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CLEANROOM FOGGER™, Model # CRF-2: DESCRIPTION, OPERATION SOP

Cleanroom Fogger™, Model #: CRF-2 Specifications

- **Operation:** Ultrasonic Cavitation
- **Voltage & Power:** 120VAC or 220VAC Transformer converted to 36VAC, 300VA, 8.33A
- **Dimensions:** 13.25"H (with handle up) x 10"W x 11"D
- **Weight:** 20 lbs with 3.75L of DI Water or WFI Water, 12 pounds empty
- **Liquid:** Deionized (DI) water (16M Ohms impedance) is used most often. Pharma WFI water for injection can also be used. Use of any other liquid other than specified for operation will void warranty. Water temperature should be 40-45 degrees F for best fog output.
- **Water Capacity:** 3.75 liters
- **Water Level Interlock:** This is a safety feature to protect the transducers. When water level approaches a preset low level, the water level sensor will detect low water level and turn power off to the transducer assembly.
- **Fog Duration:** ≈ 50 minutes typical operating time.
- **Fog Hose:** Flexible, corrugated, white hose extends from ~30" (76cm) to ~80" (203cm).
- **Fog Visualization distance:** ≈ 7 - 8 feet depending on room humidity and room airflow velocity.
- **Fog Temperature output:** typical 65°F. Use cold water at 40-45 degrees F for best fog production (**do not heat water up**).
- **Fog Volume:** Fog volume output, ≈ 9cfm (0.26 CM), constant fog w/ on/off control by power switch or remote power switch
- **Cable Length:** ≈ 3.3M, ≈ 10 feet

1) **Cleanroom Fogger Description:** The CRF-2 uses DI Water or WFI Water to produce a pure fog using a single, atomizing transducer assembly with 9 individual transducers inside the fogger. Operation is straight forward by turning power on, and the fogger immediately begins to generate fog, which exits the top of the fogger thru a flexible hose. the hose can be manipulated in a vertical manner or in any direction at 360 degrees around the fogger, thus directing the fog in the direction required to visualize airflow, turbulence and patterns. An optional Fog Curtain Wand is available, which can be attached to the end of the Fogger hose, converting the FOG STREAM output to a FOG CURTAIN output. The Fog stream is useful when one wishes to direct the full fog volume into a concentrated area, while the Fog Curtain Wand is used when one wishes to spread the fog volume out across a wide area to visualize a wider area such as a door way or laminar flow. The Fogger includes Operating Instructions on the side of the fogger, so as there is no requirement for paper inside the production areas to ZERO. The Fogger has a water level interlock inside the fogger to turn power off to transducers when low water level is detected. When water level inside the fogger reaches a pre-defined low level, the interlock shuts power off to the transducer, leaving power on to the fans. The fogger has a water fill indicator, so that the technician knows what volume of water to fill into the fogger. **The use of the CRF-2 is to visualize airflow, turbulence and patterns around equipment, searching for unwanted airflow instabilities, which cause migration of contamination (particulate or biological) into the pharmaceutical production process.**

2) **Fogger Preparation:** Place the Fogger on a Cleanroom Bench or a Rolling Trolley, connect the power cable between the CleanRoom Fogger and Power Transformer. Plug the Power Transformer into the wall for power, which converts 115VAC to 36VAC power to the fogger. Remove Top Black Cap from the water fill port and store Black Cap as appropriate. Fill water into the CleanRoom Fogger (use only DI water or WFI Pharma water) to the Water Fill line, as indicated on the left side of the CleanRoom Fogger. Ensure Drain Plug, located at bottom right of the front of the Cleanroom Fogger, is tight by looking for any unwanted, water dripping from the Drain Plug. Tighten Drain Plug as appropriate. Connect the Flexible Fogger Hose to the top opening of the CleanRoom Fogger by slipping the hose over the 2" wide opening tube. Rotate the Fogger Hose in the direction desired to visualize airflow and turbulence. If an optional Fog Curtain Wand is required to widen the fogger pattern output, connect the Fog Curtain Wand to the flexible hose. Turn Fogger power on and begin the fog visualization process. The fogger will operate at a typical 8-9 CFM of fog output for a period of about 60 minutes. Once the fogger operation is complete, drain water and store fogger as noted in #3 below.

3) **Cleanroom Fogger Storage:** Once fogging operation has been completed, the fogger provides a drain port to empty water from the water tank. The fans can be left on after draining to evaporate any remaining water inside the water tank, thus keeping bacteria growth from occurring. Once the Fogging action is complete, place the black cap on the top fogger outlet, re-insert the drain plug, disconnect the fogger from the power cable, wrap power cord up as required, disconnect Power Transformer from the Wall Outlet. Store Fogger, Power Cable, Fogger Hose and Power Transformer on a shelf, or store the Fogger parts inside an optional Rolling Carry/Storage Case.

4) **Technician Operation and Training:** With the Fogger turned on, the Technician can use the Fogger output in several manners to visualize airflow, turbulence and patterns. If the interest is visualizing equipment dead zones, the technician can use the fog



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stream to surround equipment in the airflow and watch the airflow as it is visualized traveling around the equipment. Look for dead zones which are possible particle traps that can enter in to the pharmaceutical production process. The equipment should have a smooth airflow pattern around the equipment. Look for exhaust outputs from equipment and instruments in the clean area. There should be no exhaust outputs into critical production areas. View the [Cleanroom Fogger video](#) for examples of Equipment exhaust, which is undesired in the ISO1-9 production area. [Fogger Comparison](#) to other foggers.

5) SOP, CRF-2, Cleanroom Fogger - (DO NOT TIP FOGGER OVER AT ANY TIME WHEN CRF-2 IS FILLED w/ WATER)

- A Remove CRF-2 and any accessories, if purchased, from Storage. Set CRF-2 and accessories on bench top or rolling cart (trolley).
 - B Remove black cap from top fog exit, store black cap for re-use.
 - C Ensure power switch is in OFF position (DOWN).
 - D Ensure Drain Plug is installed and snug tight, front, lower right location.
 - E Connect Remote On/Off Power Cable for behind wall operation, if required.
 - F Connect Power Transformer cable between the CRF-2 (front lower left connector) and the Power Transformer.
 - G Fill DI Water or WFI water (40-45 degrees F) in the top fog exit, be careful not to over fill. Monitor the FILL MARK on left side of CRF-2. Ensure there is no water leaking from drain plug, tighten Drain Plug as required. **DO NOT TIP FOGGER DURING OPERATION.**
 - H Place white, flexible fog hose over top fog exit, snug down to the bottom of the aperture.
 - I Position the Flexible hose in the direction that fog is desired or attach the optional Fog Curtain Wand to the end of the flexible hose.
 - J Turn CRF-2 power switch ON. If Remote Power Cable is being used, the Remote Cable will control power via on/off switch.
 - K Direct Fog output via HOSE (as a stream of fog) or via Fog Curtain Wand (as a fog curtain) over and around area of interest. Fog at different angles around equipment, especially around exhaust ports and enclosure openings.
 - L Look for turbulence from exhaust fan outputs or enclosure gaps, where turbulence is created due to instrument design interference to laminar flow around equipment.
 - M Look for interference in walkways, when entry doors are opened/closed.
 - N Look for turbulence and patterns of the general laminar flow coming from laminar source.
 - O Look for exhaust turbulence around each instrument in the critical ISO5 production areas.
 - P Note each unwanted turbulence in LOG, and/or video each unwanted turbulence.
 - Q When water level is low, there may be a chatter sound and the fog density will be reduced prior to shut off. If you wish to continue operation, refill with 40 – 45 F Di Water or WFI water to FILL Level and restart.
 - R When Fog Process is complete, Turn Power Off, remove Accessories.
 - S Place Fogger over Sink to open DRAIN PLUG and drain water into drain receptacle.
 - T **DO NOT TIP FOGGER DURING DRAIN PROCESS. Drain Water through the drain port only!**
 - U When water has drained from fogger, turn fan on to evaporate remaining water in cavity.
 - V Ensure all water is evaporated from inner cavity by tipping CRF-2 to one corner, keep fan on until all water evaporated.
 - W Retighten Drain Plug. Turn Power off and disconnect power and cables.
 - X Place Black Cap on top fog exit.
 - Y Place CRF-2 Fogger and Accessories in optional Rolling Carry / Storage Case, if available. Otherwise, store on shelf.
 - Z Store Fogger in clean (Class 10 or 100) storage area with black cap covering the fog exit.
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- 1 Remote On / Off Power Cable Option - **Use Optional Remote On / Off Power Cable to fog “Behind Closed Wall”. Turn Main Power Switch off, Plug Remote Cable in and turn Remote Power On.**
 - 2 Fog Curtain Wand Option - **To convert the fog stream to a wide fog pattern, plug Optional Fog Curtain Wand into white hose.**
 - 3 Carry / Storage Case - **Store parts (fogger, hose, power supply) in [Optional Rolling Carry / Storage Case](#) or store parts on shelf.**