

Fulton's firetube condensing boilers are built with high mass and high volume pressure vessels and fully modulating burner technology. The large volume of water already present in the pressure vessel typically eliminates the need for a buffer tank; a significant system cost savings advantage when compared to low mass and low volume watertube or cast aluminum boilers which are far more likely to require buffer volume.

In certain unique application cases, such as an extremely small loop with very brief repeating heat demand periods, a buffer tank may be used with a Fulton firetube condensing boiler to increase the system's total thermal mass thereby smoothing out temperature fluctuations. A buffer tank in a hydronic system is analogous to a flywheel in a rotational system.

To determine the size of buffer tank ( $V_b$ ) desired, it is required that several parameters must be known:

$Q_b$	=	Minimum Boiler Output (BTU/hr)
$Q_s$	=	Minimum Heating System Load (BTU/hr)
$t$	=	Minimum Desired Boiler Run Time (min)
$V$	=	Total System Volume Excluding Buffer Tank (gal)
$T$	=	On/Off Hysteresis Range ( $\Delta^\circ\text{F}$ )

The buffer tank sizing equation is as follows, solve for buffer tank volume in gallons ( $V_b$ ):

$$V_b = \frac{t(Q_b - Q_s)}{T \times 8.34 \text{ lbs/gal} \times 60 \text{ min/hr}} - V$$

*Note: A negative result means a buffer tank is not necessary.*

Fulton firetube condensing boilers are designed for variable primary flow systems; a piping method that simplifies design, reduces installation and operating costs, and enhances temperature control. The P&ID shown in Figure 1 illustrates a variable primary flow piping arrangement, and the recommended location if utilizing a buffer tank.

Although not required, it is acceptable to install Fulton firetube condensing boilers in a primary-secondary flow system. Figure 2 shows the recommended location of the buffer tank in this decoupled style piping arrangement.

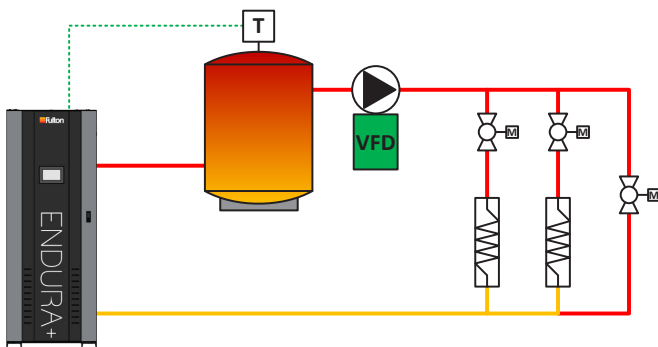


Figure 1 - Primary Variable Flow

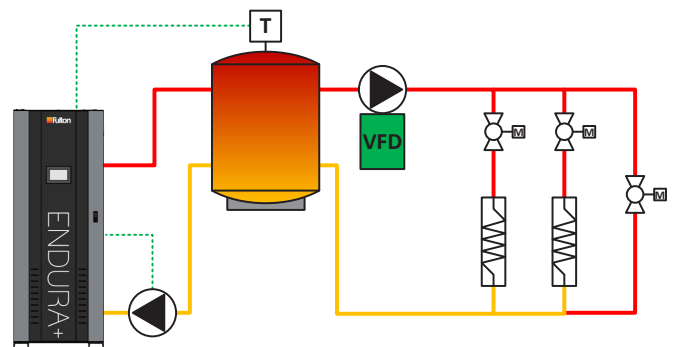


Figure 2 - Primary-Secondary Flow

*Note: Not all components are shown on the P&ID for simplification purposes.*