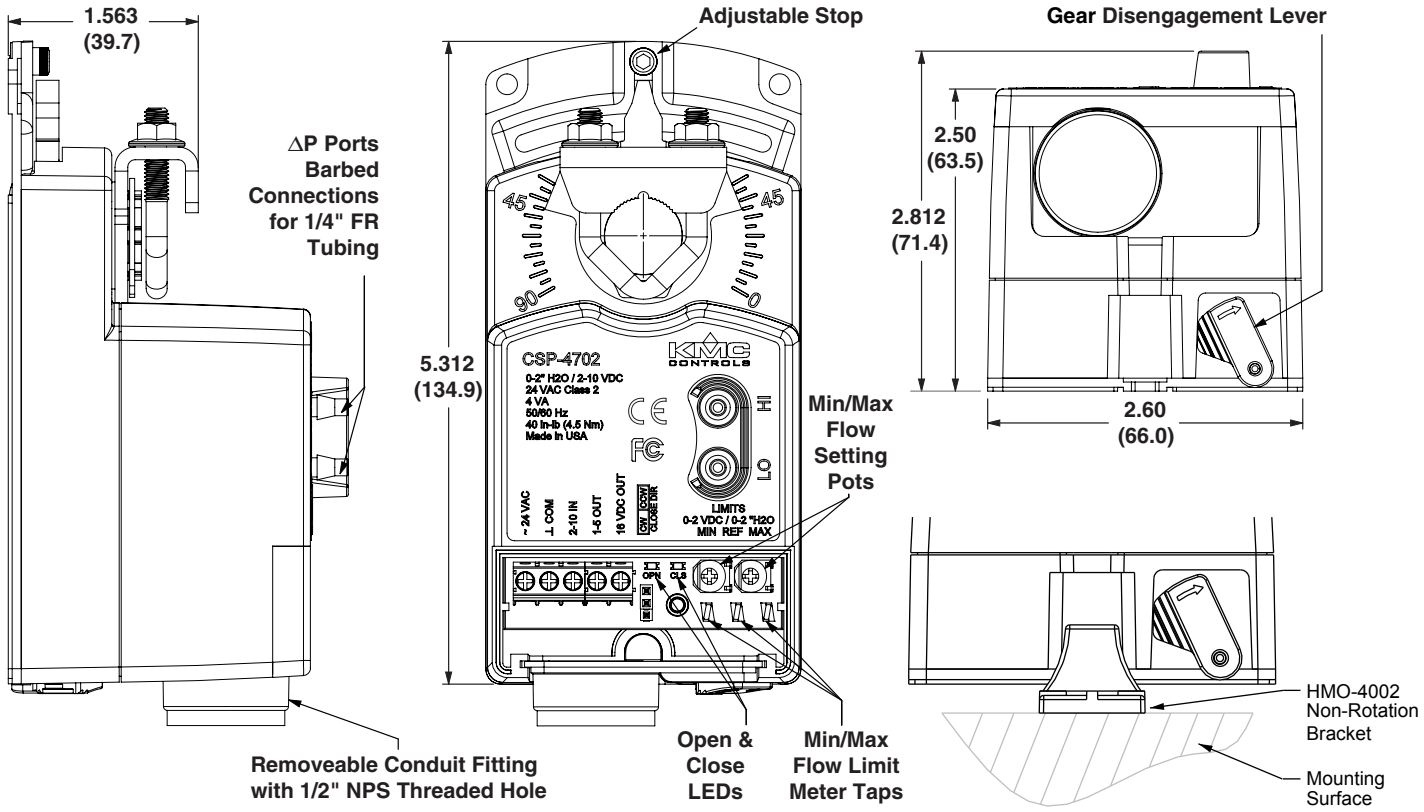


Illustration 1—Overview (Direct-Coupled Mounting)

NOTE: For VAV applications with the analog CTE-5202 thermostat, see the **CTE-5202 Applications Guide**. For static pressure controller applications, see the **CSP-4702 Static Pressure (Bypass) Control Application Guide**.

The CSP-4702 mounts directly to 1/4- to 5/8-inch (6 to 16 mm) round shafts or 1/4- to 7/16-inch (6 to 11 mm) square shafts.

1. Ensure the damper can move freely through its entire range of motion, and fix any binding before installing the actuator. Turn the damper blade to its fully closed position.
2. Press (to the right) and hold the gear disengagement lever (see Illustration 1), rotate the actuator to the fully closed position, and release the lever.

NOTE: Depending on the damper-seal design, backing the actuator off its stop approximately 5° may provide tight damper shut-off.

3. Align the actuator and slide it onto the shaft.
4. Leaving a small gap between the actuator and mounting surface to prevent any binding, finger-tighten the nuts on the V-bolt.
5. Insert the provided (HMO-4002) non-rotation bracket into the slot at the base of the actuator and secure the non-rotation bracket with two #8 or #10 self-tapping screws.
6. Evenly tighten the V-bolt nuts (30–35 in-lb.).
7. If desired, use a 7/64-inch hex key wrench to loosen and position the end-stop screw.

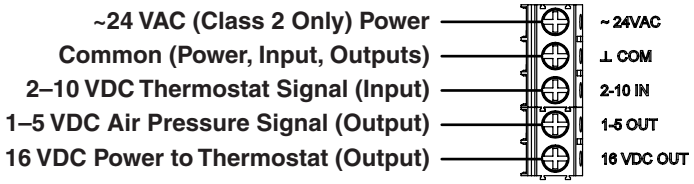
NOTE: **The two holes at the top of the actuator are NOT for use in direct-coupled applications.** (They are for **remote** mounting, such as with the optional HLO-4001 Crank Arm Kit.)

Wiring Connections

1. Loosen the screw on the conduit fitting and lift up to remove the fitting.
2. Using a utility knife or drill, cut the red plug to accept wiring or replace the plug with an application-specific fitting.

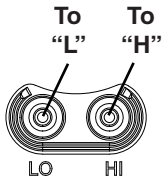
NOTE: The red plug (or similar fitting) protects internal components from debris, helping to ensure long actuator life.

3. Thread wires through the plugged opening and connect to the terminal block as shown.
4. Make the air pressure connections (see *Air Pressure Connection on page 2*), set MIN/MAX flow (see *Min. and Max. Flow Limits on page 3*), and change the rotation direction (see *Rotation Direction on page 2*) as needed.
5. Reinstall the conduit fitting and tighten the screw.



Air Pressure Connection

Connect the CSP-4702 to a differential pressure flow sensor with 1/4-inch OD x 0.040-inch wall FR instrument and control tubing:



1. Connect the "HI" port to the (high side) "H" of the sensor.
2. Connect the "LO" port to the (low side) "L" of the sensor.

NOTE: For use as a static pressure controller, see the **CSP-4702 Static Pressure (Bypass) Control Application Guide**.

NOTE: For VAV applications, the SSS-1000 series differential pressure flow sensor must be mounted with the arrow pointing in the direction of the air flow. To connect to 1/4-inch tubing from the CSP-4702, an SSS-10**0**x differential pressure flow sensor requires a 3/8" to 1/4" barb union adapter and 1" of 3/8" OD x 0.062 "FR" tubing for both connections (as shown in the illustration). An SSS-10**1**x sensor does not require the 3/8" tubing or adapter.

NOTE: All tubing should be free of kinks and restrictions.

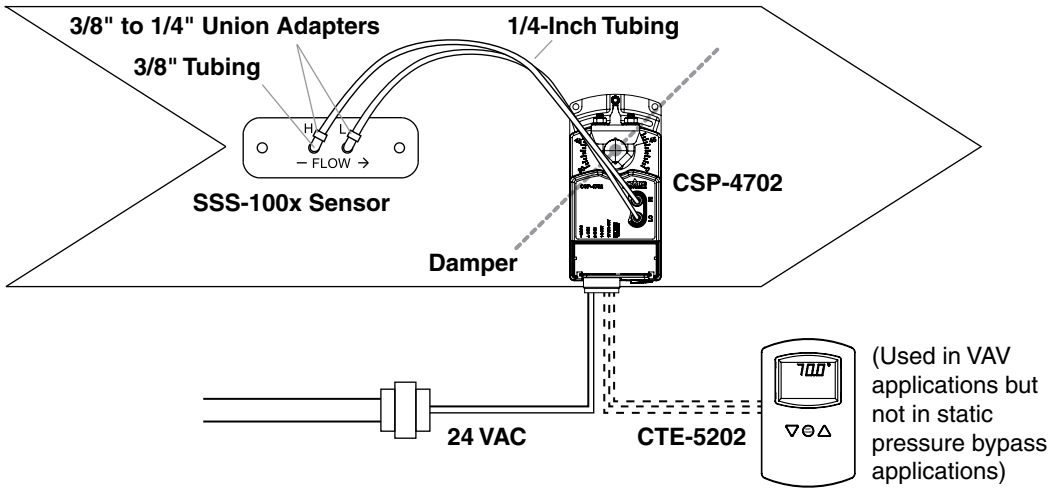


Illustration 2—Connections

Rotation Direction

The CSP-4702 is factory-set for counterclockwise to close. To reverse the direction (with the conduit cover removed), move the jumper to the CW position.

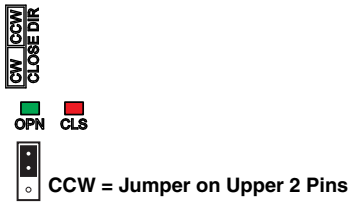


Illustration 3—Rotation Indicators and Jumper

NOTE: For about 15 seconds after power is applied, no rotation occurs and one or both of the LEDs will flash. The Close LED illuminates (solid red) when the actuator is closing. The Open LED illuminates (solid green) when opening. When the actuator reaches the end of rotation or the mechanical stop, the LED may stay illuminated a brief time if the called for condition remains unsatisfied.

Min. and Max. Flow Limits

NOTE: If desired, the min. and max. limits can be set within the thermostat **or** the CSP-4702, but **do NOT try to set the limits at BOTH the controller and the thermostat** (or else the limits will not reflect either the controller's or the thermostat's limits).

Limits Set at the CSP-4702

To set the minimum and maximum flow limits at the CSP-4702 **(with thermostat supplying 2–10 VDC)**:

1. Ensure the thermostat output is 2–10 VDC. For the CTE-5202 thermostat, see the **CTE-5202 Applications Guide**.
2. Loosen the screw on the conduit fitting and lift up to remove the fitting.
3. Connect a voltmeter to the meter taps. The middle pin (REF) is the common for the outer (MIN and MAX) pins.
4. Adjust the MIN potentiometer for the desired minimum voltage. The factory default is 0 VDC = 0" wc.

NOTE: 1 VDC = 1" wc. If, for example, the desired minimum is 0.5" wc, set the voltage for 0.5 VDC.

5. Adjust the MA X potentiometer to the desired maximum voltage. The factory default is 2 VDC = 2" wc.

NOTE: If, for example, the desired maximum is 1.5" wc, set the voltage for 1.5 VDC.

6. Reinstall the conduit fitting and tighten the screw.

Limits Set at the Thermostat

To set the flow limits at the thermostat **(with CSP-4702 potentiometers set at their defaults)**:

1. Return the CSP-4702 potentiometers to the factory defaults if necessary (see above).
2. Set the thermostat output limits according to its instructions. For the CTE-5202 thermostat, see the **CTE-5202 Applications Guide**.

NOTE: Voltage from the thermostat = **desired ΔP x (voltage span = 8 VDC)/(pressure span = 2" wc) + 2 VDC.** For example, if a minimum of 0.1" is desired instead of the default 0", then 0.1 x 4 + 2 (= 0.4 + 2) = 2.4 VDC for the minimum limit. If a maximum of 1.9" is desired instead of the default 2", then 1.9 x 4 + 2 (= 7.6 + 2) = 9.6 VDC for the maximum limit.

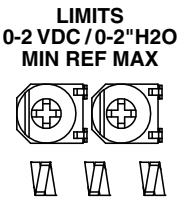


Illustration 4—CSP-4702 Limits Adjustment

Operation Test

To test the CSP-4702 operation:

1. Temporarily disconnect the thermostat signal wire leading to the "2–10 IN" terminal.
2. Jumper the "2–10 IN" terminal to the "16 VDC OUT" terminal. The green Open LED should illuminate, and the shaft drive hub should start rotating the damper open. The damper should go to full open unless the maximum limit was set at the CSP-4702, and then the damper will only go to the maximum setting. If the damper is rotating closed, change the direction jumper. (See *Rotation Direction on page 2*.)
3. Remove any jumper to the "2–10 IN" terminal. **If** there is a normal amount of airflow in the duct at the time (creating a differential pressure exceeding the minimum limit), the red Close LED should illuminate, and the shaft drive hub should be rotating the damper closed. The damper should go to full closed unless the minimum limit was set at the CSP-4702, and then the damper will only go to the minimum setting. If the damper is rotating open, change the rotation direction jumper. (See *Rotation Direction on page 2*.)
4. Reconnect the thermostat signal wire to the "2–10 IN" terminal.
5. Adjust the thermostat's setpoint all the way up (simulating a drop in temperature and a need for less cooling or more heating) and then all the way down (simulating a rise in temperature and a need for more cooling or less heating) and check that the damper position reacts accordingly.

Maintenance

No routine maintenance is required. The motors are permanently lubricated and all internal gear-train components are oil-impregnated. Careful installation will also ensure long term reliability and performance.

Troubleshooting

No Rotation

NOTE: For about 15 seconds after power is applied, no rotation occurs and one or both of the LEDs will flash.

- Check that the shaft moves freely. (Press and hold the gear disengagement lever and manually rotate the shaft.)
- Check wiring. (See Wiring Issues section below.)
- Check for a tripped circuit breaker to the transformer, for proper supply voltage from the transformer (or power supply), and for enough capacity (VA) for all connected devices. See their respective data sheets and **Tips for Connecting 24-Volt Power Application Note (AN0604D)** available on the KMC Controls web site.
- Check that the direction jumper is in the proper position. See *Rotation Direction on page 2*.
- Check the polarity and level of the input signal from the thermostat.

Wrong Rotation Direction or Stroke Range

- Check the position of the direction jumper. See *Rotation Direction on page 2*.
- Check the flow limits (on the controller and the thermostat). See *Min. and Max. Flow Limits on page 3*.
- Check the adjustable stop position.

No Pressure Output Signal

- Check the wiring. (See Wiring Issues section below.)
- Check air flow and sensor. Tubing should be free of kinks and restrictions. Sensor must be oriented in the correct airflow direction.

Wiring Issues

- Check for correct wiring at the each device.
- Use a voltmeter and ohmmeter to check the terminals for expected values.
- See **Tips for Connecting 24-Volt Power Application Note (AN0604D)**.

NOTE: Wiring must be adequate to avoid excessive voltage drop on long runs! Allow plenty of "cushion" in measurements. A meter may be too slow to register transient dips or peaks during startup.

Static Pressure Control

Besides VAV applications, the CSP-4702 can also act as a static pressure controller in such applications as AHU or RTU bypass control. It is not then connected to a thermostat. For information, see the **CSP-4702 Static Pressure (Bypass) Control Application Guide**.

More Information

For specifications, see the CSP-4702 Data Sheet on the KMC web site.

For applications (with the CTE-5202 thermostat) and other information, see the CTE-5202 Applications Guide.

For information about using the CSP-4702 as static pressure controller in AHU/RTU bypass applications, see the **CSP-4702 Static Pressure (Bypass) Control Application Guide**.

Important Notices

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This Class B electronic apparatus complies with Canadian ICES-003.

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