AIRSWEEP®

MATERIAL ACTIVATION SYSTEMS

INSTALLATION AND MAINTENANCE MANUAL

Revised January 2022

USDA-ACCEPTED AIRSWEEP® MODELS:

USDA-135

USDA-185

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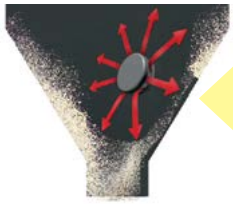
USDA-Accepted AirSweep® Systems

Cleans interior surfaces • Eliminates ratholes, bridging & material buildup

Ideal for applications requiring sanitary equipment or frequent cleaning.

- Designed and fabricated according to sound sanitary design principles
- Flanged connections for quick installation or removal from mounting and process connections
- Quick and easy removal/disassembly with simple hand tools
- All surfaces resistant to corrosive products and cleaning/sanitizing chemicals
- Manufactured from high-grade 316 Stainless Steel for long service life
- Energy efficient – uses plant air

The AirSweep® material activation system delivers on-demand product flow, eliminates material buildup and enhances batch uniformity.



360° activation of material lifts and sweeps stagnant materials off vessel walls.

Each AirSweep nozzle directs a high-pressure, high-volume, 360-degree burst of compressed air or inert gas along the inside walls of process equipment or vessels, breaking friction to lift and sweep stalled material back into the flow stream. The patented nozzle design ensures an immediate reseal after each pulse to eliminate material feedback.

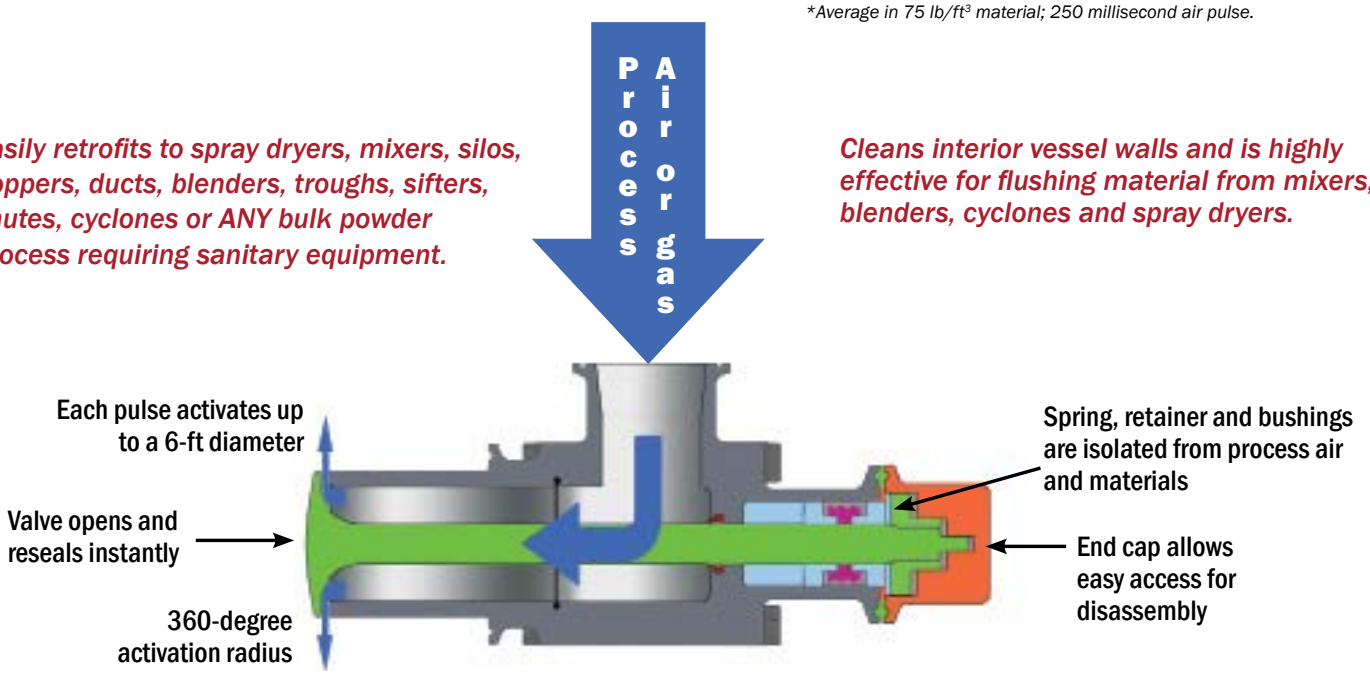
Sequenced pulsing of strategically-positioned AirSweep units activate bulk material to produce a first-in, first-out controlled flow.

Model	Material Activation Area (diameter)	Approx. Air Consumption*
USDA-135	4 feet (1.22 m)	0.75 scf @ 80 psi
USDA-185	6 feet (1.83 m)	2.2 scf @ 90 psi

**Average in 75 lb/ft³ material; 250 millisecond air pulse.*

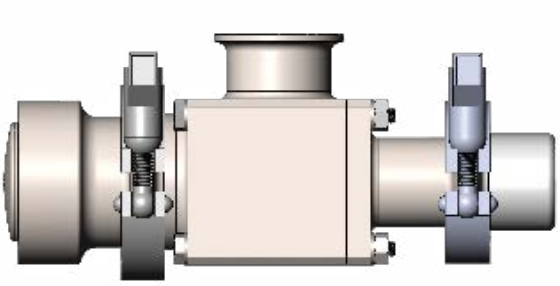
Easily retrofits to spray dryers, mixers, silos, hoppers, ducts, blenders, troughs, sifters, chutes, cyclones or ANY bulk powder process requiring sanitary equipment.

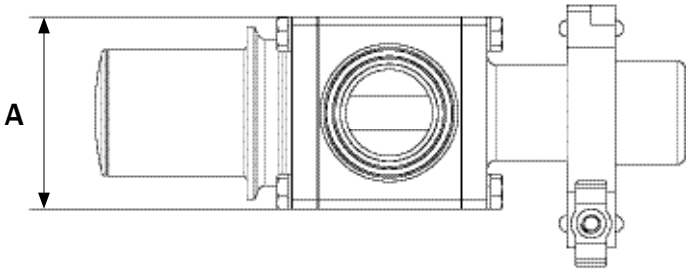
Cleans interior vessel walls and is highly effective for flushing material from mixers, blenders, cyclones and spray dryers.

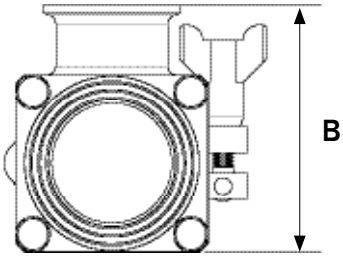


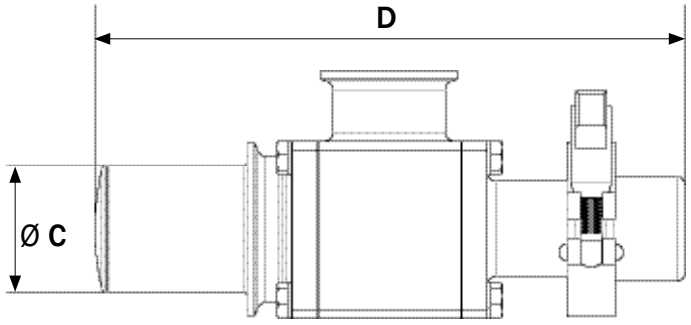
USDA-Accepted AirSweep Models Specifications

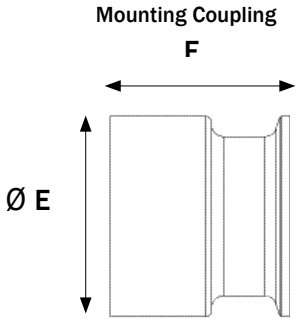
USDA-135 and USDA-185







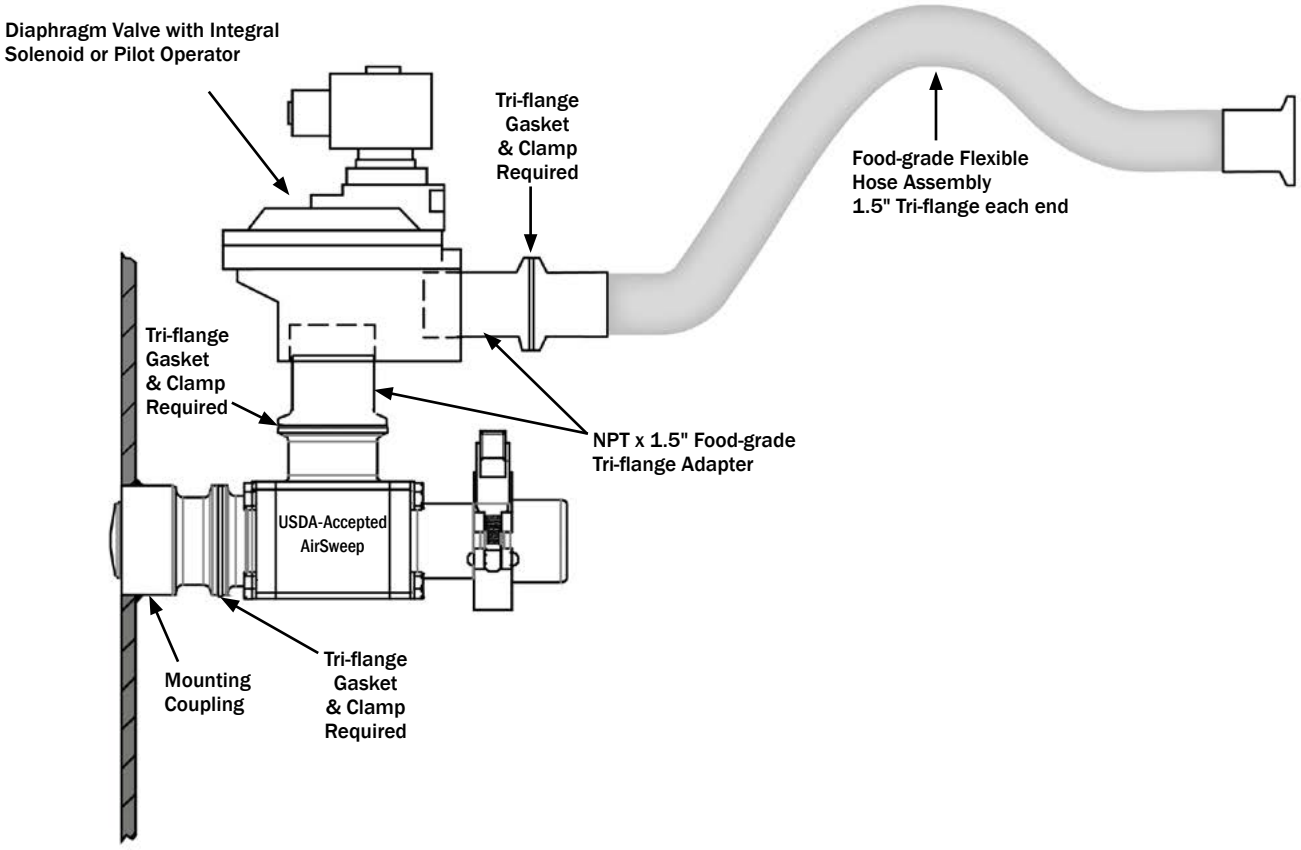




	Main Unit				Mounting Coupling		
Model	**A**	**B**	**Ø C**	**D**	**Ø E**	**F**	**Weight**
USDA-135	2.35" (5.97 cm)	3.12" (7.92 cm)	1.37" (3.48 cm)	8.39" (21.30 cm)	1.98" (5.04 cm)	1.77" (4.50 cm)	6.25 lb (2.83 kg)
USDA-185	2.77" (7.02 cm)	3.55" (9.02 cm)	1.84" (4.67 cm)	8.50" (21.59 cm)	2.52" (6.39 cm)	1.89" (4.80 cm)	8.19 lb (3.71 kg)

Main AirSweep® System Components

The main components of the AirSweep system include the AirSweep nozzles, solenoid-operated diaphragm valves, sequence timer/controller and associated piping and electrical connections. All other components that may be installed within the system are considered optional accessories.



USDA-Accepted AirSweep® Main Components

	Components for Model USDA-135		Components for Model USDA-185	
Component	**Part Number**	**Description**	**Part Number**	**Description**
Mounting Coupling	USDA-135-MC-316	316SS Mounting Coupling	USDA-185-MC-316	316SS Mounting Coupling
Tri-flange Clamp	USDA-135 Clamp	304SS Tri-flange Clamp	USDA-185 Clamp	304SS Tri-flange Clamp
Tri-flange Gasket	USDA-135 PTFE Clamp Gasket	Gasket for Clamp	USDA-185 PTFE Clamp Gasket	Gasket for Clamp
Diaphragm Valve*	See options on pages 19-28		See options on pages 19-28	
Flexible Hose Assembly	FGH-1"x30"w1.5" TF	Food-Grade Hose Assembly, 1" Plicord Gray Food Hose, 30" AOL. Sure Seal Hose Fitting, 304 SS, 1-1/2" Tri-flange, both ends	FGH-1.5"x30"w1.5" TF	Food-Grade Hose Assembly, 1-1/2" Plicord Gray Food Hose, 30" AOL. Sure Seal Hose Fitting, 304 SS, 1-1/2" Tri-flange both ends
Tri-flange Adapter (Male)	USDA-ADP-1.5QCx1.0NPT Male	Food Grade Tri-Clamp Adapter, 1.5" Clamp x 1.0" NPT Male 316L SS	USDA-ADP-1.5QCx1.5NPT Male	Food Grade Tri-Clamp Adapter, 316L SS 1.5" Clamp x 1.5" NPT Male

Specifications subject to change without notice.

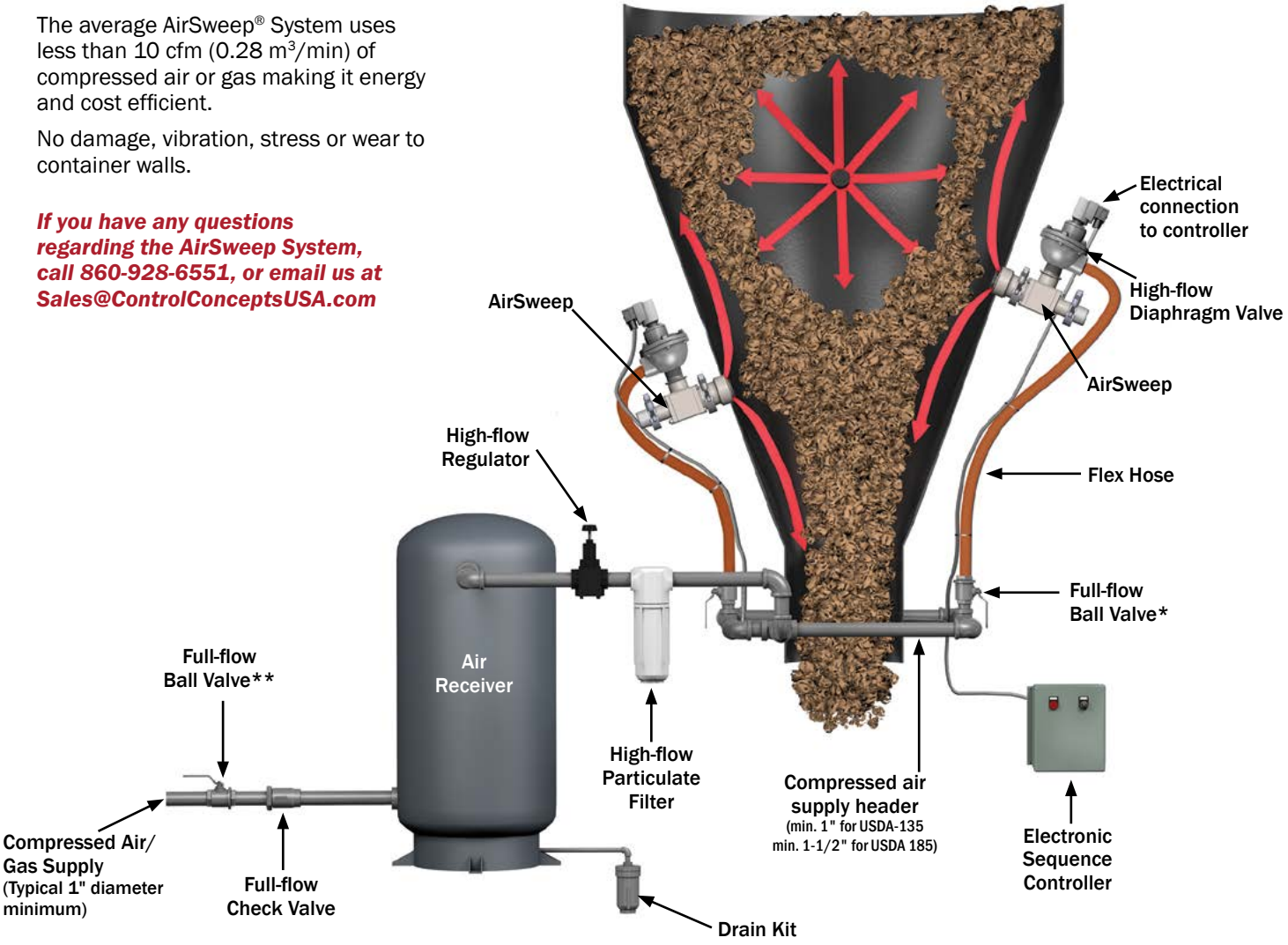
Typical AirSweep® System

A typical AirSweep® material activation system consists of strategically-located AirSweeps, high-flow solenoid valves, electronic sequence controller and air receiver.

The average AirSweep® System uses less than 10 cfm (0.28 m^3/min) of compressed air or gas making it energy and cost efficient.

No damage, vibration, stress or wear to container walls.

If you have any questions regarding the AirSweep System, call 860-928-6551, or email us at Sales@ControlConceptsUSA.com



Typical USDA-Accepted AirSweep® System Components

Component	Model USDA-135	Model USDA-185	Description
High-Flow Diaphragm Valve	1"	1-1/2"	Delivers rapid, high-volume pulse of compressed air/gas to AirSweep nozzle.
Flex Hose Assembly	1"	1-1/2"	Connects the solenoid valve to hard-piped header loop. (Length as required)
* Full-flow Ball Valve	1"	1-1/2"	Isolation valve for individual nozzles.
High-flow Particulate Filter	1"	1-1/2"	Point-of-use particulate filtration enhances life of system components by removal of in-line contaminants.
Air Receiver	30-gallon	60-gallon	Compressed air reservoir ensures instantaneous volume for system.
High-flow Regulator	1"	1-1/2"	Regulates compressed air supply for proper AirSweep operation.
Full-flow Check Valve	1"	1-1/2"	Ensures one-way flow to system.
** Full-flow Ball Valve	1"	1-1/2"	System shut-off.
Electronic Sequence Controller	✓	✓	Controls sequenced pulsing of AirSweep system; adjustable for any process.

About the AirSweep® System

System Overview

The AirSweep® system is a pneumatic material activation/aeration system designed to promote flow of material by disbursing short bursts of high-pressure, high-volume compressed air or inert gas along the inside of a vessel wall, chute, hopper, silo cone, etc.

The system generally consists of:

- One or more AirSweep nozzles
- Pilot or solenoid-operated diaphragm valves
- Controller to pulse the valve (or valves) in a linear sequence
- Various components typically associated with the delivery and preparation of compressed air. These components may include
  - Air receiver tank
  - High-flow regulator
  - point-of-use particulate filtration

Other system components may include a check valve, flexible hoses for connection from the rigid header supply pipe to the diaphragm or solenoid valves/AirSweep nozzles, and various pipe fittings, safety relief, drain and shut off valves, etc., that would be typical of a compressed air delivery system.

See system diagram on page 5

Safety

The AirSweep system operates under high-pressure compressed air or gas. As with any high pressure pneumatic system, caution should be taken to relieve all pressure from the system and disconnect all electric power before attempting to dismantle or maintain any component within the system. Safety relief valves and/or auto drain valves, if supplied, should be checked per manufacturer's recommended maintenance schedule.

Never allow anyone to enter or look into vessel when AirSweeps are operating, as eye or other injury may result from dispersed debris.

Process Description

The AirSweep nozzles are typically positioned on a hopper, silo cone, or chute bottom at points where material may commonly build up and impede on-demand flow. When an actuation signal is sent to the pilot valve or solenoid, the diaphragm valve opens to allow pressurized air or inert gas to flow through the AirSweep valve. The spring-loaded AirSweep piston opens under the release of pressurized air or inert gas, directing the air/gas pulse to flow along the vessel wall and promote material flow. When the actuation signal ends, the diaphragm valve quickly closes and the AirSweep piston immediately retracts by spring tension, allowing the AirSweep nozzle to reseal. Actuation is usually performed in a linear sequence, beginning with the AirSweep nozzle closest to the discharge point and continuing to each successively higher unit. The sequence normally repeats continuously while the discharge cycle is active.

Process Control and Operation Procedures

The AirSweep system should only be operated during material discharge cycle. Activating the AirSweep nozzles when material is not meant to be discharged may result in compaction of the material, resulting in reduced material flow when discharge is desired. Even when not operating, system should remain pressurized to specified operating range, unless maintenance is being performed.

When system is pressurized, the normally-closed diaphragm valve holds pressure in the lines; in this state, no compressed air is introduced to the AirSweep nozzles. Each high-flow diaphragm valve is connected directly to each AirSweep nozzle. The diaphragm valve is operated by an integral solenoid or external pilot, depending upon model and design supplied. An external timer/controller or PLC provides an electrical signal to the solenoid/pilot valve to control the length of the actuation. Recommended actuation length range is 100-250 milliseconds. High pressure compressed air is distributed to the diaphragm valves via large diameter header piping. An air receiver tank, used to collect and store a reserve of volume upstream from the system, may be attached to the header pipe. Air preparation components, including particulate filter and regulator may also be installed upstream of the header piping.

Upon energizing the controller, the first output signal will actuate the first solenoid in the system, opening the corresponding diaphragm valve to allow the first AirSweep to pulse for the pre-set duration, typically 100 to 250 milliseconds. The next AirSweep will pulse, after the preset dwell time (set by end-user depending upon process requirements and material characteristics), followed in a linear sequence by the other AirSweeps in the system. **Pulse duration of longer than 250 milliseconds is <u>not</u> recommended.**

Pulsing is achieved by the timer/controller sending an electric signal to the solenoid operator in the normally-closed pilot or diaphragm valve. Upon energizing the solenoid, the pilot opens or solenoid post lifts to allow the diaphragm valve to exhaust its top chamber, which in turn allows the main diaphragm to open and let the system compressed air to flow through the diaphragm and into the AirSweep nozzle. Upon pressurizing the AirSweep, the AirSweep piston head is forced open and compressed air flows through and is disbursed into the vessel, activating and aerating material in a 360 degree pattern around the AirSweep nozzle head. When the electric signal terminates, the pilot valve or solenoid closes, causing the main diaphragm in the diaphragm valve to re-seat, shutting off the flow of system compressed air to the AirSweep. The immediate drop in pressure allows the return spring in the AirSweep piston to force the piston head to its closed position, resealing the AirSweep nozzle.

AirSweep® Maintenance Requirements

Maintenance Requirements

Inspection of all components every 6 months is recommended for signs of wear or fatigue. Replacement of all internal parts is recommended after 250,000 cycles. Failure to perform routine inspections and recommended replacement may result in sudden failure and possible contamination of material and/or damage to production equipment.

Isolation

Should it be necessary to overhaul any AirSweeps while the system is working, it will be necessary to first close the valve(s) isolating the AirSweep(s) on that part of the vessel. Next, switch on the AirSweep control system for one full cycle. This will allow compressed air to clear from all isolated pipes around the vessel, by cycling all AirSweeps within the system at least once.

CAUTION: To avoid injury, pressure must be relieved from header piping before maintenance is started.

AirSweep Installation Notes

Consult installation drawing (if provided) for proper AirSweep location. It is important to adhere to the recommended locations as the type, number and location of AirSweeps have been selected for thorough "sweep" coverage of problem surfaces in the vessel or chute.

CAUTION: NEVER ENTER A VESSEL WHILE AIRSWEEPS ARE OPERATING

When welding, a continuous bead should be used to fasten the mounting to the vessel wall on steel vessels.

Alert: Welding procedure must be done properly to avoid warping of Mounting Coupling.

Welding should be done in accordance with the American Welding Society (AWS) standards as supported by ASME (American Society of Mechanical Engineers).

PIPING INSTALLATION

It is suggested that you follow the piping schematic that is a part of this instruction manual. (See pg 5)

Never use smaller pipe size fittings or valves than the ones shown.

It is important that the header be installed below the level of the AirSweeps so that any condensation that may form in the lines will not drain into the AirSweeps. If the header must be installed above the level of installed AirSweeps, the feed lines for the individual AirSweeps must be taken off the top of the header (rather than the bottom) to minimize condensation drainage into the AirSweeps and solenoids. A full flow gate or ball valve is recommended as it allows one AirSweep to be taken out of service without shutting down the entire system.

Using a flexible air hose in lieu of rigid piping from the header to the solenoids is recommended for ease of installation and for easy removal of the AirSweep when service is required.

NOTE: USING SUITABLE SAFEGUARDS – Always blow out all air supply lines thoroughly before final hook up to solenoids. Dirt in supply lines may cause the solenoid valves to malfunction.

When operating properly, with material in the vessel, the AirSweeps are almost silent. If an AirSweep begins to chatter, vibrate or "machine gun", it is generally caused by a malfunctioning solenoid valve, often due to dirt. If this occurs, **SHUT OFF ELECTRIC & AIR SUPPLY** and **DISCHARGE AIR** in system, then clean solenoid thoroughly *(see Troubleshooting on pages 29-30)*.

NOTE: USING SUITABLE SAFEGUARDS – Always blow out all air supply lines thoroughly before final hook up to solenoids. Dirt in supply lines may cause the solenoid valves to malfunction.

AIR USAGE NOTE

It is important to note that the lower limit of the interval timer is governed by how fast the air receiver can recover its air loss from the preceding AirSweep burst. If there is some doubt, a gauge should be installed on the air receiver tank or header. For example, if the gauge initially reads 90 psi (620.53 kPa) when the receiver is fully pressurized, it should not drop below 75 psi (517.11 kPa) for one burst if the receiver has been properly sized. The instant the receiver again recovers the 90 psi (620.53 kPa) after one AirSweep is fired, it is then ready for another firing. If the gauge never indicates the original pressure, the AirSweeps are firing faster than the air supply can recover.

GENERAL NOTES & SUMMARY:

- For personal safety, the entire electrical system must be properly grounded.
- Distance between air receiver and header has no limit, as long as proper size pipe and fittings are used throughout. (1" pipe size/fitting for model USDA-135, and 2" pipe size/fitting for model USDA-185)
- Never use pipe or fittings smaller than sizes indicated.
- Slope header toward receiver 1/4" per ft (0.635 cm per 0.30 m) for moisture drainage. Whenever possible, locate header below AirSweeps.
- Always tap feed lines off top of header (even if header is above AirSweeps) to prevent moisture drainage into solenoid valves and AirSweeps.
- Use location arrangement drawing (if provided) for AirSweep location.
- Whenever possible, complete header loop around the hopper.
- Manual isolation valves (optional) must be gate valves or comparable full orifice valves, to not induce flow restriction in system.
- If vessel is outdoors, air receiver and filter should be located indoors whenever possible.
- Use of a check valve is recommended if plant air pressure varies more than 10 psi (68.95 kPa).
- Air Supply: USDA-135 – 80 psig (551.58 kPa)
  USDA-185 – 90 psig (620.53 kPa)
- **IMPORTANT!** Solenoid valves must be located at AirSweep air inlets and not any distance upstream.
- Purge all lines and unions before connecting to solenoid valves. Particulate in lines may result in solenoid valve malfunction and excessive maintenance.
- Use PTFE tape on pipe joints rather than pipe dope, to avoid fouling of solenoid valves.

USDA-135 and USDA-185
Mounting Coupling Installation

USDA-135 Mounting Coupling Installation (Weld to vessel)

1. Cut hole in vessel wall. Recommended hole size of approximately 1/8" (3.175 mm) greater than diameter of coupling to allow coupling to pass through curved wall.
   For USDA-135 mounting coupling, recommended hole size is 2.109" (53.569 mm)
   For USDA-185 mounting coupling, recommended hole size is 2.641" (67.081 mm)
2. Align coupling flush with inside of vessel wall and weld continuous bead to exterior of wall.*** (See Figure 1 below)**
3. Install clamp gasket to inside groove in mounting coupling flange.
4. Push AirSweep fully into mounting coupling, ensuring clamp gasket is tightly sandwiched between AirSweep and mounting coupling. **(See Figure 2 on page 12)**
5. Install tri-flange clamp around AirSweep and mounting coupling flange and finger-tighten until snug.
6. Apply PTFE tape to adapter thread and thread solenoid valve onto adapter. Do not over-tighten.
   Do not use pipe dope or paste on threads, as this material may foul the solenoid valve.
7. Install clamp gasket to inside groove in rear AirSweep flange.
8. Position adapter flange to mate with rear AirSweep flange – with gasket sandwiched between the two parts.
9. Install tri-flange clamp around rear flange and finger-tighten until snug. **(See Figure 3 on page 12)**

Note: *On sharply curved vessel walls, front surface of mounting coupling may extend slightly into the vessel at top and bottom (12:00 & 6:00 positions), and should be flush at sides (3:00 & 9:00 positions).*

- For maximum effectiveness, connection between adapter and solenoid valve should be direct, with no additional pipe nipples or fittings. When possible, use only the supplied adapter. If additional pipe length is required, do not exceed 12" (30.48 cm) between solenoid valve and AirSweep.

* *Welding procedure must be done properly to avoid warping of Mounting Coupling.*
Welding should be done in accordance with the American Welding Society (AWS) standards as supported by ASME (American Society of Mechanical Engineers).

Figure 1

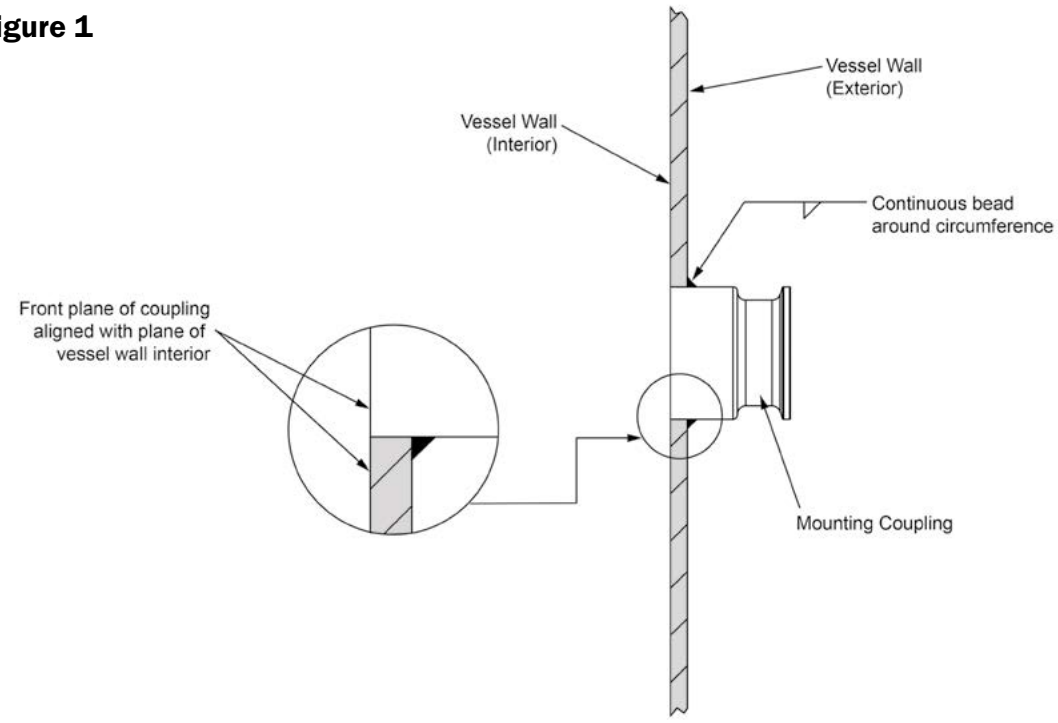


Figure 2

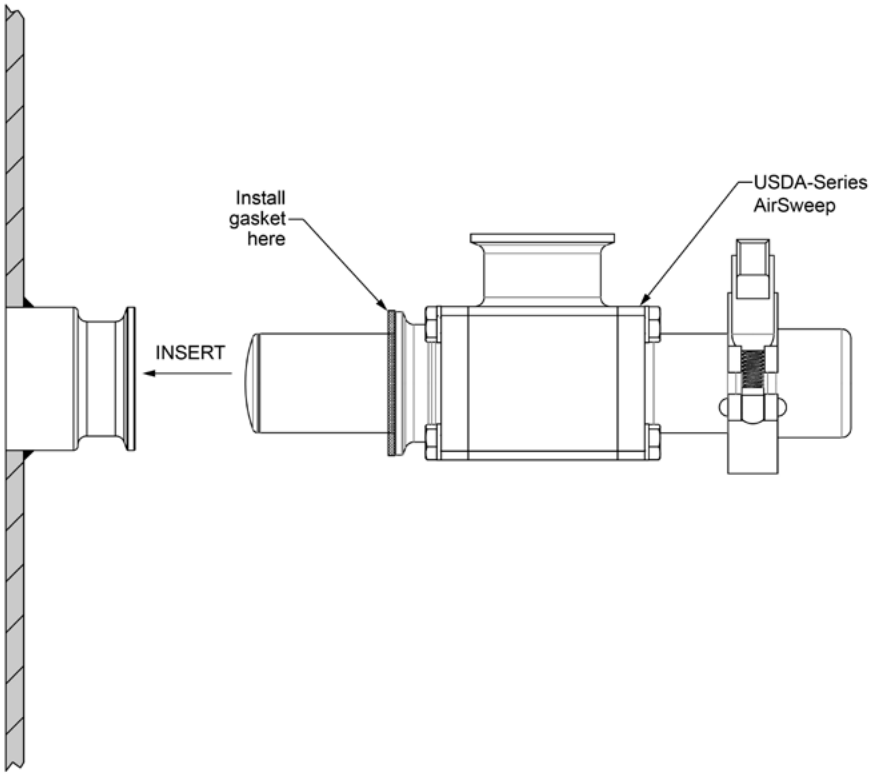
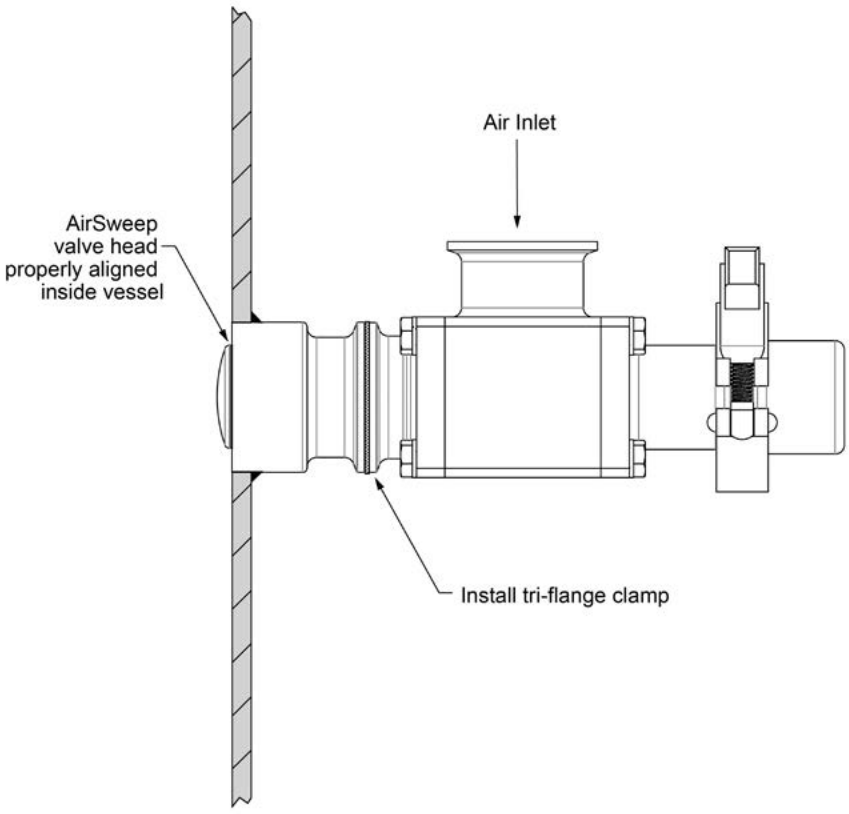
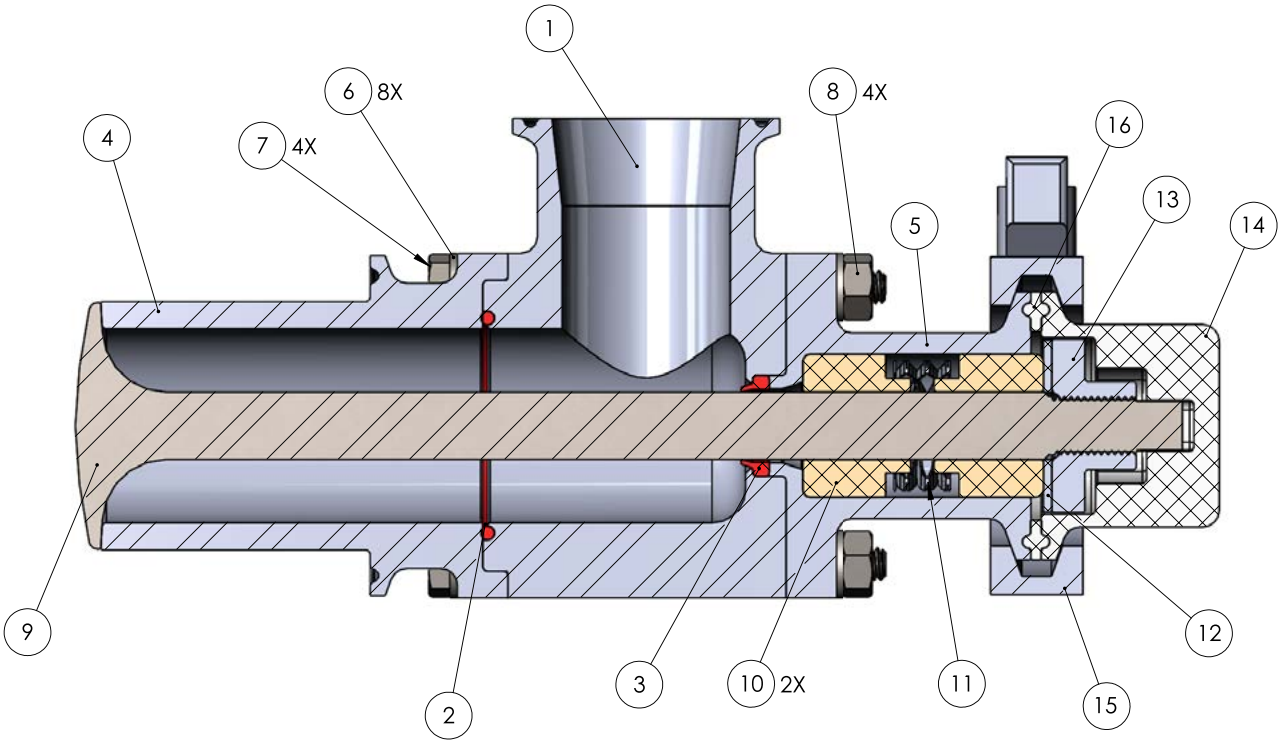


Figure 3

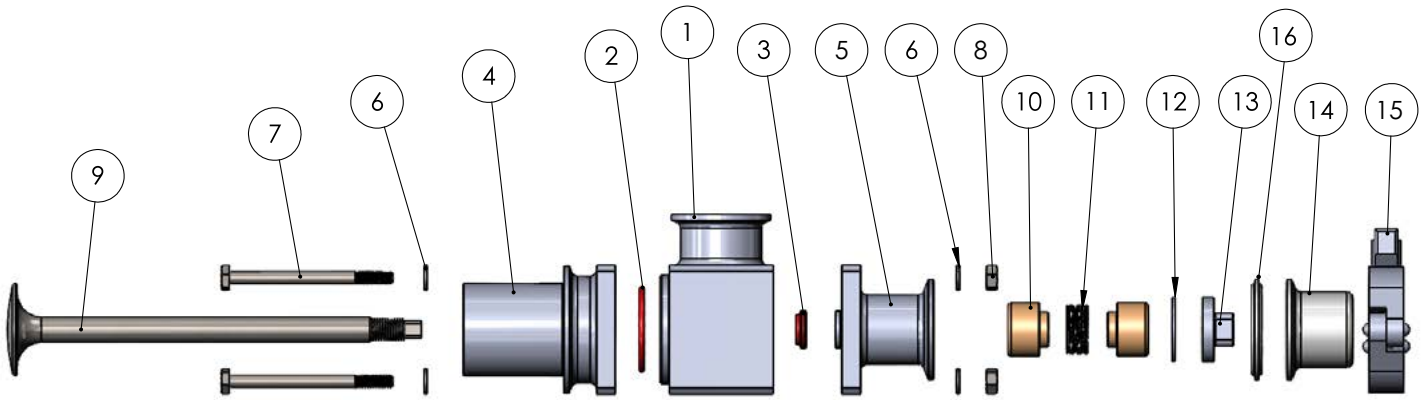


USDA-Accepted Model Cutaway View



Item No.	Description	Qty
1	Center Body	1
2	O-Ring (-126 O-Ring for USDA-135 and -128 O-Ring for USDA-185)	1
3	PTFE Wiper Seal	1
4	Barrel	1
5	Rear	1
6	Flat Washer	8
7	1/4-20 x 3 1/4 Hex Bolt	4
8	1/4-20 Hex Nut	4
9	VCW (Valve Stem)	1
10	Standard Stem Guide Bushing	2
11	316SS Wave Spring	1
12	Compression Washer	1
13	Retaining Nut	1
14	PTFE End Cap	1
15	1-1/2" Tri-flange Clamp	1
16	PTFE Gasket	1

USDA-Accepted Model Exploded View



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6	Flat Washer	8
7	1/4-20 x 3 1/4 Hex Bolt	4
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9	VCW (Valve Stem)	1
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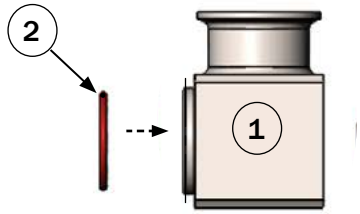
12	Compression Washer	1
13	Retaining Nut	1
14	PTFE End Cap	1
15	1-1/2" Tri-flange Clamp	1
16	PTFE Gasket	1

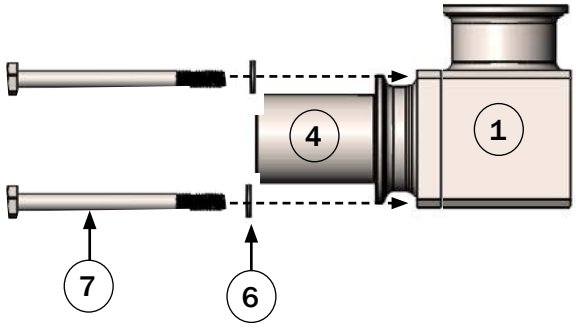
USDA-Accepted AirSweep Assembly Instructions

(Disassembly is in Reverse)

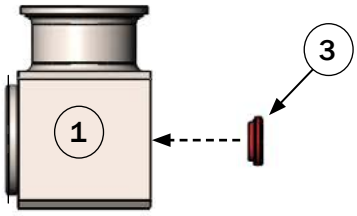
1. Install O-ring (item #2) in groove in center body (item #1).



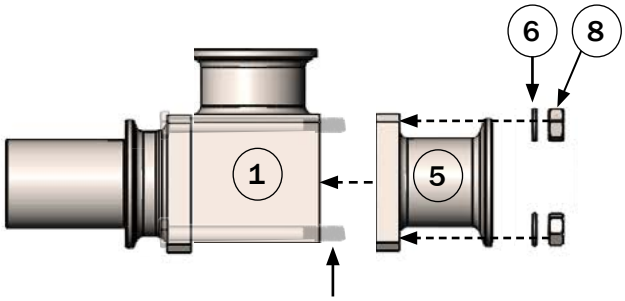
2. Position barrel (item #4) over center body; align bolt holes
3. Insert four hex bolts (item #7) with flat washers (item #6) through barrel and center body.



4. Install one wiper seal (item #3) in recess in rear of center body. Press seal into recess with light finger pressure to ensure even, positive seat. Chamfer section of wiper seal faces barrel.



5. Position rear body (item # 5) over rear of center body, with hex bolts aligning and passing through bolt holes in rear body.
6. Install (4) flat washers (item #6) on protruding threaded bolt ends.
7. Thread (4) hex nuts (item # 8) onto bolts; finger tighten, then hand-tighten with wrench in cross pattern (0, 180, 90, 270 degrees).

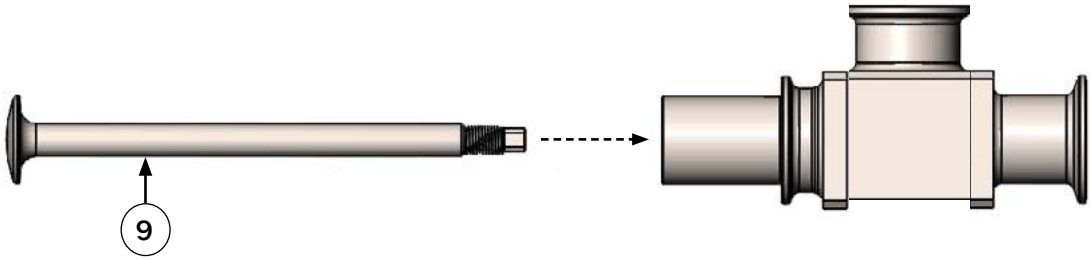


Protruding hex bolt (Item #7) end.

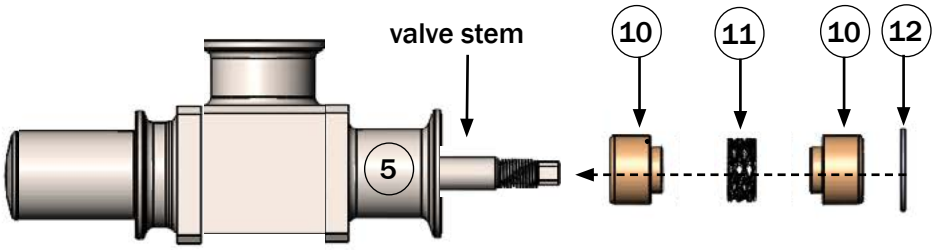
USDA-Accepted AirSweep Assembly Instructions *continued*

(Disassembly is in Reverse)

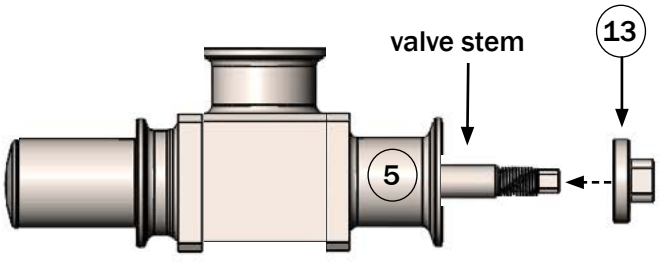
8. Install valve stem (item #9) through barrel, center and rear bodies. Push stem until valve head seats fully against front face of barrel.



9. Slide standard stem guide bushing (item #10) over valve stem and into rear body. Bushing should slide completely in and bottom out in rear body.
10. Slide wave spring (item # 11) over valve stem and seat against wiper seal bushing.
11. Slide rear bushing (item # 10) over valve stem, flat side oriented to the front. Bushing should slide completely in and bottom out against wave spring.
12. Slide compression washer (item # 12) over back of valve stem and seat against flat side of rear bushing.



14. Thread retaining nut (item # 13) onto back of valve stem, flat side facing front of unit. Apply slight pressure to compress spring while rotating retaining nut clockwise to engage thread on valve stem.
15. Continue to rotate retaining nut clockwise to tighten until back of retaining nut is flush with top of threaded section of valve stem.
16. Align flats of retaining nut parallel with flats on valve stem.
17. Push on back of retaining nut to check proper open/close of valve. Valve should open approximately 1/8" (3.175 mm) when pushed and immediately close when released.

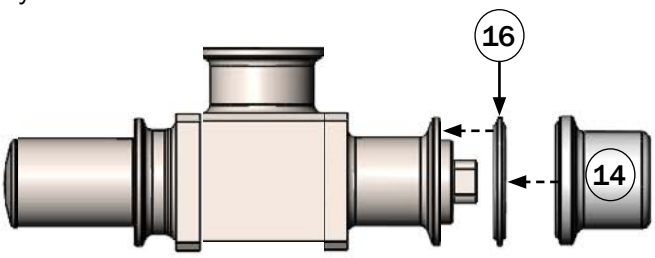


Bushings, wave spring and compression washer are inside Rear (item #5).

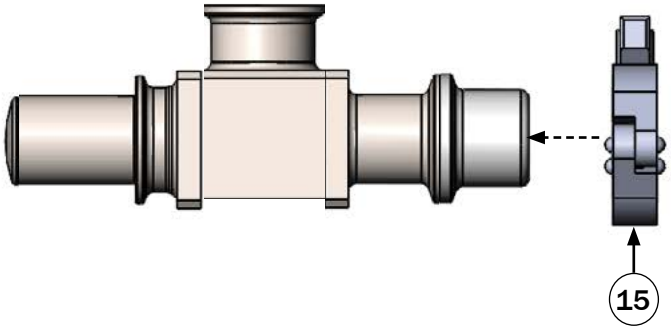
USDA-Accepted AirSweep Assembly Instructions *continued*

(Disassembly is in Reverse)

18. Install flange gasket (item #16) in gasket groove of rear body.
19. Install end cap (item #14) by aligning flats on stem/retaining nut with corresponding section inside end cap and seating end cap onto flange gasket.



20. Install Tri-flange Clamp (item #15) to retain end cap onto rear body and finger tighten. Avoid rotating end cap while tightening flange clamp.



AirSweep® System Components

VXM-208 and VXM-212 Stainless Steel Diaphragm Valves

The 200 SERIES in stainless steel is a range of diaphragm valves suitable for dust collector applications. The 200 Series valve has the inlet port at 90° to the outlet port. The range includes two models, which comprises a 1" valve and a 1-1/2" size valve. Both models have a single diaphragm. The inlet and outlet ports have threaded female gas connections.

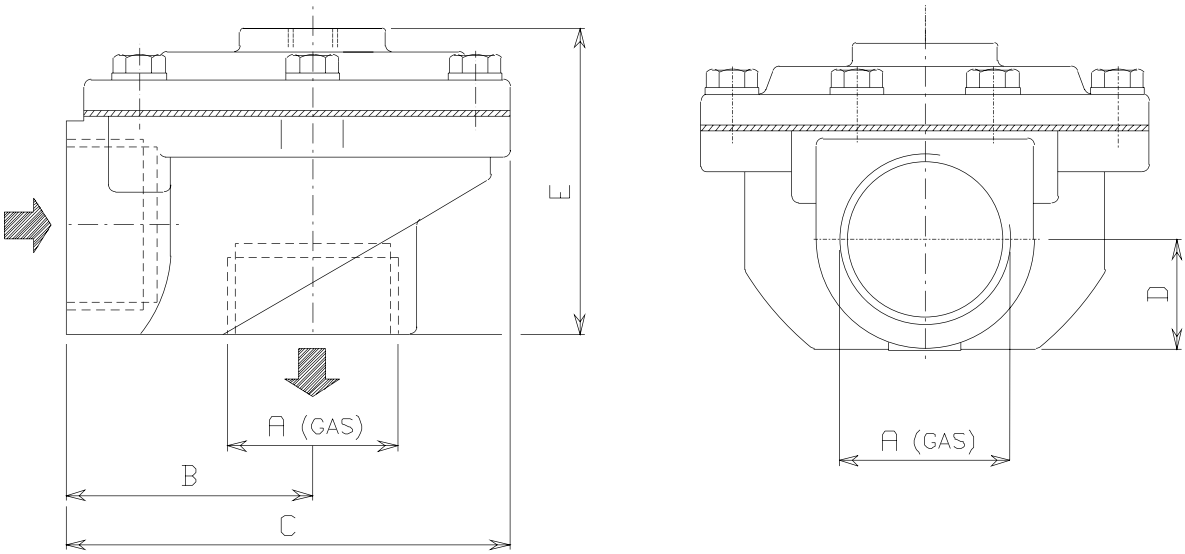
The 200 Series valves in stainless steel, are manufactured in AISI316L. These valves are particularly appropriate for installation in aggressive environments where there is risk of corrosion.

General Characteristics

Fluids: Filtered air and oil free
Diaphragm: *Standard*
NBR: −20°C/+80°C (-4°F/+176°F)
Viton: −29°C/+232°C (-20°F/+450°F)
Pressure Range: From 0.5 to 7.5 bar

Construction Features – Valve

Cover: AISI 316L
Body: AISI 316L
Pilot: Stainless steel
Spring: Stainless steel
Bolts and Screws: Stainless steel
Diaphragm Back Disk: Stainless steel

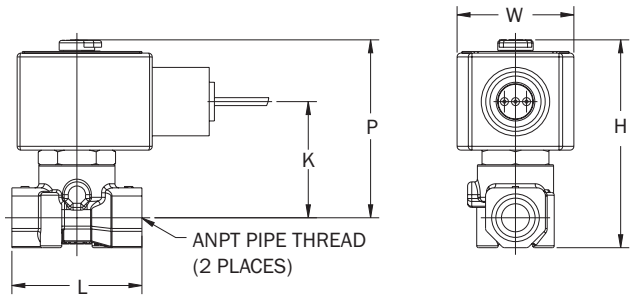


MODEL	ØA	B	C	D	E	E	ØL	Weight	Pressure Range		No. Diaph.
									Min	Max	
VXM-208-NPT	1" (25.4 mm)	2.05" (52 mm)	3.54" (90 mm)	0.91" (23 mm)	5.31" (135 mm)	2.36" (60 mm)	1/8" (3.18 mm)	1.87 lb (0.85 kg)	7.25 psi (0.5 BAR)	108.78 psi (7.5 BAR)	1
VXM-212-NPT	1-1/2" (38.1 mm)	2.83" (72 mm)	5.12" (130 mm)	1.22" (31 mm)	2.36" (60 mm)	3.35" (85 mm)	1/8" (3.18 mm)	5.27 lb (2.39 kg)	7.25 psi (0.5 BAR)	108.78 psi (7.5 BAR)	1

8262 SERIES Pilot Valves for Remote Pilot-operated Diaphragm Valves

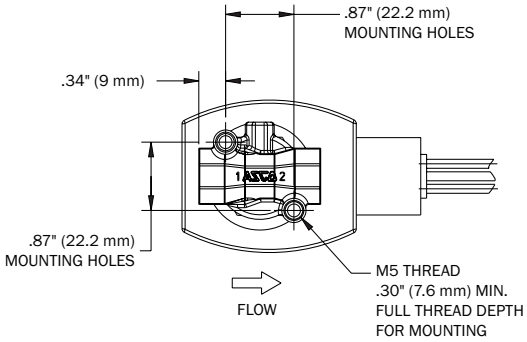
Part No. 8262H007 (Suitable for VXM-208 only)
2-way, normally closed, pilot valve
Stainless steel construction
Available in AC/DC voltages
NEMA 4 or NEMA 7 options available *(NEMA 4 pictured)*

Pipe Size: 1/4" (6.35 mm)
Cv flow factor: 0.35
Max. Operating Pressure Differential (Air, Inert Gas)/DC@104°F: 130 psi
(DC@40°C: 896 kPa)



H	K	L	P	W
2.96" (75 mm)	1.72" (44 mm)	1.56" (40 mm)	2.60" (66 mm)	1.63" (43 mm)

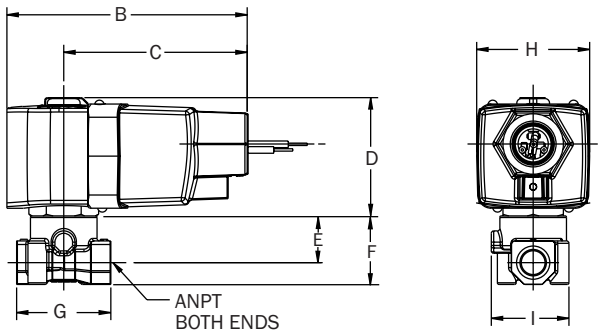
Mounting Dimensions



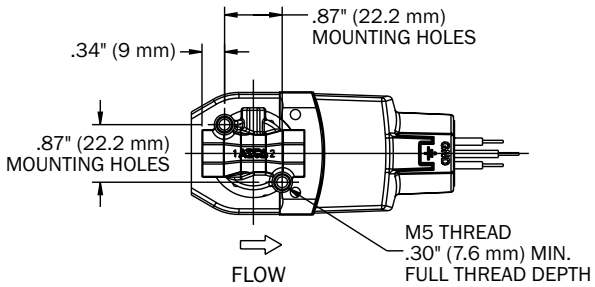
Note: Mounting holes will accept a standard #10-32 machine screw.

Part No. 8262230 24-120 (Suitable for VXM-208 or VXM-212)
Normally-closed solenoid operated pilot valve, 1/4" (6.35 mm) in/out, stainless steel construction,
24-120 VAC, 24-125 VDC
Available in NEMA 4/NEMA 7 *(NEMA 4 pictured)*

Pipe Size: 1/4" (6.35 mm)
Cv flow factor: 0.88
Max. Operating Pressure Differential (Air, Inert Gas): 105 psi (724 kPa)



Mounting Dimensions



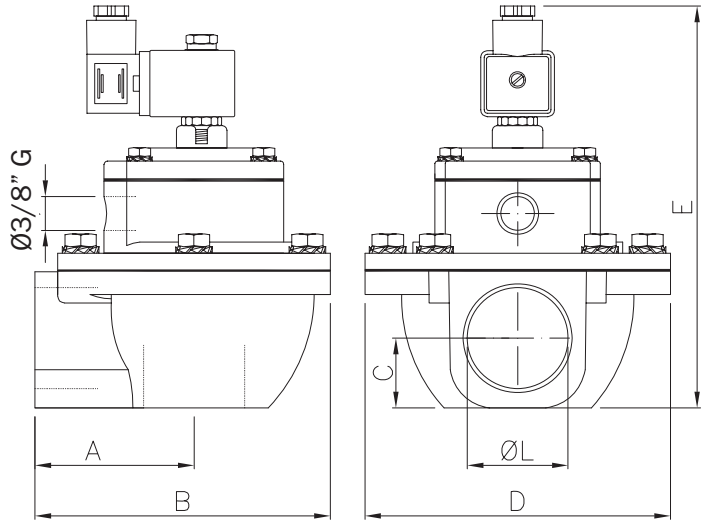
B	C	D	E	F	G	H	I
3.98" (101 mm)	3.04" (77mm)	2.00" (51 mm)	0.78" (20 mm)	1.11" (29 mm)	1.56" (40 mm)	1.87" (48 mm)	1.29" (33 mm)

1-1/2" SOLENOID VALVE – MODEL SV-150

High-Flow Diaphragm Valve with Integral Solenoid

SV-150 Characteristics

Fluid	Filtered and oil-free compressed air
Temperature Range	STD diaphragm: -40°F to +176° F (-40°C to +80°C) Viton Diaphragm: -22°F to +392° F (-30°C to +200° C)
Operating Pressure	min. 7.25 psi; max. 108.78 psi (min. 0.5 bar; max. 7.5 bar)
Body & Cover	Die cast aluminum
Core Tube	Stainless Steel
Plunger	Stainless Steel
Screws	Stainless Steel
Coil Insulation	Class H
Connector	PG 9; IP65 DIN 43650 ISO 4400
Standard Voltage	230 - 110 - 24V / 50-60 VHz 19 VA 24 VDC 15W



Ø L (nom)	A	B	C	D	E	Wt
1-1/2"	2.81"	5.31"	1.22"	5.51"	~7.40"	3.53 lb
38.1 mm	71.3 mm	135 mm	31 mm	140 mm	~188 mm	1.6 kg

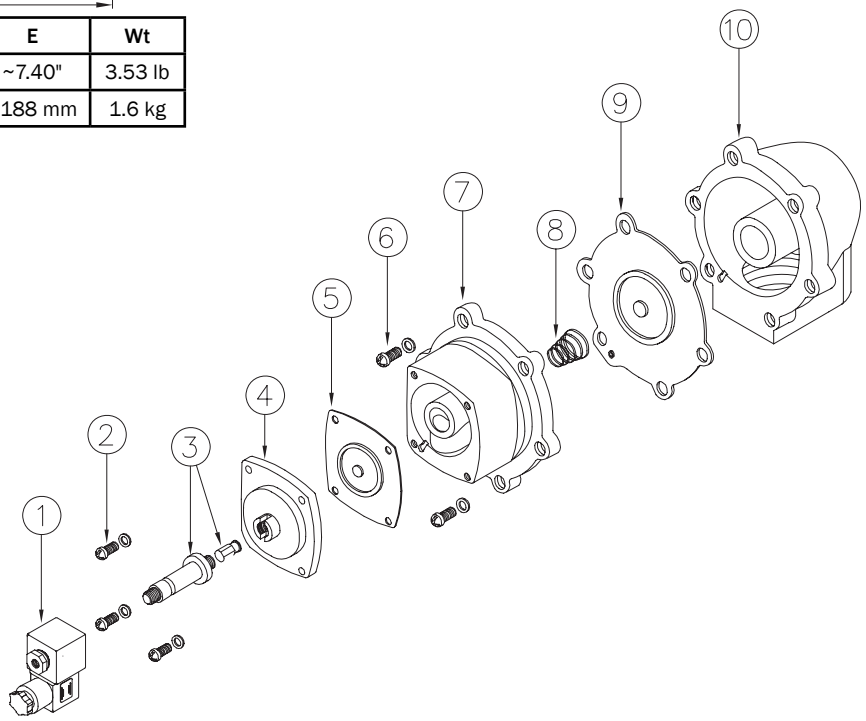
Sound Levels – Model SV-150 (1-1/2")

Pressure	w/o silencer
4 bar (58 psi)	77.6 db
6 bar (87 psi)	102.8 db

Sound level information pertains to pulse valves with integral solenoid at a distance of 2 meters from the valve.

The valve with remote solenoid will be less than the above figures. For the 1-1/2" double diaphragm valve, the utilization of a silencer in the exhaust port will decrease these numbers by approximately 10%.

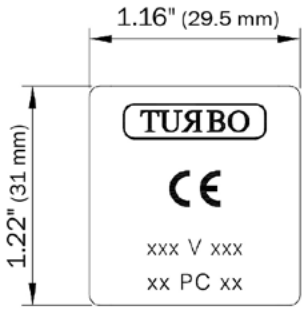
No.	Description	Component Part No.
1	Coil, Connector, Nut with gasket	BH10...V/50-60 Hz
2	Screws + Washers	VTE6x20 and VROS6
3	Pilot Unit	GPC 10
4	Pilot Cover	TCOP 25
5	Secondary Diaphragm	M25
6	Screws + Washers	VTE8x20 and VROS8
7	Main Cover	TCOP 40
8	Spring	TMOL 40
9	Main Diaphragm	M40
10	Valve Body	TCOR40FFG

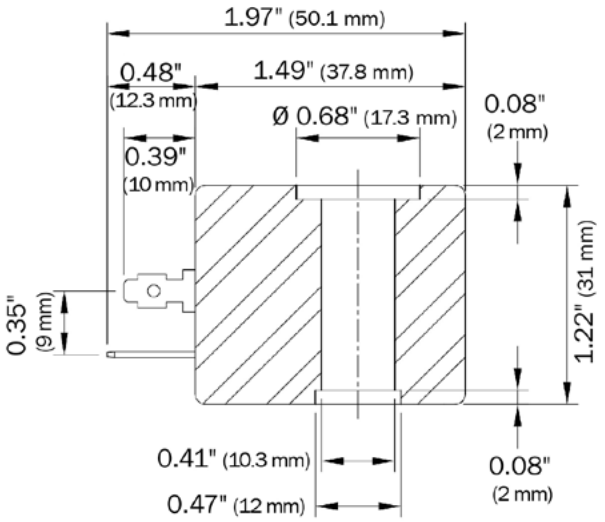


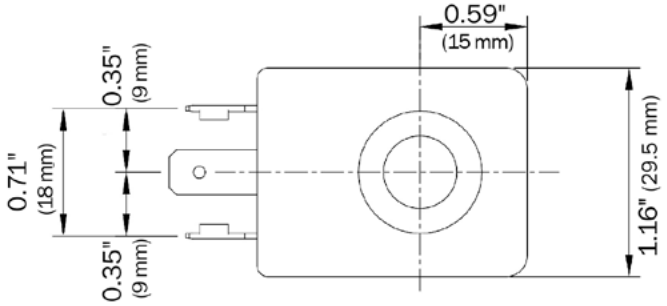
Solenoid Valve Coil for Model SV 150 Valve

The solenoid valve coil converts electrical energy into mechanical movement to control the opening and closing of the solenoid valve. While solenoid valves can be mounted in any position, mounting a valve vertically with the coil upwards is recommended.

Technical Features	
Nominal voltage	24 VAC 50-60VHz (±10%) 110 VAC 50-60VHz (±10%) 230 VAC 50-60VHz (±10%) 12 VDC (±10%) 24 VDC (±10%)
Power absorption at 68° F (20°C)	19VA AC working 18W DC working, standard version 18W DC working, standard version 12W DC working, low energy consumption type
Operating temperature	-4°F to +176°F (-20°C to +80°C)
Protection class	IP65 with DIN 43650 valve connector form A
Copper wire class	H maximum temperature 356°F / 180°C according to IEC 85
Isolation class	F (311°F / 155°C) Stnd H (356°F / 392°F [180°/200°C]) according to CEI EN 60034-1
Electric connections	3 x 0.248" (6.3mm) leads pins for fittings to DIN 43650 form A connector
Waterproof level	IP65 with DIN 43650 valve connector form A
Body overmolded	Nylon fiberglass reinforced
Available with ATEX Zone 21 and Zone 22	





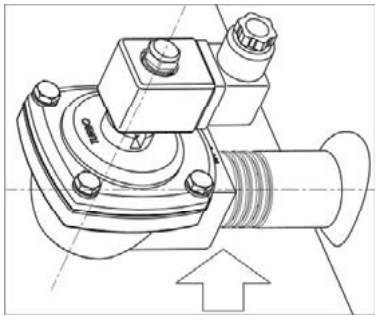


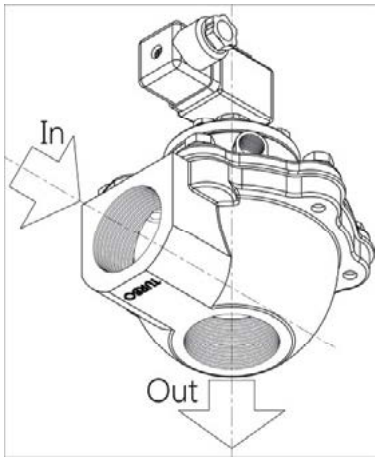
Installation – Model SV-150

WARNING: During installation, maintenance and replacement procedures, turn off the power supply before starting work.

Ensure the tank is not pressurized. Tank should be completely empty.

Inform department personnel that power and pressure are turned off to avoid accidental start up.





Assembly and Installation:

- Screw the valve in place in its seat on the threaded stub. To avoid damages, do not overtighten the valve inlet connections.
- Spread a layer of gas-tight sealing paste for removable joints on the tank stub threads (not on the valve threads).
- Screw the valve onto the tank using the threaded connector marked **IN**, and secure it in place.

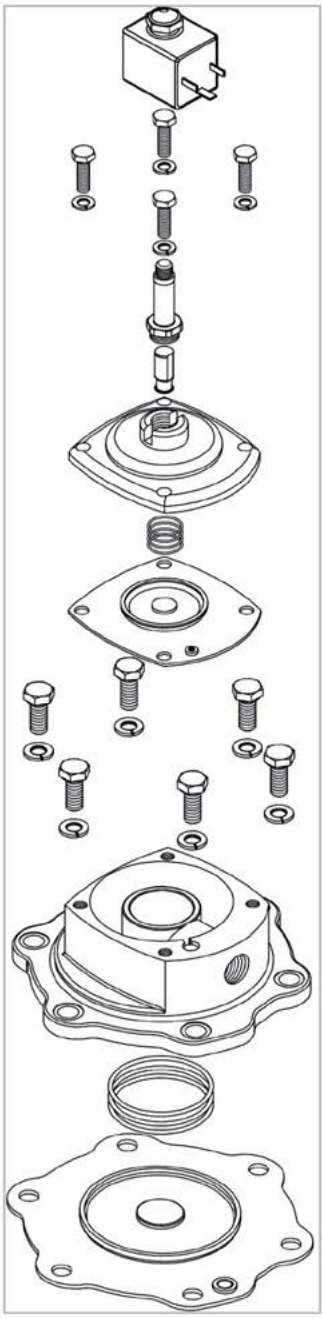
For proper operation:

- The power voltage must be ±10% of the rated value printed on the back of the solenoid coil.
- System compressed air pressure must be between 0.5 and7.5 Bar (7.25 to 116 psi).
- The diaphragm valve must be connected to systems that supply dry compressed air, with low solid particle residue, water and oil.
- The tank volume must be proportionate to the valve air consumption.

Diaphragm Replacement

1. Unscrew the screws that secure the cover, remove it from its housing to access the diaphragm.
2. Remove the diaphragm.
3. Insert the new diaphragm, adhering it to the valve body perimeter.
4. The disk facing up and rivet with air passage hole in its housing.
5. Mount the diaphragm spring that must be housed on the disk centered on the rivet.
6. Replace the cover over the diaphragm, refer to the housing for the rivet with the air passage hole.
7. Screw in and tighten the screws with the following torque:

   M6: 7 Nm torque
   M8: 16 Nm torque
   M10: 32 Nm torque



Exploded view of SV-150

Pilot and Coil Replacement

1. Unscrew the nut at the top of the coil.
2. Unscrew the pilot unit from the valve cover.
3. Replace worn parts.
4. Reassemble the pilot unit guide sleeve, mobile core with gasket facing down, tighten with 6 Nm torque.
5. Insert the coil in the pilot unit and tighten the nut with 8 Nm torque.

Troubleshooting

The valve does not work:

- No coil power.
- The power supply is insufficient or out of tolerance, it must be ±10% of the rated value.
- Tank air pressure insufficient.
- Pilot unit blocked, impurities prevent movement.

The valve does not close:

- The electric signal is always on and keeps the coil energized.
- Pilot unit blocked, impurities prevent movement.
- Tank air pressure too high.
- Damaged diaphragm.
- Damaged diaphragm spring.
- Loose cover fastening screws.

Before pressurizing the circuit, start the valve several times to check correct operations.

MODEL MCA45T 1-1/2" NPT DIAPHRAGM VALVE

High performance diaphragm valve with threaded ports. Outlet at 90° to inlet.

Pilot Connections: 1/8" NPT
Exhaust Connections: 3/8" NPT

Nominal Valve Size: 1.77" (45 mm)
Nominal Port Size: 1.5" (40 mm)
Number of Diaphragms: 2
Flow: 51 CV, 44 KV
Weight: 3.3 lb (1.5 kg)

Pressure Range: 5-125 psi (30-860 kPa)
Temperature Range:
Nitrile Seals: -40°F to 179.6°F
(-40°C to 82°C)
Viton Seals: -20.2°F to 449.6°F
(-29°C to 232°C)

Installation

1. Prepare supply and blowtube pipes to suit valve specification. Avoid installing valves underneath the tank.
2. Ensure tank and pipes are free from dirt, rust or other particulate.
3. Ensure supply air is clean and dry.
4. Mount valves to inlet pipes and blowtube to valves, ensuring no excess thread sealant can enter the valve itself.
5. Make electrical connections to solenoid.
6. Apply moderate pressure to system and check for installation leaks.
7. Fully pressurize system.
8. Test fire and listen for proper actuation and crisp pulse noise.

Operation

Recommended on-time range: 50–500 ms
Recommended time between pulses: 1 minute or greater

Construction

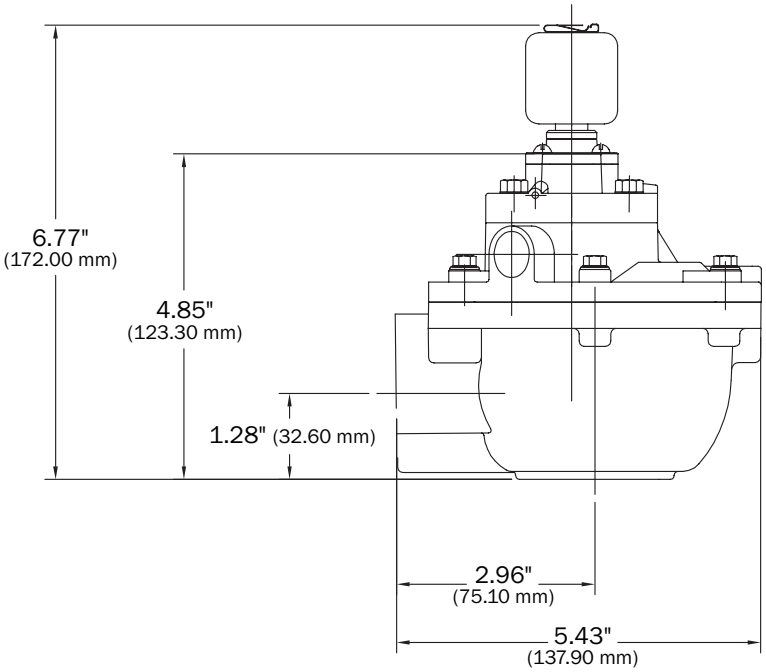
Body: Aluminum (diecast)
Ferrule: 305 SS
Armature: 430FR SS
Seals: Nitrile or Viton
Spring: 304 SS
Screws: 302 or 304 SS
Diaphragm Seat: PA-66 (standard), Viton or Nitrile coated mild steels, Nitrile, Viton or High Density PE

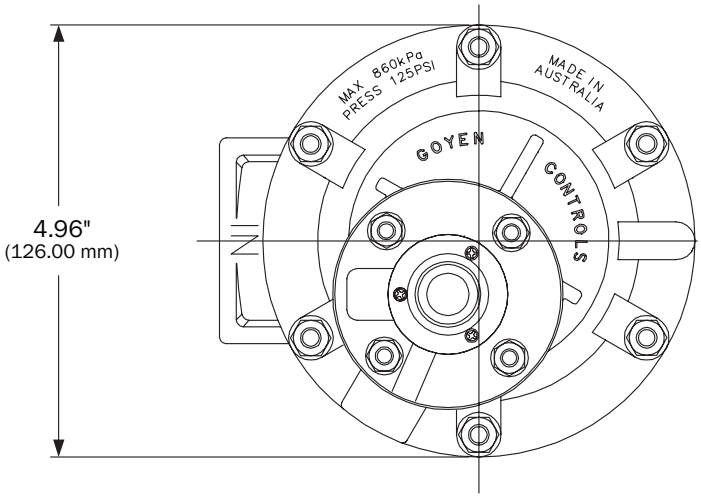
Maintenance

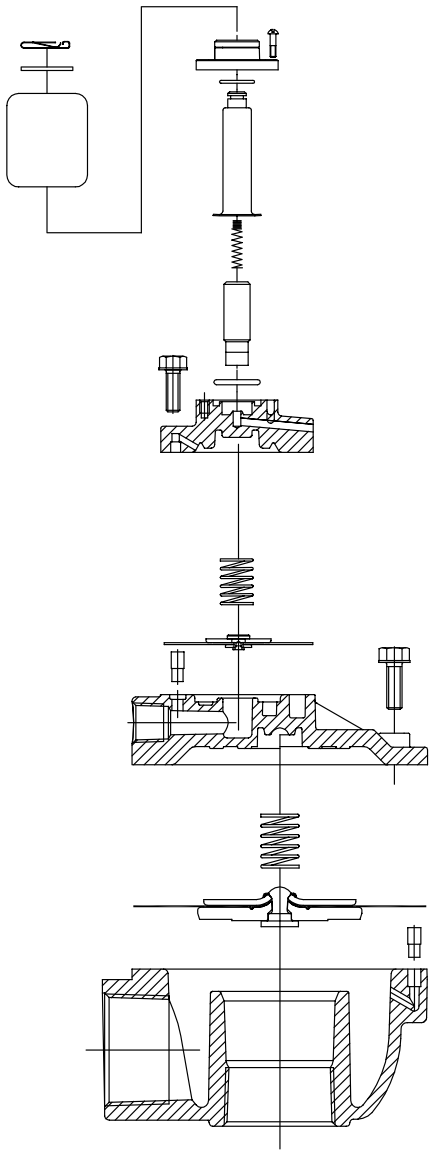
Before conducting any maintenance activity on the system ensure that components are fully isolated from pressure and power supplies. Pressure and power should not be reapplied until the valve has been fully assembled.

Diaphragm and pilot inspection should be conducted annually.

MODEL MCA45T 1-1/2" NPT DIAPHRAGM VALVE



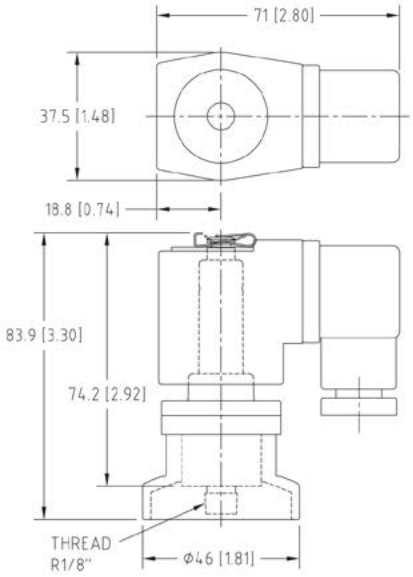




Spare Parts Kit				
	Solenoid Kit		Diaphragm Kit	
MODEL	Buna N	Viton	Buna N	Viton
MCA45T	K0380	K0384	RK-45	K4503

RCA3DM
Pilot Valve Coil Kit

Dimensions in mm and (inches)



FOR INTEGRAL PILOT (CA) APPLICATIONS

The RCA3DM is a pilot valve with an integral silencer and dust shroud which mounts directly (screw in) to the 4-series valve cover.

RCA3DM and RCA3PV are suitable piloting options for all 4-Series valves and RCA35T diaphragm valve.

COIL CONSTRUCTION

Encapsulation: PA-66
C-Frame: Mild steel, zinc passivated
Bobbin: PA-66
Insulation Class: B/130°C
IP Rating: IP65
Rating: Non-continuous use only
Clip: Mild steel (mechanically plated)

OPERATION

Recommended on time range: 50 to 500 ms
Recommended time between pulses: 1 minute or greater

COIL CERTIFICATION AND CONFORMITIES

- C-Tick
- EMC (89/336/CE)
- CE – EMC (2004/108/EC) and LV (2006/95/EC)
- CSA

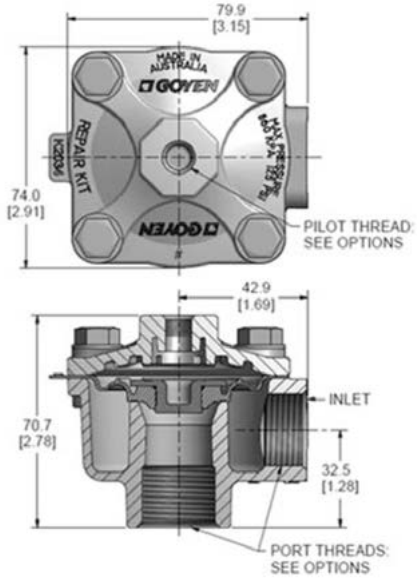
SPARE PARTS

K0380 – Kit includes Nitrile replacement seal, armature, spring and ferrule.

K0384 – Kit includes Viton replacement seal, armature, spring and ferrule.

RCAC20ST4
High-Flow Diaphragm Valve

Dimensions in mm and (inches)



CONSTRUCTION

Body: Aluminium (diecast)

Screws: 304 Stainless steel

Diaphragm: Proprietary high-performance engineering/ thermoplastic Elastomer or Viton

OPERATION

Recommended on time range: 50 to 500 ms

Recommended time between pulses: 1 minute or greater

MAINTENANCE

Before conducting any maintenance activity on the system ensure that components are fully isolated from pressure and power supplies. Pressure and power should not be reapplied until the valve has been fully assembled.

Diaphragm and pilot unit inspection should be conducted annually.

APPROVALS

The RCAC20ST4 meet the requirements of the European Low Voltage Directive 2006/95/EC, when fitted with the RCA3PV pilot.

DESCRIPTION

High-performance diaphragm valve with short threaded ports. Equipped with 'Shockwave' springless diaphragm. The 4 series valves are available as remote pilot valves and may be converted to an integral pilot using either the RCA3DM or RCA3PV screw-in pilots. Outlet is at 90° to inlet.

SUITABLE FOR

Dust collector applications, in particular for reverse pulse jet filter cleaning and its variations, including bag filters, cartridge filters and envelope filters, ceramic filters and sintered metal fiber filters.

Please Note: *We recommend using Schedule 40 pipe. Thickness OD is as shown below.*

SIZE	OD
3/4"	26.67 mm / 1.05"

WEIGHTS	
Valve	**kg (lb)**
RCAC20ST4	0.30 (0.66)

MAINTENANCE KITS		
Model	**Shockwave**	**Viton**
Diaphragm Kit RCAC20ST4	K2034	K2033

PRODUCT CHARACTERISTICS AND PERFORMANCE					
Nominal Port Size	**Number of Diaphragms**	**Flow**	**Pressure Range**	**Temperature Range**	
				Shockwave	**Viton**
20 mm (3/4")	1	14 KV (17 CV)	30 kPa (5 psi) to 860 kPa (125 psi)	-40° C (-40°F) to 82° C (176.6°F)	-29°C (-20.2°F) to 232°C (449.6°F)

Troubleshooting Diaphragm Valves

PROBLEM	POSSIBLE CAUSE
Diaphragm valve fails to operate (open)	• No pressure in header • Low or no power to coil • Coil inoperative • Pilot valve plunger jammed shut • Pilot orifice blocked • Secondary bleed-hold blocked • Main diaphragm perforated • Secondary diaphragm perforated • Pilot valve connecting line too long • Muffler, if fitted, may be blocked
Diaphragm valve fails to shut	• Pilot valve plunger jammed open • Foreign matter under pilot valve • Secondary diaphragm spring broken • Foreign matter under secondary diaphragm • Main diaphragm spring broken • Foreign matter under main diaphragm • Main diaphragm seating disc damaged • Main bleed hole blocked • Secondary bleed hole blocked • Leak in line connecting pilot valve
Unable to build header pressure	• Excessive leakage from main diaphragm seat • Broken main valve spring • Secondary diaphragm not seating • Foreign matter under main or secondary diaphragm seat or under pilot valve seat • AirSweep sequence rate too rapid • Air supply line too small • Compressor too small
Sluggish operation of diaphragm valve	• Partial blockage of one of the bleed-holes • Muffler, if fitted, may be blocked

Special Note

To prevent premature failure of a diaphragm valve, special attention must be paid to the quality of the compressed air/gas being handled.

An adequate moisture and oil removal system must be incorporated that takes into account:

- Relative humidity likely to be experienced
- Ambient temperatures
- System operating temperatures
- Pressure drops (and associated temperature drops) through the valve and also through the blow tube holes (dew point problem)

Also, small traces of chlorine and other aggressive gases, often present in filter systems, can be absorbed in wet areas resulting in corrosion and premature failure.

Apart from valve failures, systems may not perform to expectation for a number of reasons including the following:

- Inaccurate mounting/positioning of the AirSweep(s) relative to the vessel wall
- Inadequately sized header and/or compressed air supply
- Incorrect pulse time
- Incorrect intervals between pulses
- Improper adjustment or wear of AirSweep(s) piston head

Food-Grade Flexible Hose Assemblies – 1" and 1-1/2"

Hose end/banding

For Model	Part No.	I.D	Nom. O.D.	Weight
USDA-135	FGH-1"x30"w1.5" TF	1" (25.40 mm)	1.450" (36.70 mm)	0.580 lb/ft (0.86 kg/m)
USDA-185	FGH-1.5"x30"w1.5" TF	1-1/2" (38.10 mm)	1.970" 50.00 mm	0.850 lb/ft (1.26 kg/m)

Hose Specifications

Max. Working Pressure: 150 psi, 1.03 MPa
Bend Radius: 4" (102 mm)
Tube: White Chemivic™ synthetic rubber (FDA/USDA compliant and conforms to 3-A sanitary standard 18-03).
Reinforcement: Spiral-plied synthetic fabric with galvanized wire helix.
Cover: Gray Chemivic synthetic rubber (wrapped impression).
Temperature: Min. -25°F (-32°C)
Max. 230°F (110°C)
Branding (Spiral): Continental Contitech Plicord® Gray Food; FDA, 3-A, and USDA 150 psi

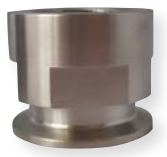
Banding Specifications

Sure Seal Crevice Free Hose Coupling™, 304 stainless steel

Food Grade Tri-Clamp Adapters

Male Adapter

For Model	USDA-135	USDA-185
Description	Food Grade Tri-Clamp Adapter, 316L SS, 1.5" Clamp x 1.0" NPT	Food Grade Tri-Clamp Adapter, 316L SS, 1.5" Clamp x 1.5" NPT
	Part Numbers	
Male	USDA-ADP-1.5QCx1.0NPT Male	USDA-ADP-1.5QCx1.5NPT Male
Female	USDA-ADP-1.5QCx1.0NPT Female	USDA-ADP-1.5QCx1.5NPT Female



Female Adapter

CONTROL® CONCEPTS USA

AIRSWEEP SYSTEM CONTROLS

AC Input, Sequence Control of Airsweep System

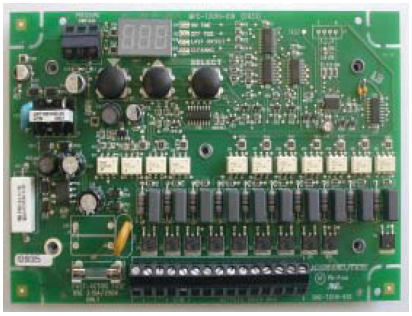
Models CCIDNC-T2006 through CCIDNC-T2032

FEATURES

- ***Universal voltage input:*** *95 to 265 VAC 50/60 Hz*
- ***One SKU:*** *covers all voltages and time ranges required in your application*
- ***Advanced surface mount component technology:*** *extremely reliable and trouble free operation*
- ***Digital microprocessor controlled circuitry:*** *for precise pulse timing*
- ***Non-Volatile memory****: for retaining programmed settings*
- ***3 digit, 7 segment numeric display:*** *for ease of viewing controller operation*
- ***Easily programmable:*** *on/off times and last output used via keypad*
- ***Small footprint****: same size for 3, 6 and 10 output control*
- ***Time Ranges for all applications:*** *On* ***Time: 50ms to 600 sec, Off time:*** *1 to 999 sec*
- ***2 modes of operation:*** *can be operated continuously or on demand via external pressure switch*
- ***Finger safe terminations:*** *reliable electrical connections and increases safety*
- ***RoHS construction:*** *suited for global applications*
- ***Supplied on metal chassis:*** *for mounting directly in a NEMA 4 box*
- ***Retrofit models available:*** *for direct drop in replacement of former*
- ***UL/CUL:*** *File # E65038*

PROGRAMMING

Programming is accomplished using 3 buttons: down, up, and select
Down: Decrements the active parameter
Up: Increments the active parameter
Select: Toggles amongst the adjustable
parameters: on-time, off-time, and last output
Programming Mode Timeout: 60 seconds

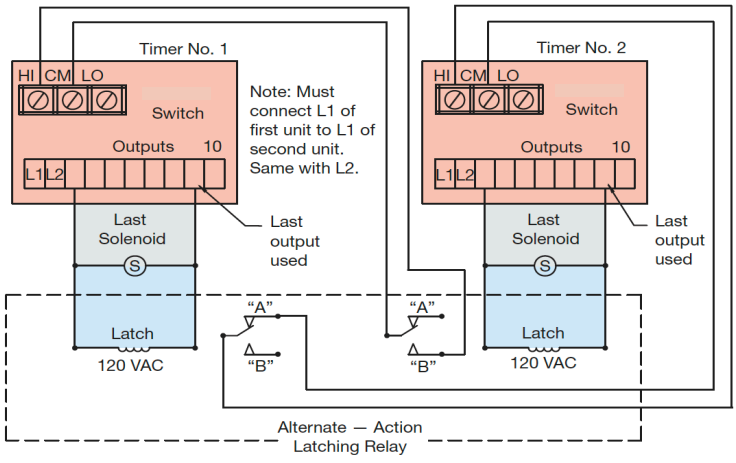


TEST & DEFAULT MODES

Test mode is entered by pressing and holding the select button for 3 seconds while the unit is in the normal operating mode. Once in test mode, the display will show tSt. Pressing the up or down arrow buttons toggles amongst outputs, and pressing select pulses the selected output for the preset ON-TIME. Pressing the select button while the display shows tSt will change the display to “dFt”. While the display shows “dFt”, the up and down arrows toggle amongst “y”, “n”, and “dFt”. Pressing select when the message is “y” will set all adjustable parameters to the factory defaults. At any time in test and default modes, pressing and holding the select button for 1.5 seconds will revert the controller back to the normal operating mode.

OPERATING LOGIC

The CCIDNC-T2003 through CCIDNC-T2032 controls are output sequencers with an adjustable ON TIME, OFF TIME, and LAST OUTPUT. Upon application of power to the L1 and L2 terminals with the HI switch contacts closed, the OFF TIME is initiated. At the end of the preset OFF TIME, output 1 will turn on for the preset ON TIME. The control will cycle through all selected outputs until the HI and LO switch contacts are opened. If the HI switch contacts open during the ON TIME, the output will complete the active ON cycle. The next time the HI switch is closed the next output in the sequence is fired. Placing a jumper across the HI input forces the control to run continuously. *Note: Controls are shipped with jumper across switch terminals.*



CONTROL® CONCEPTS USA

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Brooklyn, CT 06234
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AIRSWEEP SYSTEM CONTROLS

SPECIFICATIONS

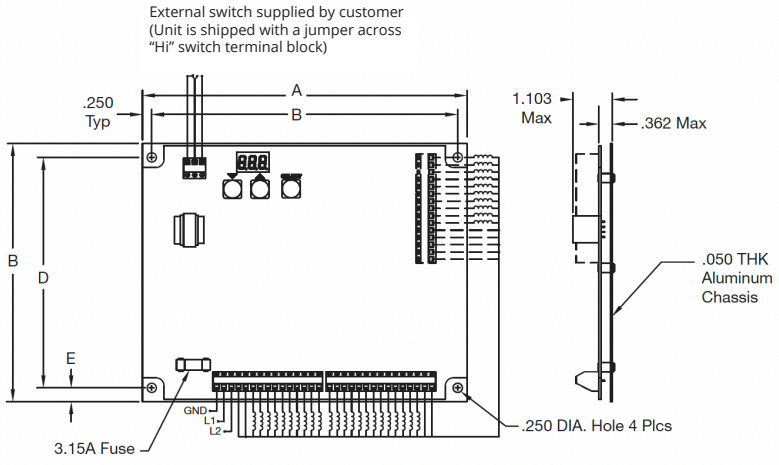
INPUT:
Input Voltage: 95 – 265 VAC 50/60 Hz*
Power Consumption: 6.30 VA max plus load
Circuit Protection: 3.15A fast acting fuse and 72J metaloxide varistor at input

OUTPUT:
Output: Solid state, 150VA max. Off State Leakage 1.5mA max
On State Voltage Drop: 1.5V max

ENVIRONMENTAL:
Operating Temperature: -40 to +150 F (-40 to +66 C)
Conformally coated with RTV to protect against moisture, corrosion, and vibration

DISPLAY:
Display: 3 digit, 7 segment, green LED
Indicator LEDs: 5 green SMT (power, cleaning, on time, off time, last output)

TIME DELAY:
On Time: 50 milliseconds – 600 seconds
Off Time: 1 – 999 seconds
Resolution: 10ms (50ms – 1 0 sec), 100ms (10sec – 100sec), 1sec (100sec – 600sec)
Accuracy and Repeatability: ±3% over temperature and voltage range
Default Settings:
On Time: 50 milliseconds
Off Time: 15 seconds
Last Output: Max. No. of Outputs



ORDERING INFORMATION

Model	Voltage	Max. No. of Outputs	Dimensions - inch					Size of NEMA 4 Enclosure Reqd.
			A	B	C	D	E	
CCIDNC-T2006-R20	AC	6	8.75"	6.875"	8.25"	6.25"	.313"	10" X 8" X 4"
CCIDNC-T2010-R20	AC	10	8.75"	6.875"	8.25"	6.25"	.313"	10" X 8" X 4"
CCIDNC-T2020-R20	AC	20	10.75"	8.875"	10.25"	8.25"	.312"	12" X 10" X 5"
CCIDNC-T2032-R20	AC	32	12.75"	10.875"	12.126"	10.251"	.312"	14" X 12" X 6"
CCIDNC-T2010-BDC	DC	10	8.75"	6.875"	8.25"	6.25"	.313"	10" X 8" X 4"

***Caution**:*
1. Do not mount controls in high vibration areas without shock mounts.
2. Do not mount controls in areas of high dust or corrosive atmospheres without a protective enclosure.
3. Do not use a converter or inverter for the power source.
4. Do not mount control in high transient voltage areas without an isolation transformer.
5. Do not leave control box open.
6. Do not allow a local repair shop to repair the controls, as we employ some very sophisticated components that could be further damaged.
For service, call us directly: 1-860-928-6551

** 12-24 volt DC model is available (DNC-T2010-R20). Additional specifications for the DC model can be supplied upon request.*

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UNITED STATES DEPARTMENT OF AGRICULTURE
MARKETING AND REGULATORY PROGRAMS
AGRICULTURAL MARKETING SERVICE

EQUIPMENT ACCEPTANCE CERTIFICATE

Firm: **Control Concepts Inc.**
19 South Main Street
Brooklyn, Connecticut 06234

Model Designation: **Dry Products Air Valve Motivator:**
Model Number: USDA Airsweep

October 20, 2020
Date of Issuance

October 19, 2025
Date of Expiration

U.S. Department of Agriculture
Marketing and Regulatory Programs
Agricultural Marketing Services
Dairy Grading Branch
1400 Independence Ave., SW
Washington, DC 20250-0230

The issuance of this form is based on U.S. Department of Agriculture, Dairy Grading Branch, Equipment Design Review Section, evaluation of the equipment listed above for compliance with:

USDA Guidelines of the Sanitary Design and Fabrication of Dairy Processing Equipment. (June 2001)

This form does not limit USDA's responsibility to take appropriate action in cases in which evidence of non-compliance, improper maintenance, or non-sanitary conditions have been observed.

USDA United States Department of Agriculture

DA-161 (09-04) Destroy previous editions.

Thank you for your interest in our Airsweep® Systems line of products. Please do not hesitate to contact us regarding any questions you may have, or if you would like to request a free design consultation and estimate.

AIRSWEEP®

MATERIAL ACTIVATION SYSTEMS

A Division of Control Concepts, Inc.

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AIRSWEEP® MATERIAL ACTIVATION SYSTEMS

ACOUSTICLEAN® SONIC MATERIAL ACTIVATION SYSTEMS

DAZIC® ZERO SPEED SWITCHES

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