Carnes pneumatic controlled throttling units are suitable for a standard 20 psi control system and may be supplied with pressure dependent or pressure independent control types.

Pressure Dependent Control: A pneumatic signal is sent directly from the thermostat. A reverse acting thermostat may be used with a normally open or closed damper. With a decrease in room temperature, an increased thermostat output signal will move the damper actuator to position the damper at a reduced air flow. A direct acting thermostat may also be used with a normally open or normally closed damper. With a decrease in room temperature, a decreased thermostat output signal will move the damper actuator to position the damper at a reduced air flow.

Units with pressure dependent controls may be ordered with optional adjustable mechanical stops for maximum and minimum air flow settings. Pressure dependent air flow settings are field set according to the job system conditions.

Units with pressure dependent controls may be ordered without mechanical stops for maximum and minimum air flow settings. The damper may be field adjusted to set the minimum air flow or limit the maximum air flow by loosening the linkage and offsetting the rotation of the damper position at one of the flow conditions.

Pressure Independent Control: By use of a reset volume controller in conjunction with a room thermostat, the throttling unit will maintain an air flow rate in response to the thermostat, independent of duct static pressure variations between the minimum catalogued static pressure value and 6.0" w.g.

Minimum and maximum air flow settings are field calibrated for system balancing at the job site. Pressure independent control can be used with reheat units where a minimum air flow must be maintained.

As a standard, the reset volume controller provided by Carnes is offered with a normally open or a normally closed damper for use with a direct acting thermostat, or with a normally closed or normally open control damper for use with a reverse acting thermostat. Many combinations of damper actions and pressure independent controls are available for controlling dual duct terminal units to provide mixing, deadband or constant volume sequencing.

Units with pressure independent air flow controls may be ordered with a zero (full shut off) minimum setting. For proper controller operation, a minimum air flow setting other than zero (full shut off) should be selected at an inlet velocity of at least 365 fpm.

	CTRL OPT.	CONTROL OPTION DESCRIPTION	SINGLE DUCT UNITS					DUAL DUCT	FAN UNITS		RETROFIT
			AVC	AVW	AVE	ABB	ABW	ADC	AS	AC	ARR
PRESSURE DEPENDENT	CA	PNEUMATIC ACTUATOR BY CARNES WITH MECHANICAL MAX./MIN.STOPS	X	X	X	X	X	X*			X
	CM	PNEUMATIC ACTUATOR BY CARNES	X	X	X	X	X	X*			X

* = ADCC Only

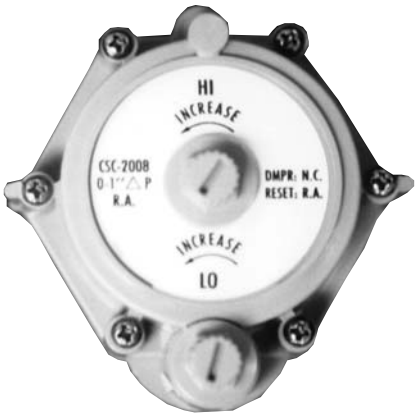
PRESSURE INDEPENDENT	CE	PNEUMATIC ACTUATOR AND RESET CONTROLLER BY CARNES	X	X	X	X	X	X	X	X	X
	CX	PNEUMATIC ACTUATOR AND MULTI-FUNCTION RESET CONTROLLER BY CARNES	X	X	X	X	X	X	X	X	X

PNEUMATIC DAMPER ACTUATOR

The Carnes pneumatic damper actuator is composed of black nylon 6/6 reinforced with 33 percent glass fiber. The actuator has a 2-1/2" stroke and is equipped with a fitting for 1/4" O. D. control tubing. The spring range is 8 to 13.

RESET VOLUME CONTROLLERS

The reset volume controllers are designed to operate pneumatic actuators to control air volume flow through terminal units in HVAC systems. These controller are submaster devices that sense terminal unit velocity from an inlet flow differential pressure sensor. Velocity set points are reset between adjustable minimum and maximum CFM settings by a room thermostat. These controllers will maintain the air volume required by the zone regardless of inlet static pressure change. Thus, the terminal unit is system pressure independent. The direct acting reset controller (beige) is used for normally open terminal unit dampers. The reverse acting controller (gray) is used for normally closed terminal unit dampers.



Reset Pressure Range:

Direct Acting 8 to 13 psig (nominal)

Reverse Acting 3 to 8 psig (nominal)

Differential Pressure Range: 0.0" to 1.35" W. C.

Main Air Pressure: 15 to 30 psig

Air Consumption: 0.4 SCFH (12 SCIM) @ 20 psig

Maximum Static Pressure: 12 W. C.

Air Connections: High/Low Pressure Taps, fittings for 3/8" O. D. plastic tubing. Main, Branch, Thermostat, fittings for 1/4" O. D. plastic tubing.

Ambient Operating Temperature: 40°F to 120°F

Material: ABS Plastic

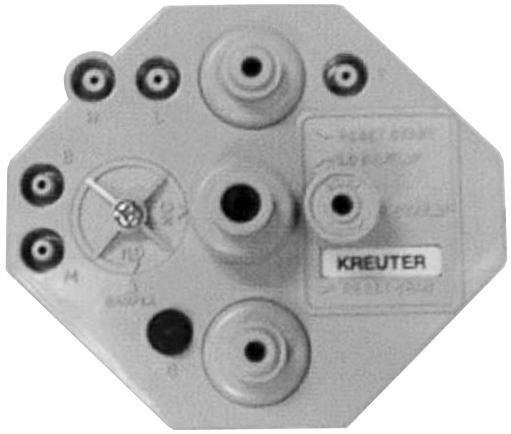
Weight: 7.5 ounces

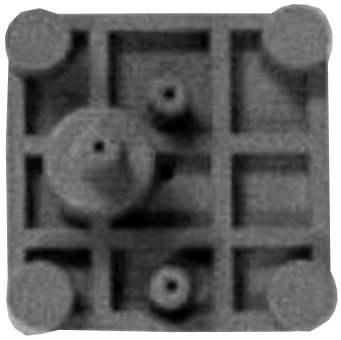
COMPONENTS WHICH DO NOT EFFECT PERFORMANCE ARE SUBJECT TO CHANGE

MULTI-FUNCTION RESET VOLUME CONTROLLER

The multi-function reset volume controllers are designed to operate pneumatic actuators to control air volume flow through terminal units in HVAC systems. This controller can be used with either direct acting or reverse acting thermostats and for normally open or normally closed terminal unit dampers.

These controllers are submaster devices that sense terminal unit velocity from an inlet flow sensor. Velocity set points are reset between adjustable minimum and maximum cfm settings by a room thermostat. These controllers will maintain the air volume required by the zone regardless of inlet static pressure change. Thus, the terminal unit is system pressure independent. These controllers have a factory set reset start point and a reset span which can be field adjusted to remain constant no matter what maximum and minimum air flow limits have been set.





REVERSING RELAY

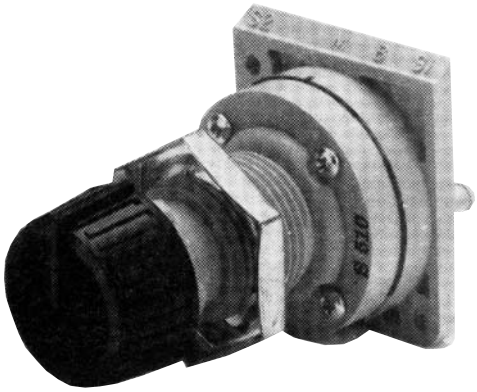
The reversing relay is designed to reverse a proportional signal from a controlling device. These relays decrease the branch line pressure as the input pressure is increased. A bias adjustment is provided to advance or retard the output pressure if required.

Reversing relays are typically used to change the thermostat signal from reverse acting to direct acting or direct acting to reverse acting. These relays are not position sensitive and are suitable for inline mounting.

PNEUMATIC/ELECTRIC (P/E) SWITCH

A single stage P/E switch is used to energize or de-energize an electrical device in response to a pneumatic signal. P/E switches are adjustable so that the switching point can be calibrated to a specific input pressure. These switches can be mounted in any position regardless of orientation.

COMPONENTS WHICH DO NOT EFFECT PERFORMANCE ARE SUBJECT TO CHANGE

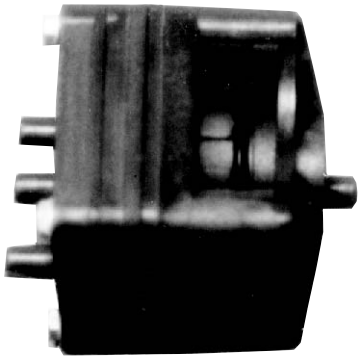


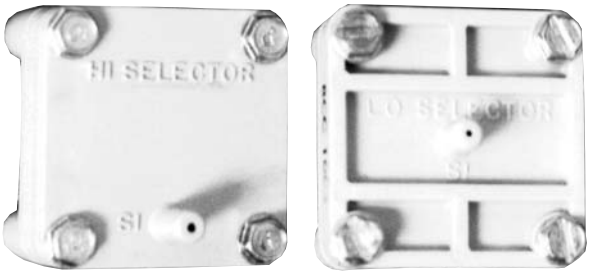
GRADUAL SWITCH

The gradual switch is designed to allow for a manual setting of a desired pneumatic pressure output up to main air pressure. A gradual switch is used where the application requires remote positioning of a final control device or remote control point adjustment of a pressure signal. Gradual switches are typically used in dual-minimum and open-close-open sequences.

DIVERTING RELAY

Diverting relays are single pole, double throw devices that are used to divert one pneumatic signal to either of two branch circuits. These relays can be used to select one or two input signals and transmit it to another control device. In some cases, diverting relays are used to feed or exhaust a particular pneumatic circuit. These relays are not position sensitive and are suitable for in-line mounting.

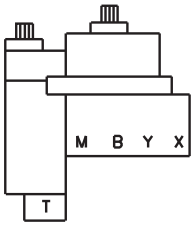




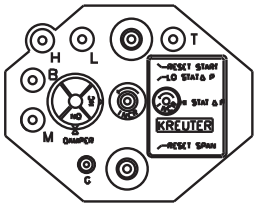
PRESSURE SELECTOR RELAY (High or Low)

Pressure selector relays are intended for use in pneumatic control systems where the final control device must be controlled from two different signals. The relay compares the two proportional signals and transmits either the higher or lower signal to another control device. These relays are not position sensitive and are suitable for in-line mounting.

COMPONENTS WHICH DO NOT EFFECT PERFORMANCE ARE SUBJECT TO CHANGE



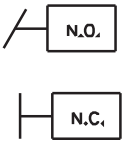
Reset Volume Controller
(Air Consumption = 15 SCIM @ 20 psi)
BEIGE CONTROLLER —
Carnes Part # 999-2825
(For Use with Normally Open Dampers)
GRAY CONTROLLER - *Part # 999-2826*
(For Use with Normally Closed Dampers)



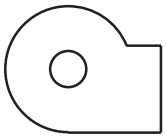
Reset Volume Controller
(Air Consumption = 30 SCIM @ 20 psi)
MULTI FUNCTION CONTROLLER —
Carnes Part # 999-2827
(May be used with both direct and reverse acting Inputs)
(May also be used with normally open and closed dampers)

BY CARNES
BY OTHERS
OPTIONAL

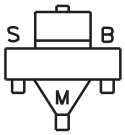
AFS — **AIR FLOW SWITCH**



DAMPER ACTUATOR
NO = Normally Open Damper
NC = Normally Closed Damper

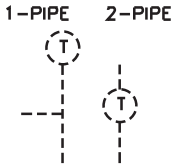


FAN
Fan Blower and Motor Assembly

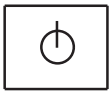


REVERSING RELAY
(Air Consumption = 15 SCIM @ 20 psi)

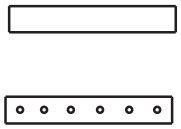
P/E
Pneumatic/Electric Switch
(Field Adjusted)



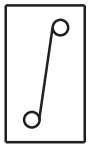
THERMOSTAT
(By Others)



FAN SPEED DIAL



INLET SENSOR
Differential Pressure
(Dots Indicate HIGH Pressure Side)
YELLOW = LOW SIGNAL (Static)
GREEN = HIGH SIGNAL (Total)

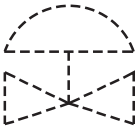


DISCONNECT SWITCH
Line Voltage Disconnect

INLINE RESTRICTOR
(By Others)

CAPACITOR
Fan Motor Start Capacitor

MAIN CONTROL AIR SUPPLY
(By Others)
Range 18 -30 psig



HOT WATER VALVE
(By Others)