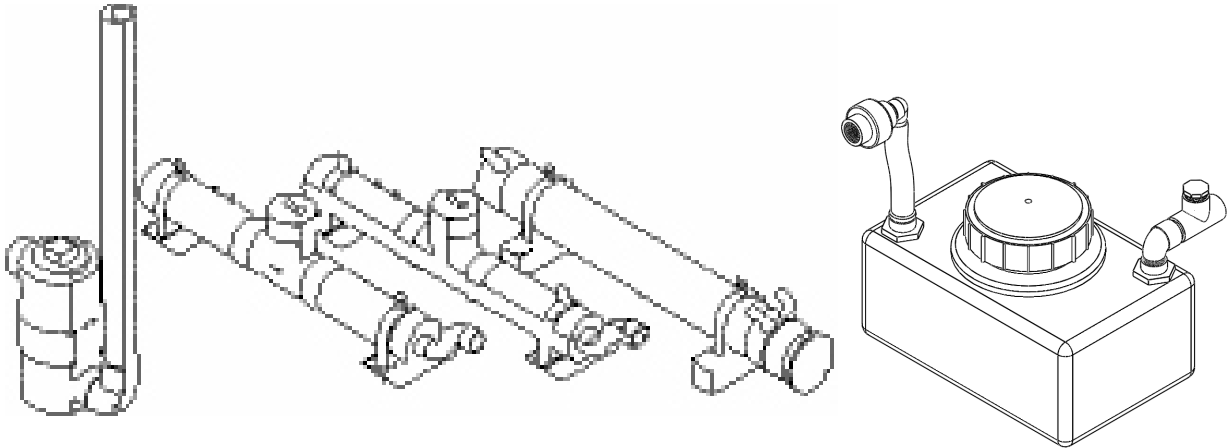


Hamilton Engineering

Installing, Operating & Maintaining

CONDENSATE DRAIN & NEUTRALIZING SYSTEMS



WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS:

- Do not try to light any appliance
- Do not touch any electrical switch
- Do not use any phone in your building

Products that the Condensate Neutralizer is intended for carry one or more of the following listings/markings



All models comply with A S M E boiler code



Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier instructions. If you can not reach your gas supplier, call the fire department.

ANSI STD Z21-13/Z21.13A
 Certified to CSA 4.9-2004
 ANSI STD Z21.10.3/Z21.10.3.b
 Certified to CSA 4.1-2004, add.A,B

New York
 MEA 425-05-E

Massachusetts
 Boilers: G1-06-06-24A
 Heaters: G1-06-06-24B

SCAQMD
 Compliant Rule 1146.2

CEC Listed
 California Energy Commission



WARNING

These appliances MUST be installed by a properly licensed individual in the City and State which the unit is being installed. All start up adjustments and subsequent service work must be done by a similarly licensed contractor or a factory trained service individual. Failure to comply could result in loss of warranty and or severe personal injury, death and or substantial property damage. ***These instructions are required to be kept with the appliance on the left side, in the pocket provided.***

USING THIS MANUAL

SPECIAL ATTENTION BOXES

Throughout this manual you will see these special attention boxes similar to this one, which are intended to supplement the instructions and make special notice of potential hazards. These categories are in the judgement of Hamilton Engineering, Inc.



DANGER

Indicates a condition or hazard which **MAY** cause severe personal injury, death, or major property damage.



WARNING

Indicates a condition or hazard which **MAY** cause severe personal injury, death, or major property damage.



CAUTION

Indicates a condition or hazard which **MAY** cause severe personal injury, death, or major property damage.



WARNING

- THE CONDENSATE NEUTRALIZER SUPPLIED WITH THE EVO APPLIANCE IS NOT REQUIRED BY CODE IN MOST JURISDICTIONS; HOWEVER, FAILURE TO USE AND MAINTAIN WILL RESULT IN DAMAGE TO MATERIALS IT COMES IN CONTACT WITH AFTER LEAVING THE EVO DRAIN CONNECTION.
- THIS HEATER INSTALLATION MUST CONFORM TO THE LATEST EDITION OF THE "NATIONAL FUEL GAS CODE" ANSI Z223.1 NFPA 54 AND/OR CAN/CGAB149 INSTALLATION CODES. STATE AND LOCAL CODES MIGHT ALSO APPLY TO INSTALLATION.
- WHERE REQUIRED BY THE AUTHORITY HAVING JURISDICTION, THE INSTALLATION MUST CONFORM TO THE STANDARDS FOR CONTROLS AND SAFETY DEVICES FOR AUTOMATICALLY FIRED HEATERS, ANSI/ASME HEATER AND PRESSURE VESSEL CODE, SECTION IV, ALONG WITH CSD-1.
- THE HEATER, GAS PIPING, WATER PIPING, VENTING AND ELECTRICAL MUST BE INSTALLED BY TRAINED & QUALIFIED PERSONNEL FAMILIAR WITH INSTALLATION PRACTICES, LOCAL CODE, AND LICENSING REQUIREMENTS.
- IF THE INFORMATION IN THESE INSTRUCTIONS ARE NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT, CAUSING PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH.
- DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

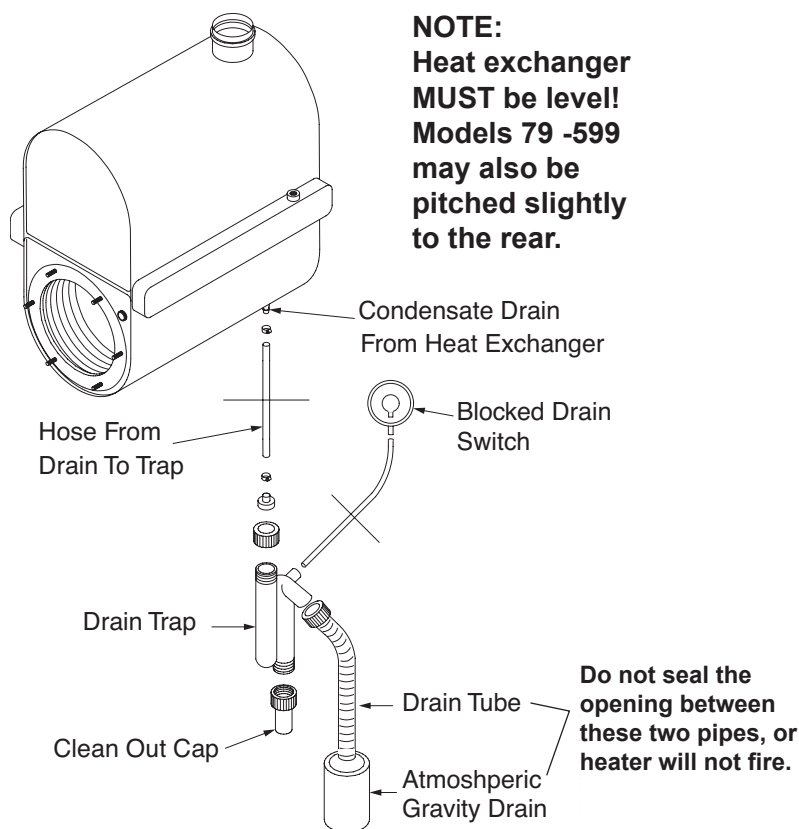
The condensate removal and neutralizing system is an important and integral part of the Hamilton condensing product system.

The condensate leaving a properly installed fully condensing product will have a pH between 2.5 and 3.5. It is extremely important that this condensate leave the heating product as produced and be passed through a neutralizing system prior to entering the building drain system. Since the condensate drain system of the Hamilton condensing product is directly connected to the positive pressure Combustion Chamber it is also very important that the condensate produced pass through a trap to isolate the combustion chamber from the atmosphere.

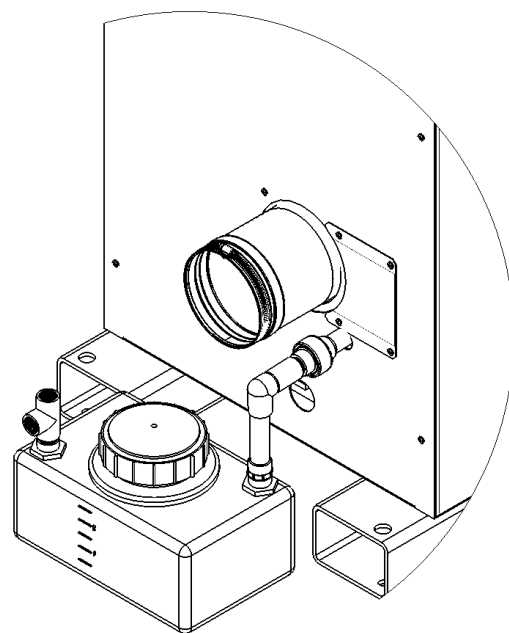
All Hamilton condensing products contain a condensate drain assembly that provides for the following:

1. Connection to the main drain port on the heat exchanger.
2. Connection to the inlet air condensate removal system.
3. Connection port for the sensing line to the pressure switch monitoring the condensate flow and excess pressure on the venting system.
4. Connection to the neutralizing appliance via kink-proof flexible hose.
5. Close off on the drain path in the event of a dry trap, such as at start up or after maintenance or cleaning.
6. A see-through clean-out cap to determine if the trap is retaining sediment which should be cleared.

**(FIGURE 1-1)
CONDENSATE DRAIN DETAIL**



**(FIGURE 1-2)
3VO CONDENSATE DRAIN DETAIL**



The neutralizer that the condensate will flow through is constructed entirely of PVC and will have an exit termination of 1"–1.5" PVC socket for connection to a gravity drain of the neutralized liquid. The neutralizer assembly shall also provide for the required air gap at the point the flexible drain hose enters the neutralizing assembly. The neutralizer shall also have the ability to have the neutralizing agent easily replaced in the field. The neutralizing agent used by Hamilton Engineering is simply 1/2"–3/4" Limestone aggregate, available at most home supply centers, a suitable substitute would also be 1/2"–3/4" marble; decorative landscape rock.

The neutralizer **must** provide for adequate soak time of the condensate over the neutralizing agent to bring the pH level to 7. From a level of 2.5 this will require 7 minutes. All factory supplied EVO Neutralizers provide for a minimum of 15 minutes from the point at which the condensate enters the assembly to the point at which it leaves the assembly. This 15 minute calculation is based on a fully condensing appliance, running non-stop and condensing 100% of the products of combustion, which will produce a flow rate of ~1.1 gallons per hour per 100,000 BTU of gas burned. The required amount of neutralizing agent is 0.6 lbs per 100,000 BTU of gas input. All Hamilton Neutralizers are factory loaded with a minimum of 1 lb per 100,000 BTU of gas input.

It should be noted that not all condensing will take place in the heat exchanger, so provisions must be made in the venting system design to allow for the condensing in the vent system to be collected and neutralized as well. This is a standard component in all Hamilton condensing products, whether individually or common vented.

Condensate generated calculations as used in the Hamilton neutralizing system:

With a 1,000,000 BTU appliance rated at 99.8% efficiency, using 54°F inlet water, with 70°F inlet air temperature:

CO₂% - 8.8% - High Fire 8.5% - Low Fire (at 5:1 turndown ratio)

All numbers are approximations

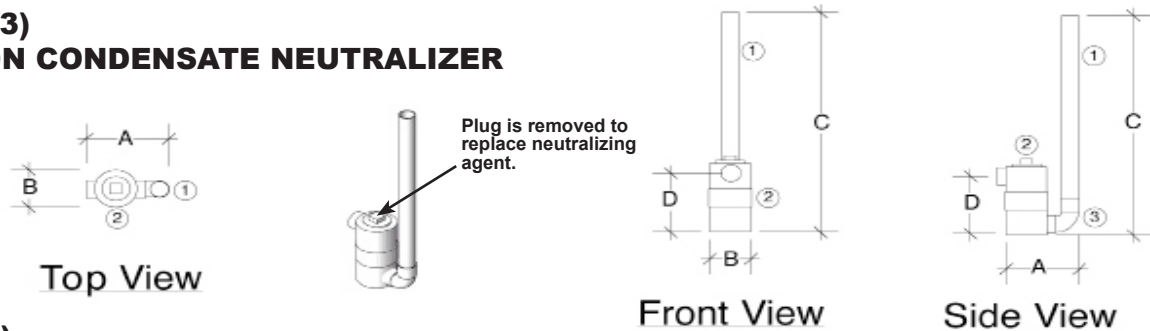
90°F supply and 70°F return	High Fire	Low Fire
Gross Stack Temperature	88°F	70°F
GPh of condensate from boiler	10.10	.40
GPh of condensate from the flue	0.06	0.01

140°F supply and 120°F return	High Fire	Low Fire
Gross Stack Temperature	138°F	120°F
GPh of condensate from boiler	0.75	0.03
GPh of condensate from the flue	1.99	0.08

Replacement of neutralizing agent

Sufficient volume of neutralizing agent is contained in the neutralizer to provide for 2000 hours of proper operation of a fully condensing appliance. pH should be checked annually and neutralizing agent replaced when the pH does not reach 6.5 or higher.

(FIGURE 1-3)
COMPANION CONDENSATE NEUTRALIZER

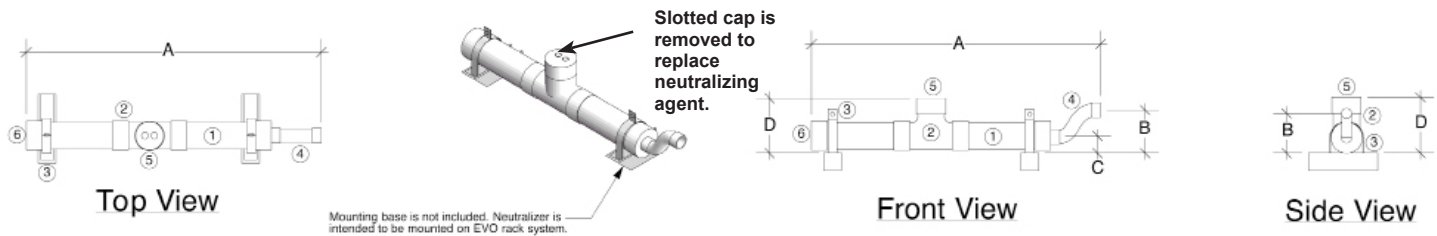


(TABLE 1-1)
COMPANION CONDENSATE NEUTRALIZER INFO

Description	Model	MBH	GPH	Lbs Media	A	B	C	D
Vertical model for EVO 79–199.1	CNK 90001 V	200	2.2	3.5	8"	3.5"	20"	6"
Vertical model for EVO 299–599	CNK 90001 VD	630	6.9	8	8"	3.5"	20"	12"

Note: These condensate assemblies can be used for Companion units HW79–HW599

(FIGURE 1-4)
EVO 79–599 CONDENSATE NEUTRALIZER

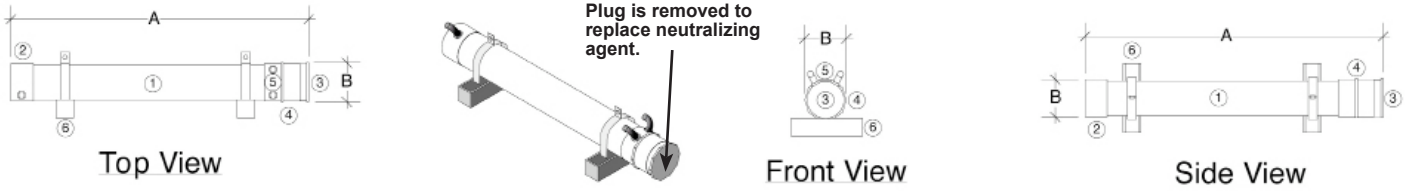


(TABLE 1-2)
EVO 79–599 CONDENSATE NEUTRALIZER INFO

Description	Model	Tees/Caps	MBH	GPH	Lbs Media	A	B	C	D
Condensate Neutralizer for 1 EVO Micro	CNK 90001 M	1	200	2.2	7.0	30"	4"	2"	6"
Condensate Neutralizer for 1 EVO Duo	CNK 90001 D	1	630	6.9	8.5	30"	4"	2"	6"
Condensate Neutralizer for 2 EVO Micros	CNK 90002 M	1	400	4.4	14.0	52"	4"	2"	6"
Condensate Neutralizer for 2 EVO Duos	CNK 90002 D	1	1260	13.8	16	52"	4"	2"	6"
Condensate Neutralizer for 3 EVO Micros	CNK 90003 M	2	600	6.6	21.0	75"	4"	2"	6"
Condensate Neutralizer for 3 EVO Duos	CNK 90003 D	2	1890	20.7	23.5	75"	4"	2"	6"
Condensate Neutralizer for 4 EVO Micros	CNK 90004 M	2	800	8.8	28.0	100"	4"	2"	6"
Condensate Neutralizer for 4 EVO Duos	CNK 90004 D	2	2520	27.7	31.0	100"	4"	2"	6"
Condensate Neutralizer for 5 EVO Micros	CNK 90005 M	3	1000	11	35.0	126"	4"	2"	6"
Condensate Neutralizer for 5 EVO Duos	CNK 90005 D	3	3150	34.6	37.5	126"	4"	2"	6"
Condensate Neutralizer for 6 EVO Micros	CNK 90006 M	3	1200	13.2	42.0	144"	4"	2"	6"
Condensate Neutralizer for 6 EVO Duos	CNK 90006 D	3	3780	41.5	45.0	144"	4"	2"	6"

Note: These condensate assemblies can be used for EVO Micro units HW79–HW199, and EVO Duo units HW299–599. The number of sanitary tees and caps increase with the size of the Neutralizer.

(FIGURE 1-5)
EVO 1499–1999 CONDENSATE NEUTRALIZER

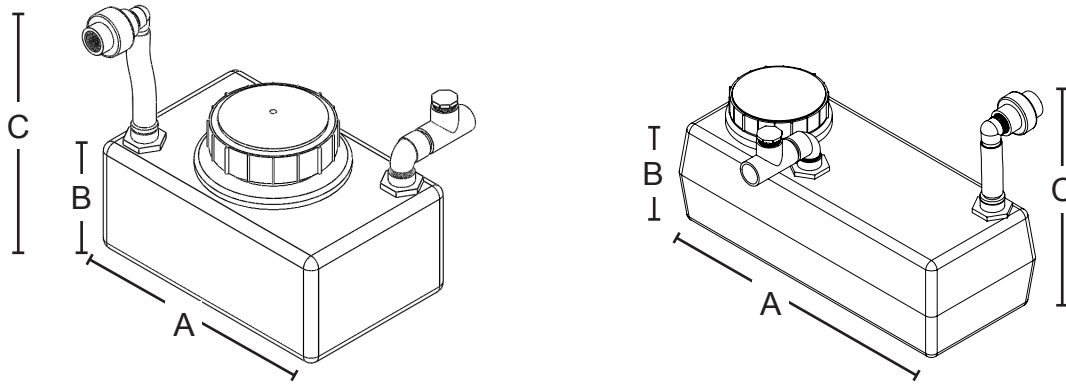


(TABLE 1-4)
EVO 1499–1999 CONDENSATE NEUTRALIZER INFO

Description	Model	MBH	GPH	Lbs Media	A	B
Condensate Neutralizer for EVO Trio 1499–1999	CNK 90001 T	2000	22	20	34"	5"

Note: These condensate assemblies can be used for EVO Trio units HW1499–HW1999

(FIGURE 1-6)
3VO 750–4000 CONDENSATE NEUTRALIZER



(TABLE 1-5)
3VO 750–4000 CONDENSATE NEUTRALIZER INFO

Description	Model	MBH	GPH	Lbs Media	A	B	C
Condensate Neutralizer for 3VO 750–1000	CNK 92001	1000	11	10	14"	6"	9"
Condensate Neutralizer for 3VO 1500–4000	CNK 92002	4000	44	40	22"	7.1"	9.7"

Note: These condensate assemblies can be used for 3VO units HW750–HW4000

Note: These condensate assemblies can be used for EVO units HW1499–HW1999

Suggested Specifications

1. The contractor shall install condensate neutralizing tubes provided by Hamilton Engineering for each condensate drain and all flue pipe condensate drains.
2. The condensate tubes shall be designed to raise the PH level 10–30 times more towards the neutral point of PH being discharged by the Hamilton condensing appliance.
3. The neutralizer tube(s) shall be manufactured by Hamilton Engineering, Inc.
4. The Consensate Neutralizer has a vent built in that shall not be sealed or covered by the installing contractor in any way.
5. All piping shall be PVC and supplied/installed by the contractor. Plastic tubing is an acceptable alternative when used with barbed fittings and hose clamps. All PVC joints shall be glued in place and all barbed fittings shall be secured with tie wraps.
6. All piping shall be per manufacturer's piping diagrams and directions. All neutralizing tubes not factory installed and secured shall be secured to the floor or wall so as not to be exposed to damage or within a normal walkway.
7. The contractor shall inform the owner of any maintenance or scheduled recharge of the tube's limestone aggregate, as described in this manual.

