

READ AND SAVE THESE INSTRUCTIONS

# **DRI-STEEM**

# **CRUV<sup>®</sup>**

## **ELECTRIC STEAM HUMIDIFIER**

### **Installation Instructions and Maintenance Operations Manual**

**For Toll-Free Customer Support,  
Call: 1-800-328-4447**



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# **DRISTEEM<sup>®</sup>**

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### TO THE PURCHASER AND THE INSTALLER

Thank you for purchasing our CRU®V humidification equipment. We have designed and built this equipment to give you total satisfaction and many years of trouble-free service. Proper installation and operating practices will assure you of achieving that objective. We therefore urge you to become familiar with the contents of this manual.

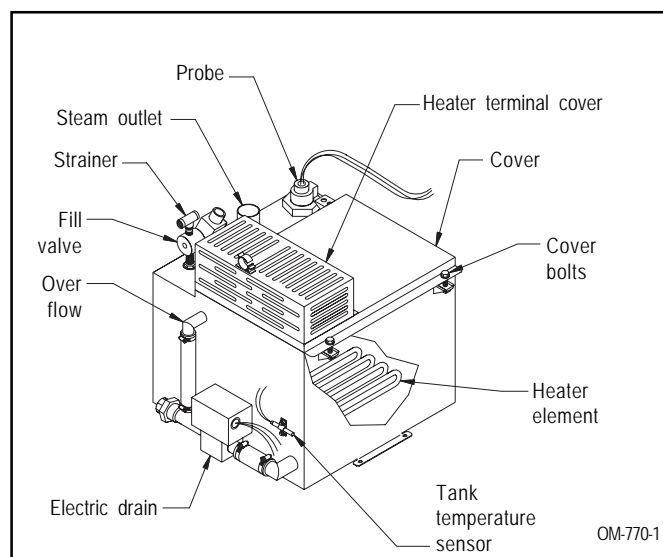
**DRI-STEEM Humidifier Company**

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## CRU®V HUMIDIFIER

**Figure 3-1: The CRU®V Humidifier**

(CRUV 6-25 shown, CRUV 2, 4, 30, and 34 not shown)

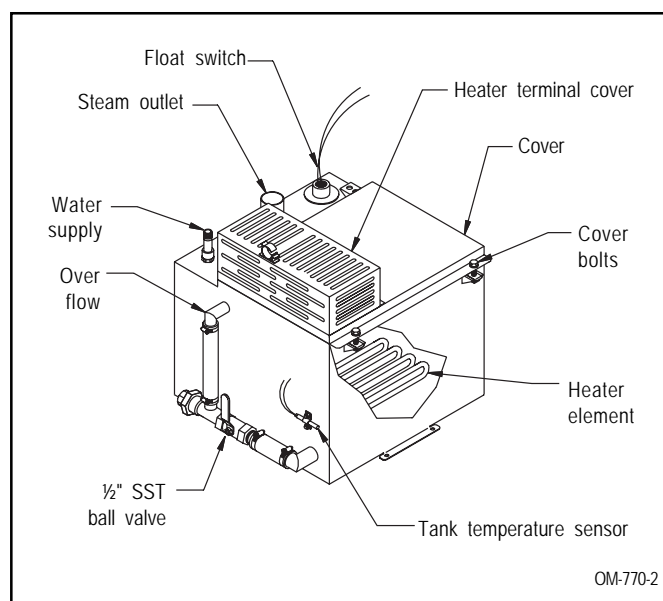


### CRUV Humidifier

This humidifier is designed to be used with either softened or unsoftened water (softened water will greatly reduce humidifier maintenance and improve overall system performance). The probe-type level control system requires water conductivity of at least 100 micromhos/cm (2 grains/gal or 34.2 mg/l) to function, and therefore, will not operate with demineralized water. For humidification using demineralized water, see CRUV-DI below.

**Figure 3-2: The CRUV-DI Humidifier**

(CRUV-DI 6-25 shown, CRUV-DI 2, 4, 30, and 34 not shown)



### CRUV-DI Humidifiers

The evaporating chamber of this humidifier is constructed of corrosion-resistant stainless steel alloy to resist the corrosive effects of mineral-free water. Since the CRUV-DI humidifier is designed for use with deionized or RO demineralized water, there is no need to clean the unit, although an annual inspection of the evaporating chamber is recommended.

# INSTALLATION

Locate the CRU®V humidifier near an electric power source, water supply and a drain. Verify that sufficient room is provided for a water seal in the drain piping. Refer to Figure 4-3.

## In an Air-Conditioning Unit

When installing a humidifier inside an air conditioning unit, provide adequate support; allow easy access for removing and servicing the evaporating chamber, and provide adequate clearance to install the vapor hose and dispersion tube (see figure 4-1) and water seal. Refer to page 6 for mounting hole locations.

## In a Duct

When installing the dispersion tube in a duct, allow for a continuous pitch of the vapor hose back to the evaporating chamber. Otherwise, use a water seal and drain (see examples in figures 4-2 and 5-1). The dispersion tube can also be placed vertically in the duct with some models (see figure 5-2).

Place the control cabinet or electrical sub-panel in a grounded protective metal enclosure and mount in a dry and accessible location.

If draining the evaporating chamber by gravity is not possible, use a small condensate lift pump, rated to pump 212° F/100°C water.

## Examples of Installation in an Air Stream

Figure 4-1: Installation in an Air-Conditioning Unit

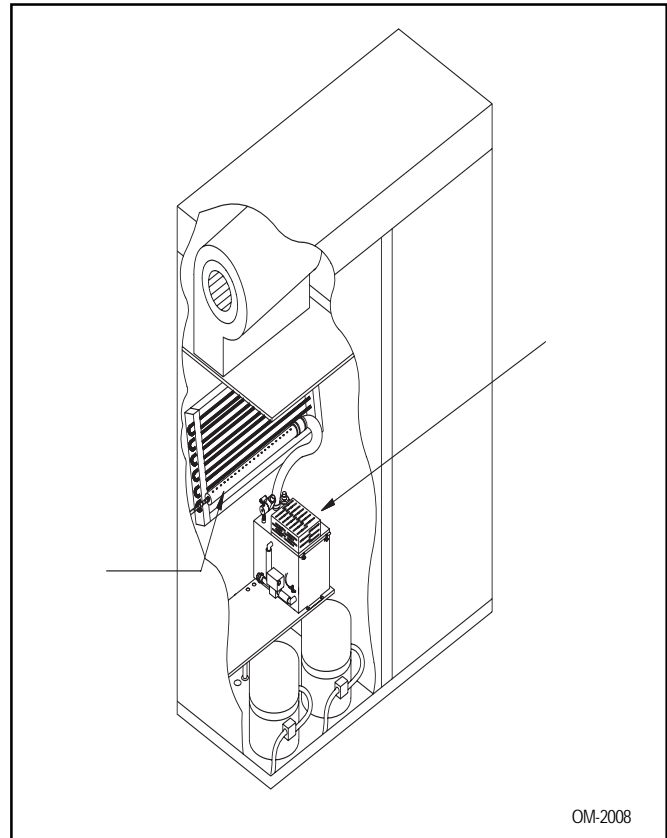
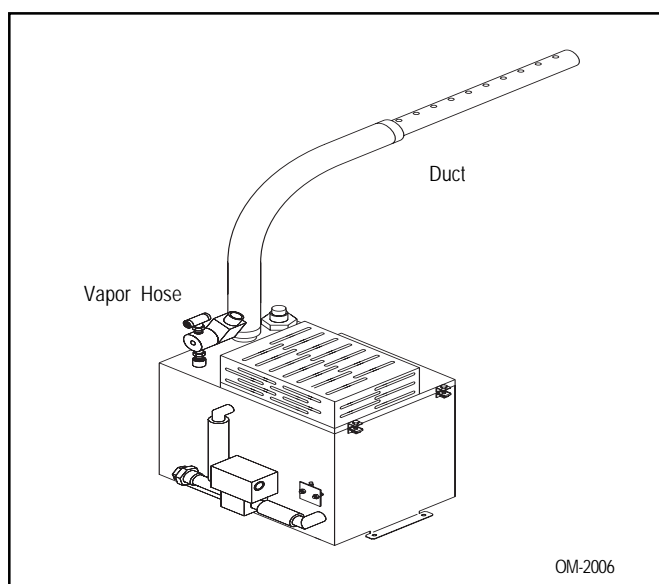
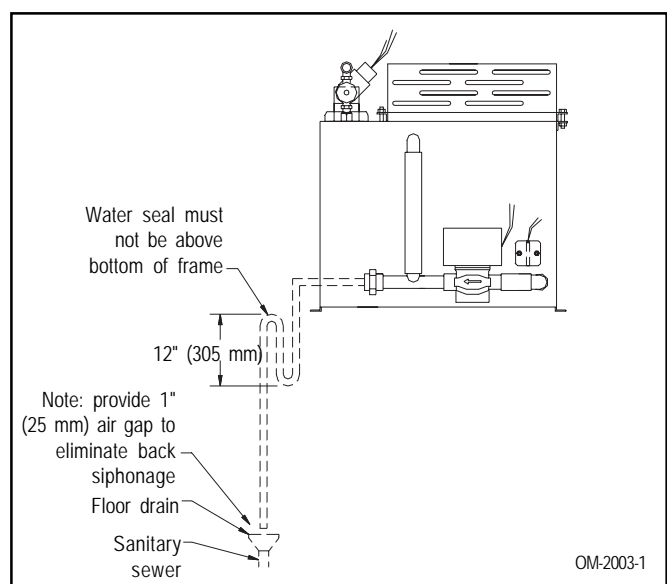


Figure 4-2: Horizontal Dispersion Tube



Horizontal mounting of dispersion tube in a duct, connected via vapor hose to a wall-mounted CRU Series humidifier.

Figure 4-3: Piping for the CRUV



## INSTALLATION

### Piping

Water make-up piping should be of corrosion-resistant, code-approved material (copper, steel, or plastic). The final connection size is  $\frac{1}{4}$ " NPT. In cases where water hammer is possible, a shock arrestor should be considered.

Drain piping should be of code approved material (copper, steel, or plastic rated for 212°F/100°C minimum). The  $\frac{3}{4}$ " O.D. copper sweat connection should not be reduced in size. (See figure 4-3).

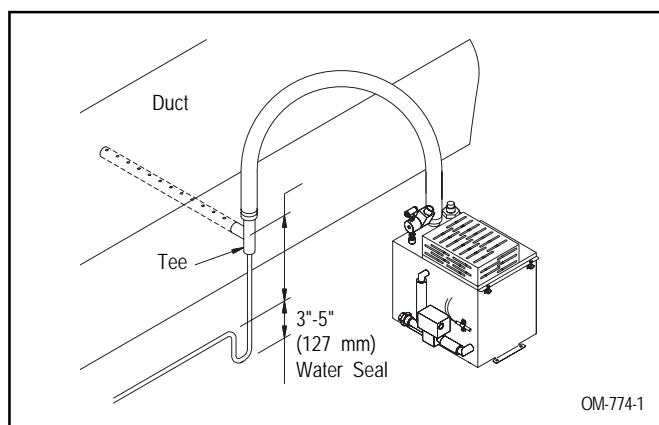
If there is no sewer available for drainage, the unit can be piped for manual drainage. Consult factory for instructions.

### Wiring

The CRU®V is designed for a single source of electric power supply. Future tank removal will be easier if plugs or quick connects and extra long conduits are used to provide electrical power to components from subpanel. Wiring must meet all electrical codes, the current characteristics, and capacity requirements should be checked against the nameplates. The electrical subpanel should be mounted in a location convenient for service. Wiring must be in accordance with all governing codes, and with the humidifier wiring diagram. The wiring diagram(s) are shipped loose with the unit. The wiring between the control cabinet and humidifier must be rated at 105°C, 600V.

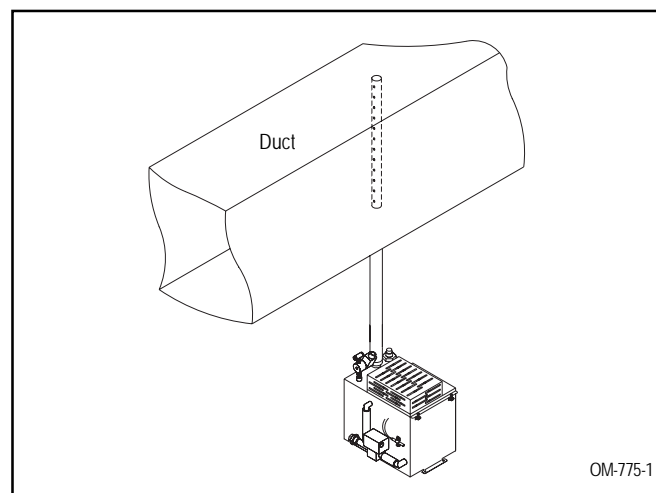
**Caution: Only qualified electrical personnel should perform installation procedures.**

**Figure 5-1: Horizontal Dispersion Tube Lower Than Humidifier**



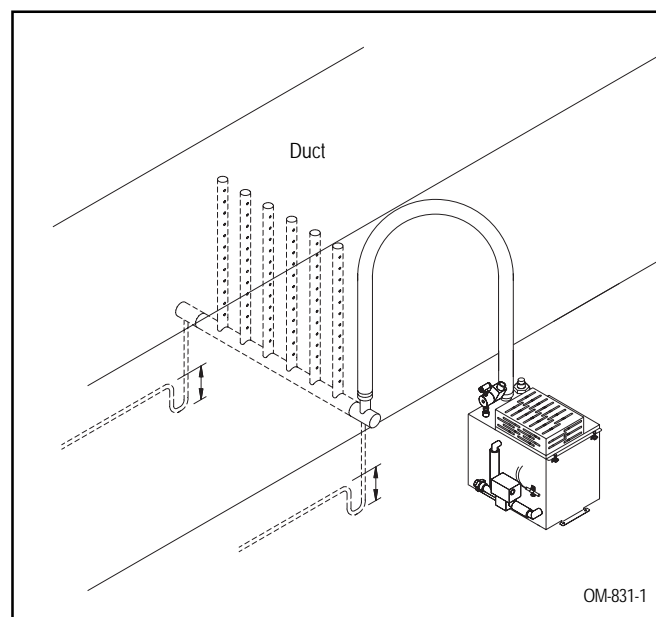
When horizontally mounting the dispersion tube in an air stream that is located lower than the CRUV humidifier a water seal (to prevent steam from escaping at the open drain) must be provided in the drain line and line extended to open drain, as shown, to drain the condensate. **A multiple dispersion tube bank must be used with a CRUV-30 or CRUV-34 because of its high output (see figure 5-3).**

**Figure 5-2: Vertical Dispersion Tube**



The dispersion tube can be mounted vertically in the duct. Note: When dispersion tube is more than 10' (3 m) from unit, insulated,  $1\frac{1}{2}$ " (38 mm) diameter minimum rigid tubing or pipe should be used instead of vapor hose. **This application is not recommended for CRUV-10 through CRUV-34.**

**Figure 5-3: RAPID-SORB™ Rapid Absorption Tube Bank**



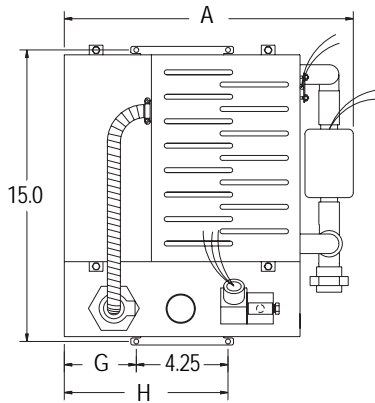
When rapid absorption is extremely critical, a RAPID-SORB™ multiple-tube bank can provide 100% steam absorption within three feet or less - at any duct temperature. **A multiple tube or RAPID-SORB dispersion system is required for CRUV-30 or CRUV-34.**

For complete information on calculating the number of dispersion tubes required to satisfy steam absorption distance requirements, consult your sales representative, the DRI-STEEM factory, or use DRI-STEEM's DRI-CALC® Humidification Sizing and Selection Software.

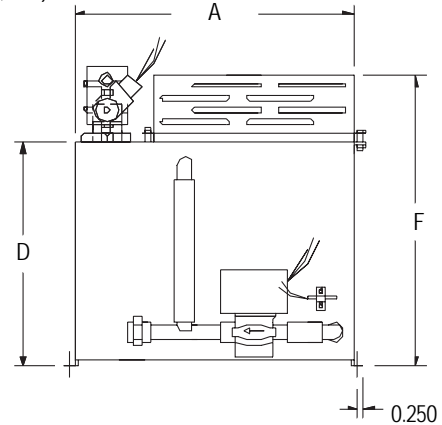
# SPECIFICATIONS, CAPACITIES, AND DIMENSIONS

## CRU®V Mechanical/Electrical Specifications

Top view



Side Elevation  
(CRUV 25, 30, 34)



End Elevation

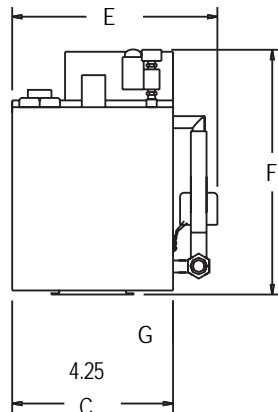


Table 7-1: CRUV Dimensions (in inches)

		0	R	G	H				
		\$	%	&	'	(	)	*	+
CRUV/CRUV-DI - 2 & 4	in.	14.35	15.50	9.00	7.88	11.50	11.44	2.38	6.6
	mm	364	394	229	200	292	291	60.33	167.7
CRUV/CRUV-DI - 6, 8 & 10	in.	14.35	16.00	14.38	8.88	16.88	12.94	5.05	9.3
	mm	364	406	365	225	429	329	128.27	236.2
CRUV/CRUV - 12 & 16	in.	14.35	16.00	14.38	10.68	16.88	14.75	5.05	9.3
	mm	364	406	365	271	429	375	128.27	236.2
CRUV/CRUV - 21, 25, 30 & 34	in.	14.35	16.00	14.38	12.25	16.88	16.25	5.05	9.3
	mm	364	406	365	311	429	413	128.27	236.2

NOTE: Charts shown here can be used for CRUV-DI sizing.

Table 7-2: CRUV Mechanical/Electrical Specifications and Capacities

	CRUV-2 CRUV-DI-2	CRUV-4 CRUV-DI-4	CRUV-6 CRUV-DI-6	CRUV-8 CRUV-DI-8	CRUV-10 CRUV-DI-10	CRUV-12 CRUV-DI-12	CRUV-14 CRUV-DI-14	CRUV-16 CRUV-DI-16	CRUV-21 CRUV-DI-21	CRUV-25 CRUV-DI-25	CRUV-30 CRUV-DI-30	CRUV-34 CRUV-DI-34
Output/hour (lbs/gal/kg)	6/7/2.7	12/1.4/5.4	18/2.2/8.2	24/2.9/10.9	30/3.6/13.6	36/4.4/16.4	42/5/19.1	48/5.8/21.8	64/7.7/29.0	75/9.0/34.0	91/10.9/41.4	102/12.2/46.3
Operating wt. (lbs/kg)	43/20	44/20	83/38	83/38	100/45	100/45	85/39	100/45	113/51	113/51	117/53	117/53
Shipping wt. (lbs/kg)	18/8	19/9	40/18	40/18	44/20	44/20	37/18	44/20	47/21	47/21	51/23	51/23
Amps at:												
120v/1ø	16.7	-	-	-	-	-	-	-	-	-	-	-
208v/1ø	9.6	19.2	28.8	38.5	-	-	-	-	-	-	-	-
230v/1ø***	8.0	16.0	24.0	31.9	39.9	-	-	-	-	-	-	-
240v/1ø	8.3	16.7	25.0	33.3	41.7	-	-	-	-	-	-	-
480v/1ø	4.2	8.3	12.5	16.7	20.8	25.0	29.2	33.3	43.8	-	-	-
600v/1ø	3.3	6.7	10.0	13.3	16.7	20.0	23.3	26.7	35.0	41.7	-	-
208v/3ø	-	16.7**	25.0**	33.3**	29.1**	33.3	38.9	44.4	-	-	-	-
240v/3ø	-	14.4**	21.7**	28.9**	25.3**	28.9	33.7	38.5	-	-	-	-
400v/3ø	-	8.7**	13.0**	17.3**	15.2**	17.3	20.2	23.1	30.3	36.1	43.3	-
480v/3ø	-	7.2**	10.8**	14.4**	12.6**	14.4	16.8	19.2	25.3	30.1	36.1	40.9
600v/3ø	-	5.8**	8.7**	11.5**	10.1**	11.5	13.5	15.4	20.2	24.1	28.9	32.7
kW	2.0	4.0	6.0	8.0	10.0	12.0	14	16.0	21.0	25.0	30.0	34.0

\* Add 9 lbs (4 kg) to total weight for models with pre-wired subpanel.

\*\* For wire sizing, highest leg draw is due to current unbalance in some cases.

\*\*\* Output capacity and kW derate of 7%.

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## START-UP AND OPERATION

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### Start-up and Checkout Procedures

After the system has been properly installed and connected to both electrical and water supplies, it may then be started.

#### Mounting

Check mounting to see that the unit is level and securely supported before filling with water. Refer to page 6 for mounting hole locations.

#### Piping

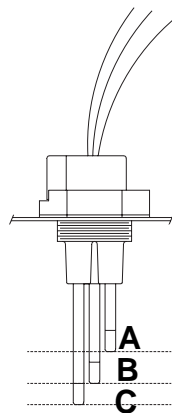
Verify that all piping connections have been completed as recommended and that water pressure is available. Refer to page 5.

#### Electrical

Verify that all wiring connections have been made in accordance with all governing codes and the enclosed wiring diagram. Refer to page 5.

**Caution: Only qualified personnel should perform start-up procedure.**

**Figure 8-1: Electronic Probe Control for Maintaining Proper Water Level (CRUV®)**



OM-211-2

A simple three-probe conductivity sensor cycles a solenoid-operated water fill valve to maintain the proper water levels.

The CRU®V humidifier is available with either the standard LW 415 Electronic Water Level Control Module or the optional VAPOR-LOGIC<sub>3</sub> microprocessor control system. If your system is equipped with the VAPOR-LOGIC<sub>3</sub> system, see the *VAPOR-LOGIC<sub>3</sub> Operations and Maintenance Manual* for more information. Then continue reading this manual beginning at the maintenance section on page 9.

### LW415 Electronic Water Level Control Module

When the power is activated, the solenoid-operated water fill valve will open, filling the evaporating chamber. Filling will continue until water reaches level A (figure 8-1), at which time the fill valve will close. To ensure that a water seal is created in the field-installed water seal, disconnect probe plug and cable from probe rod assembly (located on the top of the tank), allowing the fill valve to re-energize and overfill humidifier tank. This process will take only seconds; probe plug and cable must then be reconnected. A call for humidity will then energize the heating element.

#### Water Refill

During operation, when the water line drops below level B the fill valve opens, and remains open until the water line returns to level A (figure 8-1).

#### Heater Protection

Should the water line ever drop below level C, the heaters are de-energized and remain OFF until the water line has been restored to level C. This feature provides heater protection in the event of a low-water condition.

#### Drain/Flush Feature

This control module contains an integral electronic timer which tracks the humidifying time of the unit. When this accumulated time reaches what has been set in the timer, the drain/flush cycle is activated.

Upon activation, the following sequence occurs:

1. The drain valve opens and begins to drain surface water and minerals from the evaporating chamber.
2. When the height of the water drops to the "REFILL" level, the fill valve opens.
3. The drain and fill valves remain open for ten more minutes, flushing the chamber.
4. The drain valve then closes, the chamber refills, and the fill valve closes. The timer resets and the unit resumes normal operation.

The electronic timer comes factory-set for drainage after 40 hours of operation. Alternate settings of 20 hours and 80 hours are available. See wiring diagram(s) attached to unit for timer board location and instructions for changing the timer setting.

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## START-UP AND OPERATION

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### Test Cycling the Drain/Flush System

The level control board contains four pairs of terminal pins which are marked 20, 40, 80 and "T" (TEST). To test:

1. Pull the pin block off the pair of pins in use, move it to the "T" pair, and push it on.
2. Set the humidistat high enough so that unit will remain "on call" for at least one hour.
3. After about 35 minutes of operation, activation will take place, causing the drain valve to open. The water level will then drop to level B (see figure 8-1 on page 8) and cause the fill valve to open. Both valves will remain open for about 10 minutes.
4. The drain valve will then close, and the water level will rise to level A (see figure 8-1 on page 8), causing the fill valve to close.
5. Once the test cycle is complete, move the pin block back to the desired pair of pins. **Failure to do so will result in a drain/flush cycle every 35 minutes.**

### CRU®V Make-up Water Piping

If the water pressure is above 60 psi (414 kPa) and/or water hammer would be objectionable, a pressure-reducing valve or shock arrester should be installed. Even though the humidifier has an internal 1" (25 mm) air gap, some local codes may require a vacuum breaker.

**Important:** Minimum water supply pressure is 25 psi (170 kPa). Maximum water supply pressure is 80 psi (552 kPa).

### CRUV-DI Water Level Control System

The basic float valve water level system and float switch circuit for heater protection in the event of a low-water condition is common to all DI humidifiers and can be found in the wiring diagram shipped with the unit.

### CRUV-DI Start-Up Procedure

- a) Adjust humidistat to "call" setting.
  - b) Open shut-off valve on water supply line. Unit should begin filling with water through the fill valve.
  - c) Shortly before the fill valve shuts off, the float operated heater cut-off switch will "make." When this switch makes, the heating element contactor(s) will be actuated. A time delay relay circuit prevents contactor chatter due to bouncing of heater cut-off float.
  - d) Check heater cut-off circuit.
    1. Close manual valve on water supply.
    2. Open drain valve and start draining unit.
  - e) Check function of field-installed safety controls, such as the fan proving switch. Contactor(s) should drop out when the proving switch is "open."
  - f) Check heater draw by testing and recording voltage and amperage in each phase. Readings should match name plate readings; name plate is located on the humidifier housing.
  - g) Inspect installations for steam or air leaks while operating the humidifier. Any leaks should be sealed.
3. When water level drops past switching level on the heater cut-off float, the heating element contactor(s) will drop out.
4. When step 3 has been satisfactorily completed, close drain valve.

Inspect after first three months of duty. The best way to determine how often your particular system will need maintenance is to remove the cover and inspect it after its first three months of duty. Potable water carries a variety of minerals and other materials in a mix that varies from location to location. This variation in water quality, combined with the hours of operation and duty cycle, will determine your own unique maintenance schedule.

### Water quality makes a difference

1. Light to moderately hard water (2 to 10 grains/gallon or 34.2 to 171 mg/1 hardness)
  - annual cleaning
2. High mineral content water (more than 10 grains/gallon or 171 mg/1 hardness)
  - cleaning frequency determined by use and water quality
  - periodic drain and flush cycles
3. DI/RO water (Model VMDI)
  - no regular cleaning required (although regular inspections are advised)
  - no drain and flush cycles required
  - the presence of chlorides in DI water will eventually cause pitting and failure of the tank and its components
4. To dramatically reduce mineral accumulation inside the evaporating chamber, softening of the makeup water recommended. (Solids like silica are not removed in the the softening process.)



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## MAINTENANCE

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### CRU®V Humidifier

(Non-DI humidifiers with either the LW 415 or VAPOR-LOGIC®<sub>3</sub> Control Systems)

#### Mineral Precipitate

As evaporation takes place in the CRUV humidifier, some of the minerals dissolved in the water precipitate out and float on the water surface. The minerals not removed by the skimmer (VAPOR-LOGIC®<sub>3</sub> option only) will settle to the bottom of the evaporating chamber.

#### Cleaning the Evaporating Chamber

The heating element itself is self-cleaning. The mineral buildup on the element flakes off after reaching a thickness of about 1/16" (2 mm), and settles to the bottom of the chamber.

Long heater element life can be expected when the operation of the humidifier is observed for a few weeks following initial start-up. By observing the mineral build-up rate, the frequency of both drain/flush use and manual cleaning can be determined and adjustments made.

**CAUTION: Before this mineral scale builds up on the underside of the heating element, it must be removed. Failure to do so may result in premature heater burn-out.**

The CRUV humidifier is designed for convenient cleaning and maintenance.

#### To Inspect and Service:

1. Drain evaporating chamber by manually opening DRAIN valve. Do this by moving lever on valve to MANUAL position and lock in place.
2. Unscrew probe-rod assembly. Scale should flake off easily. Build-up on tips should be scraped off to remove any mineral residue.
3. Remove the tank cover and wet vac minerals out of tank (recommended).
4. To remove tank for cleaning, disconnect drain line union, fill valve supply line, electrical connections to drain, (disconnecting field wiring in conduit is NOT recommended,) thermal trip, heaters, fill valve, and probe. Disconnect steam hose from top of tank and remove mounting bracket fasteners.
5. Remove evaporating chamber and clean.
6. Install the probe and probe plug assembly. Verify that ground wire is connected.
7. Replace tank cover, making sure tank is sealed tight.
8. Reconnect drain line union, fill valve supply line, electrical connections to drain, thermal trip, heaters, fill valve, and probe. Connect steam hose to top of tank.

9. Verify drain valve lever is in AUTO position.
10. The CRUV humidifier is again ready to humidify.

#### Off-Season Shutdown

1. Switch off power.
2. Turn off water supply to make-up valve.
3. Drain evaporating chamber and clean if necessary (see steps 1 through 9 above).
4. Leave chamber dry, power OFF and water shut-off valve closed until the next humidification season.

### CRUV-DI Humidifier

#### To Service

1. Manually open drain valve.
2. Allow time for the evaporating chamber to cool. If the tank is hot, cool it down by moving the valve lever located on the back of the drain valve to the manual open position – the fill valve will eventually open allowing cool water to run through the tank until it is cool enough to handle.
3. Shut off electrical power to unit.
4. Shut off water supply to make-up valve.
5. Make sure evaporating chamber is drained.
6. Unscrew four cover bolts and remove cover.
7. Check operation of float valve and low-water cut-out.
8. Inspect heating elements.
9. Inspect evaporating chamber and clean if necessary.
10. Inspect cover gasket, and replace if necessary.
11. Replace chamber cover.
12. Verify drain valve is in the closed position.
13. Open water supply valve and turn on electric power.
14. CRUV-DI humidifier is again ready to humidify.
15. If necessary, remove tank as follows:  
Remove flexible vapor hose from tank. Close drain valve. Disconnect unit from drain and supply water lines. **DO NOT DISCONNECT ANY OF THE ELECTRICAL CONDUITS.**

#### Off-Season Shutdown Procedure

1. Switch off electrical power to unit.
2. Check overall appearance of unit.
3. Shut off water supply to make-up valve.
4. Drain evaporating chamber by manually opening drain valve.\*
5. Visually check electrical components of subpanel.
6. Leave chamber dry, power off, and water shut-off valve closed until the next humidification season.

\* With VAPOR-LOGIC<sub>3</sub> option, the evaporating chamber is automatically drained after 72 hours without a call for humidity when the end-of-season drain option is ordered.

# CRU® V TROUBLE-SHOOTING GUIDE (LW415 Electronic Water Level System Only)\*

PROBLEM	CONTROL PANEL LIGHTS			POSSIBLE CAUSE	RECOMMENDED ACTION
	FILL	READY WATER	DRAIN		
Humidifier will not heat	Off	Off	Off	Control transformer	Verify control voltage across secondary leads of transformer. Reset transformer circuit breaker. T1 and T2
	Off	On	Off	Humidistat is not calling	Set humidistat to call. Inspect for faulty humidistat.
				Safety controls open	Check safety controls, air flow switch, high limit humidistat, etc.
				Faulty control board	Verify control voltage between terminals.
				Probe head deterioration**	Replace probe head.
Humidifier will not fill	On	Off	Off	No water pressure at valve.	Check water supply/shut off valves.
				Faulty water fill valve	Verify action of fill water solenoid valve by turning control module switch from standby to normal op. Audible click should be heard as solenoid operates.
				Plugged strainer	Check strainer.
				Plugged valve	Check valve.
				Faulty control board	Verify control voltage across terminals H & N on LW415.
Humidifier does not stop filling	On	Off	Off	Lack of tank to probes electrical continuity. Water conductivity 100 micromhos/cm (2 gr/gal) min	Jumper wires brown to yellow. If water stops, verify tank ground; check water supply conductivity; then consult factory.
				Fill valve is stuck open	Check valve for foreign matter.
				Drain Valve not closed Fill valve installed backward	Check for correct water flow through valve note arrow.
	On	Off	On	Auto-drain mode	10 Minute must complete first.
Low output	Off	On	Off	Electric drain valve not seating	Correct cause of leakage or replace valve.
	Off	On	Off	Fill valve is stuck open	Check valve for foreign matter.
Unit short cycles	On & Off	On	Off	Probes may be incorrectly wired or need cleaning	Confirm that unit is wired per diagram. Clean probe rod tips with steel wool.
Reduced or no output even though water is at the proper level	Off	On	Off	Heater malfunctioning	Verify that proper voltage is being applied to heaters. Check heater (amp draw and compare to wiring diagram ratings).
				Malfunctioning control system	Heater contactor not functioning--replace. Service fuses blown. Auxiliary limit controls not allowing system to operate (dust humidi-stat, air flow proving switch, etc.). Reset, replace or calibrate as required. Faulty or inaccurate humidi-stat, replace or calibrate.

\*For VAPOR-LOGIC<sub>2</sub> trouble-shooting, see the *VAPOR-LOGIC<sub>2</sub> Operations and Maintenance Manual*.

\*\*Probe rod corrosion or probe head material aging may cause level control system failure. This generally does not occur in the first two years of operation.

## CRU®V-DI TROUBLE-SHOOTING GUIDE (LW415 Electronic Water Level System Only)\*

PROBLEM	READY WATER	POSSIBLE CAUSE	RECOMMENDED ACTION
Humidifier will not heat	Off	Control transformer	Verify control voltage across secondary leads of transformer. Reset transformer circuit breaker.
		Humidistat is not calling	Set humidistat to call. Inspect for faulty humidistat.
		Safety controls open	Check safety control. (Air flow switch, high limit humidistat, etc.)
		Low water float switch	Verify control voltage from float switch and transformer secondary common.
Humidifier will not fill	Off	No water pressure at valve	Check manual water supply. Valve, minimum 25 psi water pressure.
		Malfunctioning water float valve	Check to make sure that valve float & stem moves freely.
		Plugged float valve	Check float valve seat.
Water float valve does not close	On	Open drain valve	Obstruction in drain valve will not allow complete closure, clean or replace valve.
		Manual drain valve not closed	Close drain valve.
		Malfunctioning float valve	Float ball has water leak. Float valve seat defective, replace.
		Water passing into overflow stand pipe	Readjust float valve rod, so water level reaches 1/4-3/8" from overflow edge when water is at ambient or cold state. Excessive water pressure, 80 psi maximum.
		Float valve stuck	Obstruction will not allow float valve to seat properly, clean or replace with new seat.
Reduced or no output even though water is at the proper level	On	Heater malfunctioning	Verify that proper voltage is being applied to heaters. Check heaters (amp draw and compare to wire diagram ratings).
		Malfunctioning control system	Heater contactor not functioning, replace. Service fuses blown. Auxiliary limit controls not allowing system to operate (duct humidistat, air flow proving switch, etc.). Reset, replace, or calibrate as required. Faulty or inaccurate humidistat, replace or calibrate.
		Time delay/interlock relays	Relay delay on time is 10-15 seconds. Check relays.
		Low water cut-off switch	Check for proper operation.

\*For VAPOR-LOGIC<sub>2</sub> trouble-shooting, see the *VAPOR-LOGIC<sub>2</sub> Operations and Maintenance Manual*.

## CRU®V TROUBLE-SHOOTING GUIDE (VAPOR-LOGIC®<sub>3</sub> only)

PROBLEM	POSSIBLE CAUSE	RECOMMENDED ACTION
Humidifier does not heat.	Incorrect or non-existent supply voltage to unit	Check main line safety switch . Check main line fuses. Check for proper supply voltage.
	Incorrect or non-existent control voltage	Reset control transformer circuit breaker. Check for 24 VAC control circuit voltage at T-1 and T-2 on the control board.
	Humidistat not calling	Set humidistat to call. Inspect for faulty humidistat.
	Safety controls open.	Check safety controls, air flow switch, and high limit humidistat.
Humidifier will not fill.	No water pressure at valve	Check water supply/shut off valves.
	Faulty water fill valve	Check for 24 volts at the fill valve.
	Plugged strainer	Check strainer.
	Plugged valve	Check valve.
	Faulty control board	Verify control voltage across the fill valve output.
Humidifier does not stop filling.	Lack of tank to probes' electrical continuity; water conductivity 100 micromhos/cm (2 gr/gal) or 34.2 mg/1 min.	Add salt to the tank. If this solves the problem, consult factory for further advice.
	Fill valve stuck open	Check valve for foreign matter.
	Drain valve not closed Fill valve installed backward	Check for correct water flow, through valve, note arrow.
	Auto-drain mode	Humidifier may be in periodic drain and flush. Check controller display.
Low output	Electric drain valve not seating	Correct cause of leakage or replace valve.
	Fill valve stuck open	Check valve for foreign matter.
Unit short cycles	Controller cycle rate set to low	Review controller cycle set point.
Reduced or no output even though water is at the proper level.	Heater malfunctioning	Verify that proper voltage is being applied to heaters. Check heater amp draw and compare to wiring diagram ratings.
	Malfunctioning control system	Heater contactor not functioning, replace. Service fuses blown. Auxiliary limit controls not allowing system to operate (dust humidistat, air flow proving switch, etc.) Reset, replace or calibrate as required. Faulty or inaccurate humidistat, replace or calibrate.

\*Probe rod corrosion or probe head material aging may cause level control system failure. This generally does not occur in the first two years of operation.

## CRU®V-DI TROUBLE-SHOOTING GUIDE (VAPOR-LOGIC®<sub>3</sub> only)

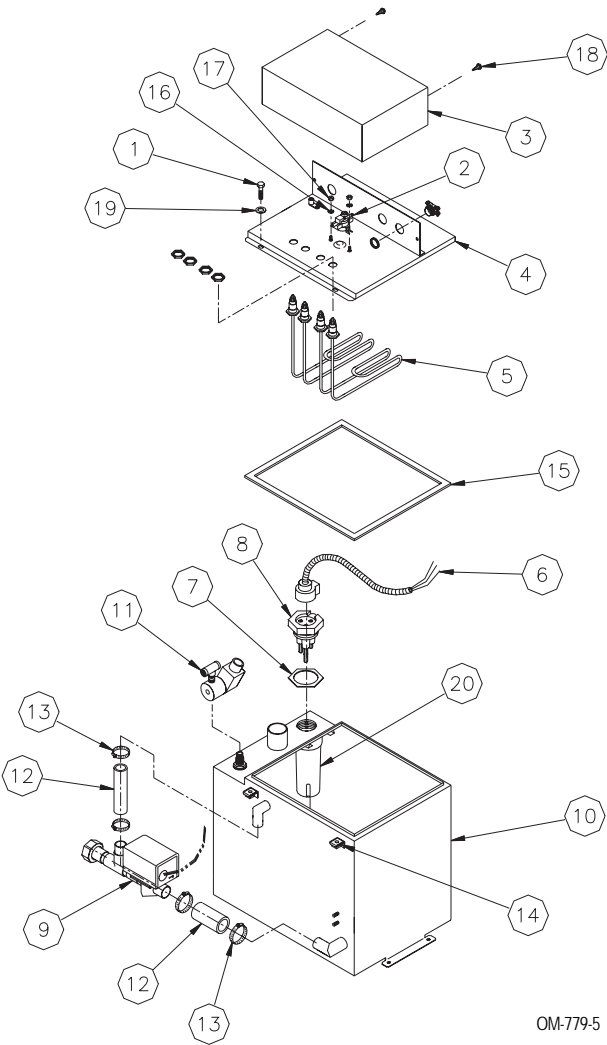
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Humidifier will not heat.	Control transformer	Reset control transformer circuit breaker.
	Humidistat is not calling	Set humidistat to call. Inspect for faulty humidistat.
	Safety controls open	Check safety controls, air flow switch, high limit humidistat, etc.
	Low water cutoff	Check at board 32 and 33. Measure 0 volts for closed switch, approximately 2.5 volt for A.C. open switch.
Humidifier will not fill.	No water pressure at valve	Check manual water supply. Valve, minimum 25 psi water pressure.
	Malfunctioning float switch	Check to make sure that float moves freely on stem.
	Plugged fill valve	Check fill valve inlet.
Humidifier does not stop filling.	Open drain valve	Obstruction in drain valve will not allow complete closure. Clean or replace valve.
	Manual drain valve not closed	Close drain valve.
	Fill valve stuck open	Check valve for foreign matter, water-logged float, broken float arm, or worn valve stopper.
Reduced or no output even though water is at the proper level.	Heater malfunctioning	Verify that proper voltage is being applied to heaters. Check heater (amp draw and compare to wiring diagram ratings).
	Malfunctioning control system	Heater contactor not functioning, replace. Service fuses blown. Auxiliary limit controls not allowing system to operate (dust humidistat, air flow proving switch, etc.) Reset, replace or calibrate as required. Faulty or inaccurate humidistat, replace or calibrate.

# REPLACEMENT PARTS

Table 14-1: CRU®V 2 through 16

Item	Description	Qty	Part No.
1	1/4-20 X 1" lg phillips head bolt	4	700300-013
2	thermo cut-out	1	409560-001
3	heater terminal cover	1	*
4	tank cover	1	*
5	heater element	1	409600 *
6	probe assy with conduit and fitting	1	406050-100
7	probe assy gasket	1	309750-003
8	probe assy, CRUV 2-4	1	406270
8	probe assy, CRUV 6-34	1	406275
9	3/4" electric valve 24v	1	505400-001
10	tank weldment	1	*
11	1/4" solenoid valve 24v w/flying leads	1	505084
12	3/4" ID hose	1	307020-002
13	3/4" hose clamp	4	700560-075
14	1/4-20 nut assy CRUV/CRUV-DI 2-4	4	700650
14	1/4-20 nut assy CRUV/CRUV-DI 6-34	2	700650
15	cover to tank gasket	1	*
16	#8 external tooth washer pltd	2	700200-003
17	#8-32 hex nut pltd	4	700200-002
18	#8-32 X1/2" phillips head screw	2	700170-007
19	1/4" lock washer	4	700351-025
20	nylon probe housing, CRUV	1	308500

\* Specify humidifier model and serial numbers when ordering replacement parts.



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## REPLACEMENT PARTS

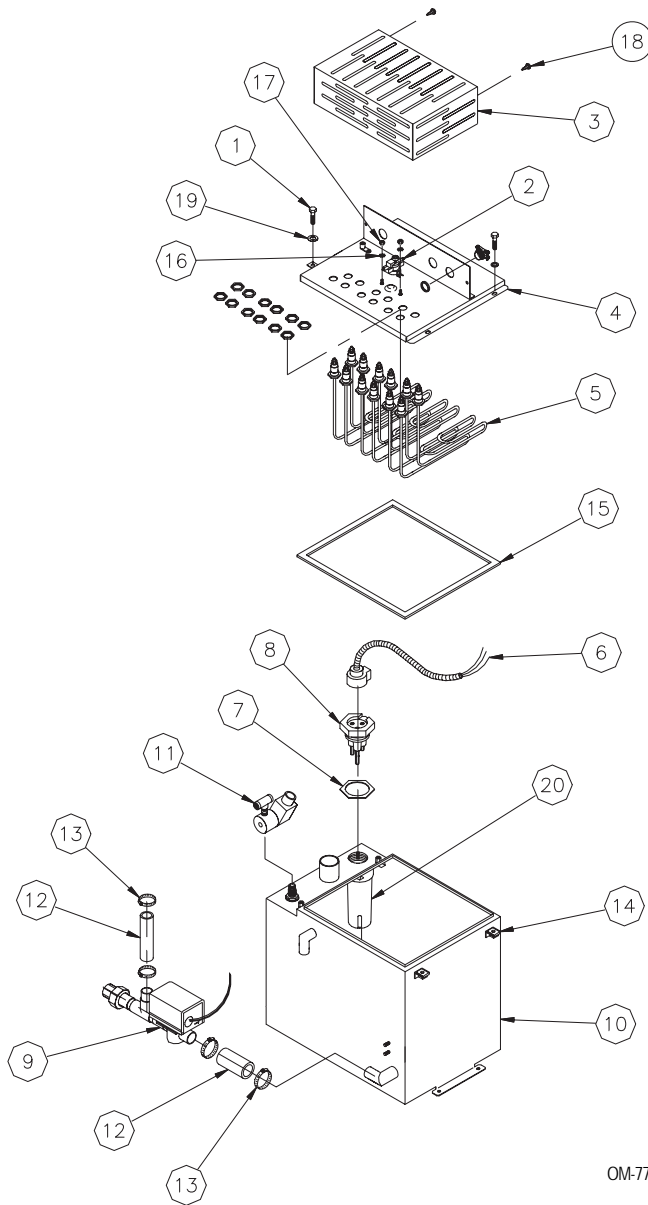


Table 15-1: CRU®V 21, 25, 30 and 34

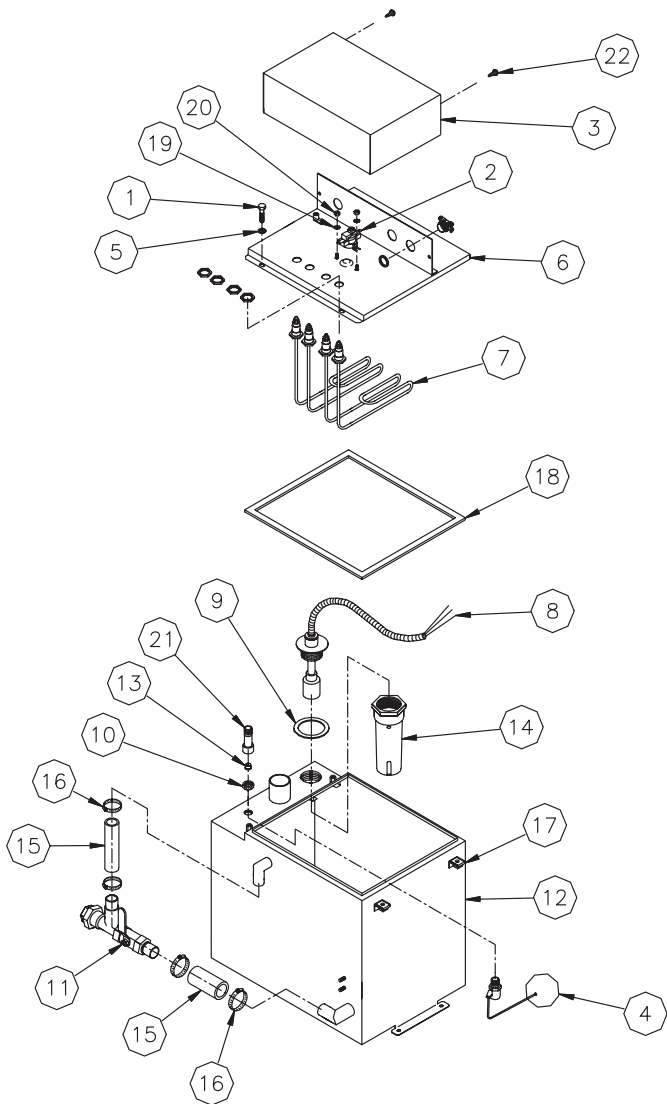
QTY	DESCRIPTION	4 W	3 DUM R
1	1/4-20 X 1" lg phillips head bolt	4	700300-013
2	thermo cut-out	1	409560-001
3	heater terminal cover	1	*
4	tank cover	1	*
5	heater element	*	409600 *
6	probe assy with conduit & fitting	1	406050-100
7	probe assy gasket	1	309750-003
8	probe assy, CRUV 6-34	1	406275
9	3/4" electric valve 24v	1	505400-001
10	tank weldment	1	*
11	1/4" solenoid valve 24 v w/flying leads	1	505084
12	3/4" ID hose	1	307020-002
13	3/4" hose clamp	4	700560-075
14	1/4-20 nut assy CRUV/CRUV-DI 6-34	2	700650
15	cover to tank gasket	1	*
16	#8 external tooth washer pltd	2	700200-003
17	#8-32 hex nut pltd	4	700200-002
18	#8-32 X 1/2" phillips head screw	2	700170-007
19	1/4" lock washer	4	700351-025
20	nylnrg probe housing, CRUV	1	308500

\* Specify humidifier model and serial numbers when ordering replacement parts.

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## REPLACEMENT PARTS

Table 16-1: CRU®V-DI 2 through 16



Item	Description	Qty	Part No.
1	1/4-20 X 1" lg phillips head bolt	4	700300-013
2	thermo cut-out	1	409560-001
3	heater terminal cover	1	*
4	float assy	1	505310
5	1/4" lock washer	4	700351-025
6	tank cover	1	*
7	heater element, 2kW 120v	*	409600 *
8	float switch assy	1	
9	probe assy gasket	1	309750-004
10	seal ring 1/4" 18 npt 303 sst	1	306365
11	1/2" sst ball valve assy	1	505000-003
11	end-of-season drain valve assy (not shown)	1	505086-003
12	tank weldment	1	*
13	orifice, .041 fill models 4-16	1	160229-041
14	nylon probe housing	1	308500
15	3/4" ID hose	1	307020-002
16	3/4" hose clamp	4	700560-075
17	1/4-20 nut assy CRUV/CRUV-DI 2-4	2	700650
18	cover to tank gasket	1	*
19	#8 external tooth washer pltd	2	700200-003
20	#8-32 hex nut pltd	6	700200-002
21	pipe weld, fill valve	1	160215
22	#8-32 X 1/2" phillips head screw	2	700170-007

\* Specify humidifier model and serial numbers when ordering replacement parts.

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## REPLACEMENT PARTS

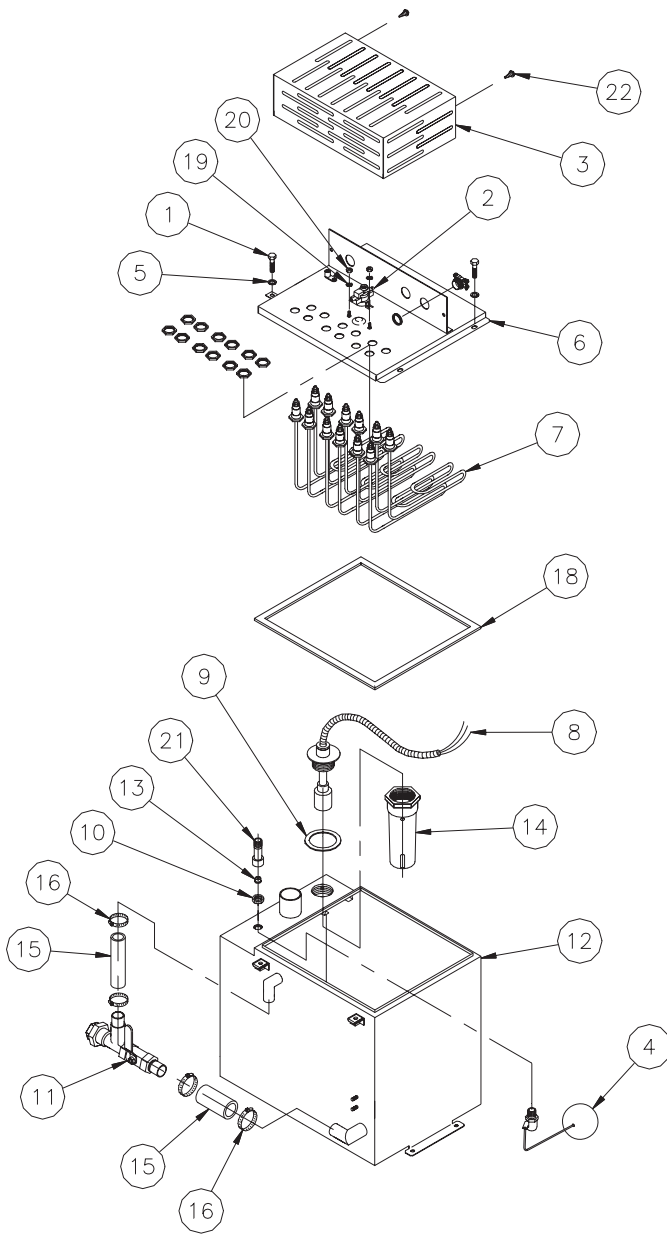


Table 17-1: CRU®V-DI 21, 25, 30 and 34

Item	Description	Qty	Part No.
1	1/4-20 X 1" lg phillips head bolt	4	700300-013
2	thermo cut-out	1	409560-001
3	heater terminal cover	1	*
4	float assy	1	505310
5	1/4" lock washer	1	700351-025
6	tank cover	1	*
7	heater element, 2kW 120v	*	409600 *
8	float switch assy	1	
9	probe assy gasket	1	309750-004
10	seal ring 1/4" 18 npt 303 sst	1	306365
11	1/2" sst ball valve assy	1	505000-003
11	end-of-season drain valve assy (not shown)	1	505086-003
12	tank weldment	1	*
13	orifice, .052 fill models 21-34	1	160229-052
14	nylon probe housing	1	308500
15	3/4" id hose	1	307020-002
16	3/4" hose clamp	4	700560-075
17	1/4-20 nut assy CRUV/CRUV-DI 6-34	2	700650
18	cover to tank gasket	1	*
19	#8 external tooth washer pltd	2	700200-003
20	#8-32 hex nut pltd	6	700200-002
21	pipe weld, fill valve	1	160215
22	#8-32 X 1/2" phillips head screw	2	700170-007

\* Specify humidifier model and serial numbers when ordering replacement parts.

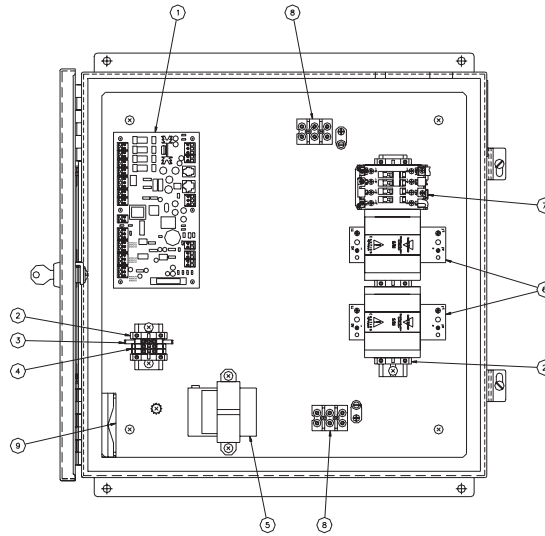
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## REPLACEMENT PARTS

Table 18-1: CRU®V Control Cabinet with VAPOR-LOGIC®<sub>3</sub> and SSR option

Item	Description	Qty	Part No.
1	main board, VL3	1	408490-001
2	block, din rail stop	5	408252-006
3	terminal, ground	1	408252-010
4	terminal	2	408252-001
5	transformer, 120/280/240/480*	1	408965-001
5	transformer, 600v*	1	408986
6	SSR, 480 VAC 50 amp 1 pole	2	408677-002
7	contactor, 60 amp*	1	407001-021
7	contactor, 32 amp*	1	408991
8	3 pole 3Ø power block*	2	408300-002
8	2 pole 1Ø power block*	2	408300-001
9	fan, 24 volt	1	408677-001

\* Specify humidifier model and serial numbers when ordering.

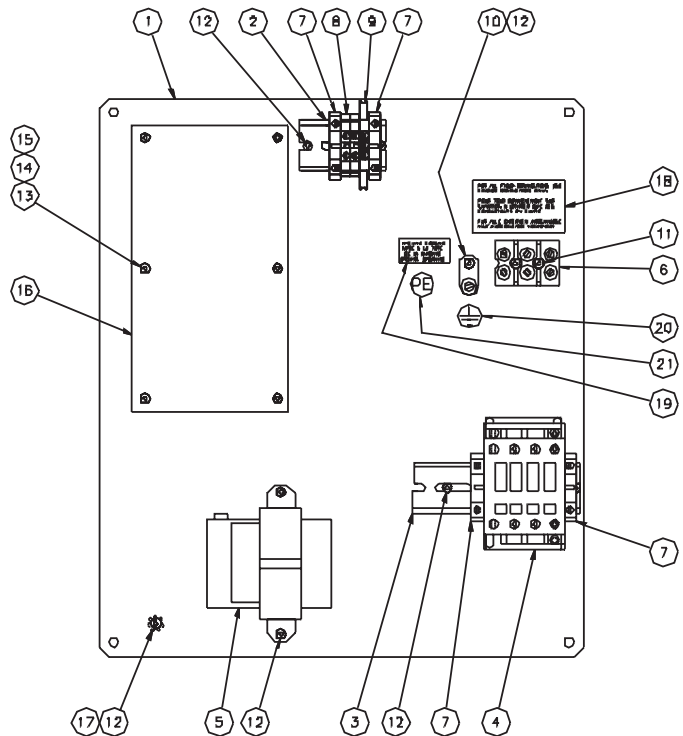


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Table 18-2: CRU®V Control Cabinet with VAPOR-LOGIC®<sub>3</sub> option

Item	Description	Qty	Part No.
1	subpanel, 13" X 15"	1	166720-003
2	DIN rail, 2-1/4" long	2	167765-0022
3	DIN rail, 4-1/2"	1	167765-0045
4	contactor, 32A*	1	407001-020
4	contactor, 60A*	1	407001-021
5	transformer, 600V*	1	408986
5	transformer, 120/240/480/208*	1	408965-001
6	3 pole 3Ø power*	1	408300-002
6	2 pole 1Ø power*	1	408300-001
7	block, DIN rail stop	4	408252-006
8	terminal	2	408252-001
9	terminal, ground	1	408252-010
10	ground lug, L-70 6-8 GA CP-4	1	409250-018
11	screw, #6-32 X 1-1/4" type F	2	700100-002
12	screw, #8-32 X .38 phillips type F	8	70170-001
13	screw, #6-32 X .75 phillips type F	6	700100-001
14	standoff, metal #8 X 3/8"	6	409592
15	nut, hex #6-32 pltd	6	700100-003
16	microprocessor board	1	408490-001
17	starwasher, #8-32 external teeth	1	700200-003
18	label, copper wire	1	805050
19	label, machine ground	1	800010
20	label, ground symbol	1	806810
21	label, protective earthing	1	806820

\* Specify humidifier model and serial numbers when ordering.



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## MAINTENANCE SERVICE RECORD

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DATE INSPECTED	PERSONNEL	OBSERVATION	ACTIONS PERFORMED

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## TWO-YEAR LIMITED WARRANTY

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DRI-STEEM Humidifier Company ("DRI-STEEM") warrants to the original user that its products will be free from defects in materials and workmanship for a period of two (2) years after installation or twenty-seven (27) months from the date DRI-STEEM ships such product, whichever date is the earlier.

If any DRI-STEEM product is found to be defective in material or workmanship during the applicable warranty period, DRI-STEEM's entire liability, and the purchaser's sole and exclusive remedy, shall be the repair or replacement of the defective product, or the refund of the purchase price, at DRI-STEEM's election. DRI-STEEM shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or reinstallation of any defective product.

DRI-STEEM's limited warranty shall not be effective or actionable unless there is compliance with all installation and operating instructions furnished by DRI-STEEM, or if the products have been modified or altered without the written consent of DRI-STEEM, or if such products have been subject to accident, misuse, mishandling, tampering, negligence or improper maintenance. Any warranty claim must be submitted to DRI-STEEM in writing within the stated warranty period.

DRI-STEEM's limited warranty is made in lieu of, and DRI-STEEM disclaims all other warranties, whether express or implied, including but not limited to any IMPLIED WARRANTY OF MERCHANTABILITY, ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, any implied warranty arising out of a course of dealing or of performance, custom or usage of trade.

DRI-STEEM SHALL NOT, UNDER ANY CIRCUMSTANCES BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, REVENUE OR BUSINESS) OR DAMAGE OR INJURY TO PERSONS OR PROPERTY IN ANY WAY RELATED TO THE MANUFACTURE OR THE USE OF ITS PRODUCTS. The exclusion applies regardless of whether such damages are sought based on breach of warranty, breach of contract, negligence, strict liability in tort, or any other legal theory, even if DRI-STEEM has notice of the possibility of such damages.

By purchasing DRI-STEEM's products, the purchaser agrees to the terms and conditions of this limited warranty.

# **DRI-STEEM®**

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