

Installation and Maintenance Manual

IM 1093-1

Group: **Controls**

Part Number: **IM 1093**

Date: **February 2015**

Single Duct VAV Terminals



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Revision History

IM 1093-1 Date: February 2015 Rebranded
IM 1093 Date: October 2010 Initial release

Reference Documents

Number	Company	Title	Source
ANSI/ASHRAE 135-2001	American Society of Heating, Refrigerating and Air Conditioning Engineers	BACnet® - A Data Communication Protocol for Building Automation and Control Networks	www.ashrae.org
OM 1092	Daikin Applied	Operators Manual, Delivered VAV Systems	www.DaikinApplied.com
ED 15126	Daikin Applied	Maverick™ I Unit Controller Protocol Information, BACnet and LONWORKS® Networks	www.DaikinApplied.com
ED 15113-2	Daikin Applied	BACnet Protocol Implementation Conformance Statement (PICS) for MicroTech III Applied Air Handling Unit Controller	www.DaikinApplied.com
ED 15112-7	Daikin Applied	BACnet and LONWORKS Protocol Information for Rooftop and Self-Contained Units with MicroTech III Controls	www.DaikinApplied.com

Limited Warranty

Consult your local Daikin representative for warranty details. To find your local Daikin representative, go to www.DaikinApplied.com.

Notice

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Hazard Identification Messages

DANGER

Dangers indicate a definite hazardous situation, physical or electrical, which will result in death or serious injury if not avoided.

WARNING

Warnings indicate potentially hazardous situations, which can result in property damage, severe personal injury, or death if not avoided.

CAUTION

Cautions indicate potentially hazardous situations, which can result in personal injury or equipment damage if not avoided.

DANGER

Electric shock hazard. Can cause personal injury or equipment damage.

This equipment must be properly grounded. Connections and service to the MicroTech III Air Handling Unit Controller must be performed only by personnel knowledgeable in the operation of the equipment being controlled.

CAUTION

Static sensitive components. Can cause equipment damage.

Discharge any static electrical charge by touching the bare metal inside the control panel before performing any service work. Never unplug cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

NOTICE

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

Daikin Applied disclaims any liability resulting from any interference or for the correction thereof.

Receiving Inspection

Prior to removing the shipping material, visually inspect the packing materials. There should be a black plastic strip wrapped in the clear plastic shrink wrap. If this black plastic strip is missing, the shipment may have been repacked by the shipper and you should make note of this on the shipping documents and inform the delivering carrier. After unpacking the terminal, check it for shipping damage. If any shipping damage is found, report it immediately to the delivering carrier. Store units in a clean, dry location prior to installation. Units with controls are not recommended for use in ambient temperatures greater than 95°F. For protection of controls, do not store in ambient temperatures greater than 135°F. Caution: Do not use the flow sensor, connecting tubing, or damper shaft as a lift point. Damage to the flow sensor or controls may result.

Hanging/Installation Requirements

⚠ IMPORTANT

If equipped with pneumatic controls, the orientation of the terminal is critical. The pneumatic controls must be mounted right side up. The single duct unit must be level within + or – 10 degrees of horizontal, both parallel to the air flow and at the right angle of air flow. The control side of the terminal is labeled with an arrow indicating UP. Unless otherwise noted, most analog and digital controls may be installed in any orientation. Check with the local Daikin representative for verification.

⚠ CAUTION

Cautions indicate potentially hazardous situations, which can result in personal injury or equipment damage if not avoided.

The equipment is heavy and counted in the ceiling. Use caution and follow OSHA and SMACNA installation guidelines.

Unless local building codes require hangers, the smaller size basic single duct terminals may be light enough to be supported by the ductwork itself. However, when accessory modules, such as DDC controls, hot water coils, or sound attenuators are included, the single duct terminal should be supported directly. Straps screwed directly into the side of the terminal, trapeze hangers, or the method prescribed for the rectangular duct on the job specifications may be used (See [Figure 1](#) and [Figure 2](#)). The MQTHI5 Single Duct Terminal is not suitable for outdoor use.

Figure 1: Strap-Hangers

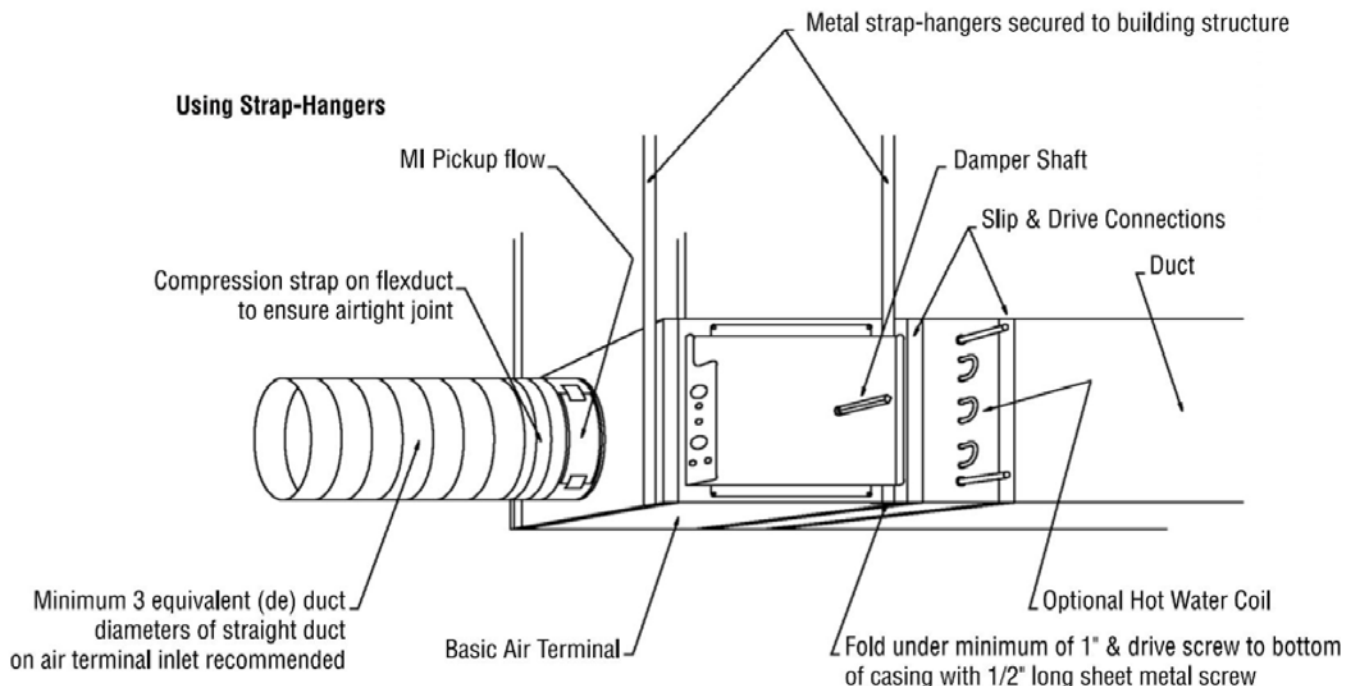
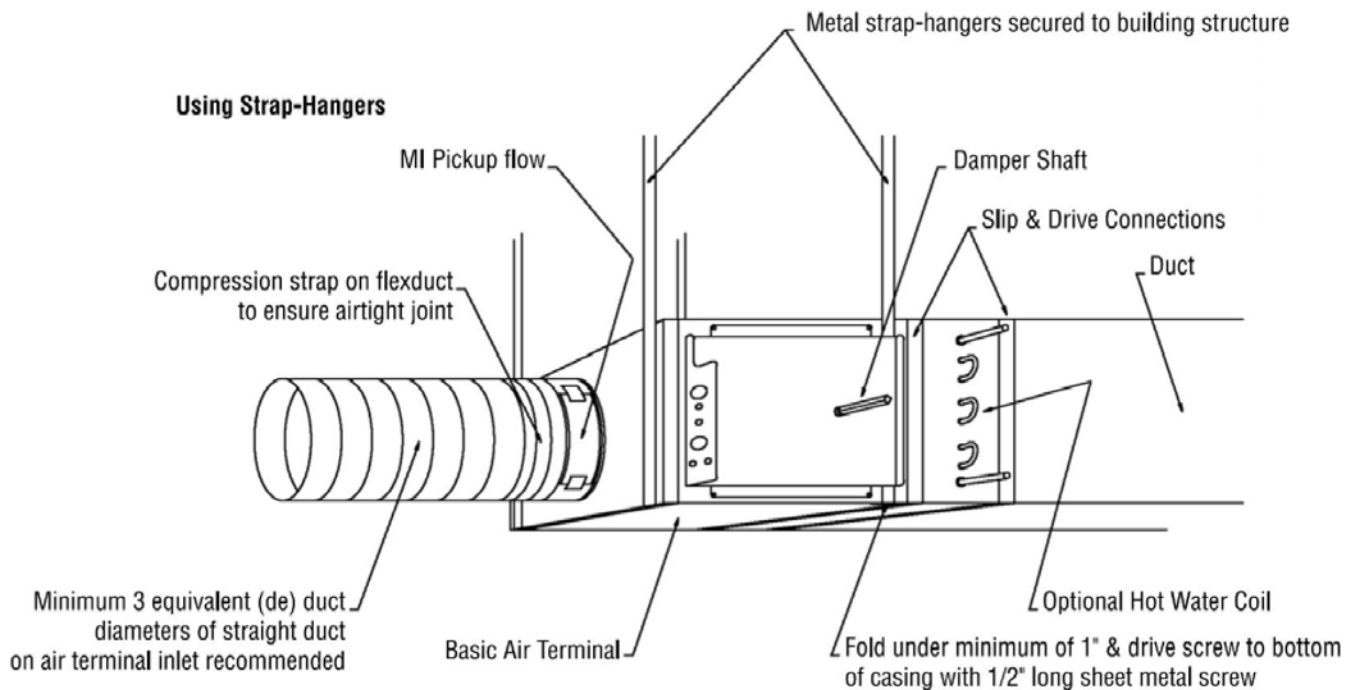


Figure 2: Trapeze-Hangers



Minimum Clearance for Access

Single Duct Air Terminals require sufficient clearance to allow servicing of the actuator, controls and single electric power hook-up (if applicable). Horizontal clearance requirements are dependent upon access panel dimensions which are indicated on the appropriate submittals (for control panel enclosure access a minimum of 18" is recommended. See the appropriate submittal for control panel location). NOTE: These clearance recommendations are not meant to preclude NEC requirements or local building codes.

Connecting Ductwork

Slip each inlet duct over the inlet collar of the terminal. Fasten and seal the connection by the method prescribed by the job specification. The diameter of the inlet duct "D" in inches must be equal to the listed size of the terminal; e.g. a duct that actually measures 8 inches must be fitted to a size 8 terminal. The inlet collar of the terminal is made 1/8 inch smaller than listed size in order to fit inside the duct.

NOTE: Do not insert duct work inside the inlet collar of the assembly.

Inlet duct should be installed in accordance with SMACNA guidelines. If a single point electronic velocity sensor is installed, it is recommended that the installer provide three to five diameters of straight duct at the terminal inlet. The outlet end of the terminal is designed for use with slip and drive duct connections (flanged outlets optional). A rectangular duct the size of the terminal outlet should be attached.

Field Electrical Wiring

DANGER

Electric shock hazard. Can cause personal injury or equipment damage.

This equipment must be properly grounded. Connections and service to the MicroTech III Chiller Unit Controller must be performed only by personnel knowledgeable in the operation of the equipment being controlled.

- All field wiring must comply with the local codes and with the National Electrical Code (ANSI/NFPA 70-2002).
- When applicable, electrical, control and piping diagrams are shown on labels attached to the exterior of the single duct unit.
- Use copper conductors only!
- All terminal units must be properly grounded per NEC 424-14 and 250.
- Always check product label for voltage and current data to determine the proper wire size and current protection.
- The control cabinet contains live electrical parts! Contacting these parts with the power applied may cause serious injury or death. The control cover must be closed prior to applying electric power to the unit.
- These recommendations are not meant to preclude NEC requirements or local building codes that may be applicable, which are the responsibility of the installing contractor.

MQTHI5 Single Duct Terminal Units with Electric Heat

DANGER

Electric shock hazard. Can cause personal injury or equipment damage.

This equipment must be properly grounded. Connections and service to the MicroTech III Chiller Unit Controller must be performed only by personnel knowledgeable in the operation of the equipment being controlled.

- Always inspect the electric coils for damage prior to installing the single duct unit.
- All electric heaters if provided by Daikin are balanced by kW per stage. The installing electrician should rotate these heater stages by phase in order to help balance the building electric load.
- See above wiring instructions.
- The “up” orientation must be followed.

MQTHI5 Single Duct Terminal Units with Hot Water Coils

- Always inspect the hot water coils for damage prior to installing the single duct unit.
- CAUTION: The copper tubing should not be used as lift points.
- The hot water coil casing is field insulated.
- The hot water coils do not have a drip pan and are not suitable for use as cooling coils.

Controls

CAUTION

Static sensitive components. Can cause equipment damage.

Discharge any static electrical charge by touching the bare metal inside the control panel before performing any service work. Never unplug cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

IMPORTANT

Units with digital controls, if factory programmed, incorporate specific communication addresses. Installing the terminal in a different location than noted on unit label and building plans may result in excessive start-up labor.

Detailed information regarding connection, start-up and operating procedures for controls provided by Daikin are available from your local Daikin representative. For information on controls by other manufacturers, contact that manufacturer's local branch or dealer.

Labeling

MQTHI5 Single Duct Air Terminals are shipped from the factory with up to seven different information labels (not all labels pertain to all single duct units depending upon the type of insulation and the final ship to state).

1. Control Label – affixed to the single duct terminal casing. Shows piping/wiring diagram and control sequence number and fusing (if applicable).
2. Calibration Label – affixed to the single duct terminal casing. Shows air flow calibration data and control settings (if applicable).
3. I.D. Label – affixed to the single duct terminal casing. Shows tagging information, customer order number, ETL Logo, etc.
4. AHRI Certification Label on Single Duct Terminal Unit – identifies applicable industry test standard and certifies unit is in compliance.
5. AHRI Certification Label on Hot Water Coils – identifies applicable industry test standard and certifies hot water coil compliance (if hot water coils is ordered as an accessory).
6. Fiberglass Label – identifies insulation type for units shipped to California.
7. Orientation label – identifies the proper air flow direction and the top of the unit.

MQTHI5 Flow Sensor

MQTHI5 Single Duct Air Terminals are shipped with a factory-installed pressure differential flow sensor installed. See Figure 3, for the calibration curve.

Investigating Noise Complaints

Noise from a terminal can be due to a variety of conditions, and can be difficult to eliminate. The first step is to isolate the type, source and direction. Generally, noise heard at the air outlet is considered a discharge type. Noise heard through the ceiling is considered a radiated noise. For detailed information concerning noise transmission in buildings see ARI Standard 885-2008E, titled *Procedure For Estimating Occupied Space Sound Levels In The Application Of Air Terminals and Air Outlets*.

Discharge Noise

Discharge noise is usually caused by high static or little to no internal duct lining downstream of the terminal. It can sometimes be caused by the air outlet itself. Air outlet generated sounds can be reduced by reducing flow or increasing air outlet size. Reducing static pressure, or flow, or adding additional attenuation materials will reduce discharge sounds from the terminal unit. Sometimes, moving the flex duct between the terminal and air outlet so the air must make an additional turn will help with the discharge sound.

Radiated Noise

Radiated noise is most commonly associated with fan powered terminal units.

Controls

DANGER

Electric shock hazard. Can cause personal injury or equipment damage.

This equipment must be properly grounded. Connections and service to the MicroTech III Chiller Unit Controller must be performed only by personnel knowledgeable in the operation of the equipment being controlled.

CAUTION

Static sensitive components. Can cause equipment damage.

Discharge any static electrical charge by touching the bare metal inside the control panel before performing any service work. Never unplug cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

Contact your Daikin representative for information concerning controls provided by Daikin. For controls provided by others, contact the local control representative for assistance.

Electric Duct Heater

DANGER

Electric shock hazard. Can cause personal injury or equipment damage.

This equipment must be properly grounded. Connections and service to the MicroTech III Chiller Unit Controller must be performed only by personnel knowledgeable in the operation of the equipment being controlled.

- If the heater does not operate:
 - Check electric power into the unit, and verify that the wiring agrees with the label diagram located on the terminal unit casing.
 - Verify that the unit is installed properly (i.e., according to the air flow orientation label). Review the wiring diagram supplied with the heater to verify the field wiring is correct and of the proper gauge and that the heater is properly grounded.
- If the heater cycles on and off:
 - Verify that the airflow is uniformly distributed across the face of the heater. Check for obstructions in the duct, or insufficient air flow (CFM) (see label for minimum CFM).
- If conditioned space fails to warm-up:
 - Make certain that the heater controls and the thermostat are compatible and wired properly. Relocate the thermostat if it is located in a position that is too warm.
- If conditioned space overheats:
 - Make certain that the heater controls and the thermostat are compatible and wired properly. Relocate the thermostat if it is located in a position that is too cool. Verify that the air distribution to the space is appropriate for the required thermal load.

Specific Electric Heat Troubleshooting Procedures:

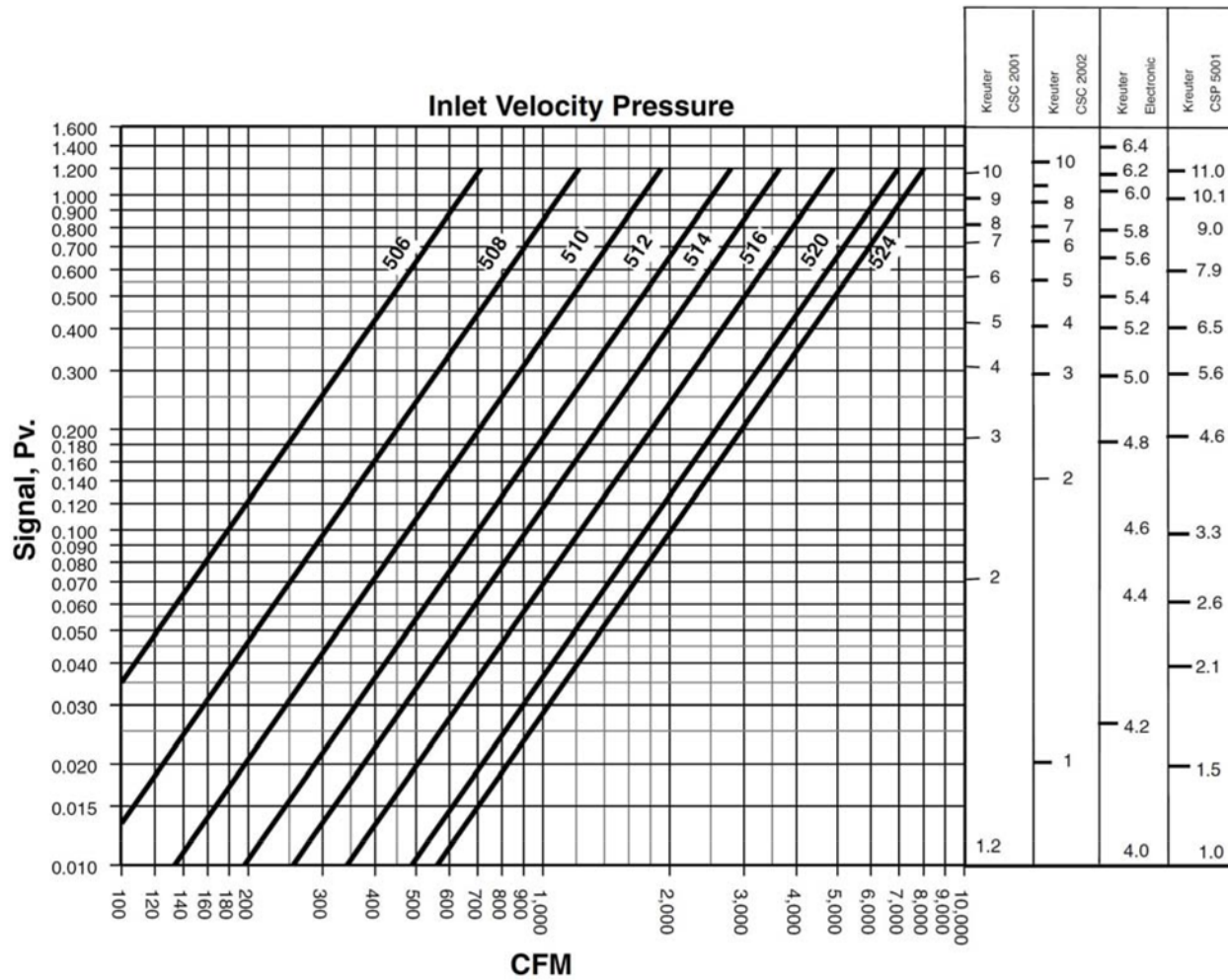


WARNING

On all troubleshooting that requires you to work inside the heater wiring casing, disconnect power first! Jumpers are used for diagnostic purposes only – remove all jumpers prior to returning unit to operation.

Possible Cause	Solution
Power not properly connected to the heater.	With a voltmeter, check the power wiring terminals to insure the proper voltage is available to the element side of the power terminal block or to the field side of the disconnect switch, power fusing, or circuit breakers. If proper voltage is not present, check the terminal studs for proper wiring and check the power source for power.
Disconnect switch, toggle switch, or circuit breaker set to OFF	Set switch circuit breakers to the ON position.
Power fuses are blown or circuit breakers have tripped.	Replace fuses with the same type and amperage as those provided with the heater, or reset circuit breaker by first setting the breaker to the OFF position, and then resetting it to the ON position. With an ammeter, check amperage draw on the power lines. For heaters with fusing, amperage draw should not exceed the fuse. For heaters with circuit breakers, amperage should not exceed the rated value. If the amperage draw is excessive, check the power supply as described above for proper voltage. If the fuse/circuit breaker trips upon application of power, check for a short. If no short is present and the power supply wiring/voltage is correct, contact the factory for further assistance.
Manual reset switch has been tripped.	Push manual reset button. Manual reset is usually located in the control cabinet near the bottom of the been tripped. element header.
Air static switch is not engaging.	Jumper out the air static switch by connecting the lead attached to the normally open stud, to the normally closed stud. If heater operates, the problem may be the air static switch. Disconnect the pneumatic tubing from the pitot tube located in the control cabinet. Attach a magnehelic gauge to the pitot tube. Available static pressure at the pitot tube should be $\leq -0.03"$ S.P. or $\geq +0.03"$ S.P. If the available static pressure is in the dead band between these two ranges, the switch will not engage and some method must be devised to increase the available static pressure. If sufficient static pressure is available, check to insure the pneumatic tube is connected to the correct port of the switch. For negative pressure, connect to the low port. For positive pressure, connect to the high port. If the air static switch still fails to operate, contact the factory for a replacement switch.
Automatic reset switch bad.	Allow the duct temperature to cool below 90°F. If the heater does not operate, jumper out the automatic reset switch. If the heater now operates, contact the factory for a replacement switch. Manual reset switch Allow the duct temperature to cool below 90°F. If the heater does not operate, do the following: - On heaters with the manual reset installed in the power wiring, jumper out the manual reset switch. If the heater now operates, contact the factory for a replacement switch. - On heaters with the manual reset located in the backup contactor circuit, jumper out the manual reset switch. If the backup contactor now engages, contact the factory for a replacement switch. If the backup contactor fails to operate, the problem is in the backup contactor holding coils. Use an ohmmeter to check the continuity of the holding coils. Contact the factory for a replacement of any contactor with faulty holding coils.
Step controller malfunction.	Jumper out each step of the step controller. If contactor engages, the trouble is in the step controller. Refer to the literature provided with the step controller for proper power and wiring. If wiring appears to be correct, contact the factory for assistance.
SCR controller malfunction.	Refer to the literature provided with the SCR controller for proper power and wiring. If wiring appears to be correct, contact the factory for assistance. Possible: Nuisance Tripping of Reset Switches
Insufficient air flow across the heating elements	The minimum allowable air flow across the heating coils is 70 CFM/kW. Unless this minimum air flow is met, the leaving air temperature will be greater than the set point of the high temperature limit switches. This will cause nuisance tripping of the reset switches. Reset the minimum air flow across the coils to the minimum listed value. If further assistance is needed, contact the factory

Figure 3: MI Flow Sensor Calibration Chart





Daikin Applied Training and Development

Now that you have made an investment in modern, efficient Daikin equipment, its care should be a high priority. For training information on all Daikin HVAC products, please visit us at www.DaikinApplied.com and click on Training, or call 540-248-9646 and ask for the Training Department.

Warranty

All Daikin equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Applied representative for warranty details. To find your local Daikin Applied representative, go to www.DaikinApplied.com.

Aftermarket Services

To find your local parts office, visit www.DaikinApplied.com or call 800-37PARTS (800-377-2787). To find your local service office, visit www.DaikinApplied.com or call 800-432-1342.

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