

23 54 16.13.1 GAS FIRED MODULATING FURNACES

Part 1 – GENERAL

1.01 SECTION INCLUDES

- A. Indoor gas furnace: Daikin **DM97MC/DC97MC** – Modulating multi-position, variable-speed, communicating ECM-based gas furnace, up to 98% AFUE.
 - a. Size Range: 60k to 120k Btu/h (nominal heating capacity).
 - b. Model Numbers:

UPFLOW/HORIZONTAL	DOWNFLOW/HORIZONTAL
DM97MC0603BN**	DC97MC0603BN**
DM97MC0803BN**	DC97MC0803BN**
DM97MC0804CN**	DC97MC0804CN**
DM97MC1005CN**	DC97MC1005CN**
DM97MC1205DN**	

1.02 QUALITY ASSURANCE

- A. The unit(s) shall be tested by a Nationally Recognized Testing Laboratory (NRTL), in accordance with ANSI/UL 1995 – Heating and Cooling Equipment and bear the Listed Mark These meets the National Electric Code (NEC) and Canadian Electrical Code (CEC) requirements.
- B. The unit(s) will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.
- C. The unit(s) will be designed, tested and constructed to the current ANSI Z 21.47b/CSA 2.3b design standard for gas-fired central furnaces.
- D. The unit(s) will be third party certified by ETL to the current ANSI Z 21.47b/CSA 2.3b design standard for gas-fired central furnaces.
- E. The unit(s) efficiency testing will be performed per the current DOE test procedure as listed in the Federal Register.
- F. The unit(s) will be certified for capacity and efficiency and listed in the latest AHRI Consumer’s Directory of Certified Efficiency Ratings.
- G. The unit(s) will carry the current Federal Trade Commission Energy Guide efficiency label.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Unit shall be stored and handled according to the manufacturer’s recommendations.

1.04 WARRANTY

- A. NON-OWNER OCCUPIED RESIDENCE WARRANTY
 - 1. This warranty is provided to you by Daikin Manufacturing Company, L.P. (“Daikin”), which warrants all parts of this heating or air conditioning unit, as described below.
 - 2. This warranty applies to heating and air conditioning units installed in residences not occupied by the owner.

3. This warranty covers defects in materials and workmanship that appear under normal use and maintenance.
4. Warranty coverage begins on the “installation date.” The installation date is one of two dates:
 - (1) The installation date is the date that the unit is originally installed.
 - (2) If the date the unit is originally installed cannot be verified, the installation date is three months after the manufacture date. The first four digits of the serial number (YYMM) on the unit indicate the manufacture date. For example, a serial number beginning with “1306” indicates the unit was manufactured in June 2013.
5. Registration is not required to obtain warranty coverage, but registration entitles the owner to the Registered Additional Term Warranty described in the following paragraph. If the unit is not registered, the warranty lasts for a period up to 5 YEARS after the installation date (the “Initial Term Warranty”). If the unit is properly registered online within 60 days after the installation date, an additional warranty (the “Registered Additional Term Warranty”) is provided and lasts for as long as the original registered owner (“registered owner”) owns the residence in which the unit was originally installed for a period up to 10 YEARS after the installation date. To register, go to www.daikincomfort.com and click “PRODUCT Registration.” Neither of these warranties continues after the unit is removed from the location where it was originally installed. The replacement of a part under this warranty does not extend the warranty period. In other words, Daikin warrants a replacement part only for the period remaining in the warranty that commenced on the installation date
6. Complete warranty details available from your local Daikin representative or at www.daikincomfort.com.

Part 2 – PERFORMANCE

2.01 DESIGN BASIS

The HVAC equipment basis of design is Daikin. All bidders shall furnish the minimum system standards as defined by the base bid model numbers, model families or as otherwise specified herein (see Appendix A for general information on HVAC equipment alternate supplier). In any event the contractor shall be responsible for all specified items and intents of this document without further compensation.

Part 3 – PRODUCTS

3.01 DM97MC/DC97MC – MODULATING, MULTI-POSITION GAS FURNACE

A. General:

The furnace shall be a modulating, multi-position, variable-speed, communicating gas-fired condensing furnace, up to 98% AFUE. Design for multi-position installation (upflow, horizontal left or right, or downflow horizontal left or right configurations) and equip with a direct-drive variable-speed ECM motor type fan with constant CFM programming.

The furnace shall be Energy Star Certified.

The furnace shall have a pre-painted heavy-gauge steel casing and shall be available in nominal heating capacities ranging from 60k to 120k Btu/h models (see product specifications in this section).

The furnace shall have connectivity with the Daikin FIT outdoor unit models DX17VSS air-conditioning and DZ17VSA heat pump, and electronic expansion valve (EEV) coils (CAPE/CAPEA and CHPE).

The furnace shall be use with natural gas or propane (factory-authorized conversion kit LPM-09 required for propane).

General product specifications table for upflow/horizontal configuration:

	DM97MC 0603BN**	DM97MC 0803BN**	DM97MC 0804CN**	DM97MC 1005CN**	DM97MC 1205DN**
HEATING DATA					
High Fire Input ¹	60,000	80,000	80,000	100,000	120,000
High Fire Output ¹	58,800	77,600	78,400	97,000	116,400
Low-Fire Steady-State Input ¹	30,000	40,000	40,000	50,000	60,000
Low-Fire Steady-State Output ¹	29,400	38,800	39,200	48,500	58,200
AFUE ²	98	97	98	97	97
Temperature Rise Range (°F)	25 - 55	30 - 60	25 - 55	35 - 65	35 - 65
Vent Diameter	2" - 3"	2" - 3"	2" - 3"	2" - 3"	2" - 3"
No. of Burners	3	4	4	5	6
CIRCULATOR BLOWER					
Available AC @ 0.5" ESP	1.5 - 3	1.5 - 3	1.5 - 4	2 - 5	2 - 5
Size (D x W)	11" x 8"	11" x 8"	11" x 10"	11" x 10"	11" x 11"
Horsepower @ 1075 RPM	1/2	1/2	3/4	1	1
Speed	VS ECM	VS ECM	VS ECM	VS ECM	VS ECM
ELECTRICAL DATA					
Min. Circuit Ampacity	8.8	8.8	11.6	15.4	15.4
Max. Overcurrent Device (amps)	15	15	15	20	20
SHIPPING WEIGHT (LBS)					
	118	121	142	144	157

Notes:

¹ Natural Gas BTU/h

² DOE AFUE based upon Isolated Combustion System (ICS)

General product specifications table for downflow/horizontal configuration:

	DC97MC 0603BN**	DC97MC 0803BN**	DC97MC 0804CN**	DC97MC 1005CN**
HEATING DATA				
High Fire Input ¹	60,000	80,000	80,000	100,000
High Fire Output ¹	58,200	77,600	77,600	97,000
Low-Fire Steady-State Input ¹	30,000	40,000	40,000	50,000
Low-Fire Steady-State Output ¹	29,100	38,800	38,800	48,500
AFUE ²	97	97	97	97
Temperature Rise Range (°F)	35 - 65	35 - 65	35 - 65	35 - 65
Vent Diameter	2" - 3"	2" - 3"	2" - 3"	2" - 3"
No. of Burners	3	4	4	5
CIRCULATOR BLOWER				
Available AC @ 0.5" ESP	1.5 - 3	1.5 - 3	1.5 - 4	2 - 5
Size (D x W)	11" x 8"	11" x 8"	11" x 10"	11" x 10"
Horsepower @ 1075 RPM	1/2	1/2	3/4	1
Speed	VS ECM	VS ECM	VS ECM	VS ECM
ELECTRICAL DATA				
Min. Circuit Ampacity	8.8	8.8	11.6	15.4
Max. Overcurrent Device (amps)	15	15	15	20
SHIPPING WEIGHT (LBS)				
	117	122	144	146

Notes:

¹ Natural Gas BTU/h

² DOE AFUE based upon Isolated Combustion System (ICS)

B. Performance:

1. The furnace heating capacity shall be as per the product specification tables in PART-3 section A.
2. Fuel gas efficiency shall be up to 97% AFUE.
3. Firing rate capacity shall be 20,000 Btu/h per HEX tube.
4. Airflow delivery shall be 400 CFM/ton at a maximum of 0.50 in. W.C.
5. The furnace shall have a 24VAC modulating gas valve controlled by an integrated control module, auto-configured for each installation. For gas valve modulating range, see details in the Installation Instruction Manual (IOD-2007J or any later revision).
6. For installation in the US, the furnace shall be shipped from the factory configured for natural gas up to 10,000 ft of altitude.
7. For installation in Canada, gas furnaces are certified only to 4,500 ft of altitude for natural gas.
8. The furnace shall be manufactured for use on 115VAC, 60Hz, single-phase electrical supply.
9. The voltage range shall be 127VAC volts maximum and 98VAC volts minimum.

C. Furnace features:

1. The furnace components shall be completely factory assembled and tested.
2. The furnace shall include factory wiring and piping, control circuit board, fan motor thermal protector.
3. The furnace shall have a gas service connection of 1/2" FPT.
4. Return air shall be through an optional or field supplied filter.
5. The furnace shall have a factory installed internal condensate trap for vertical "upflow" models.
6. The furnace shall allow the condensate trap to be easily removed and reinstalled for horizontal applications.
7. The furnace shall have a durable Silicon Nitride igniter.
8. The furnace shall have a variable-speed airflow system.
9. The furnace shall have dehumidification modes available.
10. The furnace shall be certified for direct vent (2-pipe) or non-direct vent (1-pipe).
11. The furnace shall be built with a 2" vent/intake pipe and connectors.
12. The furnace shall have top venting with optional side venting.
13. The furnace shall have left or right connection for gas and electrical service.
14. The furnace shall have a heavy-gauge steel cabinet with durable finish.
15. The furnace shall have a fully insulated heat exchanger and blower section.
16. The furnace shall have an airtight solid bottom or side return with easy-cut tabs for removal in bottom air-inlet applications.
17. The furnace shall have the capability to be used in conjunction with a heat pump in a dual-fuel application.
18. The furnace shall have a gas pressure test feature that allows gas valve pressure to be checked at 100% firing rate.

D. Unit Cabinet:

1. The furnace shall have a pre-painted heavy-gauge steel casing.
2. The furnace shall have galvanized, leather grain-embossed finish.
3. The installer shall select an installation location with adequate structural support, space for service access and clearance for air return and supply duct connections.
4. A field supplied secondary drain pan shall be installed where required by national, state, or local code.
5. The furnaces shall have a door sight glass.
6. Cabinet air leakage shall be less than 2.0% at 0.5 inch H₂O when tested in accordance with ASHRAE standard 193.
7. The furnace shall have removable front panels for complete service access.

8. The furnace dimensions shall be:

MODEL	W	D	H
DM97MC0603BN**	17 ^{1/2} "	28 ^{7/8} "	34 ^{1/2} "
DM97MC0803BN**	17 ^{1/2} "	28 ^{7/8} "	34 ^{1/2} "
DM97MC0804CN**	21"	28 ^{7/8} "	34 ^{1/2} "
DM97MC1005CN**	21"	28 ^{7/8} "	34 ^{1/2} "
DM97MC1205DN**	24 ^{1/2} "	28 ^{7/8} "	34 ^{1/2} "

MODEL	W	D	H
DC97MC0603BN**	17 ^{1/2} "	28 ^{7/8} "	34 ^{1/2} "
DC97MC0803BN**	17 ^{1/2} "	28 ^{7/8} "	34 ^{1/2} "
DC97MC0804CN**	21"	28 ^{7/8} "	34 ^{1/2} "
DC97MC1005CN**	21"	28 ^{7/8} "	34 ^{1/2} "

E. Fan (Blower Wheel and ECM Blower Motor)

1. The fan shall be a variable-speed direct-drive ECM type fan, statically and dynamically balanced impeller. The fan shall have infinitely variable speed from 300 to 1250 RPM.
2. The fan wheel shall be galvanized and centrifugal type.
3. The fan motor shall be permanently lubricated with sealed ball bearings.
4. The fan motor shall operate on 115VAC, 60Hz, single-phase with a motor output range 1/2 to 1 HP.
5. The fan motor shall be thermally protected.

F. Draft inducer motor:

1. The draft inducer motor shall be variable-speed design.

G. Filter:

1. The return air shall be filtered by means of an optional or field supplied filter (See Section L for external filter rack accessory). Filters are not shipped with this furnace, but must be provided, sized, and installed externally by the installer.
2. The furnace can use reusable-type filters.
3. (optional) Highly efficient media filter accessories:
 - i. In-line air cleaner Daikin Premium Air Cleaner (DPAC). The DPAC has a high efficiency MERV 15 media filter removes more than 85% of particles down to 0.3 microns in size at 492 fpm. For more information visit www.daikincomfort.com.
 - ii. (optional) CLEAN COMFORT product line of media air cleaners. For more information visit www.cleancomfort.com.

H. Primary Heat Exchanger:

1. The furnace shall be one piece heavy-duty stainless-steel tubular heat exchanger.
2. The furnace shall have **“Wrinkle bend”** technology that maintains wall thickness in all bends and provide turbulence for improved heat transfer.

I. Secondary Heat Exchanger:

1. The secondary heat exchanger must be stainless-steel (3/8 inch stainless steel tubes).
2. The furnace shall have stainless-steel rear header for added strength and reliability.

J. Electrical:

1. The furnace shall be factory tested.
2. Electrical supply shall be 115 volts, 60 Hz, single-phase (nominal).
3. The voltage range shall be 127VAC volts maximum and 98VAC volts minimum.
4. Minimum Circuit Ampacity = (1.25 x Circulator Blower Amps) + ID Blower amps. Wire size should be determined in accordance with National Electrical Codes. Extensive wire runs will require larger wire sizes (see product specification tables in PART-3 section A).
5. Maximum Overcurrent Protection Device refers to maximum recommended fuse or circuit breaker size. May use fuses or HACR-type circuit breakers of the same size as noted.
6. Transmission (control) wiring between the furnace and outdoor unit shall be a maximum of 250 ft.
7. Electrical inlets shall be provided in the right and left side of the cabinet.

K. Control:

1. The furnace shall have controls provided by Daikin to perform input functions necessary to operate the system.
2. The furnace shall be compatible Daikin communicating outdoor units interfacing with ClimateTalk protocol.
3. The furnace shall be compatible with the Daikin *One+* Smart Thermostat.
4. The furnace shall have a self-diagnostic control board with constant memory fault code history output to dual 7-segment display and shall display troubleshooting codes through the display.
5. The furnace shall have color-coded low-voltage terminals with provisions for electronic air cleaner and humidifier.
6. The furnace shall provide DIP switches on the furnace PCB for airflow speed adjustments, including separated blower speeds for all modulating heating capacities, low stage cooling, high stage cooling and continuous fan. Continuous fan speed is selectable at 25%, 50%, 75% or 100% of the furnace’s maximum airflow capability.
7. The furnace shall have an option to use a dehumidistat, allowing the furnace’s blower to operate at a slightly lower speed (85% of desired speed) during a combined thermostat call for cooling and dehumidistat call for dehumidification. Done through an independent dehumidistat, or through a Daikin communicating thermostat’s DEHUM terminal.
8. The furnace shall have an integrated control module with selectable blower heat off delay function (the heat off delay period may be set to 90,

120, 150, or 180 seconds using the DIP switches or jumper provided on the control module. The delay is factory shipped at 150 seconds but may be changed to suit the installation requirements and/or homeowner preference).

L. Optional accessories available:

MODEL	DESCRIPTION	DM97MC 0603BN**	DM97MC 0803BN**	DM97MC 0804CN**	DM97MC 1005CN**	DM97MC 1205DN**
DTST-CWBSA-NI-A	Daikin Communicating Compatible Control	√	√	√	√	√
CVENT-2	Concentric Vent Kit (2")	√	√	√	√	√
CVENT-3	Concentric Vent Kit (3")	√	√	√	√	√
RF000142	Drain Kit -Horizontal Left Vertical Flue	√	√	√	√	√
EFR02	External Filter Rack with 16" x 25" Permanent Filter	√	√	√	√	√
0170K00000S	Flush Mount Vent Kit - 3" or 2"	√	√	√	√	√
0170K00001S	Flush Mount Vent Kit - 2"	√	√	√	√	√
AFE18-60A	Fossil Fuel (Dual Fuel) Kit	√	√	√	√	√
LPLP03	Low LP Gas Pressure Switch	√	√	√	√	√
LPM-09	LP Conversion Kits	√	√	√	√	√

MODEL	DESCRIPTION	DC97MC 0603BN**	DC97MC 0803BN**	DC97MC 0804CN**	DC97MC 1005CN**
DTST-CWBSA-NI-A	Daikin Communicating Compatible Control	√	√	√	√
CVENT-2	Concentric Vent Kit (2")	√	√	√	√
CVENT-3	Concentric Vent Kit (3")	√	√	√	√
RF000142	Drain Kit -Horizontal Left Vertical Flue	√	√	---	---
EFR02	External Filter Rack with 16" x 25" Permanent Filter	---	---	√	√
0170K00000S	Flush Mount Vent Kit - 3" or 2"	---	---	---	---
0170K00001S	Flush Mount Vent Kit - 2"	---	---	---	---
AFE18-60A	Fossil Fuel (Dual Fuel) Kit	---	---	---	---
LPLP03	Low LP Gas Pressure Switch	√	√	√	√
LPM-09	LP Conversion Kits	√	√	√	√

Notes for all the above accessory tables:

√ Indicates available for this model

• For installation in Canada, gas furnaces are certified only to 4,500' altitude.

1. (optional) Highly efficient media filter accessories:
 - i. In-line air cleaner Daikin Premium Air Cleaner (DPAC). The DPAC has a high efficiency MERV 15 media filter removes more than 85% of particles down to 0.3 microns in size at 492 fpm. For more information visit www.daikincomfort.com.
 - ii. (optional) CLEAN COMFORT product line of media air cleaners. For more information visit www.cleancomfort.com.

APPENDIX A
HVAC EQUIPMENT ALTERNATE (GENERAL INFORMATION)

- 1) The alternate equipment supplier shall provide to the bidding mechanical contractor a complete equipment data package.
 - a) This package shall include, but is not limited to, equipment capacities at the design condition, power requirements, indoor units CFM/static pressures, fan curves, installation requirements, and physical dimensions. Nominal performance data is not acceptable.
 - b) The mechanical contractor shall request and receive the equipment data package ___ days prior to bid date and submit this package with the alternate bid.
 - c) The mechanical contractor shall list the equipment supplier and submit the required data package with the bid detailing a complete comparison of the proposed alternate equipment to the specified equipment and the associated cost reduction of the alternate equipment. The contractor bids an alternate manufacturer with full knowledge that that manufactures product may not be acceptable or approved.
 - d) All equipment must have visible and permanent label clearly identifying the original manufacturer of the equipment. These labels shall have original manufacturer's name and contact information and be located both inside and outside the equipment and on all equipment-related literature. Submittals shall include the above statement as confirmation by supplier that all conditions are agreed to and complied to. Failure to comply with these requirements shall be sufficient cause for rejection of the submittal and product with no further consideration.
- 2) The alternate equipment supplier shall furnish a complete drawing package to the mechanical contractor ___ days prior to bid day for bidding and installation.
 - a) The drawing format shall be .dxf or equivalent, on 30"x42" sheets.
 - b) The HVAC and electrical series design documents will be made available in electronic format for use by the equipment supplier in preparing their drawings.
 - c) The alternate equipment supplier shall prepare the following drawings:
 - i) XXX HVAC Floor Plan
 - ii) XXX HVAC Refrigerant Piping/Controls Details
 - iii) XXX HVAC Details
 - iv) XXX HVAC Schedules
 - d) The alternate equipment supplier shall draft all refrigerant piping components, overall building control schematic, detailed control wiring diagrams, system details and schedules for their system. The drawings shall convey all requirements to successfully install the alternate equipment suppliers system.
 - e) Provide (2) drawing package sets plotted on 20 lb. vellum. Provide (1) drawing package in electronic format (.dxf files) on CD.
 - f) The submitted documents shall be complete system designs and show no less information than the HVAC equipment/controls contract bid documents.
- 3) The equipment supplier shall submit, as part of the equipment data package, outdoor unit data sheets. Data sheets to include the following:
 - a) COOLING capacities at project design conditions:
 - i) Cooling (Btu/h)
 - ii) Cooling Input Power (kW)
 - iii) SEER
 - iv) EER
 - b) HEATING capacities at project design conditions:
 - i) Heating (Btu/h)

- ii) Heating Input Power (Btu/h)
- c) The submitted capacity and efficiency performance must meet or exceed the listed performance on the schedule at the designed outdoor ambient and indoor space temperature conditions including de-rate factors for defrost.
 - i) HSPF
 - ii) COP
 - iii) OPERATING TEMPERATURE RANGE:
 - (1) Cooling
 - (2) Heating
 - iv) POWER SUPPLY:
 - (1) Maximum Circuit Amps (MCA)
 - (2) Maximum Overcurrent Protection Amps (MOP)
 - (3) Maximum Starting Current (MSC)
 - (4) Outdoor Fan Motor
 - v) UNIT DATA:
 - (1) Sound pressure level at 3.3 ft (dBA)
 - (2) Weight (lbs)
 - (3) Dimensions
- 4) The equipment supplier shall guarantee the performance of their system and all published data submitted. Performance shall be based on the design criteria below.
 - a) Room Temperature (Cooling)
 - b) Room Temperature (Heating)
 - c) Ambient Temperature (Summer)
 - d) Ambient Temperature (Winter)
- 5) The alternate equipment supplier shall submit with bid, indoor unit data sheets. Data sheets to include the following:
 - a) Capacities at project design conditions:
 - i) Cooling (Btu/h)
 - ii) Heating (Btu/h)
 - iii) Air Flow (CFM)
 - iv) SEER
 - v) EER
 - vi) HSPF
 - vii) COP
 - b) External Static Pressure (ESP)
 - c) Electrical Data (MCA, MOP, MSC, RLA)
 - d) Weight (lbs)
 - e) Dimensions