NOZZLETECH CEV10 SERIES

COMPACT ELECTRIC VALVES FOR SPRAYING ROUND PATTERNS

WARNING: The fluid supply system on which this applicator is used may be pressurized! Relieve system fluid pressure before breaking any connection. Failure to relieve the system fluid pressure can result in the uncontrolled release of fluid that can cause personal injury, including death.

DANGER: Never work on any equipment with electrical power on or compressed air connected. Failure to disconnect energy sources can result in injury, including death, to themselves and others, and damage to the equipment

WARNING: Allow only personnel with appropriate training and experience to operate or service the equipment. Allowing untrained or inexperienced personnel to do so can result in injury, including death, to themselves and others, damage to equipment, or a chemical spill.

WARNING: Many fluid dispensing systems have the capability of atomizing fluid that could be dangerous if inhaled.

Respiration protection must be used when working near such a system if fluid is atomized especially if the fluids involved are hazardous.

WARNING: Atomized fluids many become flammable or explosive. The user MUST evaluate the fluid being used and consider if increased flammability will become a problem.

GENERAL DESCRIPTION:

The Nozzletech CEV10 Compact Electric Valve for externally air atomized spray applications is designed to spray low to medium viscosity, non-flammable fluids such as light adhesives, marking inks, paints, perfumes, silicones, surfactants, and other cold fluids. It is ideally suited for applications requiring small repetitive amounts to be applied at high rates of speed where accurate registration is essential.

Its miniaturization and low weight, makes it ideal for use in confined areas, or on rapidly moving automatic equipment.

The Nozzletech CEV10 Compact Electric Valve uses an external atomizing type spray nozzle that mixes air with the fluid as it is expelled from the nozzle, providing a fine atomized spray.

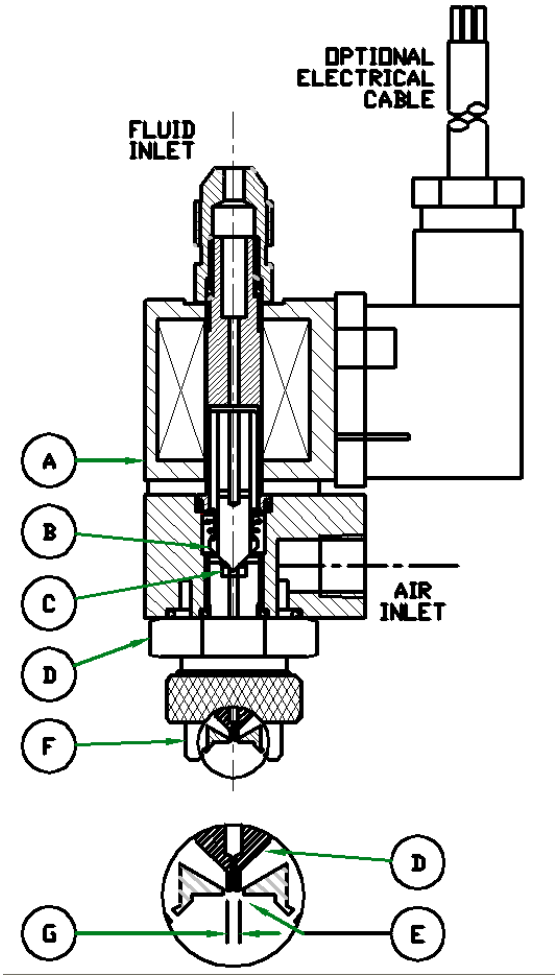
When the solenoid coil is energized, the fluid plunger moves to allow fluid to pass through the applicator. To maintain simplicity and because of the very small amounts of air involved, there is no provision for the mechanical control of the atomizing air and all on/off control is through the fluid shut-off.

The Compact Electric Valve for externally air atomized spray applications is used in a similar manner to any valve type mechanism. The fluid being used should be clean and suitable for this type of application. The nozzle orifice size should be selected in accordance with the viscosity of the fluid being used, the operating pressure, and the amount of fluid required.

The Compact Electric Valve is made of 300 Series stainless steel and uses Viton o-rings to seal the body to the fluid tube. Make sure the fluid being dispensed is compatible with these materials.

OPERATION

The Compact Electric Valve is fitted with a solenoid coil (A), that when energized, moves the plunger (B) to lift from the seat (C), allowing fluid to be extruded through the nozzle (D). As the jet of fluid leaves the nozzle, it is surrounded by air from an annular orifice (E) formed by the center hole of the air cap (F), and diameter of tip extension (G). This atomizes the fluid. Shortly after the atomized spray leaves the fluid tip, air from side holes in the ears of the air cap impinge on it, causing the atomized jet to be spread out into a fan pattern.

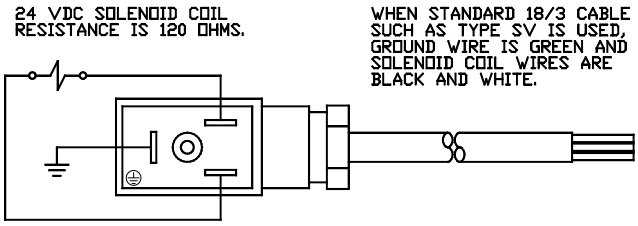


For cone spray air caps, there are no ears or side holes in the air cap, and the ejected fluid continues outwards and arrives at the substrate as a solid circular pattern.

If interruption of the atomizing air is required, an additional solenoid valve may be used in the air supply line as detailed in the Air Inlet Connection section.

ELECTRICAL REQUIREMENTS

A plug-in connector is provided for the termination of an optional electrical cable. An 18 gauge, 3-conductor cable with an outside diameter of this cable being .23 to .31 inches is recommended.



In some cases, the power source for the Compact Electric Valve actuation will be supplied internally from the pattern control/timer unit, so that the user will need only to supply a DC signal or passive contacts to activate the applicator.

For small repeatable amounts of fluid, where accurate control is required, a DC Timer should be used.

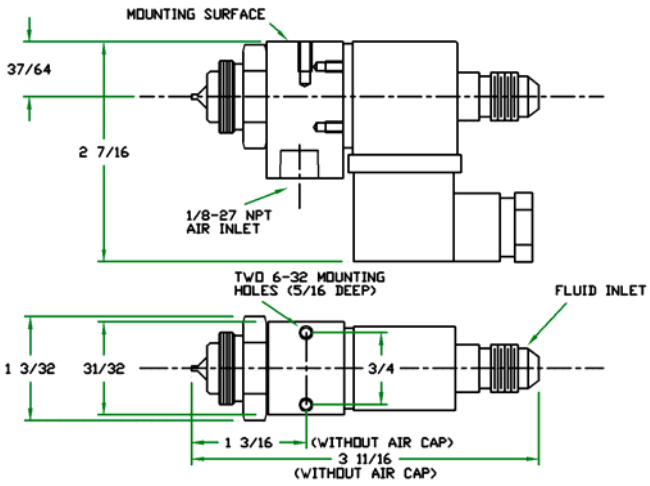
The source of electrical power for the Compact Electric Valve (and possibly the related applicator head driver) MUST have an electrical disconnect method suitable for the machine and environment. This will also require Emergency Stop controls that are part of the main machine or independent. This is part of the pattern controller of the larger machine (parent machine) this applicator is used with.

FLAMMABLE FLUIDS

Many fluids that are sprayed are water based and have no flammability concerns. Other fluids are considered not flammable when in liquid form but are quite flammable or even explosive when atomized. The user must ensure the fluid being atomized cannot cause a fire or explosion hazard. This series of applicators is NOT suitable for use with hazardous fluids. Other applicators are available for these fluids.

MOUNTING

The Compact Electric Valve may be mounted in any position by bolting it directly to a simple bracket using the two #6-32 tapped holes in the gun body.



FLUID INLET CONNECTION

Fluid is supplied to rear of the applicator head via the input connector (inside is female 1/8 NPT and outside is male 1/4 NPT).

200 PSI (14 Bar) is the maximum working pressure.

After installation, fluid must be purged through the applicator. Even small amounts of air in the fluid system can cause significant changes in the amount dispensed and store unexpected amounts of energy.

AIR INLET CONNECTION

Compressed air for atomization is supplied to side of the gun body via a female 1/8 NPT opening.

Because of the relatively low volume of air required, and the Compact Electric Valve being typically used for high speed operation, many applications allow the atomizing air to run continually, and turn the spray on and off via the applicator head solenoid coil (controlling the fluid flow only).

AIR USAGE

Air Pressure	Air Flow Rate
10 PSI	1.0 CFM
20 PSI	1.5 CFM
40 PSI	2.8 CFM
80 PSI	5.0 CFM

However, if a conventional spray-painting type of operation is required, an additional solenoid valve can be installed in the atomizing air line, to interrupt the flow of atomizing air as required. When this is done, the air should be turned on prior to the flow of fluid, and the fluid flow turned off prior to stopping the air flow. Equipment for this type of operation is available.

SUGGESTED SPRAY OPERATION

The patterns and amounts deposited are dependent upon many variables, including the following;

1. Characteristics of fluid and viscosity.
2. Fluid pressure.
3. Air pressure.
4. Fluid nozzle orifice.
5. Air cap type.
6. Distance of nozzle from substrate.
7. Speed of substrate.

It is assumed that the equipment has been correctly installed and checked for operation.

The fluid to be used should be suitable for the application, free of any dirt or foreign matter, and used in accordance with the manufacturer's recommendations. Typically, the lowest practical viscosity will give the best results.

Because of the wide variety of fluids that can be used, and many possible applications, the following should only be considered a general guide for initial operation.

The type of spray provided by the CEV Compact Electric Valve is known as "external atomization" whereby fluid and compressed air mix immediately after fluid leaves the nozzle. Under most conditions, the air pressure will be at least, slightly higher than the fluid pressure.

Set the fluid pressure at approximately 10 PSI as a starting point (if no other data is available) (the chart on last page may be helpful). Activate the applicator head with the atomizing air turned off to ensure that there is a positive flow of fluid with clean shut-off.

Set the atomizing air pressure at approximately 15 to 30 PSI. Activate the applicator head and observe the results. Adjust pressures until a satisfactory pattern and volume is obtained.

If a specific volume per minute of fluid is required, activate the applicator head for a set time period, without the atomizing air being turned on, collect the material in a small cup and weigh it to calculate delivery. In most cases, the amount obtained can be adjusted by a change of fluid pressure and, when necessary, a change of fluid nozzle (fluid orifice).

FLUID SECTION DISASSEMBLY

Under normal production operating conditions, foreign matter may partially or completely block the fluid nozzle causing erratic fluid ejection. Should this happen, removal of the entire applicator from service is not necessary. All fluid parts are easily removable from the applicator while it is in place.

Never work on a pressurized applicator or system. Always relieve all pressure sources and remove power before serving. See the fluid supply system for details on how to remove pressure sources.

Verify the fluid inlet pressure has been relieved by actuating the applicator head to bleed off any remaining fluid pressure, and disconnect the fluid supply hose. Even with pressure off, it is likely there will be fluid on the parts and gloves and eye protection are required.

In most cases, only the removal of the fluid nozzle (item 7) is required for cleaning. To do this, remove the locknut (item 8) and air cap (item 9) and unscrew the seat from the gun body (item 5). After cleaning, replace the seat.

To disassemble the fluid tube and plunger, disconnect the fluid supply hose and remove the fluid inlet adapter (item 1). This will allow the solenoid coil (item 3) to slide off fluid tube (item 2), exposing four (4) screws (item 15) that secure the clamp plate (item 14). After the four screws and clamp plate are removed, simply pull the fluid tube out of the gun body (item 5) and remove the plunger/spring (item 12).

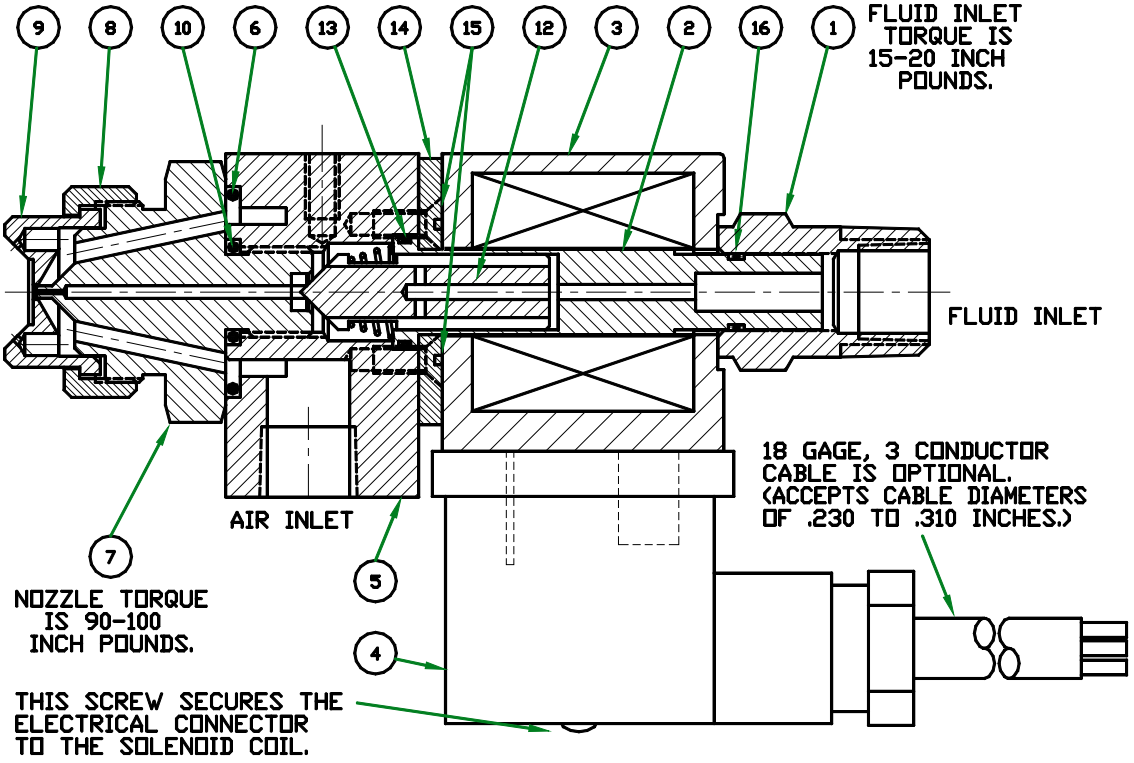
Assembly is the same steps in reverse.

Fluid Nozzle torque is 90-100 inch-Lb (11Nm)

Clamp Plate screw torque is 3 inch-Lb (.3Nm)

Inlet Fitting torque is 15-20 inch-Lb (2Nm)

NOTE: All o-rings (items 6, 10, 13, & 16) are Viton.



ITEM #	DESCRIPTION	PART #	ITEM #	DESCRIPTION	PART #
1	Fluid Inlet Fitting		10	O-ring (Fluid)*	CEVP1011
2	Fluid Tube		12	Plunger w/Spring Installed	CEVP1003
3	Solenoid Coil (24 VDC)	CEVP0001	13	O-ring (Gun Body)	CEVP0013
4	Electrical Connector	CEVP0002	14	Clamp Plate	
5	Gun Body		15	Screw (Qty. 4)	
6	O-ring (Air)	CEVP1006	16	O-ring (Fluid Inlet)	CEVP0010
7	Fluid Nozzle	See Chart	17	Decal	
8	Locknut	CEVP1001			
9	Air Cap	CEVP1002		* Included with Fluid Nozzle	

FLUID NOZZLE SIZES

Model	Part #	Orifice Inch (mm)
CEV 11	CEVP1010	0.010 (.25mm)
CEV 12	CEVP1014	0.014 (.25mm)
CEV 13	CEVP1020	0.020 (.25mm)
CEV 14	CEVP1028	0.028 (.25mm)

CLEANING & NORMAL PARTS REPLACEMENT

Normally there would be no need to carry out any cleaning operation on this equipment. The only parts that will require replacement, after considerable use, are the fluid nozzle (item 7) and the plunger/spring (item 12). This replacement will be due to wear, damage, or change in pattern requirements.

TROUBLESHOOTING

ELECTRICAL PROBLEMS

NOTE: The solenoid coil can be checked by un-plugging the electrical connector and using the pins on the solenoid coil. Pin designation is shown on page 2. The 24 VDC solenoid coil resistance is 120 ohms. Also, ensure that applicator electrical cable leads are not shorted or open.

I. APPLICATOR DOES NOT DISPENSE

A. Follow instructions for the applicator not dispensing inside the MECHANICAL PROBLEMS section that follows.

B. Check control circuit (ensure that correct electrical signal is being applied to applicator). This may involve many components if DC timing has been provided. The timer, applicator driver, and auto/off/test switch should be checked for correct operation as described in their respective instructions.

Remove applicator cable at applicator head and check across coil contacts of connector for 20-24 VDC signal when control or test is activated. Note that some timer/pattern controls use a higher voltage to rapidly open the applicator and then keep the applicator open with a lower voltage. See the timer/pattern control instructions for more details.

If no voltage is obtained, check input device that actuates the timer or power pack.

If input signal is OK, check timer or power pack in accordance with their instructions.

C. If voltage is obtained, check solenoid coil for correct resistance (120 ohms) and ensure no shorts to ground.

D. Check electrical cable and plug-in connector for broken or shorted wires.

II. DISASSEMBLE HEAD TO REPLACE COIL

A. Turn off fluid pressure, activate the applicator to bleed off pressure, disconnect the fluid supply hose.

B. Loosen the screw that holds the electrical connector to the solenoid coil and unplug.

C. Remove the fluid inlet adapter (item 1) at fluid entry end of the applicator by unscrewing it.

D. Slide the solenoid coil (item 3) off fluid tube.

Inlet fitting torque is 15-20 inch-lb (2 Nm).

MECHANICAL PROBLEMS

I. CONTROL CIRCUIT IS ACTIVATED AND NO EXTRUSION OF MATERIAL OCCURS

A. Never install or remove a fluid nozzle from a pressurized applicator or system. Always relieve all pressure sources and remove power before serving. See the fluid supply system for details on how to remove pressure sources.

Even with pressure off it is likely there will be fluid on the parts and gloves and eye protection are required.

Unscrew locknut (item 8), remove air cap (item 9), and replace fluid nozzle (item 7). If applicator head now extrudes, nozzle is clogged and should be cleaned or replaced. If no material extruded:

B. Check for adequate liquid material available in supply container.

C. Check fluid supply for sufficient pressure.

D. Check if plunger/spring (item 12) are free and not restricted when control circuit is activated, by listening for distinct “click” when operated.

E. Check that excessively high fluid pressure is not impeding the plunger from retracting.

IF NOT CORRECTED:

A. Turn off fluid supply.

B. Never install or remove a fluid nozzle from a pressurized applicator or system. Always relieve all pressure sources and remove power before servicing. See the fluid supply system for details on how to remove pressure sources.

Even with pressure off it is likely there will be fluid on the parts and gloves and eye protection are required.

C. Remove fluid nozzle (item 7) carefully if pressure has not been positively relieved.

D. Energize solenoid. Plunger/spring (item 12) should partially retract (NOTE: With seat removed, travel of plunger will be longer than would normally be with seat installed. For this reason, plunger may need to be partially pushed in and solenoid coil actuated. When actuated, plunger should retract into applicator head.)

E. If plunger is restricted, it may be due to foreign matter lodged behind plunger. Disassemble and clean the fluid section.

F. If plunger does not retract, and there is no foreign matter restricting the plunger, check solenoid coil as in the ELECTRICAL PROBLEMS section preceding.

II. APPLICATOR EXTRUDES SLUGGISHLY AND/OR ERRATICALLY

A. Check fluid nozzle for foreign matter in seating area after relieving pressure and clean or replace.

B. Check plunger/spring for any foreign matter behind plunger and also check plunger assembly for straightness, damage, etc.

C. Check control circuit for erratic operation.

D. Check fluid to see if viscosity is correct for application.

E. Check fluid pressure.

III. SHUT OFF IS NOT CLEAN, HEAD DRIPS OR WILL NOT SHUT OFF

A. If timing is of short duration, actuate head for several seconds at high pressure to possibly clear any stoppage in seat area by “blowing through”.

B. Shut off fluid supply, bleed pressure, and remove seat. Reverse blow seat to remove any particles of dirt that would not allow plunger to seat correctly.

C. Fluid viscosity may be too high for a particular operation.

D. Should applicator head not shut off, also check control circuit for malfunction.

IV, FREQUENT CLOGGING OF FLUID NOZZLE

A. Check filtering system in fluid supply for damage or clogging.

B. Inspect fluid for foreign matter, dirt, etc.

C. Nozzle orifice may be too small for the fluid being used (increasing tip size may greatly reduce clogging).

Model	Type	Angle	Orifice Diameter Inch (mm)	Flow At 5/20 PSI Water in Grams per min.	Pattern at 3 (75mm) height	Pattern at 6 (150mm) height	Pattern at 12 (300mm) height
CEV 11	Spray Round	15°	0.010 (.25mm)	15/30	.75 (19)	1.5 (38)	3 (76)
CEV 12	Spray Round	15°	0.014 (.35mm)	30/60	.75 (19)	1.5 (38)	3 (76)
CEV 13	Spray Round	15°	0.020 (.50mm)	50/100	.75 (19)	1.5 (38)	3 (76)
CEV 14	Spray Round	15°	0.028 (.71mm)	100/200	.75 (19)	1.5 (38)	3 (76)

ALL PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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