Measuring Combustion Efficiency Properly on 90%+ Condensing Equipment

Application Note #HV-13-0603

Combustion efficiency is a measurement of how well any given fuel is being burned and converted into useful energy (e.g.: heat, hot water, steam). The calculations are based on **3 MAJOR Factors**:

1. Chemistry of the burned Fuel (e.g. Propane, Natural Gas, Oil, etc)
2. The CO2 percentage by volume after the combustion process
3. **The NET temperature difference between the Stack Gas & the Primary Air being used**

Condensing furnaces, boilers, and tankless water heaters use a different method of measuring the ΔT because condensing systems use OUTDOOR AIR as the Primary temperature (not the ambient room air temp). Furthermore, the Stack Temperatures of condensing systems are MUCH lower than atmospheric systems, so the importance of properly measuring the correct ΔT is much greater for accurate Combustion Efficiency calculations using your combustion analyzer.

High Efficiency, Condensing furnaces/boilers/water heaters need to be tested properly by drilling a hole in the INCOMING Air plastic/PVC vent pipe (most manufacture’s have dual testing ports already for both incoming air & exhaust, please refer to their specifications of where to test). In order to obtain an accurate Combustion Efficiency reading, the **Smart Incoming Air Temperature Probe** (included on all our “HE” Kits) must be inserted in the combustion air intake (while simultaneously the standard 12’ probe is inserted into the Flue Exhaust Stack) so that a **True NET Stack Temperature** is used in the efficiency calculation of the analyzer.

Instrumentation Solution:
Any of the HVAC BTU Series of Combustion Analyzers are equipped to add the “HE” Kit – including the High Efficiency Smart Incoming Air Temperature Probe to properly measure the Differential Temperature for ALL High Efficiency, Condensing systems.