

OPERATION MANUAL

CM12

SERIAL NUMBER FROM JANUARY 2009 (0109) TO PRESENT



**READ THIS MANUAL CAREFULLY FOR INSTRUCTIONS ON CORRECT
INSTALLATION AND USAGE, AND READ ALL SAFEGUARDS.**

SECCIÓN EN ESPAÑOL
SECTION EN FRANÇAIS
AVAILABLE AT WWW.MOVINCOOL.COM



MOVINCOOL®
THE #1 SPOT COOLING SOLUTION

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FOREWORD

Congratulations on purchasing the MovinCool air conditioner. This manual explains how to assemble, install and operate the MovinCool CM12 air conditioning unit. Please read this operation manual thoroughly to familiarize yourself with the features of the unit and to ensure years of reliable operation.

You may also find it useful to keep this operation manual on hand for reference. Components and/or procedures are subject to change without prior notice.

Definition of Terms



WARNING: Describes precautions that should be observed in order to prevent injury to the user during installation or unit operation.



CAUTION: Describes precautions that should be observed in order to prevent damage to the unit or its components, which may occur during installation or unit operation if sufficient care is not taken.

Note: Provides additional information that facilitates installation or unit operation.

GENERAL WARNINGS & CAUTIONS

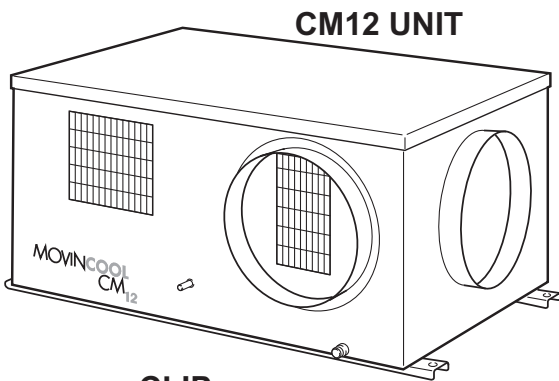
1. All electrical work should only be performed by qualified electrical personnel. Repair to electrical components by non-certified technicians may result in personal injury and/or damage to the unit. All electrical components replaced must be genuine MovinCool parts, purchased from an authorized reseller.
2. Disconnect power before any electrical installation.
3. Installation should be conducted by qualified technician only. DENSO and DENSO affiliate are not responsible for injuries and/or damages caused by improper installation.
4. Do not place water or any other liquid on the unit. This can cause damage to the unit and increase the risk of electrical shock.
5. Do not sit or stand on the unit.
6. Do not place hands or any object in the cool air outlet or exhaust duct. Touching the fan, which is rotating at a high speed, is very hazardous.

INVENTORY

After unpacking your MovinCool unit, please check to make sure you have the following items:

1. **CM12 MovinCool Unit (1)**
2. **Operation Manual/Product Registration (1)**
3. **Clip (1)**
4. **Packing I (1)**
5. **Packing II (1)**

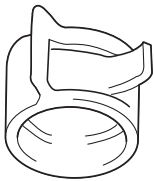
Note: If any of these items were not included in the box or appear damaged, please contact your MovinCool reseller for replacement.



**OPERATION MANUAL /
PRODUCT REGISTRATION**



CLIP



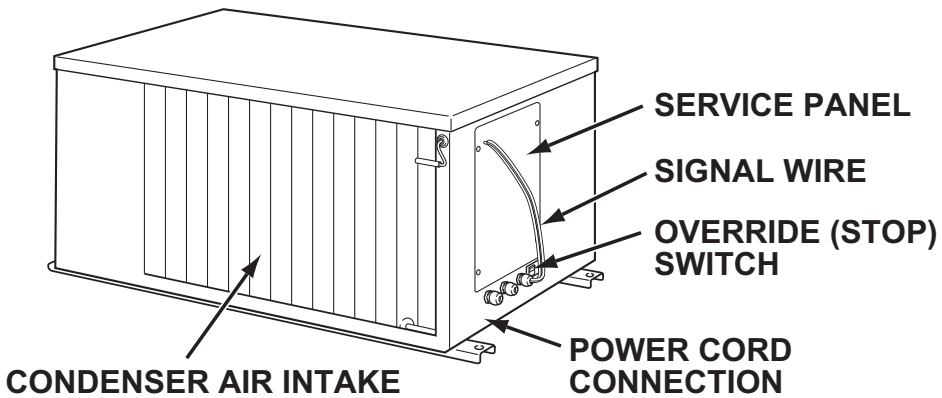
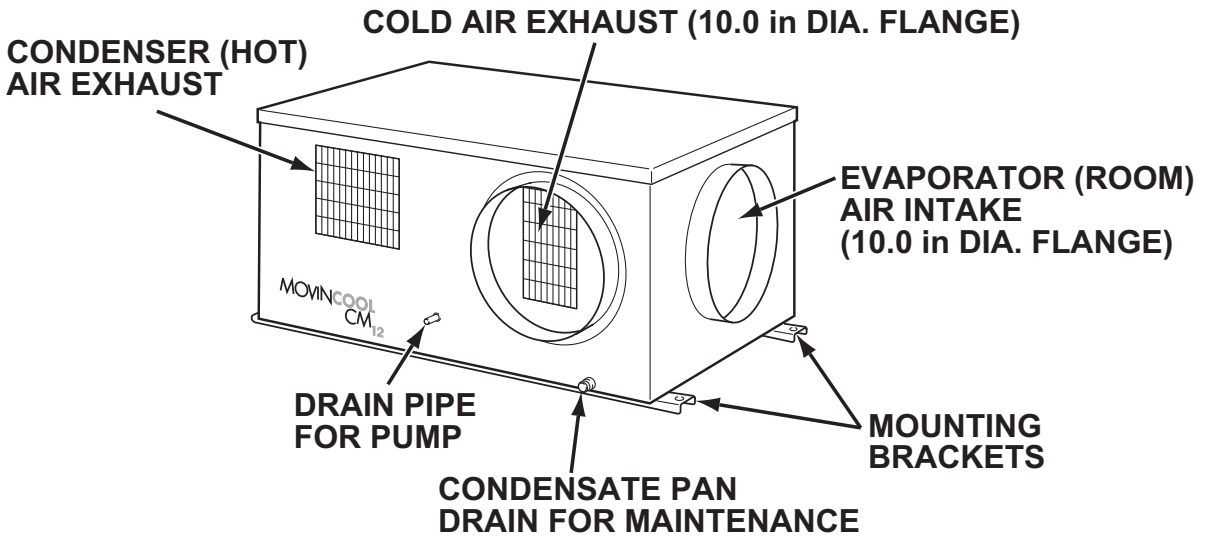
PACKING I (2.8 in x 32.0 in x 0.2 in)



PACKING II (1.0 in x 33.0 in x 0.2 in)

INSTALLATION

Unit Overview

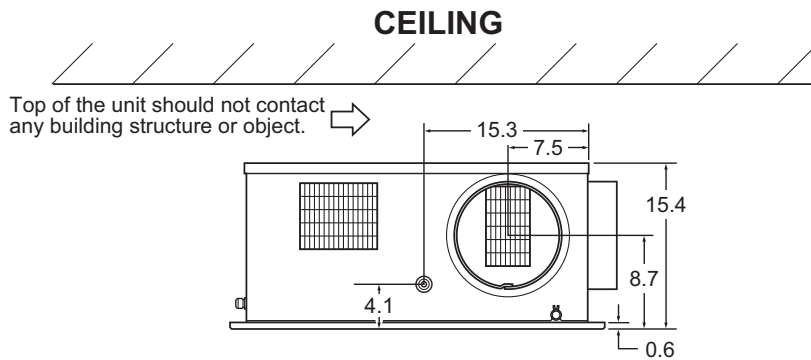
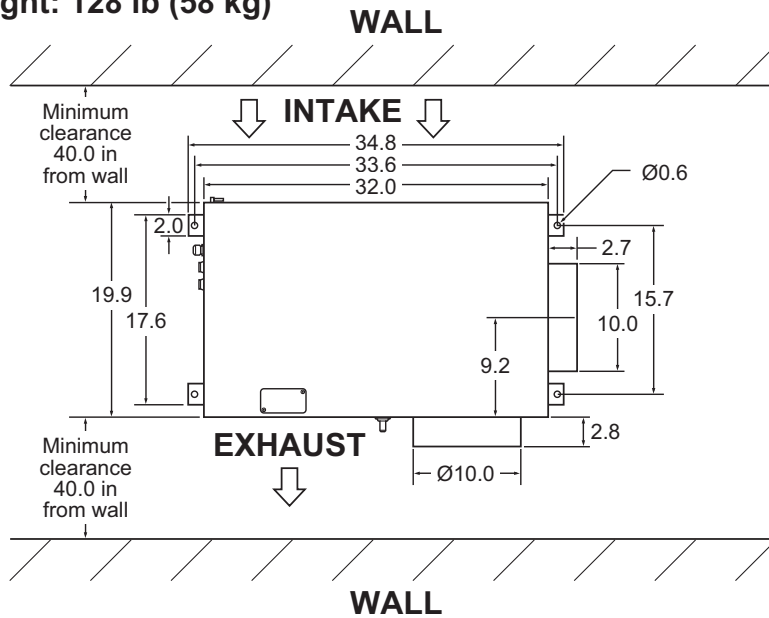


 **WARNING:** Remove protective cardboard from condenser intake after installation.

INSTALLATION (cont.)

Clearance Requirement

All dimensions are in inches.
Unit Weight: 128 lb (58 kg)



INSTALLATION (cont.)

Mounting the CM12 to a Roof Structure

WARNING: Be sure that the supporting roof structure is capable of supporting the weight of the unit, mounting hardware and the accessories (Roof structure should be capable to support four times of total weight or more. Unit weight is 128 lb (58 kg)).

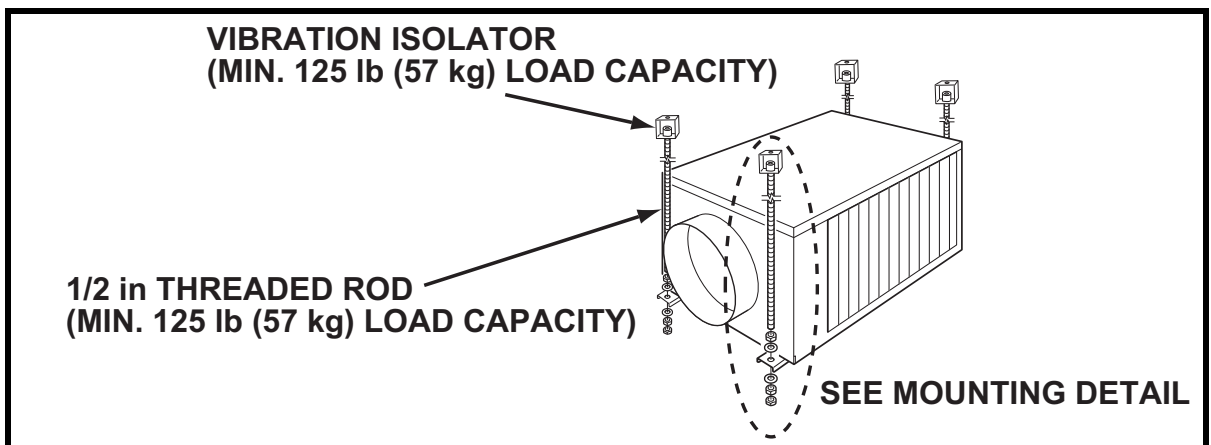
Be sure to securely anchor the top ends of the suspension rods. Make sure all nuts are tight. Be sure to follow all applicable codes.

The CM12 unit is usually mounted above the ceiling and must be securely mounted to the roof structure. The ceiling support of the existing building may require reinforcements.

Use field-supplied threaded 1/2 inch suspension rods, washers, nuts and vibration isolators.

The recommended clearance between ceiling grids and building the structural member is the unit height plus 3.0 inch (76 mm).

ALL MOUNTING HARDWARE FIELD PROVIDED

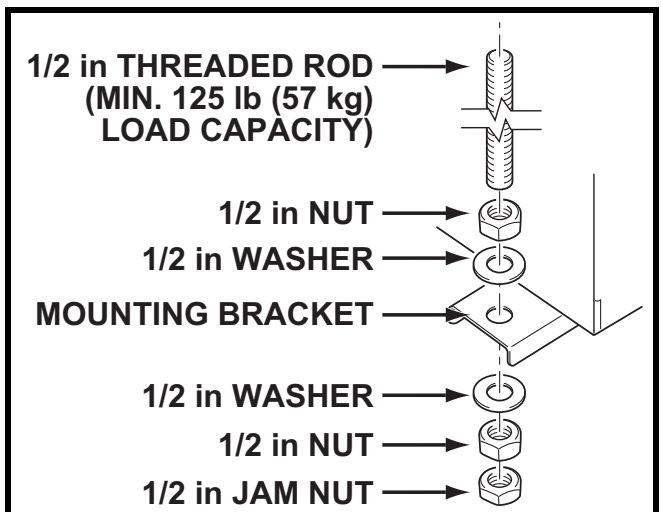


Install the four field-supplied rods by suspending them from suitable building structure members. Locate the rods so that they will align with four mounting holes in the mounting bracket that are part of the unit base.

WARNING: Wear gloves to avoid injury during installation.

Tightening torque for nuts: 3.02 ft•lbf (4.1 N•m)

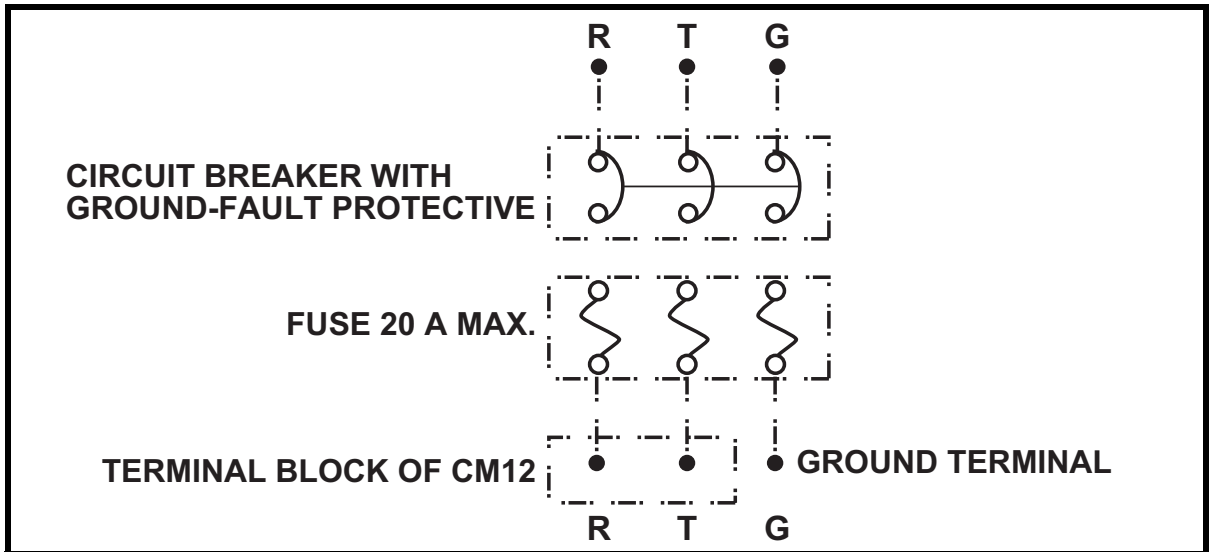
CAUTION: Make sure the unit is level (must be less than 2° incline).



INSTALLATION (cont.)

Power Supply Requirements

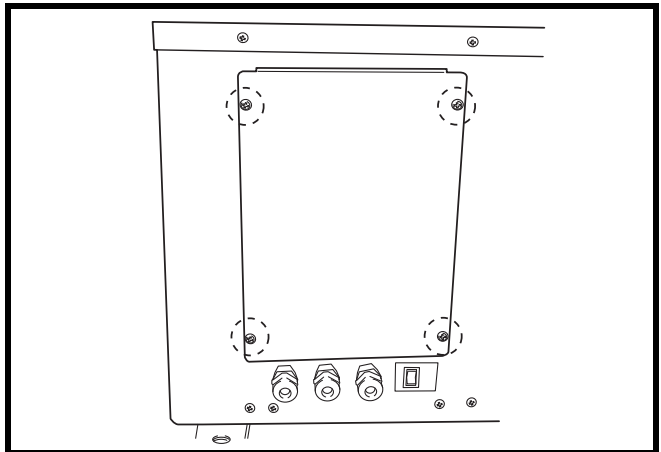
- The CM12 requires a single-phase 115 V, 60 Hz power supply to operate.
- The power supply should be a dedicated single outlet circuit with a UL approved short-circuit and ground fault protective breaker with a fuse size of 20 A maximum.



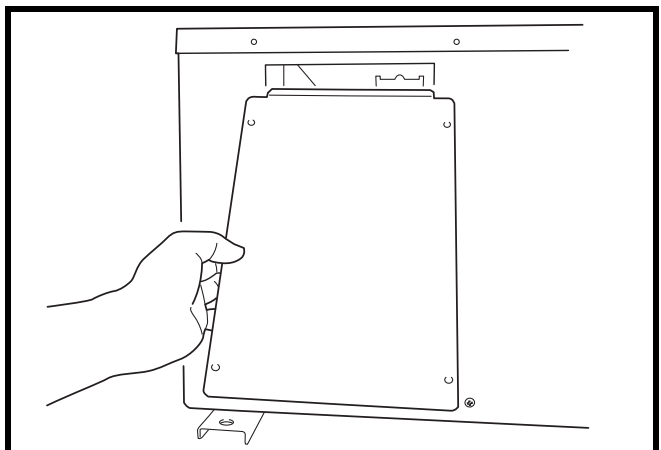
Service Panel Access

1. Access service panel by removing 4 screws.

Tightening torque for screw: 1.10 ft•lbf (1.5 N•m)



2. Remove the service panel.



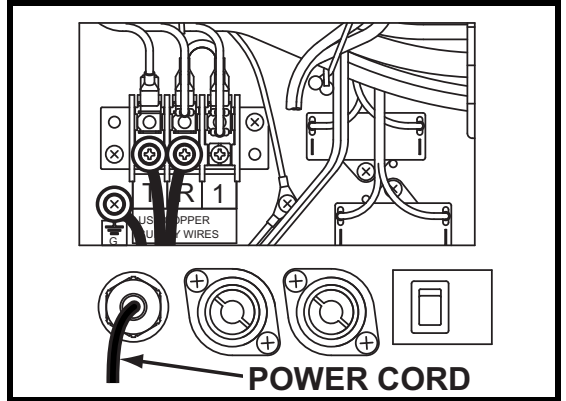
INSTALLATION (cont.)

Power Connection

Connecting Power Supply to Unit

The following are recommended wire sizes and electrical ratings:

- Cord Type: SJT (3 wires) or equivalent
- Wire Gauge: 14 AWG
- Voltage Rating: 300 V minimum
- Heat Resistance: 140 °F (60 °C)



1. Remove service panel from the right side of CM12 unit.
2. Route power cord wires through the opening of the left grommet connector located below service panel. Tighten the grommet connector at about 0.15 ft•lbf (0.2 N•m) torque.
3. Connect the neutral wire (white color label “R”) to the center screw connection of terminal block. Tighten screw at about 0.96 ft•lbf (1.3 N•m) torque.
4. Connect the line wire (black color label “T”) to the left screw connection of terminal block. Tighten screw at about 0.96 ft•lbf (1.3 N•m) torque.
5. Connect the ground wire (green color label “G”) to brass screw located below terminal block. Tighten screw at about 0.96 ft•lbf (1.3 N•m) torque.

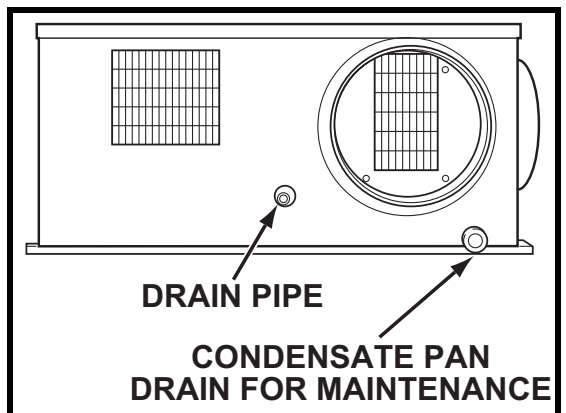


WARNING: All electrical work, if necessary, should only be performed by qualified personnel. Repair to electrical components by non-certified technicians may result in personal injury and/or damage to the unit.

Drain Hose Connection

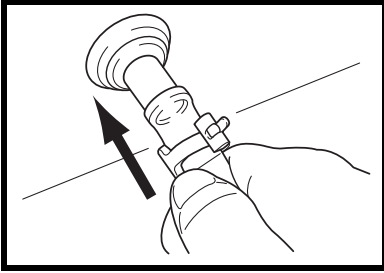
The CM12 is equipped with an internal condensation removal pump. Maximum lift is 4 feet (1.2 m).

1. Use the provided 1/2 inch (13 mm) female connection on the unit for the evaporator coil condensate drain. The drain line must be located so it will not be exposed to freezing temperatures. The drain should be the full size of the drain connection. (Connect the drain hose to the condensation drain or the janitor closet.)
2. A 1/2 inch (13 mm) ID (5/8 inch (16 mm) OD), PVC tubing is required for the drain. Insulate the drain hose; condensation may occur during humid conditions. (Field supplied material)

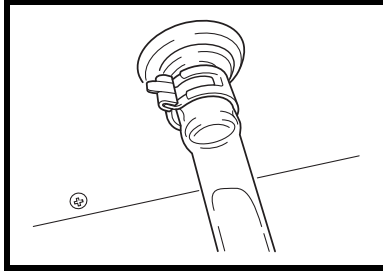


INSTALLATION (cont.)

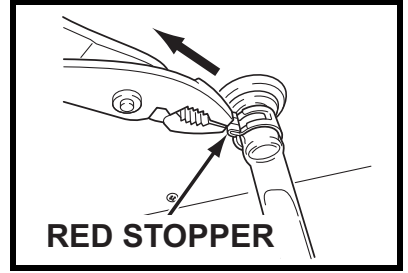
Drain Hose Connection (cont.)



1. Plug in the 1/2 inch (13 mm) drain hose with the lose clip into the drain pipe. Make sure the hose is all the way in and flush with the grommet.



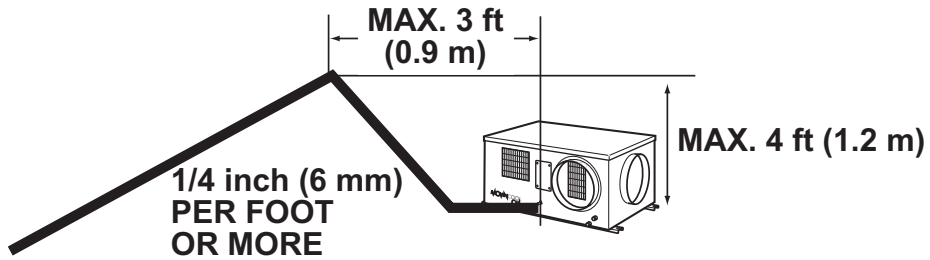
2. Position the clip to the top of the drain pipe near the unit as shown.



3. Pull out the red stopper and secure hose. Make sure there are no kinks or bends. When using the gravity drain, make sure the hose is connected as a decline.

Note: Do not use more than 4 feet (1.2 m) of drain hose vertically. This is maximum lift of the condensation pump.

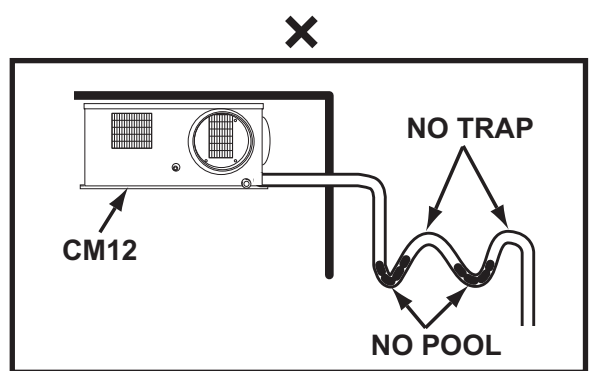
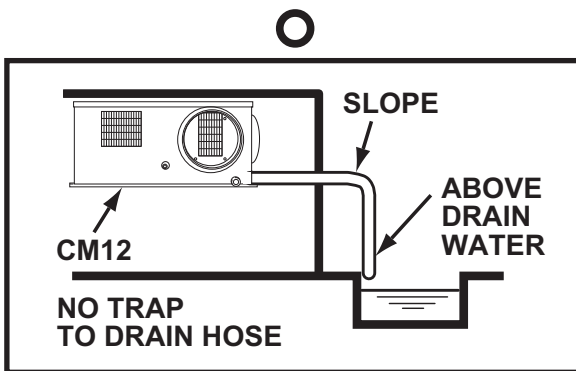
To insure proper drainage, locate the drain hose to the highest vertical position, no more than 4 feet (1.2 m) high, and run the hose to the drain, run the drain hose on a downward slope at a minimum rate of 1/4 inch (6 mm) per foot.



Check following items:

1. No kinks or bends on the drain hose
2. No trap in the drain hose
3. The end of the drain hose should be higher than the water level at the drain
4. No dripping from the drain hose at the clamping area

DRAIN HOSE ARRANGEMENT



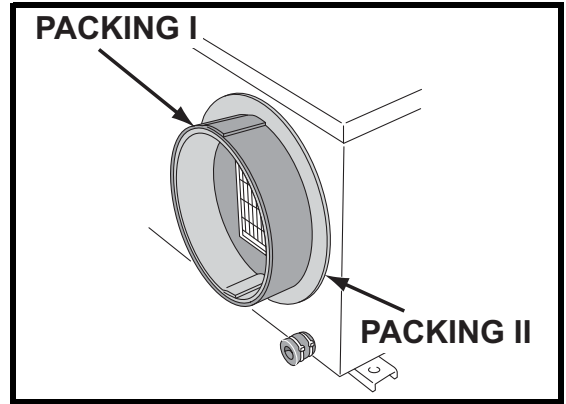
When uninstalling the unit, empty the drain pan by draining out the water through the drain pan drain pipe.

INSTALLATION (cont.)

Packing Attachment

Apply include “Packing I” (provided) and “Packing II” (provided) to the cold air outlet flange to prevent condensation in high humidity environments.

1. Release the liner on Packing I and apply to outside flange cylinder of the ring as shown.
2. Release the liner on Packing II and apply to edge of Packing II as shown.



Wall Thermostat Connection (Millivolt System ONLY)

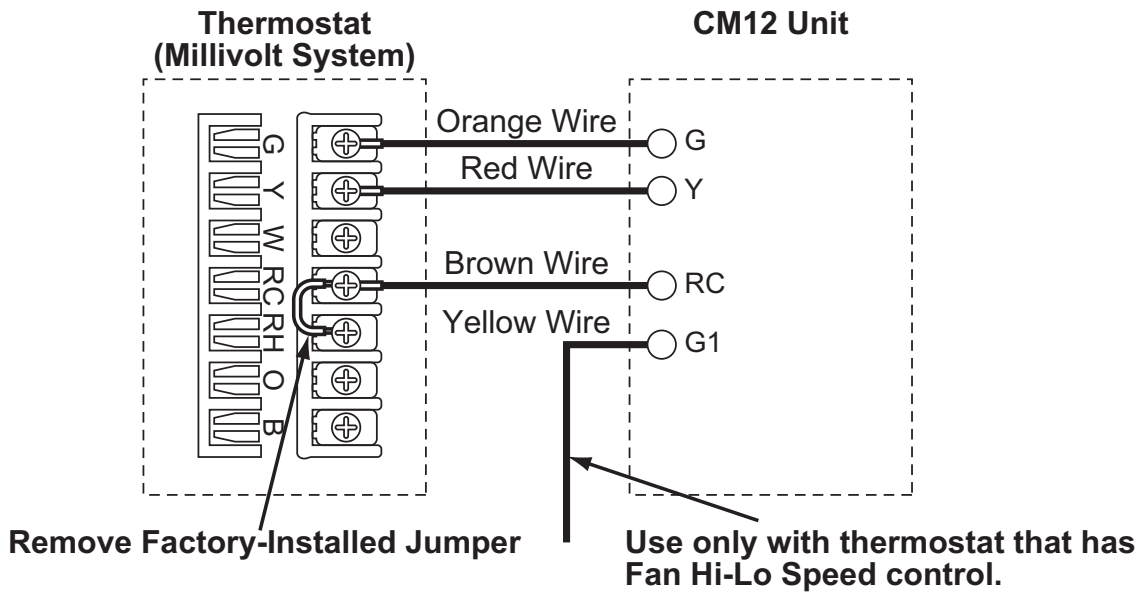
Preparation for Wall Thermostat Connection

1. Use with a single stage wall thermostat.
Thermostat type: Millivolt System
2. Set the wall thermostat to cooling system mode, since most wall thermostats are designed for both heating and cooling.
3. Prepare the wire harness for connection from the unit to the thermostat. The recommended wire size is:
Wire Type: Thermostat cable / Solid wire 16 ~ 26 AWG
4. Identify the thermostat connectors labeled G, G1, Y, and RC.
G (Fan On/Off), G1 (Fan Speed Hi/Lo), Y (Cooling On/Off) and RC (Cooling Transfer - Common)

Connecting Thermostat to CM12 Unit

Wall Thermostat Connector Name	CM12 WIRES		Function
	Label Name	Color	
RC	RC	Brown	Common
Y	Y	Red	Cool On/Off
G	G	Orange	Fan On/Off
G1	G1	Yellow	Fan Hi/Lo

INSTALLATION (cont.)



Note: Use thermostat that is compatible with millivolt system. Do not connect thermostat to AC power source.

5. Install the wall thermostat to the proper location inside the room where it can be conveniently accessed. Do not install the wall thermostat where unusual heating condition may occur (i.e. hot stove, hot pipe, fireplace, direct sunlight, and etc.)

Most thermostats provide these basic functions:

Fan Mode: On / Auto (Select the desired fan mode)
System: Cool / Heater (Select Cool only)

Warning Signal Connection (Output Signal)

The CM12's controller is equipped with a warning signal output relay type (Form-C, normal open dry contact), which can be used to monitor the failure condition.

Relay contactor is closed when the following condition has occurred:

- a. Condensation Overflow
- b. Temperature Sensor fails
- c. Cooling Function fails

The relay output contactor is rated 5 A at 30 VDC or 5 A at 250 VAC (resistive load), and it is compatible with various warning devices such as alarm speakers, light indicators, and etc.

Connecting Warning Signal From CM12

1. Connect the warning device to CM12 signal wires label L+ and L-.
2. Use recommended warning signal wire size from 16 AWG to 26 AWG for a solid wire, or 16 AWG to 22 AWG for a stranded wire.

INSTALLATION (cont.)

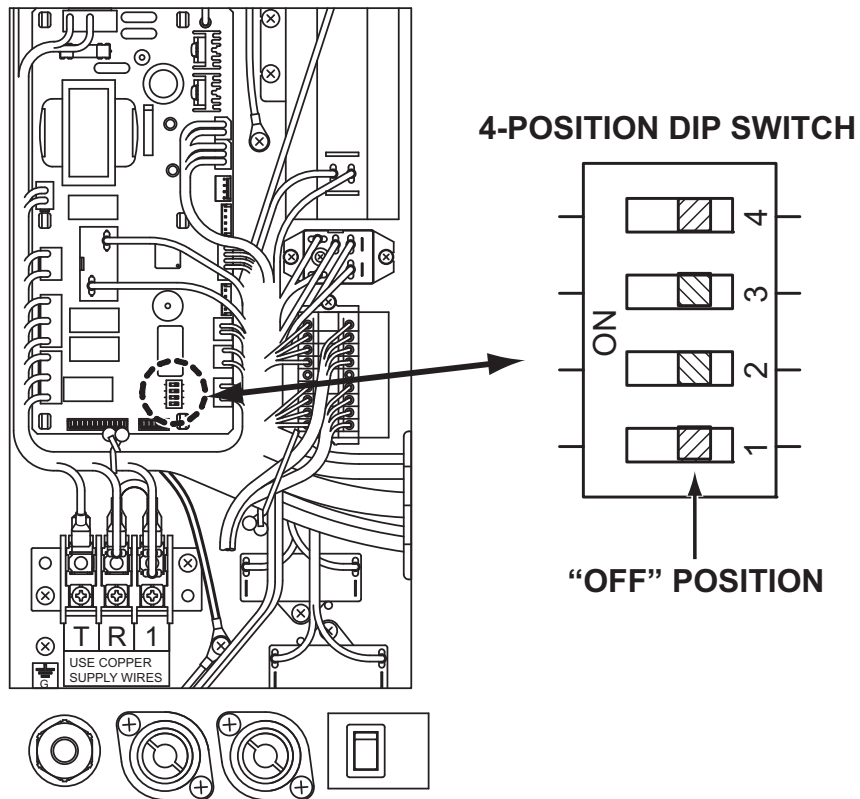
Fire Alarm Control Panel Connection (Input Signal)

The CM12's controller is equipped with a normal open input signal, which can be connected directly from the fire alarm control panel. When receiving the signal from the fire alarm control panel, the unit turns off and does not turn back on until power source is reset or turns the wall thermostat off and on.

Connecting Fire Alarm Control Panel to CM12

1. Connect the fire alarm signal wires to CM12 signal wires label E+ and E-.
2. Use recommended fire alarm signal wire size from 16 AWG to 26 AWG for a solid wire, or 16 AWG to 22 AWG for a stranded wire.

DIP Switch Configuration and Setting

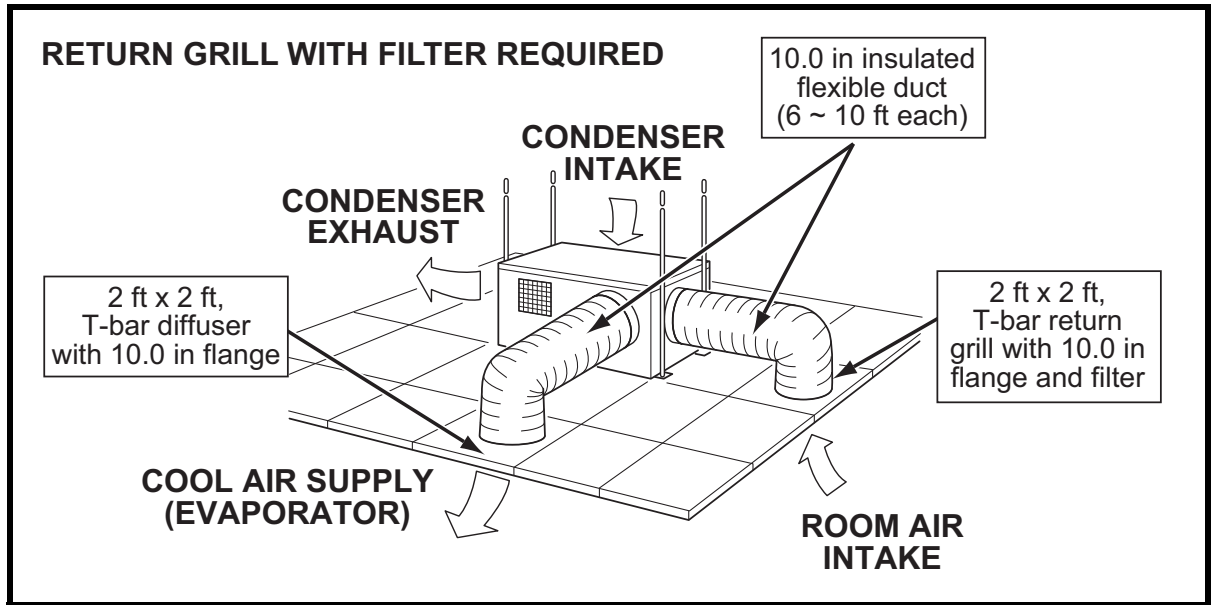


The CM12's controller is equipped with a 4-position DIP switch, which defaults in the OFF position. The DIP switch can be set to configure the following functions:

- a. When the switch position #1 is ON, the evaporator and condenser fan motor turn on. This function is used for test purposes and verification.
- b. When switch position #2 is ON, the compressor, evaporator and condenser fan motor turn on. This function is used for test purposes and verification.
- c. When switch position #3 is ON, the compressor delay timer function is disabled.
- d. When switch position #4 is ON, the buzzer sound function is disabled.

INSTALLATION (cont.)

Ducting With Typical Drop Ceiling



Use a 10.0 inch diameter insulated duct with low friction and air resistance.

The duct should be bent in a large radius. If the bending radius is less than 15.0 inch (381 mm), then use vanes or guides to reduce air resistance.

Make sure the ducts are secured in order to absorb vibration from the unit.

Avoid bending the duct suddenly and have air ducts travel in a straight line for improved performance.

- Following field supplied hardware requires:
 - Insulated 10.0 inch diameter ducts
 - Return air grill with filter for evaporator air intake
 - Diffuser for cold air
- Maximum external static pressure, 0.40 IWG (100 Pa) for evaporator duct and grills



CAUTION: Do not operate CM12 without the filter installed on the return air grill.

FEATURES

CM12 Features

- Built-in condensation removal pump
- Built-in mounting bracket
- Built-in flange for supply and return air (room air) - 10.0 inch diameter, 2.8 inch deep cylinder for easy installation
- Fire alarm control panel connection with automatic shut off
- Automatic shut off and warning signal output and alarm for
 - Condensation Overflow
 - Unit Failure (no cooling)
 - Temperature Sensor Failure

DAILY INSPECTION & MAINTENANCE

Cleaning Air Filters

The air filter on the evaporator return grill should be checked weekly for dust buildup.

Clean or replace air filter on a weekly basis. If the unit is used in a dusty environment, more frequent cleaning may be required.

A dirty air filter can reduce the air output, resulting in a decrease in cooling capacity.

Cleaning Condenser Air Intake

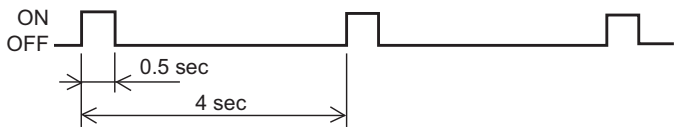
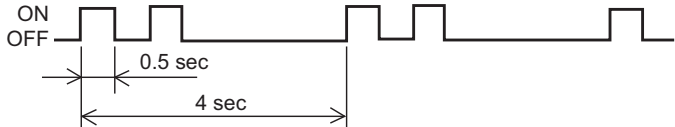
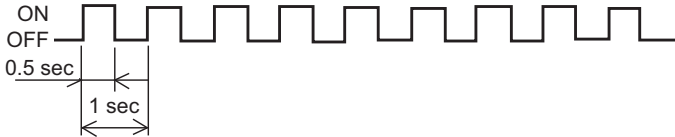

Inspect and remove dust buildup on the condenser air intake of the unit with a vacuum cleaner periodically to prevent insufficient cooling.

Ground Fault Breaker Testing

The ground fault breaker should be tested at least once a month.

TROUBLESHOOTING

Buzzer Pattern

<p>PATTERN 1 (Internal thermistor failure)</p>	
<p>PATTERN 2 (Pump or drain problem)</p>	
<p>PATTERN 3 (Refrigeration system problem)</p>	
<p>PATTERN 4 (Fire alarm signal input)</p>	

TROUBLESHOOTING (cont.)

Check the following items before calling your MovinCool reseller or a qualified technician.

SYMPTOM	POSSIBLE CAUSE	REMEDY
Unit does not operate	1. Power supply is off	Check circuit breaker.
	2. Power interruption	Unit will turn on automatically when power back (Some thermostats require reset).
	3. Blockage of air duct	Check duct for any blockages or excessive kinks in ducting.
	4. Turn off signal input	Check for turn off signal input (fire alarm control panel).
	5. Override (Stop) switch is active	Ensure the switch is in "OPERATE" position.
	6. Battery ran out on thermostat	Change battery.
Insufficient Cooling / Unit operation interrupted frequently.	1. Blockage of Condenser air intake or outlet in the ceiling	Check any blockages in the ceiling.
	2. Dirty Surface of Condenser Core	Clean surface of Condenser Core.
	3. Dirty / Blocked filters	Clean / replace air filter.
	4. Excessive evaporator air ducting	Evaporator ducting should not exceed 10 feet (3.0 m) and bend radius should be larger than twice of duct diameter.
	5. Blockage of Condenser air intake or outlet in the ceiling	Remove the blockage.
	6. Outside of operating range	Use within operating temperature range.
Beeping / Alarm coming from unit and unit stops. (Buzzer sound pattern indicated on page 18.)	1. Internal thermistor failure (Sound pattern 1)	Replace internal thermistor.
	2. Pump or drain problem (Sound pattern 2)	Check for drain connection and blockage, kink or bend on drain hose. (See "Drain Hose Connection" on page 11.)
	3. Refrigeration system problem (Sound pattern 3)	Turn off power source and contact your MovinCool reseller or a qualified technician.
	4. Receiving fire alarm signal input (Sound pattern 4)	Reset power source or turn the wall thermostat off and on.

If symptoms persist after the above actions have been taken, turn the unit off, disconnect the power and contact your MovinCool reseller or a qualified technician.

TROUBLESHOOTING (cont.)

CM12: Installation Check Sheet

		ITEMS	✓
Installation	Unit	Check and make sure all screws are tight and unit is secured in place.	
		Check and make sure inlet / outlet air exhaust are clear without blockage.	
	Wiring	Check and make sure the unit is properly connected to the dedicated circuit breaker.	
		Check and make sure all wiring are properly connected and secured.	
		Check and make sure ground wire is tighten and secured.	
	DIP Switch Setting	Check and make sure all DIP switches located on relay board are set to "OFF" positions.	
	Drain Hose Connection	Check and make sure that drain hose provided with heat insulator to prevent condensation on hose surface.	
	Grill Installation	Check and make sure that grill is secured and properly installed.	
	Wall Thermostat	Check and make sure wall thermostat is connected properly to unit.	
Other	Remove card board on condenser inlet side.		
Before Test Operation	Maintenance Switch	Check and make sure override switch located below maintenance's panel is at "OPERATE" position before test operation.	
Test Operation	Check Operation with Wall Thermostat	Set wall thermostat to Fan On or Fan Only mode to confirm fan only mode operation.	
		Set wall thermostat to Fan Auto or Cool mode operation. During cool mode operation, check and confirm cooling operation after delay timer is expired. (Note: Delay timer vary from 2 ~ 5 min depending on thermostat model used.)	
	Abnormal Noise	Check and observe abnormal noise during Blowing/Cooling operation.	
	Drain	During cooling operation, check and observe condensation drip through normal drainage path.	
	Air Leakage	Check for air leakage from duct and duct connection.	

TECHNICAL SPECIFICATIONS

Electronic Features	Control Panel		Wall Thermostat (Millivolt System)	
	Thermostat Control		Electronic	
Cooling Capacity		10,500 Btu/h (3,090 W)		#1, #2
Electrical Characteristics	Voltage Requirement		115 V, 1 Phase, 60 Hz	
	Total Power Consumption		1.23 kW	#1, #2
	Current Consumption		11.2 A	#1, #2
	Recommended Fuse Size		15 A	
	Min. Max. Voltage		Min. 104 V, Max. 127 V	
Fans	Motor Output (Evaporator) - high/low		0.04/0.01 kW	
	Motor Output (Condenser) - high/low		0.10/0.03 kW	
Evaporator	Fan Type		Centrifugal	
	Max. Air Flow - high/low		324/228 CFM (550/390 m ³ /h)	#1
	Max. External Static Pressure		0.16 IWG (40 Pa)	
Condenser	Fan Type		Centrifugal	
	Max. Air Flow - high/low		700/370 CFM (1,190/630 m ³ /h)	
	Max. External Static Pressure		0.12 IWG (30 Pa)	
Compressor	Type		Hermetic Rotary	
	Output		0.91 kW	
Refrigerant Charge	R-410A		1.23 lb (0.56 kg)	
Dimension	W x D x H (without flange and mounting bracket)		32.0 x 19.9 x 14.8 in (813 x 505 x 376 mm)	
	W x D x H (with flange and mounting bracket)		34.8 x 22.7 x 15.4 in (884 x 577 x 391 mm)	
Weight	Net / Shipping		128/142 lb (58/64 kg)	
Condensate Pump Capacity	Pump Rate		5.0 gal/h (19 L/h)	
	Head		4 ft (1.2 m)	
Operation Conditions	Evaporator	Max. Inlet Air	95 °F (35 °C), 50 %RH	#1, #3
		Min. Inlet Air	65 °F (18 °C), 50 %RH	
	Condenser	Max. Inlet Air	113 °F (45 °C), 50 %RH	
		Min. Inlet Air	65 °F (18 °C), 50 %RH	
Max. Duct Length	Cold Duct Hose		20 ft (6.1 m)	#4
	Hot Duct Hose		10 ft (3.0 m)	#4
Max. Sound Level	Under Ceiling Tile with Evaporator Duct		52 dB (A)	

#1: With two 6 feet (1.8 m) duct with one 90° bend each, supply grill and return grill with filter (0.16 IWG (40 Pa) external static pressure)

#2: Ambient condition for rating: Evaporator: 80 °F (27 °C), 50 %RH / Condenser: 95 °F (35 °C), 50 %RH

#3: When ambient temperature is lower than 65 °F (18 °C) operation may interrupt due to anti-freeze protection activation.

#4: Confirm pressure drop of duct, grills and filter with manufactures specifications.



LIMITED WARRANTY

DENSO SALES CALIFORNIA, INC. (“DENSO”) warrants its MOVINCOOL Products only to the extent stated in its official written warranties. Unless otherwise specifically provided in writing by DENSO, DENSO warrants to end-user that the Products shall be free of defects in materials or workmanship and will function in accordance with DENSO’s published specifications under ordinary intended use and service for a period of twelve (12) months after delivery to the end-user; provided, however in the case of the compressor element of the Products such warranty shall be for a period of thirty six (36) months after delivery to the end-user. DENSO shall, at its sole option, repair or replace any defective Product covered by this warranty. Such remedy shall be end-user’s sole remedy with respect to any particular defect in the Products.

This warranty does not cover defects or malfunctions which result from causes beyond DENSO’s control, including, without limitation, (i) unusual physical or electrical stress; (ii) accident, neglect, abuse, misuse or other abnormal use; (iii) failure to perform routine maintenance in accordance with DENSO’s recommended procedures; (iv) normal wear and tear; (v) repairs or attempted repairs by an unauthorized person; (vi) modifications or alterations to the Products; (vii) use with supplies or devices not supplied or approved by DENSO; or (viii) improper servicing. This warranty shall extend only to the original end-user and shall be void if any labels or other identifying marks permanently affixed to Products when shipped by DENSO are removed, altered, defaced or obliterated.

The aforesaid warranty is the only warranty made by DENSO with respect to the Products and is in lieu of all obligations or liabilities on the part of DENSO for damages arising out of or in connection with the sale, use or performance of the Products, including, without limitation, any lost profits or any other consequential, incidental, special or exemplary damages of any kind.

DENSO DISCLAIMS ALL OTHER WARRANTIES WITH REGARD TO THE PRODUCTS, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION CONTAINED HEREIN.

PURCHASE DATE: _____

SERIAL NUMBER: _____

DENSO

DENSO SALES CALIFORNIA, INC.

Long Beach, CA 90810

www.movincool.com

P/N: 484007-2961EN

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