* 1. Indirect Fired Gas Heat Module (Rack System)
     1. General Specifications
        1. Provide an indirect fired heating system having 81% minimum thermal efficiency and incorporating Listed Gas-fired Duct Furnaces manufactured by Heatco Inc.
        2. The Duct Furnace models HDA or HDB shall be listed by Intertek Testing Services (ITS / ETL) for operation on Natural or Propane gas to the current edition of ANSI Z83.8 Standard for Gas-Fired Duct Furnaces.
        3. Duct furnaces are for installation on the positive pressure side of the circulating air blower, only.
     2. Construction
        1. Gas-fired duct furnaces provided shall have a tubular heat exchanger constructed of (Type 409 Stainless Steel .044 Min. Wall thickness produced to ASTM A268)
        2. Gas-fired duct furnaces provided shall have a tubular heat exchanger constructed of (Type 409 Stainless Steel .044 Min. Wall thickness produced to ASTM A268) or (Type 304L stainless tubes .047 Min. Wall thickness produced to ASTM A249) or (316SS).
        3. The heat exchanger design shall be suitable to withstand 3.0” w.c. total external static pressure without burner flame disturbance.
     3. Control Module
        1. Individual Duct Furnaces shall incorporate a Direct Spark Ignition control module that is design certified by a recognized national testing agency. The control shall provide
           1. 100% safety shut-off
           2. A 15 second minimum pre-purge period prior to trial for ignition
           3. High energy direct spark ignition of main burners
           4. Electronic flame supervision incorporating a 0.8 second flame failure response time
           5. Up to 2 additional ignition retrials preceded by an interpurge period
           6. A minimum 30 second post-purge
           7. Automatic reset after one hour to initiate additional ignition trials if lockout occurs during heat call
           8. An LED indicator light to provide a flash code to identify the operating condition of the control
     4. Control
        1. Lead Duct Furnace:
           1. Electronic Modulation- Operates from 20 to 100% of input based on an external analog input of 0 -10 VDC (supplied by others).
           2. Thermostat or heat enable contact (supplied by others) initiates and opens to end heating cycles.
           3. Furnace controls provide two-speed induced draft fan operation and electronic modulating controller to control modulating furnace section.
        2. Slave Furnaces(s)
           1. On/Off or Two-Stage operation
        3. Vernier Staging Controller
           1. Integral to the complete assembly will be an electronic controller to provide vernier modulation and staging of all duct furnaces within the assembly. As a minimum it will include the following features:
* Capability of handling the lead modulating heater and up to (4,8 or16) subsequent stages of heat.
* Power Supply is to be low voltage 24VAC
* The controller must be capable of inputting either an analog 0 to 10vDC signal or analog 4 to 20 ma DC and output a controlled 0 to 10vDC, for modulation
* The control board will have adjustable ratio modulation output control function
* Relays to control subsequent stages will be integral to the control board
* The control will have a fully adjustable time delay between relay stages
* The control board will have diagnostic lights and a function test button
  + 1. Rack Assembly
       1. All duct furnaces shall fit in a single 14 gauge galvanized metal frame
       2. 18 gauge galvanized sheet metal shall be used to optimize air flow across the furnaces
       3. The system design shall allow for removal of individual furnaces without disassembly
       4. All wiring shall utilize quick connects for serviceability.
       5. All wiring from the individual duct furnaces to the sequencer shall be completed. A connection panel for customer power, heat enable and analog input shall be provided
       6. All individual furnace gas piping shall be pre-piped to a suitably sized main gas header
       7. Each furnace shall have a flexible connector and manual isolation valve for easy service
    2. Electrical
       1. The Duct furnace may be equipped for operation on a 115, 208 or 230 VAC, 1 Ф, 60 Hz power supply as specified at time of order.
       2. All electrical components shall be UL Listed
    3. Gas Service
       1. For Natural Gas, gas supply pressure to the gas valve inlet shall be:
          1. Racks with a max single furnace input of 400 MBH and below: 5.0" to 13.5" w.c.
          2. Racks with a max single furnace input over 400 MBH: 6.0" to 13.5" w.c.
       2. For Propane Gas, gas supply pressure to the gas valve inlet shall be 11.0" to 13.5" w.c.
    4. Start-Up
       1. Each system shall be provided with printed installation and maintenance instructions, burner operating and maintenance instructions, piping and wiring diagrams and Installation Start-up data sheet
       2. A circulating air flow switch **(shipped loose for customer installation)** to prove that sufficient air flow is present must be installed upstream of the heating system.
       3. A manual reset high temperature limit control **(shipped loose for customer installation)** to shut down the furnaces in an over temperature condition must be installed downstream of the heating system