Phoenix industries®
Comprehensive User's guide

Blue Multifunctional Cabinet Vaccine Sprayer (blue)

Green Knapsack Vaccine Sprayer (green)

Black caged layer Vaccine Sprayer (black)

DESCRIPTION:

The (Blue), (Green) and (black) are high quality professional spray applicators developed specifically for poultry vaccination. All products are designed under USDA (APHIS), FDA, CFIA and OIE Licensure. The sprayer is capable of producing & administering a repeatable and accurate vaccine dose of a very uniform size range of droplets. Spray discharged at a constant pressure by means of an electric pump and pressure transmitter which are precisely controlled by artificial intelligence to control accurately spray droplet size and volume (dose), a process referred to as Controlled Droplet Application (CDA) which is essential for the efficient delivery of spray vaccine. Spray droplets are dispersed in a turbulent airstream to ensure even distribution to all birds. Each dose is administered by activating a thumb switch. It's suitable for the delivery of respirable spray vaccines, ensuring accurate delivery of vaccine to the eye, upper respiratory tract and mouth parts directly or through secondary uptake by preening and ingestion into the digestive system. Post-vaccinal reaction caused by the production of very small droplets is minimized. The precise control over droplet size also allows the use of low spray volumes (ULV), which significantly reduces the time spent for both vaccine preparation and application, ensuring minimal disturbance to birds.

Tank capacity:

Tank capacity is usually up to 20 litres, sufficient to vaccinate up to 100,000 birds. Day old chicks are normally vaccinated in holding trays (typically 80 - 150 birds) either on farm or at the hatchery.

Certified diseases:

The (Blue) or (Green) can be used for vaccination of broilers, layers and turkeys and is recommended for administering live vaccines against respiratory diseases such as Infectious Bronchitis (IBV), Newcastle Disease (ND), and Turkey Rhinotracheitis ART/TRT, Coccidiosis, E. coli.

The unit can also be used to administer non-vaccines such as competitive exclusion products to control salmonella or other products.

Battery (Recharging and Maintaining)

1- Connect the battery charger supplied with the sprayer to the 3 pin socket on the control panel. Connect the battery charger to the mains electricity.
2- When the battery are in charging, the " red" and when are fully charged, the "green or blue" indicators will glow. After charging, remove the charger from the mains. Charger should always be disconnected from the machine, as soon as the Battery is fully charged.
3- The battery, will need recharging after approximately 4 hours of continuous use and will be fully charged in approximately 3 hours after which the red light will cease to glow.
4- On delivery of a new sprayer, the battery will be disconnected. Connect the battery terminals by connecting the red (positive) to the + (positive) terminal on the battery and similarly the black wire to the - (negative) terminal.
5- Before starting vaccination, switch on. After vaccinating, when the sprayer is not in use, it is very important to set the toggle switch to the OFF position, otherwise the battery will slowly discharge.
6- Some fuses is fitted to protect the electrical system and pump.
7- Always use the correct battery charger as supplied with the sprayer, to maintain battery condition.
8- Always remove battery Enclosure Cover when charging the battery.
9- The battery supplied is a 12V D.C. lead acid, sealed, maintenance-free, 8 amp - non- spill able type.
10- Do not check electrolyte specific gravity or add water, which will permanently damage the battery.
11- Continuous charging by the charger supplied will not damage the battery, but it's not recommended.
13- If the device is used with other 12V D.C. batteries or rechargers consult the manufacturer for recharging information.
14- Always store the battery fully charged. If the sprayer is to be stored for more than a month, it is advised to disconnect and remove the 12V sealed lead acid battery.

WARNING:

Sick birds should not be vaccinated. Seek professional advice in this case.

Nozzles vs. Droplet size vs. Flow rate vs. Walking Speed:

The flat fan nozzle: when passed over the birds, will give a rectangular shaped spray deposit (a fan shaped pattern).
The width of the spray pattern is determined by number of nozzles, the nozzle's spray angle and the nozzle's height from the bird's head.
Select the correct nozzle according to the volume dose and application required, or refer to recommendation from your vaccine supplier. Then fit nozzle bodies to the mast.
For nozzle changing just push the *push fit connector* to free the nozzle and refit alternative nozzle.

In pressure control types you can set droplet size by digital controller.
In static pressure types you should choose your droplet range in advance, then we supply your appropriate nozzles.

The choice of nozzle and operating pressure will determine the flow rate per nozzle (ml/min) and droplet size.
The flow rate and walking speed will determine the dose applied.
It is very important to accurately set flow and walking speed to achieve the correct vaccine dose.

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Recommended droplet size:

* Studies have shown that droplets of 20-160µm (fog or mist) are ideal to vector carriers.

* In addition formulations can be applied in concentrations of 10-90% and at flow rates of up to 0.47 litres per minute making them more efficient in the pest & virus control fields.

1- Vaccination of day old chicks: coarse spray, (Upon contact: 3 µm):
(Acceptable droplet range: 75 – 300 µm)

Cabinet sprayer:
> In hatcheries: 150 – 170 µm in diameter.

Backpack sprayer:
> Floored chicks: **A**- 150 – 170 µm, **B**- 150 – 250 µm, **C**- 115 – 240 µm, D- 115 – 120 µm.

2- Vaccination of chickens above 6 weeks: fine spray, 50 µm in diameter (40 – 90 % = 0.5 – 5 µm), (moderate particles = 1 – 4 µm). (Upon contact: 1 µm).

3- Vaccination of chickens above 12 weeks: aerosol, 5 - 20 µm in diameter. (Upon contact: 0.1 µm).

* Vaccination of chickens below 5 weeks by fine spray, below 50 µm in diameter, results in high mortality, especially in farms infected by mycoplasma.

* Ambient temperature & RH should be considered in droplet size.

Droplet size measurement techniques used to get licensure:

1- Direct Photographic Method (image analysis): Visibility / intensity validation: number and size (volume) distribution.
2- Interferometric Phase Doppler Laser diffraction particle analysis: Often used to measure the droplet size distributions and the droplet velocities.

Dose or Mixing Rate:

The Phoenix sprayer products is highly productive, capable of vaccinating up to 100,000 birds in only one hour.

Spraying should be carried out on a time and volume basis rather than solely on volume.

For day old birds in boxes, two shots are normally used.

Time:

Chicks respiration rate are 15 – 30 per sec. or one respiration cycle per 2-4 sec.
So every spray shot duration less than 2 sec. results in untaken vaccine.

Based on our researches 3 sec. are optimum.

As a general guideline:

Backpack sprayer: 0.5 – 1 ml per bird for littered birds. 0.3 -.5 ml per boxed birds.
Cabinet sprayer: 5 – 35 ml per 100 chicks (16 -24 ml are common, in some ref.: 6 -16 ml) for water based vaccines.
Cabinet sprayer: 25 – 50 ml for gel based vaccines.
Atomizer: 0.4 – 0.5 ml per bird for littered birds.

But based on our experiences: amount of water at all applications should not be more than 0.3 ml per chick and our recommends are 0.1 – 0.2 ml per bird. More volumes make birds get soaked and stressed. Below this make vaccine solving and distribution problems.

I.e. for 10,000 birds mix 10,000 doses in 1 - 1.5 litres of distilled water.

Chick boxes normally contain 80 - 150 chicks.

For caged birds, number of birds per cage determine dose per nozzle and the total output from the sprayer will be determined by the number of tiers sprayed.

Formula to calculate quantity of water to prepare vaccine mix:

T = Total Number of Birds to be Vaccinated
V = Volume per shot
S= Number of shots
N= Number of birds in each tray or box

$(T) \times (V) \times (S) =$ Total volume of water needed

$(T) \times (V) \times (S) \div (N) =$ Volume per Box

Calculate the number of birds in each spray area or box, e.g. 100 birds. Applying two doses at 7.5 ml per shot will deliver 15 ml.

E.g. to vaccinate 20,000 birds (T) presented in boxes containing 100 (N) birds each using two shots (S) with the Blue nozzle at 7.5 ml (V) per shot, we would mix as follows:

T × V × S = 20000 × 7.5 × 2 = 2400 ml or 2.4 litres

Therefore add 20000 vaccine doses to 2.4 litres of water.

So 24 ml are applied at each box.

IMPORTANT:

As a certain amount of spray mix is required to fill the device's lines and prime the pump, and there will be a small residual volume of vaccine mix that remains in the spray lines, pump and filter when the spray tank get empty at the end of vaccination and to ensures there is sufficient spray liquid to treat all birds, it is advisable to add a further 5% of water (Usually 50 -100 ml of water) to calculated total water needed to prepare vaccine mix.

i.e. 2.4 + 0.12 litres of water = 2.52 litres in total

Timing and flow rate:

Flow rate means sprayed volume per min.
Total flow rate are the sum of all in line nozzle's flow rate.
Time needed to spray 1000 bird are up to 3 min (usually 1 min).
Low spray volumes of 1- 2 litres per house are normally applied allowing operators to treat up to 10,000 broilers and 30,000 layer, for example, in less than 20 minutes.
The more time spent spraying the birds the better the vaccine coverage. However, the time allowed for spraying is determined by the length of time during which the shed/house ventilation can be inoperative.

Time obtained based on flow rate and dose, are used to set phoenix digital controller.

Time = flow rate ÷ dose

E.g.: you need 16 ml per 100 chicks > flow rate are 1.5 ml/sec. per nozzle 6 ml./sec./4 nozzle

Time = 16 ml ÷ 6 = 2.66 sec.

Calculate the required walking speed as follows:

Walking Speed (m/min) = (Flow per nozzle (ml/min) × Cage Length (m)) ÷ No Birds/Cage

E.g. Blue Nozzle at 12 bar = 90 ml/min × 1 m cage length ÷ 10 birds/cage

Walking Speed (m/min) = 9 m per minute

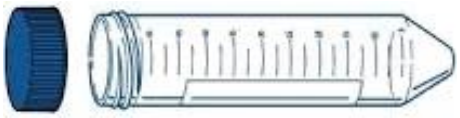
Calibration:

Due to minor variances in nozzles, operating pressure and difference between start and set (static or settable) pressure, before for the first time and every spray vaccination (or as periodic calibration), and after each nozzle change, it is recommended that each nozzle operation be checked using only water, to ensure coverage area is adequate (spray angle are true) and to flow rate (volume dispensed per min) be measured, so as to ensure these values are consistent with calibration and also this values be used for calibration purposes. This should be routinely done as part of good vaccination practice.

To verify flow rate: it is possible to measure the output by spraying 50 shots into the measuring cylinder (falcon) provided to find the average volume dispensed,

Average = Volume dispensed from 50 shots ÷ 50

Below you can see schematic of falcon.



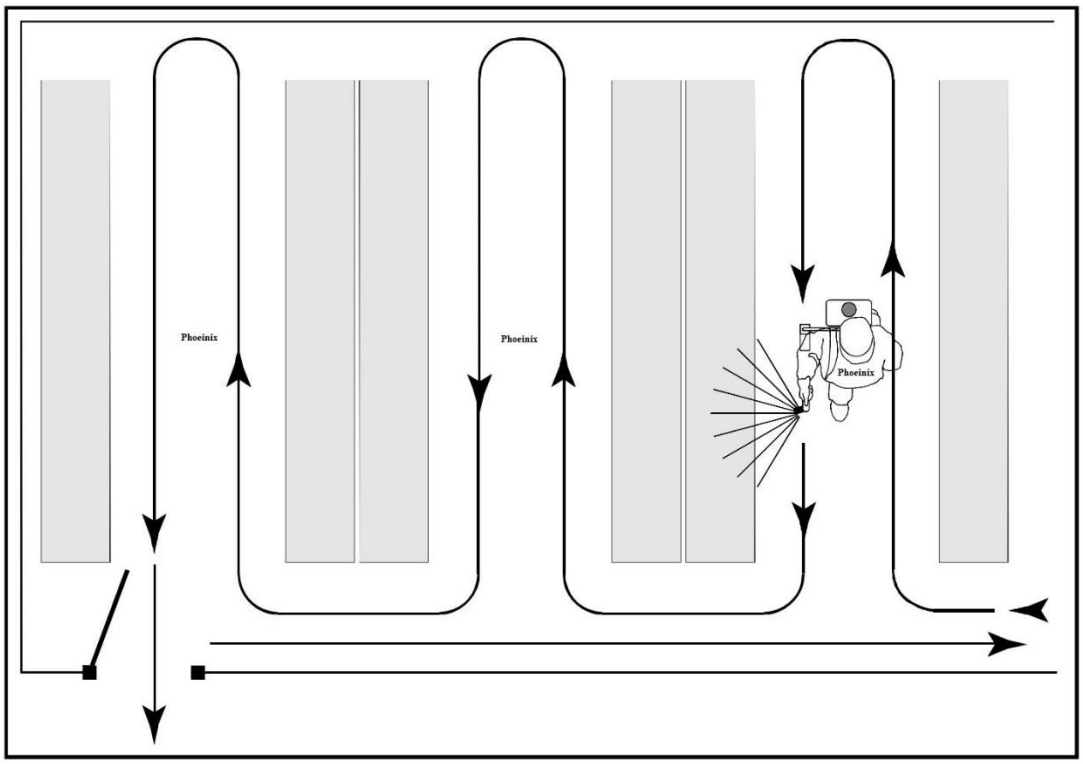
Filter:

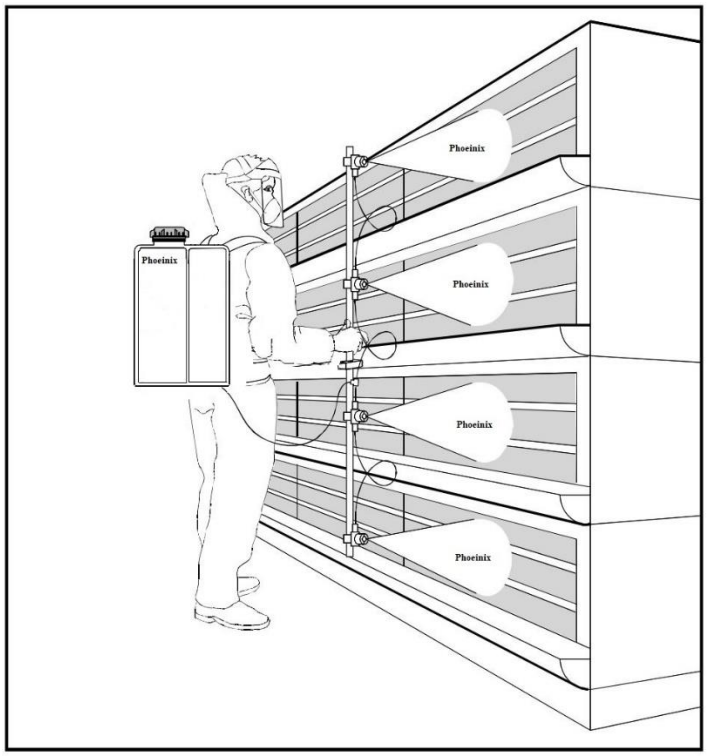
The tank filter located at the bottom of the tank helps prevent any debris from getting into the pump and orifices of the spraying wand which could reduce the flow rate, change the droplet size, and decrease the spray pattern.

PLANNING SPRAY VACCINATION ROUTE:

1. Plan your spray route carefully to ensure there are no obstructions in the passage ways or posts which have to be avoided. The operator should position themselves at the furthermost point from the exit door so that the operator always works towards the door if possible (Always walk towards the door).
2- Divide birds into groups whilst walking through them.
3. **In cage spray:** check that the position of each spray nozzle is central to each cage tier. Adjust the arm, where fitted, to maintain a distance of around 30 cm from each cage.

4. **In continuous spray:** With the pump off, use a stop watch to measure the time taken to walk along one row and calculate your forward speed in m/minute. This should correspond to the value previously calculated. Practice maintaining the correct forward speed before spraying as this is critical in achieving the correct vaccine dose.
5. Begin spraying at the row end by switching on – pump on. As spray emerges from the nozzles immediately start walking.
6. When spraying maintain a distance of 30 cm from the cages. Ensure all nozzles are spraying evenly.
7- If nozzles block stop spraying immediately. Solve the problem immediately.
* Fill sprayer with a small amount of water and practice spraying if using the devise for the first time or the house are new.





Before Spraying:

1- Fully follow recommended "Operator Protection" guidelines.
2- Stand the sprayer on a firm, clean, flat surface.
3- It may be useful to walk through the house with the fan switched on but without vaccine whilst the ventilation is still in operation in order to clear as much dust from the cages prior to vaccination.
4- In order to minimize stress to the birds during hot weather it is preferable to carry out vaccination early in the day at the coolest time. Locking ventilation on full for a period of time prior to vaccination in order to lower the temperature may also be useful during periods of hot weather.
5- Before spraying turn off all ventilation fans and dim the lights as low as possible whilst still being able to see obstacles in the shed/house. In naturally lighted houses it may be beneficial to vaccinate when darkness has fallen.

OPERATOR PROTECTION:

Follow label and data sheet recommendations supplied with the vaccines or other products to ensure operators are not exposed to potential eye, lung and skin irritants during spraying. If in doubt consult manufacturer of product being used. Consult vaccine manufacturer's guidelines for advice on appropriate personal protective equipment (PPE). It is recommended that a filter face

mask/respirator with goggles or eye shield, disposable overall and rubber boots are worn to maintain good hygiene.

PREPARING THE VACCINE:

Use a clean, disinfectant free, non-metallic calibrated jug for preparing the vaccine mixture.
Only use fresh clean distilled or de-ionized water for mixing with vaccine.
Make sure there are adequate washing facilities available for personal cleaning after vaccination i.e. warm water for soap and disinfectant.
Ensure appropriate protective clothing and equipment is worn according to vaccine manufacturer's instructions.
Read the label carefully and then follow the vaccine manufacturer's instructions. If necessary take advice from the vaccine supplier or your veterinarian.
Make sure you have a sufficient number of doses to treat all birds.
Calculate the volume of water required to vaccinate the birds according to nozzle used and time of application (dose).
Wash hands to make sure they are clean and free from soap and disinfectant.
Measure volume of distilled or de-ionized water required in the jug as described previously.

Preparing the Vaccine mix:

After determining the volume of water required and Following above instructions:

1- Fill a container, with approximately half the determined volume of distilled water.
2- For premixing the vaccine below water: Remove the metal caps from all vaccine vials. Submerge the vaccine bottles one by one, remove rubber stoppers under the water and then rinse each bottle to remove all live vaccines before discarding empty bottle.
3- Remove the spray bottle cap, Transfer the vaccine Premix prepared to the spray bottle, through the basket filter.
4- Then, Add the remaining required volume of determined water to the spray bottle, through the basket filter.
5- Prime the pump and mast (lance) by discharging spray briefly into the top of the tank until all the air has been excluded.
6- Fit the tank lid (Replace bottle cap) securely and shake to mix the vaccine with water.

SECURITY STRAPS:

The Device is positioned on the operator's back with the straps loose. Once positioned on the operator's back the waist belt is coupled and the straps adjusted by pulling down on the adjustment tabs.

During Spraying:

Start walking along planned route inside house. Hold the sprayer to your side(s) and walk slowly through the birds.

Back pack sprayer:

A- Boxed day old chicks:

Boxes should be laid out in a line to allow the operator to move quickly from one to another. The nozzle should always be hold vertically over the box. Hold sprayer unit or lance to your side(s) at a 45 degree angle to the floor. The height of the nozzle above the birds (30 cm as usual) should be adjusted to ensure the full width of the box is sprayed but avoiding over-spray. The spray lance should be moved steadily backwards and forwards from one end of the box to the other (two shots) ensuring an even coverage over all birds. Walk slowly through the bird boxes.
Each shot delivers spray for adjusted and calculated time (volume, pressure and droplet size).
It is advisable to leave the birds in the box after vaccination preferably up to 20 minutes to facilitate secondary uptake of vaccine (at least 50% of droplets below 5 µm in diameter remain floating in air after 30 min).

B- Littered birds:

As a general guide, as you walk, hold the sprayer unit or lance down at arm's length directed slightly downwards to aim at the birds are approximately three meters in front of you and cover a strip about three meters wide on each side of you. The height of the nozzle above the birds should be kept 50 cm as usual. Then, following a logical and systematic route as previously planned, walk slowly through the birds up and down the house.

It is possible to see birds reacting by shaking their heads as the vaccine reaches them.

Continue walking through the birds until all the vaccine has been sprayed. Walk through the same birds more than once if necessary.

Where stocking densities are low, it may be necessary to pen birds into smaller areas in order to ensure ease of coverage.

Caged birds:

Connect nozzle bodies in series with each pipe delivering liquid.

Just for backpack sprayers (specially designed for cage spray) that have "*optional support arm*": Place the mast in the jaw of the supporting arm so that the mast extends from lower to upper tiers. Fix the mast position by securing the adjustable clamp which acts as a stop.

Adjust the nozzle positions so that each sprays at right angles into the center of each cage tier.

Walk slowly along the front of each row of cages, spraying directly at each cage. If possible spray from at least two meters away.

After Vaccination:

Restore Ventilation immediately after vaccination and turn on Lights 15 – 30 min later.

Sprayed chicks should get dry in 10 -15 min (use this as a benchmark for evaluating if your determined dose are appropriate).

* To stop spraying at any stage invert the sprayer to the resting position.

IMPORTANT:

Do NOT use DISINFECTANT in the vaccine bottle OR through the nozzles or hoses.
Do NOT use Disinfectants by device planed for vaccination.
The Phoenix products should only be used for vaccination. Non vaccine products may leave residues that are detrimental to live vaccines.

CLEANING:

After vaccination is complete:
1- Clean off poultry dust immediately from surfaces of sprayer and wipe down with a damp cloth.
2- Wash out any residues & cleaned thoroughly by rinsing the tank and spray line with clean water.
3- Fill the tank with around 1 liter of water and spray out 20 - 50 shots in a suitable area to clean out spray lines thoroughly and remove vaccine residues.
4- De-couple the quick fit Nozzles by releasing the push fit connector at the lance head bifurcate or spray hood (spray cabin or spray box) roof.
5- Unscrew the nozzle head.
6- Soak Nozzles in warm water to remove residues and debris. Use only warm water or approved cleaning products. Do not use soap.

* Nozzle's orifice are very fine, so easily can be blocked and prevent spraying or demolish spray dispersion pattern.

* After prolonged use, deposits will accumulate on all device's parts, so it is necessary to thoroughly clean these items to maintain good hygiene conditions especially if spray equipment is transferred from one shed to another.

MAINTENANCE:

With regular cleaning and battery maintenance, it should give many years trouble free operation. Simple maintenance involves regularly cleaning the sprayer both internally and externally. It is also advisable to carry spare parts which may become worn, blocked or damaged with regular use. Make sure hose pipe and electrical wires are not damaged with use. Repair/replace as necessary. Be sure to store sprayer in appropriate facility and keep from freezing temperatures.

WARNING: Never run pump dry.

STORAGE:

Before storing the Device for long periods clean off to remove any deposits and don't wipe the metal components with an oily rag to help combat corrosion because all parts are made of corrosion resistant material.

To prolong the life of the spray, clean all electrical contacts with soft fabric wiping.
Also check the motor for corrosion. Ensure that the motor is dry before storage.
Store the sprayer in a clean dry place away from direct sunlight and preferably in a dust-proof container.

* The battery should be disconnected and removed then stored in a cool dry place.

Phoenix Industries®. Based in Silicon Valley, San Francisco, California, USA

California Made / Made in the U.S.A

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