EngA® ENGINEERED AIR®

DJ SERIES
INDIRECT FIRED HEATERS

ENERGY EFFICIENCY

The Engineered Air DJ Series furnaces redefine heating for the commercial – industrial market place. Our complete line of indirect gas-fired heating products incorporates independent proportional control of combustion air and gas flow. This ability to maintain the proper ratio of combustion air to gas burned is called "linearization". With linearization our DJ Series product maximizes HEATING EFFICIENCY and ENERGY SAVINGS.

DJX, DJS and DJE models meet or exceed the current ASHRAE 90.1 requirements for steady state efficiency being 80% at operating high fire. The DJS and DJE heat exchanger was engineered to operate at 80% efficiency throughout its complete firing rate. The DJX models offer 90% efficiency throughout its complete firing rate OPTIMIZING ENERGY PERFORMANCE.

The maximizing of these efficiencies is accomplished by using the Engineered Air DJM electronic controller. This solid state controller provides the burner linearization as it modulates throughout the full turndown rate. The DJM controller is compatible with all DJ Series heat exchanger models. This provides increased heating efficiency with ECONOMIC ADVANTAGES and annual FUEL SAVINGS.

Engineered Air has the ability to provide high turndown ratios and high efficiency heat exchangers coupled with "linearization" of the combustion process. This is illustrated by the "COMBUSTION EFFICIENCY" chart provided below.

COMBUSTION EFFICIENCY

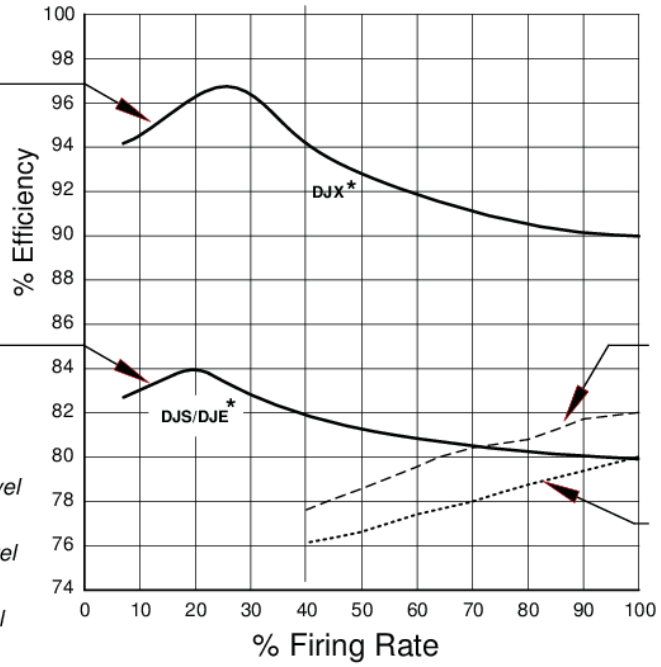
High efficiency condensing Heat Exchanger, HT Power Burner, modulating combustion air, 15:1 Turndown.

Standard Heat Exchanger, HT Power Burner, modulating combustion air, 15:1 Turndown.

DJS efficiencies were tested at 110 °F temperature rise at sea level

DJX efficiencies were tested at 100 °F temperature rise at sea level

DJE efficiencies were tested at 85 °F temperature rise at sea level



* *Efficiencies improve at operations less than full fire.*

High efficiency Heat Exchanger, HT Power Burner, constant air 2.5:1 Turndown.

Pack Heat Exchanger, Atmospheric Burner, constant combustion air, 2.5:1 Turndown.

Features - Benefits

Energy efficient	-	Low operating cost
High Turndown	-	Better control & comfort
Stainles Steel Drum & tube heat exchanger	-	Longer heat exchanger life
All single supply fan units	-	Reduced maintenance
All stainless steel heat exchanger	-	100% outside air service
Electric ignition	-	No waste of energy in off cycle
Wide range of airflow & gas inputs	-	Allows for flexibility in design
Cooling coil cavities	-	Combines heating & air conditioning
Wide range of control options	-	Can handle any system design requirement
Quality Assurance program	-	Highest quality in the industry
Insulated double wall heat exchanger cabinet	-	Improves efficiency

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DESIGN FEATURES

Airside Flexibility

The Engineered Air DJX, DJS and DJE models can be ordered with a wide range of airside options. Engineered Air has the industry's widest range of air volume selections and unit configurations satisfying even the most unique design challenges.

Our standard single supply fan configuration provides optimum performance with increased side wall clearance. A wide selection of air volumes combined with our heat exchanger design permits equipment selections with low to high temperature rises, as low as 8°F temperature rise through to a 125°F temperature rise.

Controls

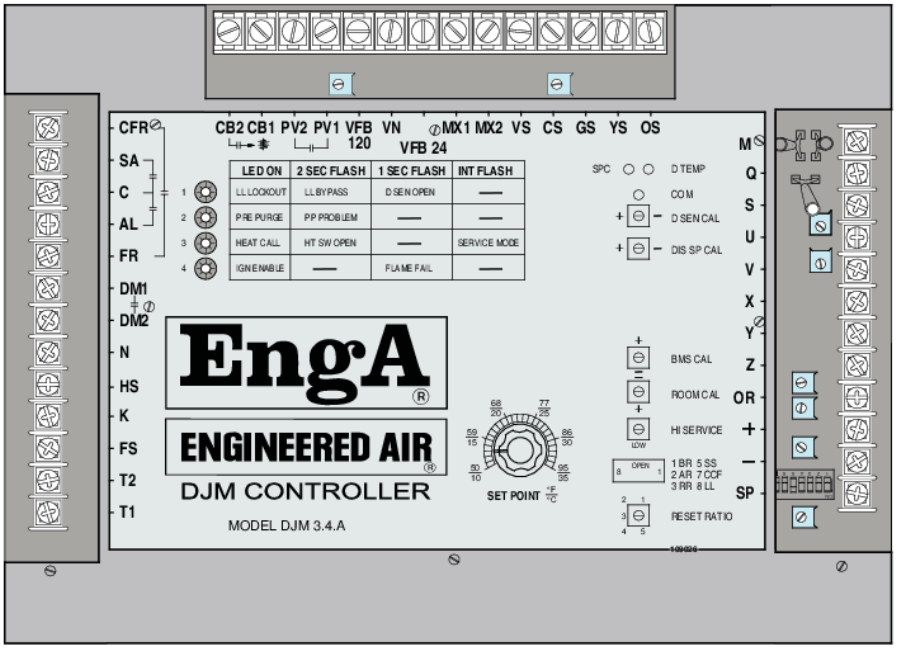
All Engineered Air DJ Series models come with integral control panels that are completely pre-wired. Included are the motor contactors, overload, control transformer, high limit, combustion controls and interlocking relays. Engineered Air provides a wide variety of control options.

DJM Electronic Control Option

The DJM electronic controller is used to increase part load efficiency and improve controllability. The DJM is a solid state controller with a discharge sensor that uses proportional and integral control to maintain set point temperature and provide rapid response to incremental changes in load demand. The proportional and integral control reduces temperature swings when the furnace cycles at loads below minimum fire. The DJM utilizes electronic dual linearization that independently modulates the gas and combustion air flow to provide optimum fuel/air mixture at all operating conditions. This results in increased efficiencies of 3 - 4% as the burner modulates from high to low fire providing a modulating range up to 15:1.

The Engineered Air DJM is a state-of-the-art controller designed with the following standard features:

- Standard non-recycling auto bypass low limit (freezestat)
- Diagnostic lights for ease of set up and troubleshooting
- Self-checking sensor
- Interrupted pilot on all units
- Optional reset from ambient, room or return air
- Night set back capability (requires time clock)
- Modulating space thermostat with discharge sensor to limit minimum and maximum discharge air temperatures
- Remote discharge air temperature set point
- Automatic selection of operating mode for blower and damper, i.e. Occupied/Unoccupied
- BMS reset (4-20 mA or 0-10 VDC)



Electromechanical Control Options

(Only available on DJS20 & 40 and DJE20 & 40 models)

- On/off room control
- High/low/off room control
- High/low/off discharge controls
- High/low/off discharge control with room override

Vent Selection

The Category I DJS and DJE Series require the use of type "A" or type "L" vents unless provided with an Engineered Air draft hood in which case a type "B" vent can be used. The DJX series is a condensing furnace that requires type "BH" Category II venting suitable for temperatures up to 300 °F (149 °C).

DJX Considerations

Due to the high efficiency of the DJX series heaters, additional consideration must be given to condensate removal. A large amount of mildly acidic condensate is produced by these condensing appliances. For every 100,000 BTU of fuel consumed, up to 3/4 of a gallon of condensate must be drained. For example, a DJX140 operating at an input of 1400 MBH will produce approximately 10 1/2 gallons of condensate per hour.

Care must be taken to ensure that the condensate line does not freeze on outdoor mounted units. The strongly recommended method to protect the line from freezing is to run it from the unit, inside the curb, and into the building. A factory supplied condensate trap is installed inside the building.

Normally the condensate is piped to the sanitary sewer using standard drainage pipe and fittings. If a floor drain is not available or inaccessible, a condensate pump with a reservoir may be used to pump condensate to a sanitary sewer above the unit. The pump must be approved for use with condensing furnaces and have an overflow switch interlocked to the heater to prevent operation if condensate spillage occurs.

In the unlikely event that the condensate line becomes blocked or freezes, the unit will shut down.

The condensate from the DJX heat exchanger will have a pH value between 3 and 5. The variation in this value is due to two variables beyond Engineered Air's control.

The first variable is the combustion air. The combustion air may contain chemicals such as formaldehyde, chlorides, and hydrogen sulfide that will precipitate in the combustion process. These three contaminates will form hydrochloric or sulphuric acid that will result in lower pH of the condensate. Sources of these contaminants may be vehicles on nearby freeways, building exhaust, plumbing vents, VOC's, off-gassing of building material, cleaning agents, industrial processes, stored chemicals, etc.

The second variable is the content of the fuel. Natural gas is mostly methane with variable quantities of ethane, propane, butane, and pentane as well as carbon dioxide, nitrogen, helium, and hydrogen sulfide. Carbon dioxide and hydrogen sulfide in the gas will result in the production of carbolic and sulphuric acid, respectively, that will lower the pH value of the condensate.

The requirements for condensate dilution must be confirmed with local regulations. In most cases, the dilution by the building's normal sanitary drainage flow is all that is required to meet most municipal effluent requirements. In many areas with hard water, the naturally occurring mineral content in the water will effectively neutralize the mild acidic nature of the heat exchanger condensate. This will take place when the condensate is diluted with other effluent in the building's sanitary sewer. The calcium and magnesium found in hard water can, in some applications, be enough to neutralize the condensate fluid. An optional Engineered Air factory supplied neutralizing tank is available upon request.

Evaluation of the building's drainage system should also be made. Generally, ABS and PVC drainage systems can easily handle the mildly acidic condensate. Copper, cast iron, and older systems may need additional protection.