KMC CONTROLS

CSC-2000 SERIES
Reset Volume Controllers

MADE IN U.S.A.

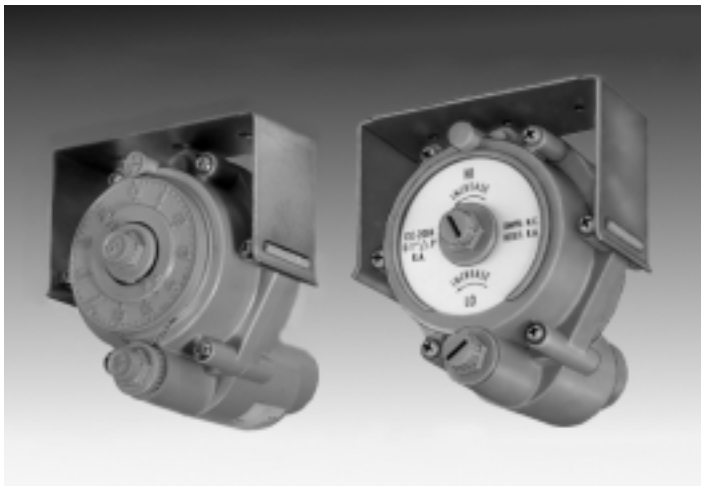
DESCRIPTION

The CSC-2000 series are designed for use on VAV terminal units in HVAC systems.

These are submaster air velocity controllers whose velocity setpoint is reset between adjustable minimum and maximum limits by a master controller, typically a room thermostat.

Available as direct acting for normally open VAV terminal units, and reverse acting for normal closed VAV terminal units.

Each is equipped with separate adjustment knobs for minimum and maximum airflow settings. CSC-2001 and 2002 hare equipped with 0 to 10 reference dials, while all others have blind adjustments. All models should be calibrated with the use of airflow measuring equipment.



MODELS

Model	Thermostat Required: For Cooling	Thermostat Required: For Heating	Setpoint Range: Minimum	Setpoint Range: Maximum	Reset Pressure Band	Air Consumption
For Normally-Open Dampers (Beige Controllers)						
CSC-2001 CSC-2003	DA	RA	0-1.0" wg (249 Pa)	Min. plus 1" wg (249 Pa)	8 (±0.5) to 13 psig (55 ±0.3 to 90 kPa)	14.4 scim @ 20 psig (3.9 mL/s @ 138 kPa)
CSC-2007						11.5 scim @ 20 psig (3.1 mL/s @ 138 kPa)
CSC-2009			0-2.0" wg (498 Pa)	Min. plus 2" wg (498 Pa)		14.4 scim @ 20 psig (3.9 mL/s @ 138 kPa)
CSC-2011			Same as CSC-2001 without mounting bracket			
CSC-2013			Same as CSC-2003 without mounting bracket			
CSC-2015			Same as CSC-2009 without mounting bracket			
CSC-2017			0-2.0" wg (498 Pa)	Min. plus 2" wg (498 Pa)		11.5 scim @ 20 psig (3.1 mL/s @ 138 kPa)
For Normally-Closed Dampers (Gray Controllers)						
CSC-2002 CSC-2004	RA	DA	0-1.0" wg (249 Pa)	Min. plus 1" wg (249 Pa)	3 (±0.5) to 8 psig (21 ±0.3 to 55 kPa)	14.4 scim @ 20 psig (3.9 mL/s @ 138 kPa)
CSC-2008						11.5 scim @ 20 psig (3.1 mL/s @ 138 kPa)
CSC-2010			0-2.0" wg (498 Pa)	Min. plus 2" wg (498 Pa)		14.4 scim @ 20 psig (3.9 mL/s @ 138 kPa)
CSC-2012			Same as CSC-2002 without mounting bracket			
CSC-2014			Same as CSC-2004 without mounting bracket			
CSC-2016			Same as CSC-2010 without mounting bracket			
CSC-2018			0-2.0" wg (498 Pa)	Min. plus 2" wg (498 Pa)		11.5 scim @ 20 psig (3.1 mL/s @ 138 kPa)

SPECIFICATIONS

Output Sensitivity	3 psig/.01" wg (21 kPa/ 2 Pa)
Air	
Main Pressure	15 to 30 psig (103 to 207 kPa)
Maximum Signal Pressure	
6" wg (1493 Pa) applied to either port (X or Y)	
Ambient Limits	
Operating	40˚F to 120˚F (4˚C to 49˚C)
Shipping	-40˚F to 140˚F (-40˚C to 60˚C)
Material	ABS (Beige or gray)
	UL Flame Class 94HB
Weight	7.5 oz (213 grams)

ORDERING

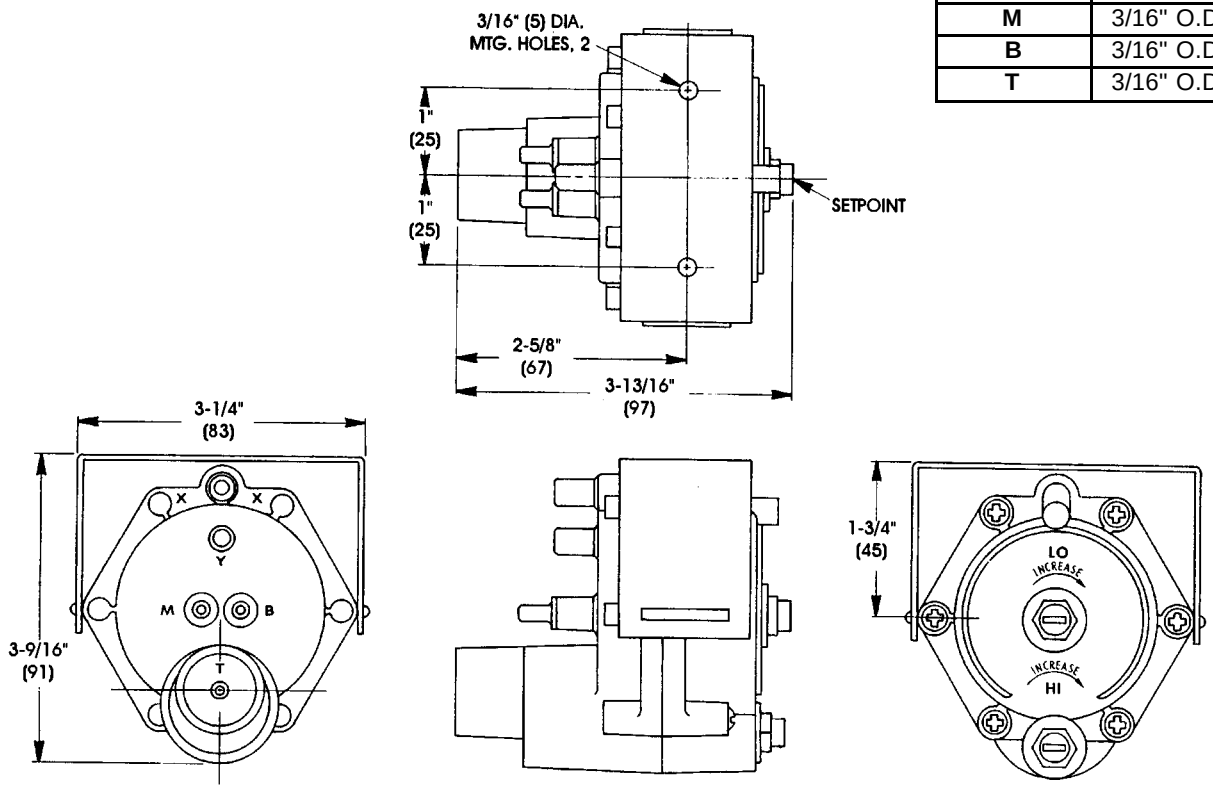
Specify: Model Number

Order From: Local KMC Controls representative or, KMC Controls, Kreuter Manufacturing Co., Inc.

DIMENSIONS

DIMENSIONS IN INCHES (MM)

PORTS	DIAMETER	TUBING "FR" SIZE
X	1/4" O.D.	3/8" O.D.
Y	1/4" O.D.	3/8" O.D.
M	3/16" O.D.	1/4" O.D.
B	3/16" O.D.	1/4" O.D.
T	3/16" O.D.	1/4" O.D.



INSTALLATION-CALIBRATION

The series of reset volume controllers may be mounted in either a horizontal or vertical plane. Other angular positions are not recommended. They should be calibrated in the same plane as they will be mounted.

For Beige Units: Normally open damper with direct acting thermostat for cooling or reverse acting thermostat for heating.

1. Connect total pressure to “X” and static pressure to “Y”.
2. Adjust “LO” center knob to desired airflow with 0 psi at “T” port.
3. Adjust “HI” outer knob to desired airflow with 15 psi at “T” port.

For Gray Units: Normally closed damper with reverse acting thermostat for cooling, or direct thermostat for heating.

1. Connect total pressure to “Y” and static pressure to “X”.
2. Adjust “HI” center knob to desired airflow with 0 psi at “T” psi.
3. Adjust “LO” outer knob to desired airflow with 15 psi at “T” port.

These devices should be supplied with clean, dry control air only. No attempt should be made to use any other medium.

MAINTENANCE

No routine maintenance is required. Each component’s design and material selection assures dependable long-term reliability and performance.

Careful installation will also enhance long-term reliability and performance.

KMC CONTROLS

Revised 1/10/97

TECHNICAL BULLETIN

CSC-2000 SERIES RESET VOLUME CONTROLLER [Beige]

DESCRIPTION

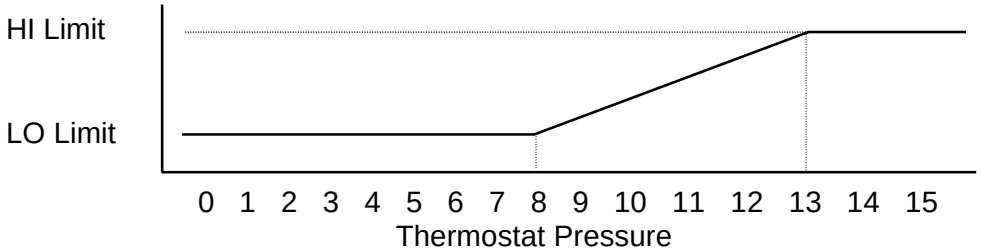
These controllers are for use on Normally Open dampers. These are differential pressure (ΔP) sub-master controllers reset by a master controller. The master controller is typically a room thermostat. These controllers have a reset range of 8 to 13 psig. The spring range of the actuator does not matter to the controller, however sufficient main air is required to provide the actuator with enough force to operate the damper/linkage. Any sequencing with other controllers, valves or pneumatic-electric relays must be sequenced with the controller's reset range, NOT the actuator's spring range. These controllers are typically used on single duct applications, and may be found in dual duct applications. When working on dual duct applications it may be necessary to work on one duct at a time while closing off the other.

Controller Color	Beige
Controller Reset Action	Direct Acting
Controller Action	Direct Acting
LO Limit (Minimum)	< 8 psig
HI Limit (Maximum)	> 13 psig
Cooling Application	Direct Acting Thermostat Required
Heating Application	Reverse Acting Thermostat Required

AVAILABLE MODELS

1. CSC-2001; 0 to 1" ΔP, 14.4 scim air consumption, with 0 to 10 reference dial.
2. CSC-2003; 0 to 1" ΔP, 14.4 scim air consumption.
3. CSC-2007; 0 to 1" ΔP, 11.5 scim air consumption.
4. CSC-2009; 0 to 2" ΔP, 14.4 scim air consumption.
5. CSC-2011; same as CSC-2001 supplied less a mounting bracket.
6. CSC-2013; same as CSC-2003 supplied less a mounting bracket.
7. CSC-2015; same as CSC-2009 supplied less a mounting bracket.
8. CSC-2017; 0 to 2" ΔP, 11.5 scim air consumption.

FLOW CHARACTERISTICS



FIELD ADJUSTMENTS (Cooling Application With A Direct Acting Thermostat)

1. The controller must be firmly mounted in it's bracket on the terminal unit.

2. The controller must be piped as follows:
   - 1/4" O.D. tubing; "T" port to the thermostat branch signal.
   - 1/4" O.D. tubing; "M" port a clean and dry main air supply (15 to 30 psig).
   - 1/4" O.D. tubing; "B" port to the damper actuator.
   - 3/8" O.D. tubing; "X" port to the total pressure on the ΔP pick-up (high).
   - 3/8" O.D. tubing; "Y" port to the static pressure on the ΔP pick-up (low).

     Note: The controller does not bleed to atmosphere. The actuator exhaust from the "B" port and the main air exhaust are vented into the lower chamber and through the "Y" port. Use 3/8" tubing for the "Y" port connections and the length should be kept to a maximum of 18" - 24" to avoid unnecessary resistance. Otherwise hunting conditions can occur.

3. Use a flow hood, or "tee" a magnahelic between the controller and the ΔP pick-up.

4. The "LO" Limit must be set first. Temporarily adjust the thermostat for a branch pressure lower than the 8 psig reset start-point (minimum cooling), typically 6 psig or less is best. Removing the thermostat branch line would be another acceptable method. Adjust the "LO" knob (center knob) clockwise to increase or counterclockwise to decrease ΔP limit. Nominally one-half turn will net a 0.10" ΔP change. Allow for reaction time. Depending on actuator size and position, timing will vary. To position an actuator/damper from closed to open could require a couple minutes.

   If the "LO" Limit must be set at "0" (zero minimum), do not turn the "LO" knob fully counterclockwise. The knob will adjust 3 to 4 full turns after a zero minimum is reached. Turning the "LO" knob fully counterclockwise will result in a negative reset condition. This means that when the controller begins to reset at 8 psig it must first overcome the negative adjustment and will not begin to reset from "0" until a higher thermostat reset pressure is reached. This negative reset will also reduce the effective range of the controller by reducing the high end; narrowing the reset span. If a zero minimum is required, adjust the "LO" knob until the controller just begins to crack the damper open, then back-off one-half turn and verify zero air flow.

5. The "HI" Limit must be set after the "LO" Limit is set. Temporarily adjust the thermostat for a branch pressure higher than the 13 psig reset stop point (maximum cooling), typically 17 psig or greater is best. Removing the thermostat branch line and teeing in to the main air line would be another acceptable method. Adjust the "HI" knob (outside knob) clockwise to increase or counterclockwise to decrease ΔP limit. Nominally one-half turn will net a 0.10" ΔP change. Allow for reaction time.

6. Recheck the "LO" Limit and the "HI" Limit settings at least twice, verify settings and fine tune each time if necessary. This procedure will remove internal component tensions and confirm settings.

7. Adjust the thermostat to the desired room temperature setpoint. Be certain to reconnect the thermostat branch line if this method was utilized.

PRESSURE INDEPENDENT OPERATION

Differential pressure is sensed via a ΔP pick-up mounted up-stream of the damper (vav terminal inlet). The ΔP pick-up is a dual pressure pick-up sensing both Total Pressure and Static Pressure. The Total Pressure is connected to the “X” port and the Static Pressure is connected to the “Y” port. These two pressures are compared across the static diaphragm which takes a position relative to the difference of the two pressures, the force of the LO Limit adjustment spring in the upper chamber, and the force of the HI Limit adjustment spring in the lower chamber. Turning the “LO” knob clockwise (to increase) relaxes the LO Limit adjustment spring placing a lesser downward force on the diaphragm; reducing the pressure at the “B” port; increasing air flow through the vav terminal. Turning the “HI” knob adjustment spring counterclockwise positions the HI Limit stop downward limiting the travel of the piston cup; limiting the amount of reset; setting the maximum air flow through the vav terminal. When the “HI” knob is turned fully counterclockwise, the HI Limit will equal the LO Limit and the controller will function as a constant volume controller.

An increase in air flow is sensed via the increase in ΔP across the static diaphragm positioning the static diaphragm closer to the nozzle increasing the “B” port pressure to the actuator decreasing air flow until the static diaphragm comes into balance at the desired ΔP setpoint.

A decrease in air flow is sensed via the decrease in ΔP across the static diaphragm positioning the static diaphragm away from the nozzle decreasing the “B” port pressure to the actuator increasing air flow until the static diaphragm comes into balance at the desired ΔP setpoint.

RESET OPERATION

With sufficient air flow and a thermostat signal connected to the “T” port less than 8 psig, the controller will position the actuator to regulate air flow at the LO Limit setting. In this state the static diaphragm is balanced over the nozzle through the forces of the opposing springs and forces of the Total and Static Pressures. When the thermostat signal increases above 8 psig the piston cup will begin to position the reset lever upward increasing the force of the HI Limit spring; positioning the static diaphragm away from the nozzle opening the damper for greater air flow requiring a higher ΔP to re-balance the static diaphragm. The ΔP setpoint of the controller has been reset upwards with the increasing thermostat signal. The stroke of the piston cup is limited via the HI Limit knob. Lowering the HI Limit will reduce the top end of the reset span narrowing the reset span. At each new ΔP setpoint, as dictated by the thermostat signal, the static diaphragm will again balance.

KMC CONTROLS

DIRECT ACTING RESET
VOLUME CONTROLLER
CSC-2000 SERIES
(BEIGE CONTROLLERS)