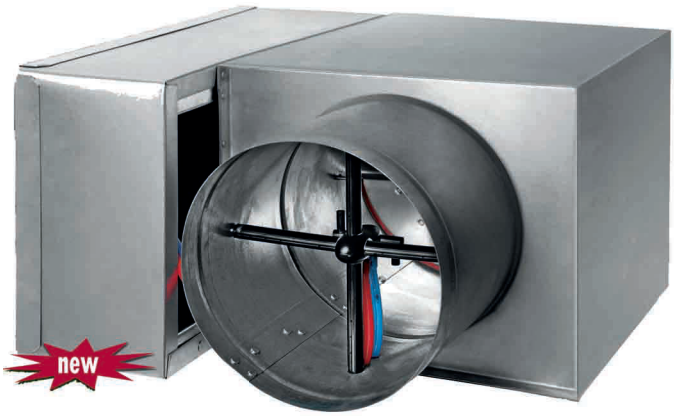
SINGLE DUCT VAV TERMINALS

INSTALLATION, OPERATION & MAINTENANCE

ENG-MA-11 REV2.0

Release 2025

MODEL KVAD -100



MODEL KVAD -200

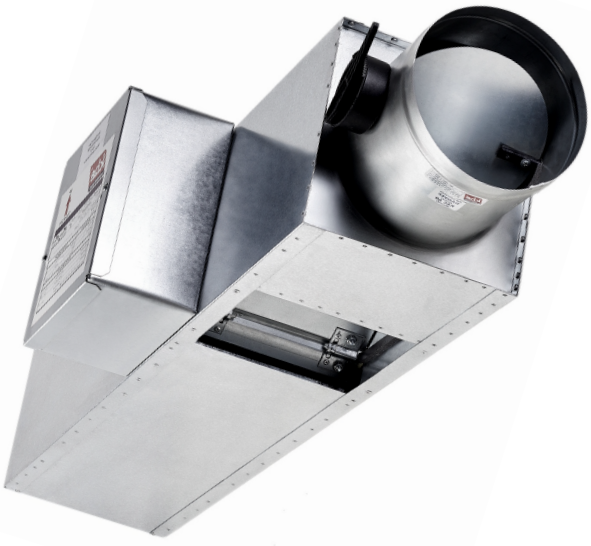


TABLE OF CONTENTS

SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to areas of potential hazard:

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

NOTE is used to highlight additional information which may be helpful to you.

SAFETY CONSIDERATIONS

The equipment covered in this manual is designed for safe and reliable operation when installed and operated within its' design specification limits. To avoid personal injury or damage to equipment or property while installing or operating this equipment, it is essential that qualified, experience personnel familiar with local codes and regulations, perform these functions using good judgment and safe practices. *See the following cautionary statements.*

ELECTRICAL SHOCK HAZARDS
All power must be disconnected prior to installation and servicing this equipment. More then one source of power may be present. Disconnect all power sources to avoid electrocution or shock hazards.

HOT PARTS HAZARD
Electric resistance heating elements must be disconnected prior to servicing. Electric heaters may start automatically; disconnect all power and control circuits prior to servicing to avoid burns.

Check that rigging and lifting equipment can safely support the unit assembly and component weights.

All assemblies must be adequately secured during lifting and rigging by temporary supports and restraints until equipment is permanently fastened and set in its' final location.

All unit temporary and permanent supports must be capable of safely supporting the equipment's weight and any additional live, seismic or dead loads that may be encountered. All supports must be designed to meet applicable local codes and ordinances.

All fastening devices must be designed to mechanically lock the assembly in place without the capability of loosening or breaking away due to system operation and vibration.

Secure all dampers when servicing damper, actuators or linkage. Dampers may activate automatically, disconnect the control circuits or pneumatic control systems to avoid injury.

Protect adjacent flammable material when brazing. Use flame and heat protection barriers where needed. Have fire extinguisher ready for immediate use.

INSPECTION

Upon receipt of equipment, carefully check all items against the bill of lading to ensure that all equipment has been received (including shipped loose items). Note any discrepancy on the bill of lading before signing.

Inspect all equipment for any signs of damage caused during transit. On units with re-heat, check the coil fins and/or ensure that the resistance heat coils are not damaged. Note any visual damage on the bill of lading before signing. Immediately report all visual and concealed damage to the carrier and file a claim with the carrier.

Locate the model number on the nameplate and check that the correct units have been received. Verify that all options have been included, such as controls, heating coils, etc. Also ensure that unit voltage agrees with the building parameters. If a discrepancy is discovered between what was ordered and received, contact your local sales representative immediately.

DO NOT USE FLOW SENSOR, CONNECTING TUBES, COIL STUBOUTS OR DAMPER SHAFT AS A HANDLE WHEN LIFTING OR MOVING EQUIPMENT, AS DAMAGE MAY OCCUR.

DO NOT HANDLE EQUIPMENT'S HEATING ELEMENTS, AS PERMANENT DAMAGE MAY OCCUR.

CHECK assembly and component weights to be sure that the rigging equipment can handle them safely. Note; also check the centers of gravity and any specific rigging instructions.

CHECK for adequate ventilation so fumes do not migrate through ductwork to occupied spaces when welding or cutting around the unit.

DO NOT work on damper until associated actuator is disconnected.

NEVER pressurize equipment above specified test pressure.

PROTECT adjacent flammable materials when brazing. Use flame and heat protection barriers where needed. Have a fire extinguisher at hand and ready for immediate use.

STORAGE

If equipment is to be stored prior to installation, observe the following precautions:

1. Choose a dry storage site that is reasonably level and sturdy to prevent undue stress or permanent damage to the equipment. Set equipment off ground if in moisture prone areas.
2. Tag and store in a safe place until needed. Cover entire equipment with protective tarp or moisture proof cover. Extend cover under equipment if stored on ground. Secure cover with adequate tie downs and store indoors. Be sure that piping connections have protective shipping caps installed.

PRE-INSTALLATION INSPECTION

DO NOT USE FLOW SENSOR, CONNECTING TUBES, COIL STUBOUTS OR DAMPER SHAFT AS A HANDLE WHEN LIFTING OR MOVING EQUIPMENT, AS DAMAGE MAY OCCUR.

DO NOT HANDLE EQUIPMENT'S HEATING ELEMENTS, AS PERMANENT DAMAGE MAY OCCUR.

Ensure that all linkages are connected properly. Check the linkage that connects the actuator to the damper shaft to ensure that the nuts are tight.

While viewing the damper from the discharge of the unit, rotate the shaft fully. The damper should close fully and there should be no gaps between the damper gasketing and the inside of the valve.

SEQUENCE OF OPERATION

Single Duct

The basic unit consists of a sheet metal casing and an air valve, which is used to modulate the air being delivered into the occupied zone. Air enters the air valve inlet and exits into the sheet metal casing to be distributed to the occupied zone through ductwork attached to the discharge of the unit.The basic unit can be ordered with either a factory mounted hot water heating coil or an electric heater.These reheat units are used primarily to reheat the air-to-zone temperature when the load in the occupied space drops off.
The primary air is modulated through the Flow probe air valve by rotating the damper blade. The air valves come in round and rectangular. The round valves only come in diameters of 4, 5, 6, 8, 10, 12,14 &16inches for KVAD-100; (6, 8, 10, 12, 14, 16 & 18inches for KVAD-200); an adapter must be used for metric ductwork.

INSTALLATION

DO NOT USE FLOW SENSOR, CONNECTING TUBES, COIL STUBOUTS OR DAMPER SHAFT AS A HANDLE WHEN LIFTING OR MOVING EQUIPMENT, AS DAMAGE MAY OCCUR.

DO NOT HANDLE EQUIPMENT'S HEATING ELEMENTS, AS PERMANENT DAMAGE MAY OCCUR.

All terminal equipment with electric heaters must be installed in a horizontal plane with respect to the airflow stream.

Clearances

All equipment including electric heat are ETL Listed for 0.0" clearance to combustibles. Refer to NEC and/or local codes for minimum electrical clearances required for service. Equipment should not make contact with any structure located above the equipment without appropriate isolation. Equipment supplied with bottom access panels requires sufficient clearance to access fasteners, and to lower and slide panel horizontally until clear of bottom of unit.

Hanging and Mounting Equipment

Although the basic equipment is generally light enough that it can be supported by the ductwork, KBE strongly recommends that all equipment be suspended from the upper most ceiling or a structural element of the building, independent of the false ceiling grid. Suspension devices are field supplied, sized and designed by others. KBE will not accept responsibility for unit support. Equipment must be installed in a level horizontal plane. Failure to level equipment properly may prevent proper operation of controls. Provisions for proper support in seismically active regions is the responsibility of others. See table *1 for unit weights.*

When requested, equipment is supplied with optional hanger brackets for use with up to a 10mm (3/8") diameter hanger rod. S*ee submittal drawings for hanger bracket locations.*

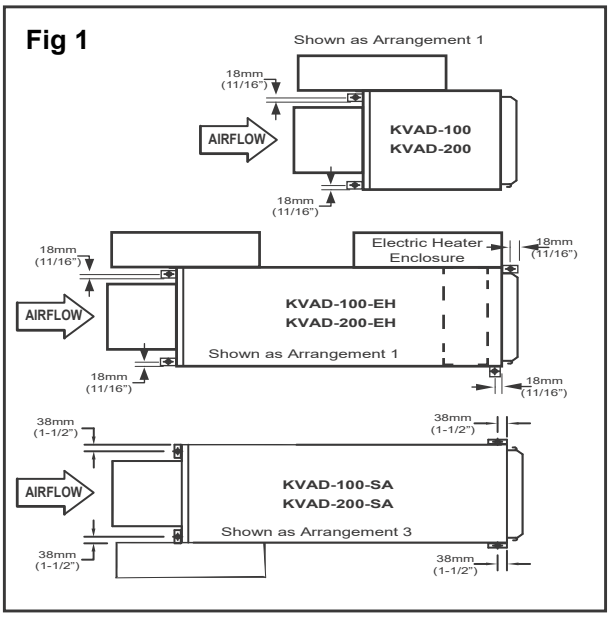
UNIT WEIGHTS

TABLE 1 - SINGLE DUCT TERMINAL UNIT WEIGHTS in Kg (in Lbs)

Unit Size	KVAD-100		KVAD-100-SA		KVAD-100-EH	
	Single Wall	Double Wall	Single Wall	Double Wall	Single Wall	Double Wall
4	7 (15)	8 (18)	14 (31)	19 (42)	28 (62)	33 (73)
5	10 (22)	11 (24)	17 (37)	22 (49)	30 (66)	35 (77)
6	8 (18)	9 (20)	14 (31)	19 (42)	28 (62)	33 (73)
8	9 (20)	10 (22)	16 (35)	22 (49)	30 (66)	36 (79)
10	11 (24)	13 (29)	20 (44)	26 (57)	34 (75)	40 (88)
12	13 (29)	16 (35)	23 (51)	31 (68)	38 (84)	45 (99)
14	16 (35)	20 (44)	28 (62)	37 (82)	42 (93)	52 (115)
16	18 (40)	22 (49)	31 (68)	41 (90)	46 (101)	56 (123)
24	32 (71)	32 (71)	40 (88)	49 (108)	56 (123)	65 (143)

Unit Size	KVAD-200		KVAD-200-SA		KVAD-200-EH	
	Single Wall	Double Wall	Single Wall	Double Wall	Single Wall	Double Wall
6	10 (22)	12 (26)	13 (29)	17 (37)	27 (60)	31 (68)
8	10 (22)	12 (26)	13 (29)	17 (37)	27 (60)	31 (68)
10	12 (26)	14 (31)	15 (33)	20 (44)	29 (64)	34 (75)
12	16 (35)	20 (44)	18 (40)	24 (53)	32 (71)	38 (84)
14	18 (40)	22 (49)	21 (46)	27 (60)	35 (77)	41 (91)
16	20 (44)	25 (55)	23 (51)	31 (68)	38 (84)	45 (99)
18	22 (49)	27 (60)	25 (55)	34 (75)	40 (88)	49 (108)

Fig 1



Hanger straps may be utilized as an alternate means of suspending the equipment. Do not secure hanger straps to electric heaters, coils or control enclosures. Hanger straps can be mounted directly to the sides and bottom of equipment casing, such that they do not interfere with working components or access panels, using screws that do not penetrate the unit cabinet more than 10mm ($^3/_8$").

When hanging equipment, always use the support method as prescribed for rectangular duct in the job specifications.

Duct Connections

When fastening ductwork to equipment, DO NOT use fasteners that penetrate equipment cabinet more than 3/8"[10mm]. Fasteners penetrating the equipment cabinet over 3/8"[10mm] may come in contact with live electrical parts or penetrate other components within the equipment casing causing damage.

CAUTION

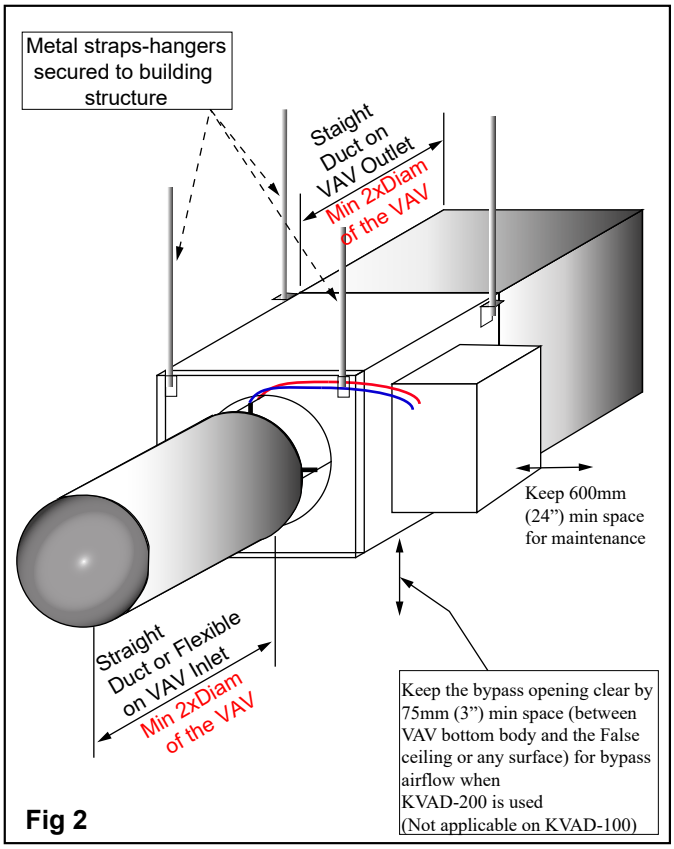


Fig 2

All duct connections should be configured and installed in accordance with SMACNA guidelines and all local code requirements.

Allow a minimum of **2 x duct diameters of straight Duct** prior to equipment inlet and equiment discharge (Fig2). The diameter of the inlet duct for round valves must be equal to the listed size of the equipment. The round air valve inlet collar of the equipment is 3mm ($^1/_8$") smaller then listed size in order to allow the round ductwork to slip over the air valve inlet collar.

DO NOT INSERT DUCTWORK INTO AIR VALVE INLET COLLAR.

DO NOT HOLD THE UNIT WITH AIRFLOW PROBE AT THE VALVE INLET COLLAR.

When making ductwork connection to air valve inlet collar and insulating air valve inlet, take caution not to damage or remove the flow sensor connections, which are vital to unit control. Provide insulation around entire inlet collar (all the way to the equipment casing).

Permissible discharge duct connections are straight flanged, slip and drive or drive and screw.

If equipment is to be installed in a location with high humidity, external insulation around the heating coil should be installed.

Sound Critical Applications

Flexible duct connectors are not recommended on equipment direct discharge. The sagging membrane of these things can cause turbulence and higher air velocities that generate noise. Also, lightweight membrane material allows noise to breakout, which can increase sound levels in the space below if not pre-insulated.

Electrical

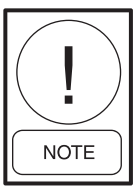
All field wiring must comply with NEC and all local codes. Electrical and/or control wiring diagrams are located on the control enclosure box. All electric heaters are staged per specify The installing electrician should rotate the incoming electric service by phase to help balance the building electrical load. Minimum circuit ampacity (MCA) designates the maximum operating load of the equipment for sizing wire feeders. Fuse size of the internal fuse if supplied. Maximum Overcurrent Protection (MOP) designates the largest breaker or fuse in the electrical service panel that can be used to protect the equipment. Use Copper conductors only.

OPERATION

Start-Up
Thorough safety precautions should always be taken when performing startup and service. Only qualified individuals should perform these tasks.
Check that all electrical work is finished and properly terminated. Check that all electrical connections are tight and that the proper voltage is connected.

3 Phase Balancing
AC power imbalance must not exceed 2%.Be sure that the following guides are met:

1. AC power is within 10% of rated voltage at rated frequency. (See equipment name plate for ratings).
2. AC power is within 5% of rated frequency at rated voltage.
3. A combined variation in the voltage and frequency of 10% (sum of absolute values) of rated values, provided the frequency variation does not exceed 5% of rated frequency.



Equipment with electric heat requires a minimum of 0.1" w.g. downstream static pressure.

Prior to start-up, the project control sequence/wiring diagram should be obtained and thoroughly understood. If factory supplied analog or DDC controls are utilized, refer to the applicable Operation Manual for start-up and balancing information.

Damper Shaft

There is an indicator on the end of the damper shaft that can be used to determine the position of the damper blade. If the indicator is horizontal,the damper is completely open. The damper shaft is 12.7mm diameter.

MAINTENANCE

Optional Damper Actuator

An optional factory mounted floating type actuator or a factory mounted Delta DDC controller with floating actuator are available,which mounts directly to the damper operating shaft. The actuator is not provided with and does not require any limit switches but is electronically protected against overload. *Ask for GDB Actuator technical data.*

Manual Override
A button on the side of the actuator cover disengages the gear train so the drain shaft can be moved manually Releasing the button will re-engage the gear train.

Mechanical Angle of Rotation Stops
The adjustable stops may be field adjusted to halt the rotation of the damper blade before the damper blade reaches the damper stops. The actuator canbe indefinitely installed in any position without harm.

1. Loosen the two end stop screws using a No.2 Phillips head screw driver, being careful not to unscrew the captive nut under the slot.
2. Move the stops (in 2.5° steps) to the desired position and retighten the screws.

Overload Protection
The actuators are electronically protected against mechanical overload. In the actuator, an electronic circuit maintains the current at a level that will not damage the motor while providing adequate holding torque.

Checkout Instructions for actuator Supplied without DDC control
1. Disconnect actuator from the controller.
2. Apply 24 VAC to the COM and CW terminals on the actuator. Actuator should rotate in a clockwise direction.
3. Apply 24 VAC to the COM and CCW terminals on the actuator. Actuator should rotate in a counter clockwise direction.
4. If actuator moves in both directions, it is operational.
5. If the actuator does not rotate, it may be at an end stop or there is a problem with the damper.
6. Loosen the set screw to free the actuator from the damper shaft.Check to make sure that the damper shaft rotates freely.
7. Check to make sure that actuator is not against stop. Repeat steps 2 and 3.
8. If actuator does not rotate, replace.

Electric Heat

Electric heaters require little or no maintenance. Electric heaters come equipped with a primary auto-reset limit switch. These limit switches provide protection against overheating. The auto-reset limits switches automatically cut the heater off when overheating occurs, and turns the heater back on when the elements have cooled down. Electric heaters also come equipped with a secondary manual reset limit switch which can be reset by pressing the reset switch button.
All Duct heaters shall have a field electric disconnect switch next to the unit if not supplied with Factory mounted door disconnect switch.

Minimum Operating Conditions

Airflow must be at least 75 CFM per kW. A minimum of 0.1" w.g. external pressure is required.

Electric Heater Element Replacement

1. Turn off power supply before servicing.
2. Disconnect field wiring from Electric Heater ControlEnclosure.
3. Disconnect Amp Plug Connectors if equipped.
4. Remove 4 mounting screws from inside ElectricHeater Control Enclosure.
5. Slide entire heater assembly out of Single DuctTerminal.
6. Remove wires and any jumpers from heater element terminal ends, noting which wire and jumper goes to which terminal.
7. Remove ¼" hexheadscrews located near terminal ends.
8. Remove ¼" hexheadscrews from opposite oft erminal end on heater rack.
9. Remove elements and replace with new ones.
10. Reassemble, replace wires correctly.
11. Close control enclosure cover before turning on power.

ELECTRIC HEATER TROUBLESHOOTING GUIDE

TABLE 6 - HEATER TROUBLESHOOTING GUIDE

Check wiring diagrams to ensure that heater is properly wired.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
HEATER DOES NOT OPERATE	No Power	Check disconnect
	No Control Voltage	Check Control Signal (i.e. 24 VAC).
		Check transformer and transformer fusing (if applicable), replace if necessary.
	Blown Fuse	Replace fuse
	Open Limit (primary or secondary)	Replace limits or reset as applicable.
		Check for continuity across limit to determine if open, replace as necessary.
	Airflow Incorrect Direction	Check sensing tube, rotate if needed.
	Low Airflow Static Pressure	Increase airflow.
	Damaged Elements	Check for open or damaged elements and replace as necessary.
LOW OR HIGH TEMPERATURE RISE	Incompatible Thermostat or Controller	Check Wiring.
		Check for compatibility.
	Problems with Additional Stages	Check location of thermostat; may be installed in a “too hot” or “too cold location. Check heat outputs on controller.
		Check contactors for open coil.
		Check for damaged elements.
	Incorrect CFM	Check for blocked duct or location of heater.
SHORT CYCLING	Improper Airflow	Check for even airflow across the face of the element section.
		Check for blocked duct.
		Verify installation per SMACNA & ASHRAE guidelines.
		Check for dirty filters.
	Low CFM	*See remedies for “Improper Airflow”.*
		Check air velocity of 70 CFM per kW.