Boilers On Demand

The Delta-T ECM Hydronic (Oil) Heating Appliance™ User's Guide including Specialized Service Notes

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The Weil-McLain® Ultra Oil (UO) Boiler with Taco® Delta-T ECM Circulation

The Boilers On Demand **Delta-T ECM Hydronic Appliance™** products are a configuration of selected commercial and proprietary components into a value product. The specifications and warrantees of these component suppliers apply and supersede any of those stated or implied within our product documentation. Reference links are provided herein to our All-American Manufacturer components.

Note: The on-line copy of this document is internally hyper-linked for clarification.

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System Component Quick-Reference Links:

Weil-McLain Ultra Oil Brochure

Weil-McLain Ultra Oil Manual

Weil-McLain Beckett NX Instruction Manual

Taco® 00e Series Delta-T ECM Variable Speed Circulators

Taco® “Zone Sentry” Zone Valves

I. Introduction:

This User's Guide (with Specialized Service Notes) applies to all installations of our Delta-T ECM Hydronic (Oil) Heating Appliance™ utilizing Taco® Delta-T (Δ-T) Differential Temperature Technology.

Our system provides a compact, efficient and cost-effective alternative to all prior conventional equipment installations and methods employed. It does so by configuring a boiler with particular physical attributes, a high performance delta-t circulator and zone valving system with a proprietary piping and distribution system, and all controlled by "intelligent" aquastat and circulation logic. They are optionally bundled with an Indirect Water Heater to optimize domestic hot water (DHW) generation efficiency.

Note: A Product Configuration Table is offered in the following section to identify your system components and their applicability.

Our Delta-T ECM Distribution Appliance™ employs a proprietary piping architecture driven by an advanced technology "intelligent" circulator (pump) and complimentary zoning valves. They are applied to a “high-mass” (heavy) cast-iron boiler to provide the maximum in durability, demand flexibility and minimizing of equipment service occurrence. This system configuration provides unique system operating attributes including selective heating fail-mode operation that are detailed in Section IV, Page 7.

Only selected American-Made Components are utilized in all of our products. They have been specifically selected, configured and assembled into a uniquely value-engineered package. These are drawn from our concurrent fifty-plus years of mechanical process engineering and direct participation in the heating trades. All system replacement components are catalogued, trade supply-house or on-line trade retailer stocked items.

Within the **Table of Contents** (Page 2) are provided "hyperlinks" to the applicable major system component documentation. This document is also posted on our website and can be utilized for electronic access.

System Maintenance Service is likewise very basic and can be provided by any competent, trained Heating Service Tradesman.

We have included both a "System Performance Characteristics" and a "Specialized Service Notes" Section herein to further aid the user and service personnel as to the distinct Operational Characteristics & Requirements of our Delta-T Systems.

II. System Configuration:

Our Delta-T ECM Hydronic (Oil) Heating Appliance™ consists of four (4) modular components and accessories assembled on-site into a functional heating appliance:

1. A Weil-McLain Ultra Oil Boiler™ appropriately sized, pre-piped and wired with a Taco 00e Series Delta-T ECM Circulator installed.
2. A suitable pre-built and wired Supply Manifold Assembly utilizing Taco Zone Sentry® Valves.
3. A suitable pre-built and valved Return Manifold Assembly.
4. A partially pre-piped HTP SuperStor Ultra Indirect Water Heater (Option).
5. A Beckett NX Oil Burner and Extrol Expansion Tank (attached at assembly).

There are several additional options available:

1. Ports at the appropriate boiler supply and return points to allow coupling to an existing Indirect Water Heater or plugged for a future install.
2. Ports (plugged) at the immediate boiler supply and return points to permit future coupling to any additional boiler heating source.
3. An Indirect Water Heater Selector Switch on the SuperStor is provided, but may be extended on-site for accessibility ease or programming by user.
4. Additional valved supply and return ports for future zone expansion(s).

Product Configuration Table

M.E. Product Code	Capacity KBTUH	Weil-McLain Boiler Model	Taco Viridian VT2218	Taco Zone Sentry Valves
DTO-100****	100,000	UO-3	After 09/01/15	Z075T2 or Z100T2
DTO-125****	125,000	UO-4	After 09/01/15	Z075T2 or Z100T2
DTO-150****	150,000	UO-5	After 09/01/15	Z075T2 or Z100T2

Note: The M.E. Product Code is extended by four (4) digits to define options:

1. Piping Configuration: C= Combined (E & T) Porting, E = External Porting Only, P = Un-ported/Plugged, T = DHW Ports for Indirect Water Heater (or plugged for a future install).
2. Total No. of Zone Valves (Ports) incl. DHW
3. Letter H = Indirect Water Heater supplied with system.
4. Single No. indicating Indirect Water Heater Size. 4 = 45 Gal., 6 = 60 Gal., 8 = 80 Gal., 9 = 119 Gal.

Our system was on-site installed by extending power & thermostat wiring, fuel line(s), water service, zone supply & return and exhaust flue piping. The Indirect Water Heater was likewise wired & piped to the boiler and to domestic hot & cold services.

III. System Operation:

All forced hot water (FHW) heating systems including our Delta-T ECM Hydronic (Oil) Heating Appliance™ generate and distribute heated water to provide area heating and domestic hot water (DHW) optionally as demanded. Where a "Delta-T" System differs is the method used to distribute hot water, and doing it very efficiently.

In simple terms, "Delta-T ECM Hydronic Technology" employs a "circulator" (water pump) with temperature sensors to exactingly control the flow rate of heated water to and from radiation (and DHW). The delivery temperature of heating water varies in response to heating demands. The "Delta-T" circulator simultaneously varies its speed (water delivery rate) to idealize heating water transmission.

As a user you should note no difference in heating uniformity other than the potential variations caused by:

1. Improperly installed or adjusted thermostats. A very common problem usually caused by having changed thermostats or improperly adjusting them.

a. New/Replacement (Digital) Thermostats: Assure that the "System Type" Selector Switches or Jumpers are correct for a FHW System.

b. Older Thermostats: There is an adjustable resistor (lever adjusted) than must be set at 0.5 A (on a scale of usually 0.2 to 0.6 A) for this system.

2. "Manual" Temperature Adjustments: The system is "smart" and learns your temperature pattern(s). A change from a programmed thermostat pattern or a manual change must be re-learned. The "recovery" from a change will initially be slower and thus possibly "felt", but if patterned will adjust itself. This includes the effect of Wi-Fi or other remote intelligent thermostat induced demands.

3. System component failure: The "Delta-T System" has several unique features that will provide heat and DHW under some fail conditions. These will be noted in the "System Diagnostics" Section to follow.

There are **four (4) power switches** associated on this system:

1. A **dedicated & identified** Circuit Breaker (15A) in your Power Panel (Code Requirement).

2. A wall-mounted, red "Oil Burner Emergency Switch" in the living area for safety and ease of access (Code Requirement).

3. A larger red "Oil Burner Emergency Switch" located immediately above the boiler toward the rear of the heating system (Code Requirement).

4. The Boiler Control Panel On-Off Toggle Switch controls the boiler only. It is selectively used as a serviceman's expedient when troubleshooting or repairing.

Power Notes:

1. Use any of the **first three switches** to secure your system.

2. If your power panel has a 20A breaker for the heating system, it is highly recommended that it be reduced to a **15A Only**. Our Delta-T ECM System uses far less power and a larger power surge is more likely to damage components.

System Observations & Indicators:

1. The initial system operation comments are two-fold, how quietly it operates and how less frequently it cycles. These are the design results of employing a very high mass (weight) boiler for its capacity along with Delta-T ECM distribution technology.

2. There is a low, virtually inaudible whir from the system circulator, varying in pitch during heating demands only. Otherwise the circulator is unpowered.

3. Under operation there is a digital display on the Delta-T Circulator and/or a Zone Valve(s) Green LED solid or flashing lamp(s). There are NO LIGHT INDICATORS when there is NO DEMAND.

4. There are two (2) indicators on the Boiler Instrument Panel Gauge, the system water pressure (between 12-20 PSI, with a 30 PSI Red Limit Needle Setting) and the boiler water temperature (varying from ambient to system operating temperature - a maximum of 190+/-°F). Variations from norm are addressed in the Service Section.

Water Leakage:

Under normal system (hot or cold) operation there should be no water leakage. This also applies to distribution piping and radiation. If so, notation should be made and corrected. Replacement water to a system introduces minerals and acidity that will deteriorate its life and performance over time.

It must be noted that if there is dripping observed at the right rear boiler tube from the Pressure Relief Valve or the Backflow Preventer (on the water service line), service is required. These are coupled together with a clear hose to aid in troubleshooting. You will sometimes note small condensation droplets in this tube from air temperature precipitation. Placing a small plate under the venting pipe on the floor will avoid any staining while warning of excessive leakage, a service issue.

IV. System Attributes:

Our Delta-T ECM Hydronic (Oil) Heating Appliance™ is an engineered heating system, designed upon three (3) principles that substantially differentiate it from all others.

1. Utilizes thermal mass (energy storage) via a "high-mass", heating-only, "triple-pass" cast-iron boiler as the energy source. The resulting resistance to thermal shocks, corrosion and heating demand extremes with lower operating temperatures assure an extended service life. Burner cycling is substantially reduced, extending component lives and performance.

2. The principle of "gravity convection" based on heated water differential convection is the basis of near-boiler piping design and layout. All cast-iron and steel system piping, premium single-function brass/bronze valving and accessories also extend component lifetimes, reducing maintenance likelihoods. **Note:** The overall effect of gravity circulation is however highly dependent upon your individual zone piping layouts!

3. Delta-T ECM Hydronic (FHW) Circulation & Distribution Technologies are applied to dramatically reduce electrical energy consumption while contributing to heating fuel conservation and heating uniformity. These "intelligent" circulators and valves self-diagnose and are readily and rapidly serviceable.

Merging these technologies contributes to enhanced heating and fail-mode performance attributes: (Refer to Manuals/Instruction sheets in Document Package.)

1. Zone "No-Heat": Depress & turn Zone Valve actuator to open. Gravity and other zone demands will supply, although not evenly. Optional: Unplug & remove Valve Head (no tools required) and rotate actuator stem less than 90°, adjusting to suit.

2. Circulator Failure: The system still heats at lowered capacity. If DHW is required, it will provide a reasonable supply while also convecting to other heating zones. Again, this effect is highly dependent upon your radiation piping layout.

3. Electrical Power Loss: Selective zone(s) - DHW or Heat - can be opened as above to utilize the boiler heat. This has a limited and temporary effect however.

Notes:

1. There is no substitute for a power generator backup system for heating continuity.

2. System Economic Life: It is reasonable beyond the Factory Pro-Rated Warrantee of 20 Years per our experience to expect a 30 to 50 year Weil-McLain Ultra Boiler life. Care as to boiler water condition and maintenance are required.

V. Specialized Service Notes:

Refer to the System Documentation Package for all Manuals, Instruction Sheets, etc.

They supersede all other notes and instructions, excepting as follows:

1. Beckett NX Burner - Use the specified **Delavan Oil Nozzle ONLY**.

2. Set the boiler over-fire draft **near** the specified minimum of **0.5" wc**.

3. **The Taco VT2218-HY1 or HY2 Circulators ONLY are specified for this system.**

    a. **Use Factory Default Settings of DELTA-T MODE, 20°F Differential ONLY.**

    b. **The Circulator Flo-Chek Valve supplied is NOT INSTALLED.**

    c. **Emergency Substitute only:** A Taco 007 (non-IFC) Circulator or other can be installed to provide TEMPORARY, REDUCED PERFORMANCE SERVICE until the specified unit can be re-installed.

4. The system design uses "gravity convection" to enhance flow and as a temporary heating service expedient. The preceding "System" Chapters explain this feature in detail. It may provide some degree of freeze protection, depending upon the fail mode.

5. System diagnostics are provided by:

    a. The Hydrolevel 3250-Plus Boiler Aquastat (under boiler cover). The "Economizer" Dial is preset for the number of heating zones only.

    b. The Taco VT2218-HY1 or HY2 self-diagnostics and display fault indicators.

    c. The individual Taco Zone Sentry Green LED Status Lamps & Flash Codes.

    d. The 4-Pin Interconnector on the right side of the Master Emergency Switch & Transformer Electrical Box. Probe the two (2) upper connector screws for 24VAC and the lower two (2) for End Switch Status.

6. The Boiler Front Panel Power Switch can be used to isolate the boiler/burner power during maintenance service while retaining system (distribution) operation.

7. Customer Service Support:

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Phone/Fax: 603-588-2333