

## KQFS Engineering Specification & Configuration

### KQFS UNIT

Fan powered terminal unit shall be designed to provide low sound levels. Unit shall be completely factory assembled and wired with motor, blower, mixing plenum and primary air damper contained in a single unit housing. Unit shall be Krueger model KQFS.

The induced air fan shall operate continuously during central system operation. Primary airflow controller shall compensate for central system pressure fluctuations. When room temperature requires maximum heating, the (direct digital) (analog) (pneumatic) pressure independent velocity controller maintains the minimum primary airflow setting by modulating the damper. The electric heating coil or hot water coil, if supplied, is energized (activated). As room temperature begins to rise, the heating coil is de-energized (deactivated). As room temperature rises above the setpoint, the primary air damper will modulate to maintain room temperature. When the room temperature calls for maximum cooling, the velocity controller maintains the maximum primary airflow setting.

To prevent the fan/motor from running in the backward direction, the unit induced air fan shall be field wired so that it is electrically or pneumatically interlocked with the central system fan.

Terminals shall be certified by use of the AHRI Standard 880 Certification Program and carry the AHRI seal.

The terminal unit shall be ETL listed as a complete assembly. All electrical components shall be UL listed and installed in accordance with the National Electric Code. All electrical components shall be mounted in sheet metal control enclosures. Electrical connection shall be single point.

Unit casing shall be constructed of not less than 20 gage galvanized steel. All primary air inlet collars shall accommodate standard flex duct sizes. Unit discharge shall be rectangular, suitable for flanged duct connections.

Unit labels shall be adhered to each unit including model, size, airflow (CFM), balancing chart, electrical information, and tagging data.

The unit casing shall incorporate an integral recirculated air inlet sound attenuator to achieve sound levels shown on equipment schedule. KQFS unit shall be equipped with a factory installed airflow sensing device. Provide a K4 LineaCross, four quadrant, multi-point center averaging sensor with an amplified signal.

- **(Optional)** Provide a linear, multi-point, velocity averaging sensor with an amplified signal.
- Provide balancing taps to allow for easy airflow verification.

The primary air damper assembly shall be constructed of heavy gage galvanized steel with 1/2" solid shaft rotating in self lubricating Delrin® bearings. Damper shaft shall be marked on the end to indicate damper position. Damper blade shall incorporate a flexible gasket for tight airflow shutoff and operate over a full 90° rotation.

Fan motor and all interior components must be accessible through a removable bottom access panel.

Fan shall be of the forward curve, centrifugal type. The fan motor shall be single speed, multi-voltage (120, 208/240, 277), 60 Hz, single phase, energy efficient design, permanently lubricated, using permanent split capacitor for starting and be specifically designed for use with an SCR fan speed controller. Motor must have thermal overload protection. The fan motor shaft shall be connected directly to the fan and the entire fan assembly shall be isolated from the unit casing to prevent transmission of vibration.

- **(Optional)** ECM Fan Motor: The fan motor shall be [120, 208/240, or 277 volt, Single-Phase] ECM (electronically commutated motor) fan motors including either a manual or remote adjustable speed controller. The manual adjustable speed controller is field set adjustable with digital display alternating between RPM and percentage full flow. The remote adjustable speed controller provides a means to remotely set and/or adjust the fan speed.

The radiated and discharge attenuation factors for the specified NC levels shall be based on attenuation factors from AHRI Standard 885-08 Appendix E, which includes room absorption, environmental adjustment factor, duct insertion, end reflection and duct branching.

### CASING LINERS

Unit casing shall be lined with 1/2" thick, 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A. Insulation shall be attached to the unit casing by adhesive and weld pins.

- **(Optional)** 1" Thick Insulation: Unit casing shall be lined with 1" thick, 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A. Insulation shall be attached to the unit casing by adhesive and weld pins.
- **(Optional)** Steriliner Insulation: Unit casing shall be lined with 13/16" thick, 4 lb. density, rigid board insulation with fiber reinforced foil covering insulation fibers that meets UL 181 and NFPA 90A. Liner shall be attached to unit casing by adhesive and weld pins with foil tape sealing the insulation cut edges.
- **(Optional)** Cellular Insulation: Unit casing shall be lined with 1/2" or 1" thick, 1 1/2 lb. density, smooth surface, polyolefin, closed-cell foam insulation for fiber free application. Cellular insulation meets UL 181 and NFPA 90A and does not support mold or bacteria growth. Insulation shall be attached to the unit casing by adhesive and weld pins.
- **(Optional)** Foil Encapsulated Insulation: Unit casing shall be lined with foil reinforced, wrapped edges, 1/2" or 1" thick, 1 1/2 lb. density fiberglass insulation that meets UL 181 and NFPA 90A. Insulation shall be attached to the unit casing by adhesive and weld pins.
- **(Optional)** Sterilwall Insulation: Unit casing shall be lined with 1/2" or 1" thick, 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A, enclosed between the unit casing and a non-perforated internal sheet metal cover extending over the fiberglass insulation, as well as covering the liner cut edges.

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- **(Optional)** Perforated Doublewall Insulation: Unit casing shall be lined with 1/2" or 1" thick, 1 1/2 lb. dual density fiberglass insulation, (additional options: 1/2" or 1" thick, 1 1/2 lb. density foil reinforced fiberglass insulation or 13/16" thick, 4 lb. density, rigid board insulation with fiber reinforced foil covering) that meets UL 181 and NFPA 90A, enclosed between the unit casing and a perforated internal sheet metal cover extending over the fiberglass insulation, as well as covering the liner cut edges.
- **(Optional)** No Liner: Unit casing shall be equipped with no internal insulation liner.

**ELECTRIC HEATING COILS**

Electric coils shall be supplied by the terminal unit manufacturer and shall be ETL listed in accordance with UL standards. Construct coil casing with minimum of 20 gage galvanized steel. Elements shall be 80/20 Ni-Cr and supported by ceramic insulators. The integral control panel shall be housed in a NEMA 2 enclosure with access to all controls and safety devices.

Electric coils shall contain a primary automatic reset thermal cutout and differential pressure airflow switch for proof of airflow.

- **(Optional)** Electric coils shall include fused or non-fused door interlocking disconnect switch, AC solid state relay, fuse-block, manual reset cutout, and/or dust tight enclosure construction.
- **(Optional)** LineaHeat solid state electronic proportional control of electric heat shall meet the requirements of ASHRAE Standard 62, Addenda N.
- **(Optional)** LineaHeat solid state electronic controlled heater with control of the leaving air temperature limiting the unit discharge temperature to a set value.

**HOT WATER COILS**

Hot water coil casing shall be constructed with minimum 20 gage galvanized steel with flanged discharge for attachment to downstream ductwork. Coils shall be factory installed on the terminal unit. Fins shall be rippled and corrugated heavy gage aluminum, mechanically bonded to tubes. Tubes shall be copper with minimum wall thickness of 0.016" and with male solder header connections. Coils shall be leak tested to 400 psi. Number of coil rows and circuits shall be selected to provide performance as required by the plans. Coil performance data shall be based on tests run in accordance with AHRI Standard 410.

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- 1. SERIES: (XXXXXX)**  
 KQFS - Quiet Fan Terminal Unit  
 KQFS-FA - Quiet Fan Terminal Unit with Fresh Air Inlet
- 2. SENSOR TYPE: (X)**  
 1 - Linear Averaging  
 3 - K4 LineaCross (Four Quadrant, Standard)
- 3. LINER TYPE: (X)**  
 0 - 1/2" Liner  
 1 - 1" Liner  
 2 - Steriliner  
 3 - No Liner  
 4 - Sterilwall with 1/2" Dual Density  
 6 - 1/2" Foil Encapsulated  
 8 - Sterilwall with 1" Dual Density  
 9 - 1" Foil Encapsulated  
 A - Perforated Double Wall with 1/2" Dual Density  
 B - Perforated Double Wall with 1" Dual Density  
 C - Perforated Double Wall with 1/2" Foil Encapsulated  
 D - Perforated Double Wall with 1" Foil Encapsulated  
 E - Perforated Double Wall with Steriliner  
 F - 1/2" Cellular  
 H - 1" Cellular
- 4. UNIT CASING CONTROLS: (XX)**  
 1L - Left-hand Side, 20 Gage  
 1R - Right-hand Side, 20 Gage
- 5. UNIT SIZE: (X)**  
 2 - Available Inlet Sizes: 6", 8"  
 3 - Available Inlet Sizes: 6", 8", 10", 12"  
 4 - Available Inlet Sizes: 8", 10", 12"  
 5 - Available Inlet Sizes: 10", 12", 14"  
 6 - Available Inlet Sizes: 10", 12", 14", 16"  
 7 - Available Inlet Sizes: 10", 12", 14", 16"
- 6. INLET CODE: (XX)**  
 06 - 6"            08 - 8"  
 10 - 10"          12 - 12"  
 14 - 14"          16 - 16"
- 7. MOTOR VOLTAGE: (X)**  
 1 - 120V, 1-Phase \*  
 2 - 208/240V, 1-Phase  
 3 - 277V, 1-Phase  
 4 - ECM Motor, 120V, 1-Phase \*\*  
 5 - ECM Motor, 208/240V, 1-Phase \*\*  
 6 - ECM Motor, 277V, 1-Phase \*\*
- 8. CONTROL TYPE: (XXXX)**  
 (2XXX) - Analog  
 (7XXX) - Digital, BACnet Compatible  
 (6XXX) - Digital, Standalone  
 (XXXX) - Factory Mounted, Provided by Others  
 (1XXX) - Pneumatic
- 9. CONTROL ACCESSORIES: (X)**  
 0 - None  
 A - 4" Fresh Air Inlet, Available on Unit Size 2, 3  
 B - 5" Fresh Air Inlet, Available on Unit Size 2, 3  
 C - 6" Fresh Air Inlet, Available on Unit Size 2, 3, 4, 5, 6, 7  
 D - 7" Fresh Air Inlet, Available on Unit Size 4, 5, 6, 7  
 E - 8" Fresh Air Inlet, Available on Unit Size 4, 5, 6, 7
- 10. UNIT ACCESSORIES: (X) (X) (X) (X) (X) (X)**  
 0 - None  
 A - Motor Toggle Disconnect \*  
 E - Dust-tight Control Enclosure  
 F - Fan Motor Fuse  
 P - Cam Lock for Access Panels  
 R - Induction Inlet Filter  
 S - Hanger Brackets ■
- 11. WATER HEAT: (ROWS/CONNECTION HAND) (XXX)**  
 000 - None  
 W11 - 1 Row/Right/Unit Discharge  
 W12 - 2 Row/Right/Unit Discharge  
 W21 - 1 Row/Left/Unit Discharge  
 W22 - 2 Row/Left/Unit Discharge
- 12. ELECTRIC HEAT: (XX)            LINEAHEAT: (XX)**  
 00 - None                            L1 - 120v/1-Phase  
 E1 - 120v/1-Phase                L2 - 208v/1-Phase  
 E2 - 208v/1-Phase                L3 - 240v/1-Phase  
 E3 - 240v/1-Phase                L4 - 277v/1-Phase  
 E4 - 277v/1-Phase                L6 - 208v/3-Phase/3-Wire  
 E6 - 208v/3-Phase/3-Wire        L9 - 480v/3-Phase/4-Wire  
 E9 - 480v/3-Phase/4-Wire
- 13. ELECTRIC HEAT STEPS: (X)**  
 0 - None  
 1 - 1-Stage  
 2 - 2-Stage  
 3 - 3-Stage
- 14. HEAT COIL ACCESSORIES: (X) (X) (X) (X) (X)**  
 0 - None  
 C - Fuse Block  
 E - Chicago Code Construction  
 F - Manual Reset Cutout  
 G - Dust-tight Construction  
 H - Staged Solid State Relays  
 K - Door-interlocking Fused Disconnect  
 L - Door-interlocking Non-fused Disconnect  
 P - Water Coil Vent & Drain
- \* KQFS unit size 7 not available with 120V.  
 \*\* Manual or remote adjustable speed controller for ECM motor option is required.  
 • Motor Toggle Disconnect not available with electric heat.  
 ■ Hanger brackets not available with Sterilwall or Perforated Doublewall liners.