Serial Number:

Purchase date:

Reseller:

Reseller's Tel:

MINOTAIR

COMPACT AIR TREATMENT UNIT

PENTACARE-V12 SERIES

USER GUIDE AND INSTALLATION MANUAL

(Seventh Edition V2)
(For use with Firmware Version 7.7.9)

PLEASE READ THIS MANUAL THOROUGHLY AND KEEP IT FOR FUTURE REFERENCE

Dear Customer,

Congratulations for purchasing this MINOTAIR product. Your MINOTAIR is a compact air treatment unit used to control the ventilation, temperature and humidity of your home. It does all this by filtering, dehumidifying, heating, cooling and renewing the indoor air – thus providing a healthy and comfortable environment all year round.

Our engineers have successfully integrated and optimized various techniques associated with ventilation and thermodynamics to build a high performance, energy-efficient device. As a result, the MINOTAIR offers superior recovery efficiency when compared to traditional Heat or Energy Recovery Ventilators. Not to mention that, unlike the MINOTAIR, none of these products can heat, cool or dehumidify by themselves. Only the MINOTAIR can claim to be truly multifunctional.

The MINOTAIR's digital control is designed to focus on the factors directly affecting comfort and air quality. Whether it is about the ventilation rate, temperature or humidity level – the information is always available at a quick glance.

Furthermore, you can rest assured knowing that you will not be left behind when new features become available, thanks to the MINOTAIR's USB Port. This makes it possible to update the microcontroller when upgrades are released for download on our website. Gone are the days when you would find out that your brand-new device was quickly becoming obsolete as subsequent features were coming to market. Your MINOTAIR will keep evolving and benefiting you for many years. By the way, new features are offered free of charge!

Finally, please take the time to read this guide thoroughly. It was written for you and contains both practical and important information. It will help you get the most out of your device. Store it for future reference, preferably close to the device.

The whole team thanks you for choosing MINOTAIR.

Karl Audet
President and Lead Engineer
MINOTAIR Ventilation Inc.

TABLE OF CONTENTS

SAFETY DEFINITIONS

WARNING: Indicates a dangerous situation that, if not prevented, could cause serious injury or death.

CAUTION: Indicates a situation that may cause damages to the device or lead to material damage or physical injury.

SAFETY INSTRUCTIONS

Please read these instructions carefully. Failure to follow these instructions could result in damages to the device or other safety hazards. It is very important to understand how this air treatment unit operates and how to perform maintenance procedures safely.

WARNING: *Electrical hazard*.
This device operates at 120 VAC, which is enough to cause serious injury or death. Always cut power to the device before performing maintenance or repairs.

WARNING: *Heavy equipment*.
Improper handling or installation of this device may cause serious injury or death. At least two people are required to hang or take down the device. The device must be suspended using all four installation hooks included for this purpose.

WARNING: *Combustion products*.
Never proceed with the installation of an extraction grille in an enclosed space containing fuel-burning equipment that may be prone to back drafting of combustion products such as an oil furnace, hot water gas heater, stove, fireplace, gas dryer, etc. Combustion products can cause serious poisoning or death.

CAUTION: *Risk of head injury*.
Use caution when opening the main access panel while the device is hanging above ground. Always support the panel until completely opened.

CAUTION: *Risk of water damage*.
This device can condense tens of liters of water every day, depending on humidity levels in the air. The condensate drainpipe must be connected to a floor drain or a dedicated pump. Moreover, in certain situations, there could be condensation forming on the outside walls of the unit and the distribution ducts. In this case, isolating the distribution ducts and adding a drain pan under the device could be required for added protection.

CAUTION: *Cutting hazard*.
Although care has been taken to prevent sharp edges on various parts, always be careful when handling the device from its edges.

CAUTION: *Construction and renovations*.
Before undertaking major painting or sanding projects, shut off ventilation to avoid clogging the air ducts and filters.

SETTING EXPECTATIONS

The following list is meant to clarify expectations following commissioning of the MINOTAIR in accordance with the instructions set forth in this manual. Keep in mind that the MINOTAIR should be installed and maintained in accordance with this manual to ensure optimal performance for many years.

- **Ideal humidity levels.** During winter, a 40% humidity level is ideal. It is, however, possible to adjust this setting depending on personal preference or until condensation appears on the windows. If condensation starts forming, lower your humidity setpoint. Please note that if temperature is lowered for the night, condensation is likely to appear on the windows in the morning. Morning condensation is normal, as long as it goes away once temperature is brought back up to the daytime setpoint. In summer, a 45% humidity level is very comfortable. At all time, the indoor humidity setpoint may be hard to reach and maintain if your house is not airtight or if you leave windows open.

- **Humidity setpoint.** It can take up to a week from the device's initial start-up to reach the humidity setpoint. This is normal and depends on various factors such as climate, occupant habits, furniture, house size, insulation and airtightness. Regarding the airtightness of the house, if the humidity setpoint cannot be reached, it is likely that the supply of air naturally entering the home through cracks and openings exceeds the MINOTAIR handling capacity. In this case, a point of equilibrium will form which will tend be more humid in summer and drier in winter.

- **Ventilation rate.** Too much ventilation will bring in an excessive amount of dry air in winter and humid air in summer. This could make it difficult to maintain humidity levels at the desired setpoint. On the other hand, insufficient ventilation will fail to renew the air in the house adequately and could lead to excess humidity. Make sure to follow the guidelines of this manual to plan and set the proper ventilation rate for your situation.

- **Heating and cooling**. While the MINOTAIR is able to heat and cool a house for parts of the year, it is unlikely to do so completely without the help of an auxiliary system, especially during the cold winter months. Furthermore, several factors can influence your heating and cooling needs. These factors include climate, house size, insulation, airtightness, window quality and area, windows' orientation in relation to the sun, and, of course, occupant habits such as leaving windows open.

- **Device maintenance.** The MINOTAIR is a sophisticated and safe air treatment system. Its proper operation can only be ensured if the device is adequately maintained. Filters must be changed regularly – every 3 months – and replacement filters must meet the specifications of the MINOTAIR. Furthermore, the condensate drainpipe and the outside air intake/outlet hoods must be inspected at least every 3 months. Clean them as necessary.

You are now ready to enjoy your MINOTAIR!

DEVICE OVERVIEW

The MINOTAIR is a multifunction device:

- Advanced control system.
  - Review the elements that affect comfort and air quality such as ventilation, temperature and humidity easily and at a quick glance!
  - Integrates the control of auxiliary units, including heating, cooling, and humidification for harmonized operations and maximum efficiency.
- High performance air exchanger.
  - Remove pollutants from the house, and oxygenates indoor air with fresh air from outside.
  - Dehumidifies and cools air in summer, and dehumidifies and recovers heat in winter.
- Self-contained heat pump.
  - Requires no installation of outside equipment other than the fresh air intake and stale air exhaust hoods.
  - Dehumidifies and cools air in summer; heats air in winter.
- Air Purifier with HEPA filtration.
  - Standard prefilters remove air dust, which could otherwise damage the device. These prefilters are MERV 8 (G4) rated and stop more than 90% of dust particles as small as 3.0 µm.
  - Standard MERV 15 (F9) High Efficiency filter removes up to 95% of particles as small as 0.3 µm.
- Powerful HumiWatch365© System.
  - Removes up to 56 liters/day (118 pints/day) of moisture from the indoor air depending on the level of humidity contained in the air, and without overheating air unlike conventional dehumidifiers.
  - Recovers the heat and moisture of showers to humidify indoor air when it is too dry, as required. Can also be connected to and control an auxiliary humidifier.

Figure 1 – MINOTAIR – Acts on temperature, humidity level and air renewal.

MAIN COMPONENTS

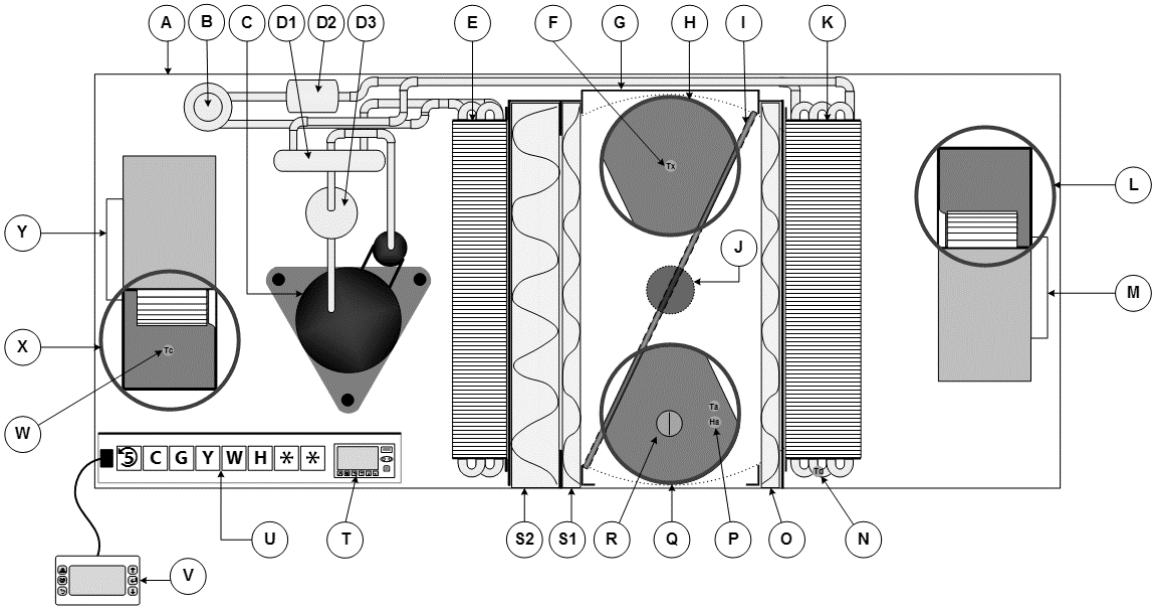


Figure 2 – MINOTAIR assembly and components.

A. Insulated finished aluminum housing with resistant powder paint.
B. Bidirectional expansion valve.
C. High efficiency compressor
D. 1) Reversible valve.
   2) Filter-dryer.
   3) Muffler.
E. Energy recovery coil – Distribution side.
F. Sensor – Outdoor temperature.
G. Motorized damper housing.
H. Fresh air intake.
I. Motorized damper.
J. Motorized damper actuator.
K. Energy recovery coil – Extraction side.
L. Stale air outlet.
M. Variable speed, constant airflow extraction fan.
N. Sensor – Defrost temperature
O. MERV 8 (G4) prefilter – Extraction side.
P. Sensor – Indoor humidity and temperature
Q. Stale air intake.
R. Condensate pan cap.
S. 1) MERV 8 (G4) prefilter – Supply side.
   2) High efficiency MERV 15 (F9) filter.
T. Microcontroller with integrated control.
U. Terminal board for auxiliary units such as a furnace, air conditioning and humidifier.
V. Wall-mount digital control.
W. Sensor – Conditioned temperature.
X. Fresh air outlet.
Y. Variable speed, constant airflow supply fan.

EXTERNAL OVERVIEW

The MINOTAIR's housing is 100 % aluminum, which makes it lighter and easier to handle. Furthermore, aluminum is a long-term guarantee against corrosion which, otherwise, would end up weakening the housing structure since it is always in contact with humidity and condensates.

The air outlets are located on top of the device for easy installation. This eliminates the need to add elbows to redirect the airflow upward to reach the main ducts, which are often installed in the ceiling joists.

The four installation hooks designed to suspend the device are each secured with a bolt, which allows the hooks to be positioned at an angle. This in turn enables more flexibility when aligning the hooks with their anchor points.

The installation hooks and their straps help level the device to perfection and are designed so as to attenuate the propagation of vibrations from the device to the structure of the house.

The transportation feet are designed to protect the condensate drains from collapsing when the device rests on the floor. Furthermore, these feet create a space under the device, which makes lifting it much easier for installers.

Access to components requiring maintenance – filters for example – is possible from the front of the device by opening the main access panel.

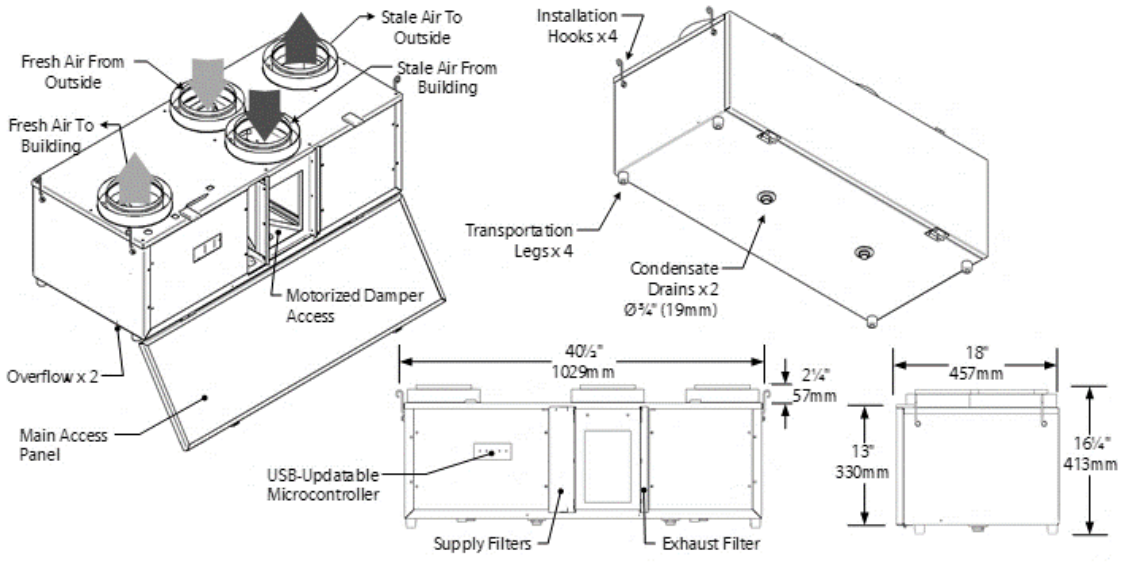


Figure 3 – External overview of the device.

OPERATING MODES

The MINOTAIR is the only system of its kind to combine a motorized damper with two constant airflow fans. The motorized damper can switch between two positions, which allow the MINOTAIR to function as either an air exchanger (ventilation) or a heat pump (recirculation). As a result, this allows for the development of various operating modes to optimize energy efficiency and occupant comfort.

1. AIR EXCHANGER MODE (VENTILATION)

- This mode controls two flows, one being fresh air and the other stale air. To operate in this mode, the motorized damper makes a clockwise rotation. In this mode, the microcontroller sets the same airflow for each fan.

- Air Exchanger Mode features include:
    - Filters air while removing pollutants from the house, and oxygenates indoor air with fresh air from outside.
    - Dehumidifies and cools air in the summer.
    - Dehumidifies and recovers heat in the winter.
    - Can also humidify when connected to an inline humidifier.

- When to use:
    - When it is imperative to have a continuous supply of fresh air. Note that at certain times of the year, this mode could make humidity management difficult; air too dry in winter and too humid in summer. Moreover, this mode could tend to over-ventilate resulting in increased energy usage. Running in this mode continuously could result in discomfort during certain periods of the year such as hot summer and cold winter days.

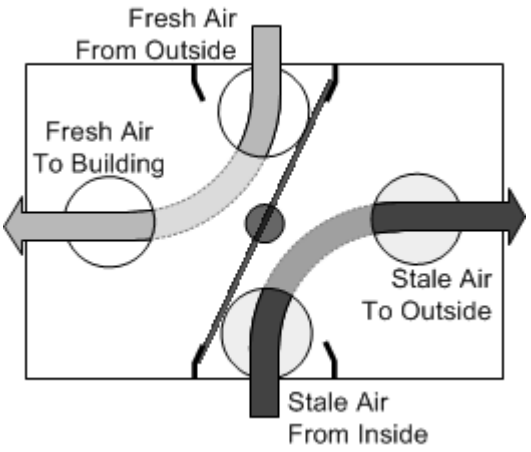


Figure 4 – Air Exchanger Mode (Ventilation).

2. HEAT PUMP MODE (RECIRCULATION)

- This mode controls two flows, one being indoor air recirculation and the other, outside air intake. To operate in this mode, the motorized damper makes a counter-clockwise rotation. In this mode, the airflows set by the microcontroller are not necessarily identical for the two fans, because the goal is to optimize the current operation (heating, cooling, and dehumidification). Thus, the left fan will usually have a lower airflow than the right fan, which should be close to the maximum possible airflow.

- Heat Pump Mode features include:
    - Dehumidifies and cools air in summer and heats air in winter.
    - Filters air while providing uniform humidity and temperature conditions.
    - Can also humidify when connected to an inline humidifier.

- When to use:
    - When comfort prevails over indoor air quality. Note that this mode does not allow any intake of fresh air, so it should not be used continuously.

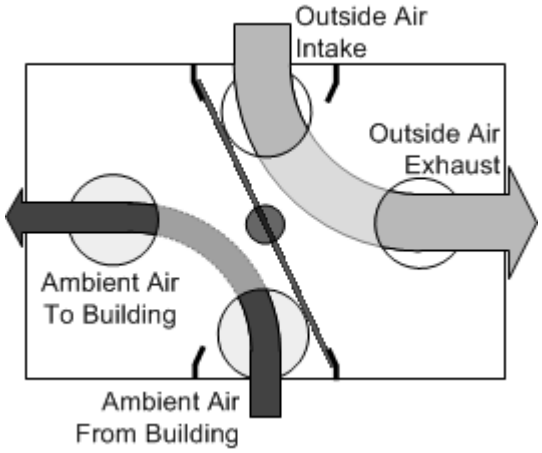


Figure 5 – Heat Pump Mode (Recirculation with Compressor).

3. RECIRCULATION MODE WITHOUT COMPRESSOR

- This mode controls a single flow, which is indoor air recirculation. To operate in this mode, the motorized damper makes a counter-clockwise rotation. In this mode, the left fan operates at the airflow set by the microcontroller while the right fan is practically stopped except when measuring the outside air temperature.

- Recirculation Mode features include:
    - Filters indoor air while providing uniform humidity and temperature conditions.
    - Ultra-low energy consumption.

- When to use:
    - When it is not possible or desired to have a supply of fresh air and there is no reason to heat, cool or dehumidify. Note that this mode does not allow any intake of fresh air, so it should not be used continuously.

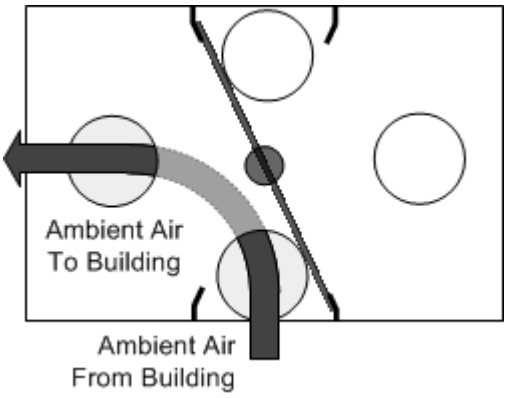


Figure 6 – Recirculation Mode without Compressor.

4. INTERMITTENT MODE

- This is a mixed mode that alternates between Air Exchanger and Recirculation modes. Four settings are possible:
    - **Intermittent-10**. Activates Air Exchanger Mode for 10 minutes before switching to Heat Pump Mode for 50 minutes, and so on.
    - **Intermittent-20**. Activates Air Exchanger Mode for 20 minutes before switching to Heat Pump Mode for 40 minutes, and so on.
    - **Intermittent-30**. Activates Air Exchanger Mode for 30 minutes before switching to Heat Pump Mode for 30 minutes, and so on.
    - **Intermittent-40**. Activates Air Exchanger Mode for 40 minutes before switching to Heat Pump Mode for 20 minutes, and so on.

- Intermittent Mode features include:
    - Lower energy consumption.
    - All the benefits of Air Exchanger and Heat Pump Modes, depending on the type of intermittency selected.
- When to use:
    - During prolonged absences to ensure a minimum supply of fresh air.
    - If air becomes too dry in winter, lower the intermittency as needed.
    - Could tend to over-ventilate if intermittency is set too high.

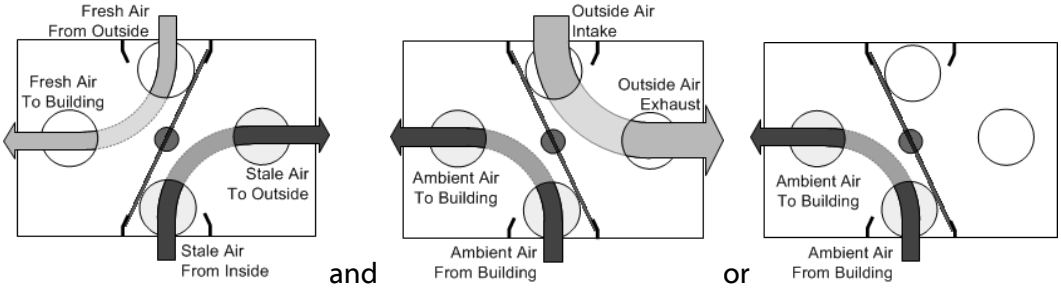


Figure 7 – Intermittent Mode 10, 20, 30 or 40 – with heat pump recirculation.

5. SMART MODE

- This is a mixed mode in which priority is given to humidity management and fresh air supply according to ASHRAE Standard 62.2. When the fresh air requirement is satisfied, the unit can switch to heat pump or recirculation modes as needed.

- Smart Mode features include:

    - Greatly optimizes humidity management.
    - Ensures compliance to ASHRAE Standard 62.2 over a twenty-minute time window, three times an hour.
    - Switches to heat pump mode upon calls for heat or cooling.
    - Switches to Free Cooling (no compressor) or to Turbo Cooling (free cooling with compressor) when outside conditions permit.
    - Goes into recirculation mode when the fresh air requirement is met and there is no need to heat, cool or dehumidify.

- When to use:
    - Always! Unless you have a specific reason to use a different mode, the Smart mode is the ideal and recommended option.
    - Combine the Smart mode with the operation of heating and cooling in *automatic* mode and you will get an integrated indoor air management system that is fully automated. In other words, once the unit is set to your preferences, you will forget it's there.
    - This is the only mode that fully abides to the ASHRAE Standard 62.2.

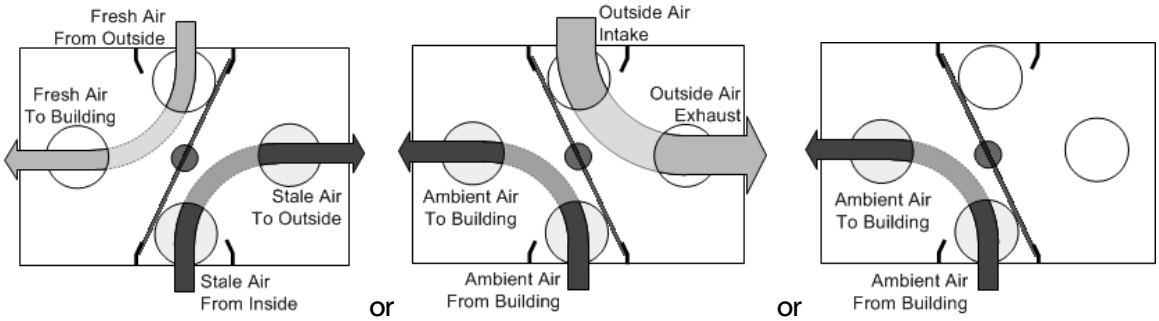


Figure 8 – Smart Mode.

INSTALLATION PROCEDURES

IMPORTANT INSTALLATION REQUIREMENTS

PERSONAL SAFETY

- Wear safety glasses when installing the MINOTAIR.
- Follow professional safety standards and all local regulations.

REGULATIONS

- **WARNING!** The MINOTAIR should be installed in accordance with the local building codes that are in effect. In absence of such requirements, it is advisable to check with local authorities having jurisdiction in your area.

DEVICE INSPECTION

- **WARNING!** Do not power on the device at this point.
- Inspect the exterior of the device to make sure it is not damaged.
- Make sure the panel, the hinges, the damper, the vents, the fan blades, the housing and the installation hooks are in good condition.
- Any damage sustained during transport must be reported within 24 hours of delivery.

CHOOSING WHERE TO INSTALL THE MINOTAIR

- Choose an accessible location that will allow and facilitate maintenance and repairs.
- Avoid lounging areas, offices and bedrooms. It is recommended to soundproof the selected location if it is too close to rooms where quietness is desired. In this case, use a solid core door and affix a rubber door sweep (weather strip) at its bottom to seal the space between the bottom of the door and floor. Do not use louvered or accordion doors as they have no soundproofing property.
- The device must be installed indoor, never outside, and the location must maintain a temperature between 16°C and 27°C (60°F and 80°F).
- The device must be located near a 120-VAC electrical source, which must be dedicated to the device. **No other device can use this same circuit**.
- The location must be close to a floor drain. If that is impossible or if there is no floor drain in the house, you must install a condensate pump (not supplied) in order to eliminate condensation in a water return pipe. For example, a washing machine return pipe could be used. Condensate pumps can be found in most hardware stores.
- If the air ducts are not already installed, it is preferable to plan their course before deciding on the unit's final location.

CHOOSING AN INSTALLATION METHOD

- The MINOTAIR must be installed using one of the three following methods:
  - Connection to a forced air ventilation system – Simplified method.
  - Connection to a forced air ventilation system – Extraction at the source.
  - Connection to an independent system of ventilation ducts.

CONNECTION TO A FORCED AIR VENTILATION SYSTEM – SIMPLIFIED METHOD

- This is the easiest installation method, though not necessarily the preferred one. It will provide fresh air to all rooms supplied by the ventilation system. Stale air and humidity extraction are done through the return plenum which could make humidity management more difficult than if the extraction were done at the source.
- This method is only possible if the MINOTAIR can be installed in the same room where the forced-air system ventilator is located. It is required that the forced air ventilator runs continuously or ventilator operations is interlocked with the "G" terminal of the MINOTAIR.
- **IMPORTANT**: Only use acoustic flexible ducts capable of withstanding a negative static pressure of -1.5 in of Water Colum (in H_2O) to prevent the ducts liner from imploding.

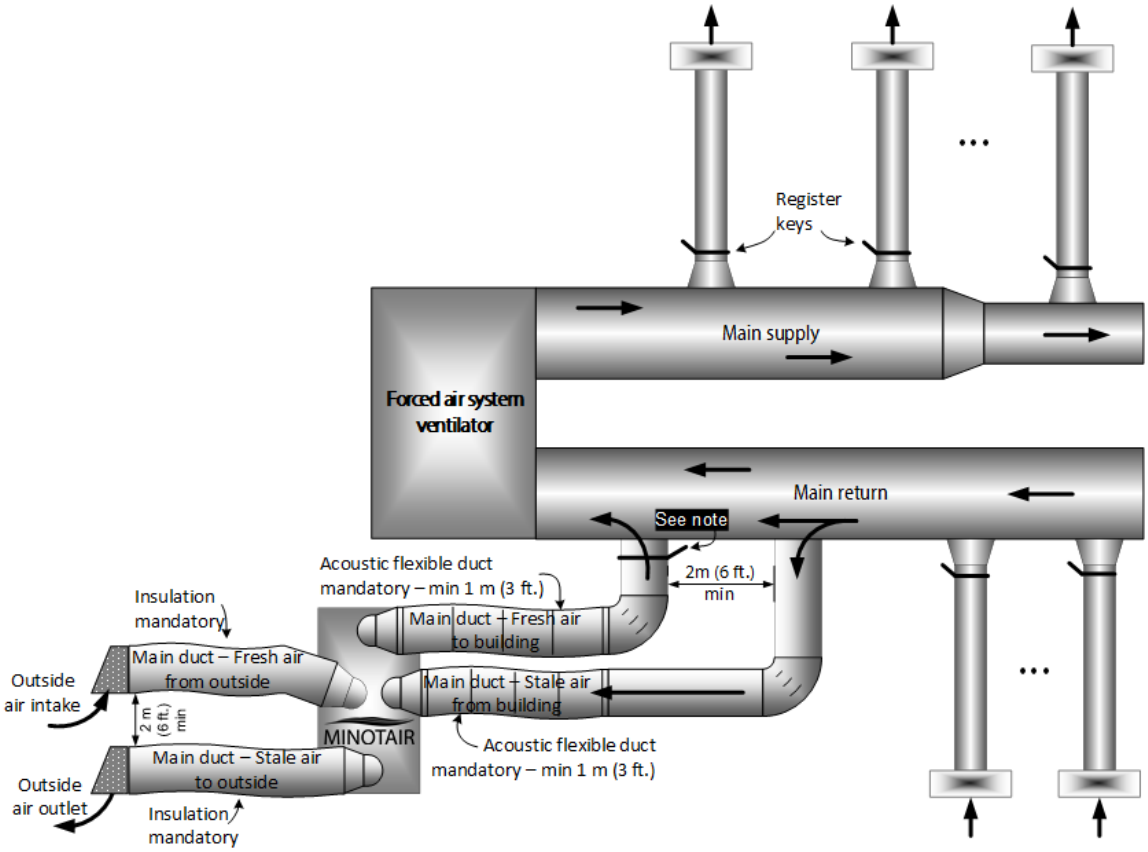


Figure 9 – Connection to a forced air ventilation system – Simplified method.
(The two MINOTAIR center ports are swapped for more clarity in the drawing)

NOTE: It is important to refer to the section about "**Preventive Measures**" on page 18 to assess the need to add a register key at this location.

CONNECTION TO A FORCED AIR VENTILATION SYSTEM – EXTRACTION AT THE SOURCE

- This installation method is preferred over the "Simplified Method" described previously. If you must choose between the two, it is better to choose "Extraction at the Source" to fully benefit from the HumiWatch365© system.
- This method will provide fresh air to all rooms supplied by the ventilation system. However, stale air and moisture will be extracted directly at the source through dedicated ducts to ensure better humidity management.
- This option is only possible if the MINOTAIR can be installed in the same room where the forced-air system ventilator is located. It is required that the forced air ventilator runs continuously or ventilator operations is interlocked with the "G" terminal of the MINOTAIR.
- **IMPORTANT**: Only use acoustic flexible ducts capable of withstanding a negative static pressure of -1.5 in H_2O to prevent the ducts liner from imploding.

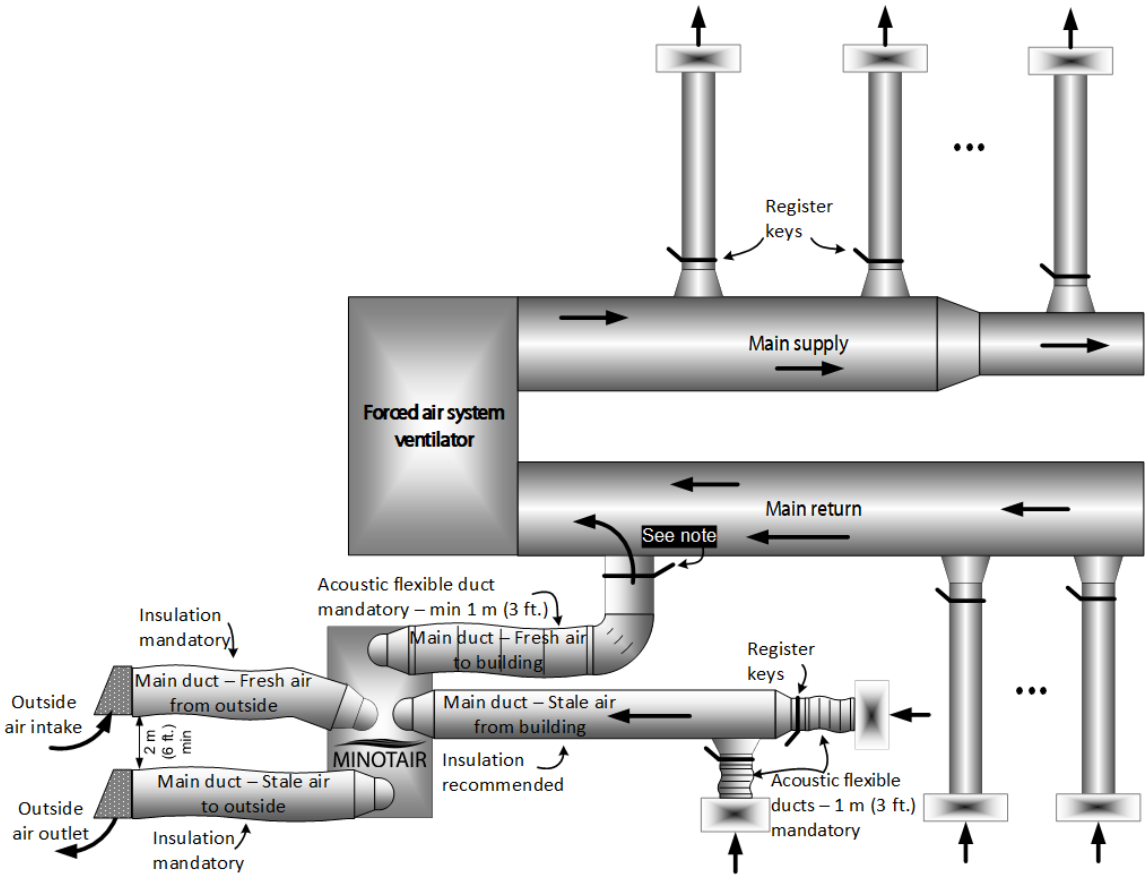


Figure 10 – Connection to a forced air ventilation system – Extraction at the source.
(The two MINOTAIR center ports are swapped for more clarity in the drawing)

NOTE: It is important to refer to the section about "**Preventive Measures**" on page 18 to assess the need to add a register key at this location.

PREVENTIVE MEASURES – FORCED AIR VENTILATOR

- In case the MINOTAIR is connected to a forced air ventilation system, the MINOTAIR's minimum airflow must be confirmed in order to deal with the large pressure differences between the forced-air system and the MINOTAIR.
- To do this, run the forced-air system ventilator at full speed while running the MINOTAIR at its lowest speed, i.e., 80 cfm (40 l/s), in recirculation mode without the compressor.
- Verify that the static pressure reported by the MINOTAIR is greater than or equal to 0.1 in H_2O (25 Pa) (refer to the "ventilation" menu).
- If it is not *(i.e., the pressure is equal to 0.0 in H_2O (0 Pa) or less),* you will need to install a register key (Figure 9 and Figure 10) and adjust it until the static pressure indicates 0.1 in H_2O (25 Pa).
- That's it! The MINOTAIR constant airflow fans will ensure real time tuning of supply and exhaust airflow from now on.
- **CAUTION!** Failure to confirm the minimum airflow may cause the supply fan to fail irremediably due to operating in a negative pressure environment.

CONNECTION TO AN INDEPENDENT SYSTEM OF VENTILATION DUCTS

- This type of installation is required when the house is heated through electric baseboards or a radiant system. Since these systems do not include forced air ventilation ductwork, it is necessary to install a dedicated system of ventilation ducts.
- Like the previous method, stale air and moisture will be extracted directly at the source through dedicated ducts to ensure better humidity management. Therefore, one will be able to fully benefit from the HumiWatch365© system.
- For this type of installation, it is **mandatory** to include a section of acoustic flexible duct measuring 1 m (3 ft) at the end of each supply and extraction branch; this will soundproof the air ducts.
- **IMPORTANT**: Only use acoustic flexible ducts capable of withstanding a negative static pressure of -1.5 in H_2O to prevent the extraction ducts liner from imploding. Moreover, if the flexible duct must move moist air (humidifier, bathrooms), the insulation must be protected by a vapor barrier located between the liner and the insulation. The Minotair *AcoustiCare*© series of flexible ducts and prefabricated mufflers are products that meet all these requirements for peace of mind installations.

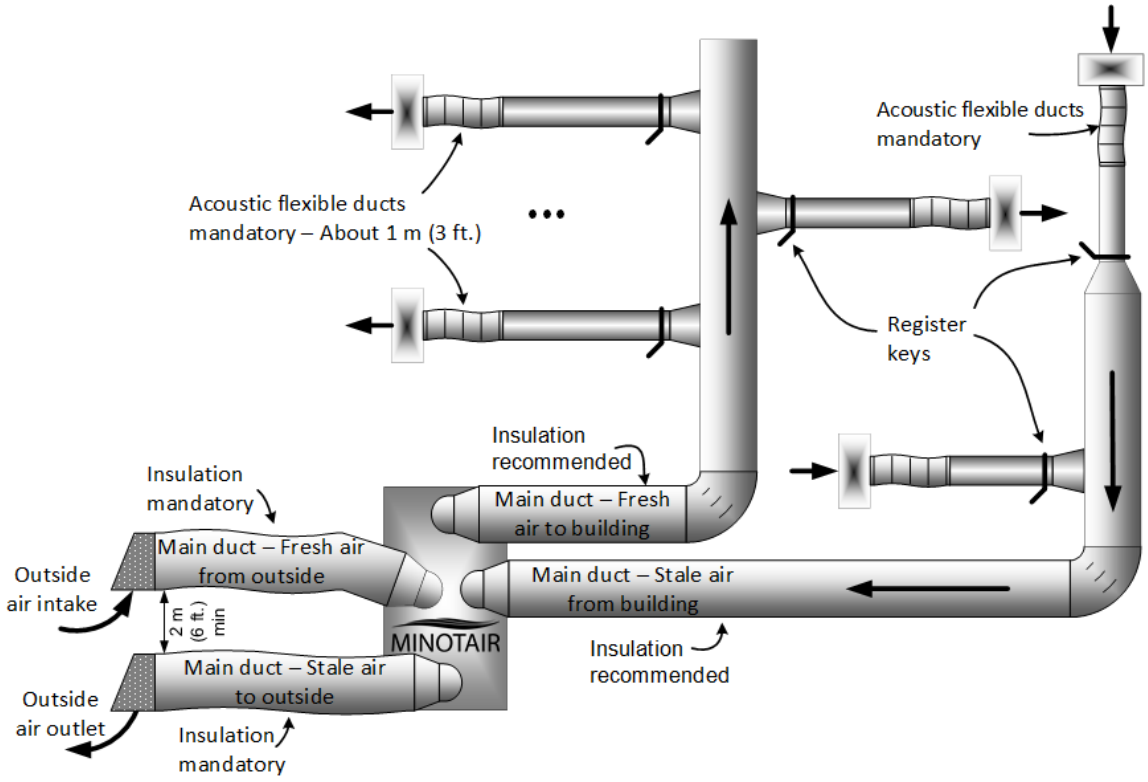


Figure 11 – Connection to an independent system of ventilation ducts.
(The two MINOTAIR center ports are swapped for more clarity in the drawing)

CALCULATING VENTILATION AIRFLOW

- The airflow rate of fresh air required for the entire house must be established between the airflow required for its occupants and that established by adding together the airflow required for each room, as indicated in the shaded columns below, unless calculated by a qualified professional. Airflows are denoted in cubic feet per minute (cfm) or liters per second (l/s).
- The smaller a room is in comparison to the other rooms, the closer the airflow rate must be to the "Min" value. Bigger rooms will require airflow rates closer to the "Max" value.

	For each dwelling	**Recommended airflow for each room**				**Air ducts diameter for each room**			
		cfm		**l/s**		**in**		**mm**	
	Rooms requiring a fresh air supply*	**Min**	**Max**	**Min**	**Max**	Min	Max	Min	Max
SUPPLY	Each bedroom (one person)	10	20	5	10	5	5	125	125
SUPPLY	Each bedroom (two persons)	20	30	10	15	5	6	125	150
SUPPLY	Home office	10	20	5	10	5	5	125	125
SUPPLY	Main lounging room (living room)	10	20	5	10	5	6	125	150
SUPPLY	Each floor not already serviced by air supply	10	20	5	10	5	6	125	150
SUPPLY	Basement if not already serviced by air supply	10	20	5	10	5	6	125	150
SUPPLY	**Optional rooms to be supplied with fresh air***								
SUPPLY	Dining room	10	20	5	10	5	6	125	150
SUPPLY	Family room	10	20	5	10	5	6	125	150
SUPPLY	Play room	10	20	5	10	5	6	125	150
SUPPLY	**Kitchen** (This will help the range hood work better).	10	20	5	10	5	6	125	150
SUPPLY	Any other furnished room	10	20	5	10	5	5	125	125
EXTRACTION	**Recommended rooms for stale air extraction***								
EXTRACTION	Bathroom or shower	60	80	30	40	5	6	125	150
EXTRACTION	Restroom	10	20	5	10	5	5	125	125
EXTRACTION	Kitchen (**Not recommended**. Use a range hood instead.) (Minimum distance between the extraction grille and any cooking surface must be no less than 3 m (10 ft.)).	10	20	5	10	5	6	125	150
EXTRACTION	Laundry room	10	20	5	10	5	5	125	125
EXTRACTION	Basement	10	20	5	10	5	6	125	150

* Treat each room comprised in an open space as an individual room

Number of permanent occupants × 15 cfm (7.5 l/s) Number of pets × 7.5 cfm (4 l/s) (Do not count guests or visitors)	**Required fresh air supply** *(Write results)*		**Main ducts minimum diameter**			
	cfm	l/s	cfm	l/s	in	mm
Total fresh air supply [1,2] 1. Decide on a value within the range of airflows from the calculation based on occupants and rooms. 2. Input this value into the microcontroller			≤ 90	≤ 40	6	150
			> 90	> 40	8	200

Table 1 – Airflow planning.

SIZING AIR DUCTS

- To minimize turbulence and ventilation noise, the ducts must be sized based on the numbers in the shaded columns below unless they have been otherwise sized by a qualified professional. The conduit diameters are denoted in inches (in) or in millimeters (mm).
- The duct diameter must be proportional to the airflow established for the room. Thus, if the airflow has been established based on the "Min" column, then the duct diameter should also be sized according to the "Min" column. If the "Max" column or another value in between was used than the duct must be sized according to the "Max" column, or the adequate value in between "Min" and "Max". If there is no in between value, use the "Max" value.
- If in doubt, use the "Max" value.

	For each dwelling	Recommended airflow for each room				Air ducts diameter for each room			
		cfm		l/s		in		mm	
		Min	Max	Min	Max	Min	Max	Min	Max
SUPPLY	**Rooms requiring a fresh air supply***								
	Each bedroom (one person)	10	20	5	10	5	5	125	125
	Each bedroom (two persons)	20	30	10	15	5	6	125	150
	Home office	10	20	5	10	5	5	125	125
	Main lounging room (living room)	10	20	5	10	5	6	125	150
	Each floor not already serviced by air supply	10	20	5	10	5	6	125	150
	Basement if not already serviced by air supply	10	20	5	10	5	6	125	150
	Optional rooms to be supplied with fresh air*								
	Dining room	10	20	5	10	5	6	125	150
	Family room	10	20	5	10	5	6	125	150
	Play room	10	20	5	10	5	6	125	150
	Kitchen (This will help the range hood work better).	10	20	5	10	5	6	125	150
	Any other furnished room	10	20	5	10	5	5	125	125
EXTRACTION	**Recommended rooms for stale air extraction***								
	Bathroom or shower	60	80	30	40	5	6	125	150
	Restroom	10	20	5	10	5	5	125	125
	Kitchen (**Not recommended**. Use a range hood instead.) (Minimum distance between the extraction grille and any cooking surface must be no less than 3 m (10 ft.)).	10	20	5	10	5	6	125	150
	Laundry room	10	20	5	10	5	5	125	125
	Basement	10	20	5	10	5	6	125	150

* Treat each room comprised in an open space as an individual room

	Required fresh air supply *Write result*		Main ducts **minimum** diameter			
	cfm	l/s	cfm	l/s	in	mm
Total fresh air supply [1] 1. The total extraction airflow must be identical	*Your answer from the previous step*		≤ 90	≤ 40	6	150
			> 90	> 40	8	200

Table 2 – Air ducts planning.

- The main ducts' diameter depends on the airflow that was calculated at the previous step. If the calculated airflow is 90 cfm (40 l/s) or less, it is possible to use main ducts of 6" (150 mm). The maximum airflow of the main ducts will then be required to be adjusted between 180 cfm and 215 cfm (85 l/s and 100 l/s) in the microcontroller's ventilation menu. Note, however, that this setting will decrease heating and cooling capacity in heat pump mode by up to approximately 25% depending on current temperatures and humidity level.
- If enough space is available, it is always preferable to choose main ducts of 8" (200 mm) to use the MINOTAIR to its full potential. The maximum airflow of the main ducts will then be required to be adjusted between 220 cfm and 250 cfm (105 l/s and 120 l/s) in the microcontroller's ventilation menu. If space does not allow the use of 8" (200 mm) ducts for all main ducts, you must favor the main distribution duct (fresh air to building) to minimize the ventilation noise at the supply grilles.
- **IMPORTANT!** In high speed or heat pump mode, airflow increases significantly. To minimize the noise of the air in motion, it is required to have a minimum number of supply and return ducts based on whether the main ducts are 6" (150 mm) or 8" (200 mm) in diameter:

    - **Main ducts – 8" (200 mm) for an airflow ranging between 220 cfm and 250 cfm (105 l/s and 120 l/s):**

        *Minimum recommendations for **supply** and **extraction** ducts:*

        - Minimum 3 x 6" (150 mm) ducts, or
        - Minimum 2 x 6" (150 mm) duct and 2 x 5" (125 mm), or
        - Minimum 1 x 6" (150 mm) duct and 3 x 5" (125 mm, or
        - Minimum 5 x 5" (125 mm) ducts.

    - **Main ducts – 6" (150 mm) for an airflow ranging between 180 cfm and 215 cfm (85 l/s and 100 l/s):**

        *Minimum recommendations for **supply** and extraction ducts:*

        - Minimum 2 x 6" (150 mm) ducts, or
        - Minimum 1 x 6" (150 mm) duct and 2 x 5" (125 mm), or
        - Minimum 4 x 5" (125 mm) ducts.

GUIDELINES FOR AIR DUCTS

- All ventilation ducts must be made of rigid materials, in galvanized sheet metal or an equivalent material, and be cleanable when needed. However, if rigid ducts are not a possibility, flexible materials can be used (see "Installing flexible ducts").
- Air ducts must always be installed on the warm side of the building envelope, such as the interior walls, the floors or the ceilings. Avoid installing ducts in the attic or in unheated spaces, but where this cannot be avoided, use ducts with an R-Value of at least **R- 24 (RSI 4.2).** Attics can reach extremely high temperatures in summer and very cold temperatures in winter.
- All air ducts located on the cold side, namely the fresh air intake from outside and the stale air exhaust to outside, must have an R-value of at least R-4 (RSI 0.7), **ideally R-8 (RSI 1.4)** especially if your location is subject to harsh winters where it's not uncommon to reach -15°C (5°F) and below**.**
- It is advisable to fully insulate the supply ductwork with an R-Value of **R-4 (RSI 0.7)** to minimize energy losses when distributing heated or cooled air. If this is not possible, it is nonetheless advisable that at least the first 6 feet (2 m) of the supply ductwork starting from the Minotair be insulated.
- **CAUTION!** During cooling and dehumidification operations, condensation could form on the outside walls of the unit and the supply ducts, which could cause water damage. In this case, isolating the supply ducts and adding a drain pan under the Minotair could be required for added protection.
- It is not necessary to insulate extraction ducts unless there is a risk of condensation or if the ductwork passes through hot or cold areas that could alter the return temperature read by the Minotair.
- All insulating sleeves must be equipped with a vapor barrier film made of aluminum for its robustness. All joints must be airtight and sealed with aluminum tape.
- All ducts that go through an air or vapor barrier must be sealed hermetically at the point of entry.
- All ventilation ducts must be airtight. To achieve this, all joints, cracks and holes on the ducts, as well as all fittings, must be sealed with mastic or aluminum tape.
- Straight tees and elbows (without bends) should be avoided. Choose wye fittings and curved elbows for better flow and soundproofing.

- **IMPORTANT!** To minimize the static pressure (air restriction) in the ventilation ductwork, departures on the four vents must be vertical and **WITHOUT** any bend radius exceeding 30°. The length of each vertical departure must measure a minimum of 6" (15 cm). Use 6" to 8" taper increasers to allow for efficient airflow and ease-up the installation of insulation sleeves. Tuck the insulation between the 6" and 8" port walls, and tape the vapor barrier to the outside wall of the 8" port with aluminum tape.

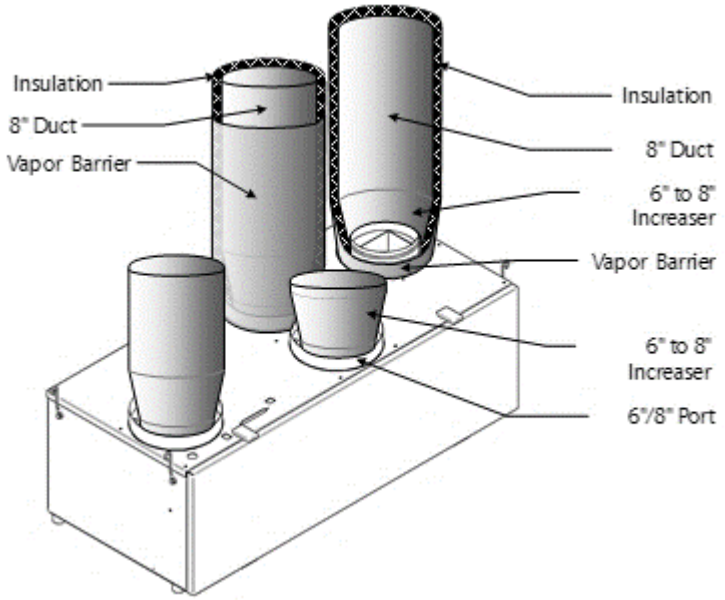


Figure 12 – Efficient airflow and easy installation of insulation sleeve using 6" to 8" increasers.

- **Acoustic ducts**. It is mandatory to install a section of acoustic flexible duct measuring about 3 ft. (1 m) at the end of each supply run to reduce ventilation noise and ensure optimal soundproofing of the distribution network (see next figure). The same must also be done for the return ducts for optimum sound comfort. Acoustic flexible duct is nothing more than insulated flexible duct for which the liner was perforated with thousands of tiny holes and which, like a muffler, will absorb the majority of sound waves caused by the air in motion and mechanical components. Use the Minotair *AcoustiCare*© series of flexible ducts and prefabricated mufflers for peace of mind installations.

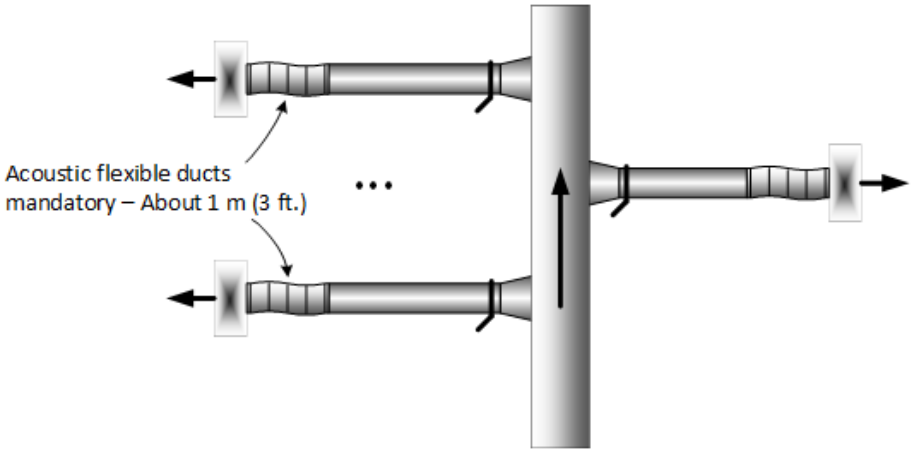


Figure 13 – Install acoustic flexible duct at the end of each supply run.

INSTALLING FLEXIBLE DUCTS

- Generally, flexible ducts should be avoided because they produce a lot of restriction which leads to a higher static pressure (air restriction) inside the ductwork. The higher the static pressure, the more the fans will have to rotate to compensate, which in turn increases ventilation noise and energy consumption.
- If and when you install flexible ducts, they must:
    - Be of the highest quality and capable **of sustaining a negative static pressure of -1.5 in H_2O** for the extraction ducts and the fresh air intake,
    - Be as short as possible,
    - Be stretched enough to reduce the internal roughness caused by the duct's natural folds,
    - Not be crushed, and
    - Not have a bend radius inferior to the rigid elbows' bend radius when changing direction. If this is not possible, replace the curved portion by its rigid equivalent and isolate it as required.
- **IMPORTANT**: Only use acoustic flexible ducts **capable of withstanding a negative static pressure of -1.5 in H_2O** to prevent the extraction ducts liner from imploding. Moreover, if the flexible duct must move moist air (humidifier, bathrooms), the insulation must be protected by a vapor barrier located between the liner and the insulation. The Minotair *AcoustiCare*© series of flexible ducts and prefabricated mufflers are products that meet all these requirements for peace of mind installations.

VALIDATING THE DUCTS INSTALLATION

- **IMPORTANT!** To avoid problems caused by too much air restriction in ductwork, make sure that the static pressure does not exceed 1.5 in H_2O (375 Pa) when operating in Air Exchanger and Recirculation modes with the unit running at full capacity, depending on the previously selected maximum airflow setting. Use the last screen of the "Ventilation" menu to get the static pressure reading.
- If you get a static pressure greater than 1.5 in H_2O (375 Pa), you must identify the causes of this excessive pressure and apply remedial actions. Possible causes mostly comprise the improper installation of ductwork. For example, the use of undersized conduits, crushed flexible conduits and their non-compliance with the minimum bend radius.

LOCATION OF INDOOR GRILLES

SUPPLY GRILLES

- The air supply grilles must be located and installed in a manner that optimizes air circulation in the rooms.
- Generally, air distribution must be performed through wall grilles. The air supply grilles must be located on the upper part of the wall, at least 1 ft. (30 cm) from the finished ceiling and at least 6 ft. (2 m) from the floor.
- It is also possible to distribute air through floor registers. However, floor registers do not provide as good air circulation as wall grilles, and can be a source of discomfort for some persons.

EXTRACTION GRILLES

- Generally, air extraction must be performed through wall grilles. The air extraction grilles must be installed on the upper part of the wall, at least 1 ft. (30 cm) from the finished ceiling and at least 6 ft (2 m) from the floor.
- **WARNING!** The extraction grilles cannot be installed less than 10 ft. (3 m) from a cooking surface. Air extraction from cooking surfaces must be performed by a range hood.
- It is also possible to perform air extraction through floor registers. However, floor registers are prone to capturing debris that could clog the inside of the air return ducts.

LOCATION OF OUTSIDE HOODS

- Outside hoods must be wall type.
- All outside hoods which go through the building envelope must:
    - Be hermetically sealed, on their perimeter, to the sealing system they penetrate.
    - Be equipped with a grid to stop small rodents from entering. This grid must not be too fine, because it could restrict air from passing through and become easily clogged with dust.
- The fresh air intake hood must be located at least 1 ft. 6 in (45 cm) from surfaces where snow may accumulate and at least 6 ft. (2 m) from any exhaust air outlet, driveways or any other source of contamination.
- The stale air exhaust hood must be located at least 1 ft. 6 in (45 cm) from surfaces where snow may accumulate and be equipped with an airtight back draft damper.
- Whenever possible, the slope of the conduits connecting to the outside hoods should have a slight slope either towards the outside or the Minotair to drain out condensates that may form if the airflow passing through the conduits is very humid.

BALANCING THE SYSTEM

BALANCING REGISTERS

- All ductwork leading to an air supply or extraction grille should be equipped with register keys. The keys must be locked and secured mechanically after final balancing (see Figure 9, Figure 10, and Figure 11).
- Where possible, register keys must be installed at least 5 ft. (1.50 m) away from the grilles in order to minimize ventilation noise.
- The last 3 ft. (1 m) of ducts leading to a supply grille must be made of acoustic flexible ducts in order to further minimize ventilation noise, especially if this is a bedroom.
- It is recommended to keep the register keys accessible through an access panel or a suspended ceiling.
- Grilles with integrated registers should be avoided, because they can be noisy when air passes through them.

BALANCING THE MINOTAIR

- In normal circumstances, the MINOTAIR does not require balancing because its constant airflow fans ensure continuous balancing with a tolerance of ± 9% at up to 1.5 in H_2O (375 Pa) of static pressure within the ductwork. This margin of error is within standards.
- For added accuracy or if the building regulations for your area so require, it is possible to further balance the intake and exhaust airflow. This is accomplished by using a differential pressure gauge capable of measuring 0 to ±0.5 in H_2O (0 to ±125 Pa) and two flexible plastic tubes.
- **Procedure**:
    - Close all windows and doors, and turn off all exhaust devices such as range hood, dryer and bathroom fans.
    - Set the controller to the maximum airflow allowed, and set the MINOTAIR to "air exchanger" mode.
    - Connect each plastic tube to the fresh air from outside and stale air to outside respectively. To do this, you will need to drill two holes (the size of the tubes) in the ductwork, each at the same distance from the Minotair fan outlets as much as possible.
    - Adjust the airflow of the extraction to make it up to 10% less than or greater than the fresh air intake until the pressure differential reads as close to zero as possible. This setting is accessible in the “Ventilation” menu of the microcontroller.
    - Wait 30 seconds between changes to give the system time to stabilize.
    - Make sure you plug the two holes at the end of the procedure.

SECURING THE MINOTAIR

- The mounting location must be solid enough to support the weight of the device filled with water, in case the drain clogs up, which is a total weight of 120 lb. (55 kg).
- The MINOTAIR must be suspended using the four specially designed hooks. Use the webbing straps (supplied) to tie the device.
- Each strap must have its upper part secured by the equivalent of a #10 screw (M5), at least 1¼ in (3 cm) deep. The lower part of the strap is attached to its corresponding hook on one of the MINOTAIR's four corners.
- Ensure there is a space of at least 16" (40 cm) in front of and under the device to open the access panel. If that is impossible, the panel can be removed completely by sliding it to the right. In that case, ensure there is a space to the right of the device of at least 2 in (5 cm).
- Allow for a minimum space of ½ in (1 cm) between the device and the walls. Do not install the device directly against a wall, because the vibrations it makes while functioning will transfer to the building structure and may disturb the occupants. However, if space allows, leave a clearance of 12" to 16" (30-40 cm) at the back of the unit for easy troubleshooting.
- The device must be level after installation in order to allow the condensates to drain properly and to avoid compressor damage.

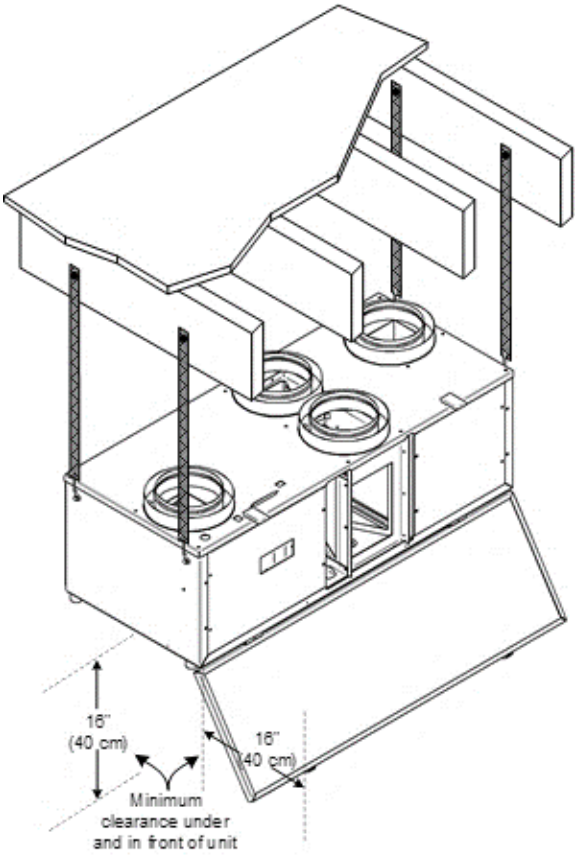


Figure 14 –Mounting the MINOTAIR using the floor joists.

CONNECTING THE CONDENSATE DRAIN

- Connect the female end of the fittings (supplied) to the condensate drains located under the device.
- Connect the male end of the fittings to a ¾ in (19 mm) internal diameter flexible tubing (supplied). Then connect the tubing ends to the supplied Tee fitting.
- The Tee fitting must be **positioned in an upward angle to form a water trap**. An angle between 30 and 45° is required. The water trap must not be located closer than 6" (15 cm) from the bottom of the device or the drain could clog over time.
- **IMPORTANT:** Failure to form a water trap as just described will also create a passageway where stale air will contaminate the fresh air. It is thus recommended to fill the trap with water before starting the device for the first time in order to avoid contamination as well as suction noises.
- The other end of the pipe must end its course in the floor drain or a condensate pump. Using a bucket is not recommended, because the MINOTAIR will fill it quickly on humid days, which will then cause spills on the floor.
- Check the drain regularly, because if it becomes clogged, water will accumulate in the unit and eventually spill on the floor through the two overflow holes on the sides.
- Using Minotair genuine filters will reduce the risk of small particulates eventually clogging the drain.

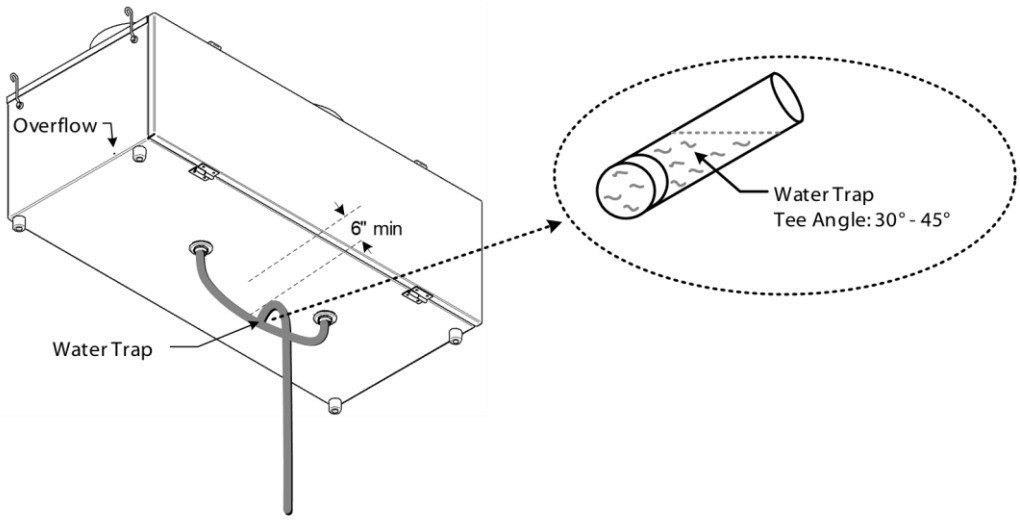


Figure 15 – Position the Tee fitting to form a water trap.

CONNECTING TO AUXILIARY DEVICES (INSTALLATION OPTIONS)

- If one of the two forced air ventilation system installation methods were chosen, the system's ventilator control terminal must be connected to the "G" terminal of the MINOTAIR terminal strip, which will send a 24-VAC signal when it is in operation.
- If the auxiliary heating unit is controlled by the MINOTAIR, the heat generator's control terminal must be connected to the "W" terminal, which will send a 24-VAC signal when the MINOTAIR calls for auxiliary heat.
- If the auxiliary cooling unit is controlled by the MINOTAIR, the air conditioner's control terminal must be connected to the "Y" terminal, which will send a 24-VAC signal when the MINOTAIR calls for auxiliary cooling.
- If the auxiliary humidifier is controlled by the MINOTAIR, its control terminal must be connected to the "H" terminal, which will send a 24-VAC signal when the MINOTAIR calls for humidity.
- If a motorized damper controls a fifth port, its control terminal must be connected to the "5" terminal, which will send a 24-VAC signal when the MINOTAIR operates in Recirculation or Heat Pump modes. In these modes, a fifth port will ensure household odors from the kitchen or bathrooms will not be introduced into the living spaces of the home environment.
- In all cases mentioned above, each device's "common" control wire must be connected to the "C" terminal on the MINOTAIR.
- **CAUTION!** If any of the MINOTAIR's terminals (i.e., "G, Y, W, H") is used to supply 24VAC to a **solenoid or any other inductive load**, it is imperative to install a surge suppressor in parallel with the 24VAC terminal in question and the "C" terminal. Otherwise, electronic components such as bathroom timers will be irremediably damaged over time due to the very high voltage surges resulting whenever the inductive load is de-energized. Ask us for advice if in doubt.

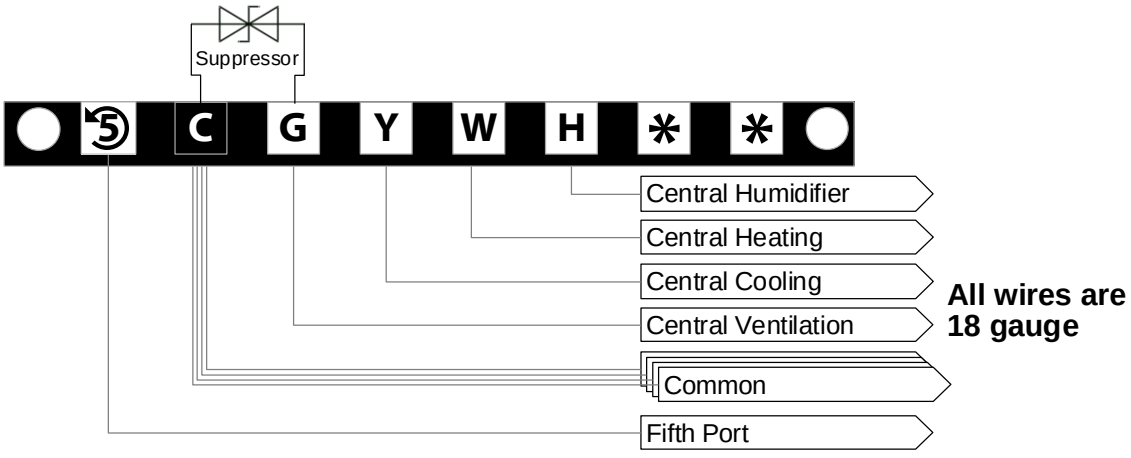


Figure 16 – Connection to a forced air ventilator and other auxiliary devices.

- **Relay-controlled equipment**. In cases where a device must be controlled through dry contacts – as is often the case with humidifiers – a relay (not supplied) must be added, to be activated by the 24-VAC signal sent by the corresponding terminal and whose "normally open" and "common" contacts will connect to the dry contact terminal of the device in question (Figure 17).
- **CAUTION!** Always use a relay whose coil is equipped with a surge suppressor circuit to avoid damaging fragile electronic components such as bathroom timers and the microcontroller. The use of a contactor is strictly prohibited unless equipped with a surge suppressor. Ask us for advice if in doubt.

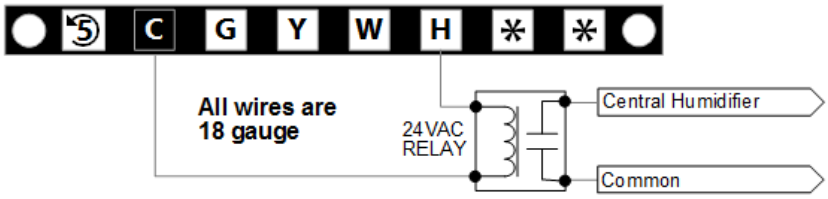


Figure 17 – Connecting to a dry contact-controlled humidifier with the use of a relay.

CONNECTING TO A 5 KW ELECTRIC COIL (INSTALLATION OPTION)

- It is possible to connect an electric coil (duct heater) of a maximum capacity of 5 kW in line with the MINOTAIR main distribution conduit. The selected coil model must be one that is able to modulate its intensity according to the actual airflow and using the coil outlet temperature as the reference point. The reference temperature should be set between 35°C and 50°C (95°F and 122°F) in a heating application or set to -10°C (14°F) in a preheating application. In the latter case, the heater enclosure must be insulated to prevent condensation from forming.
- Ensure the MINOTAIR auxiliary heating option is set to "YES" in the "Temperature" menu while specifying that the fan source is the MINOTAIR itself and not that of another auxiliary device such as a furnace.
- In the case of a *Stelpro* brand electric heater supplied by MINOTAIR:
    - The "W" terminal of the MINOTAIR controls and connects to the "IN" terminal of the heater.
    - The "C" terminal of the MINOTAIR connects to the "REF" terminal of the heater.
    - Finally, the "A" and "B" jumpers of the heater must be set to "0" and "1" respectively (i.e., 24 V REF).
    - Do not use the "C" and "R" terminals of the heater.

CONNECTING TO AN AUXILIARY HEAT PUMP (INSTALLATION OPTION)

- It is possible to connect a heat pump to the MINOTAIR. In this case, there must be a 120-VAC relay (not supplied) that will connect in parallel with the reversing valve (Terminal NO2 on the microcontroller) located inside the MINOTAIR which will then act as "O" terminal or "B" according to the heat pump model. You have to choose the relay according to whether an "O" terminal (normally open relay) or "B" terminal (normally closed relay) is required.
- In the case of a heat pump, MINOTAIR terminal "W" is used to control the auxiliary heating of the heat pump "AUX", which in this case is essentially the third stage of heating.
- In the case of a heat pump, MINOTAIR terminal "Y" is used to control the compressor "COMP (Y)" of the auxiliary heat pump.
- In the case of a heat pump, its 24 VAC "common" control wire must be connected to the "C" terminal on the MINOTAIR.

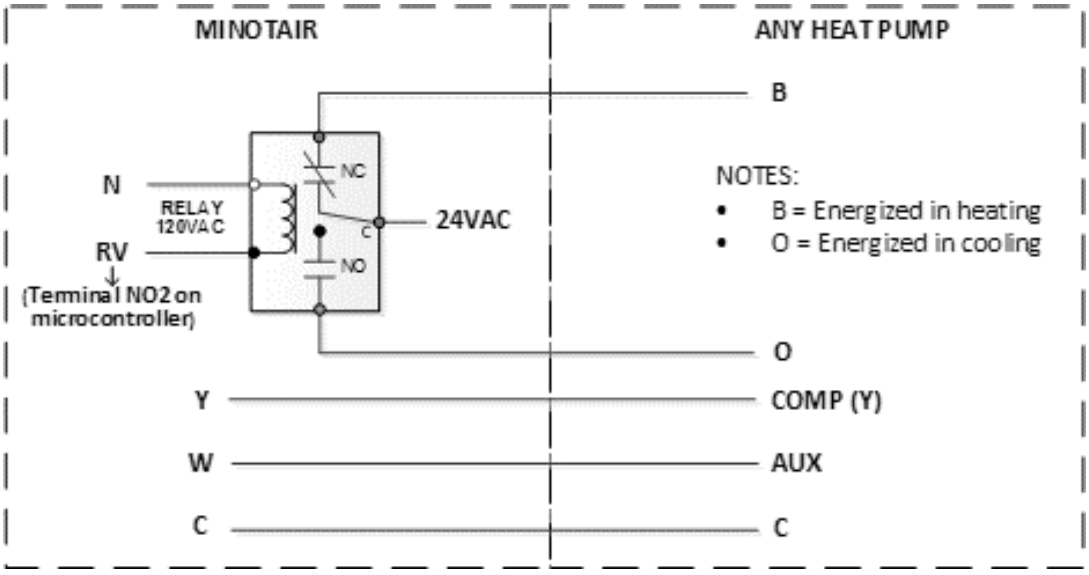
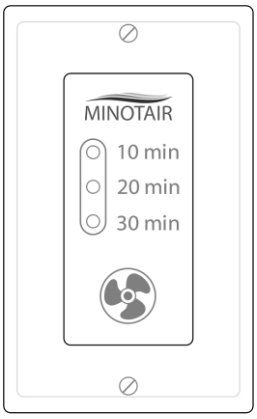


Figure 18 – Connection of a heat pump to the MINOTAIR.

CONNECTING TO A BATHROOM TIMER (INSTALLATION OPTION)

A. OPERATION :



Interval Operation

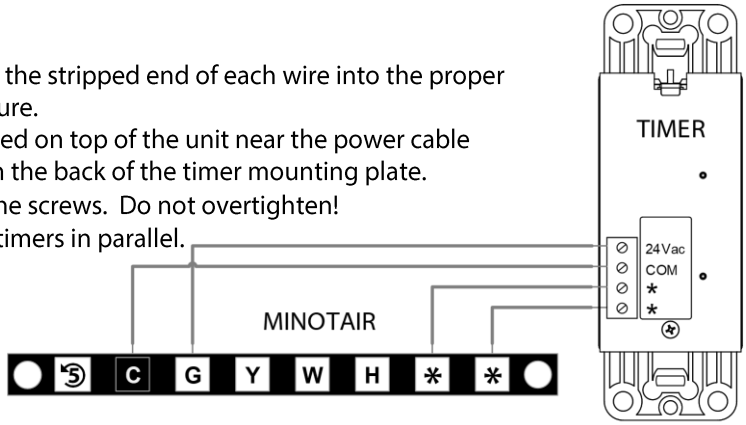
- Press the button once to activate the air exchanger mode for a 10-minute interval.
- Press the button a second time to activate the air exchanger mode for a 20-minute interval.
- Press the button a third time to activate the air exchanger mode for a 30-minute interval.
- Press it a fourth time to turn off the timer and resume the predetermined mode of ventilation.
- Pressing the button while the timer is active will reinitialize it to the next time interval.
- The indicator light illuminates next to the interval corresponding to the time remaining.

Continuous Operation

- Press the button for 3 seconds to activate the continuous operation of the air exchanger mode.
- Press it again to turn off the timer and resume the predetermined mode of ventilation.
- The 3 indicator lights illuminate to indicate continuous operation.

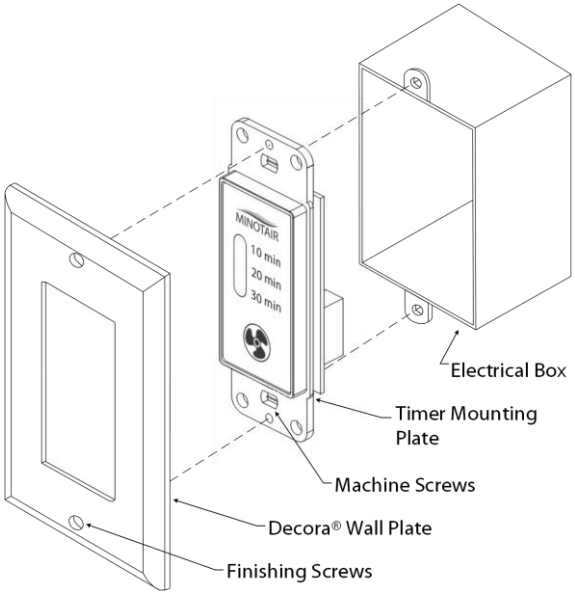
B. WIRING :

- Using a 4-wire cable (not supplied), insert the stripped end of each wire into the proper terminal connection as shown in this picture.
  Note: The MINOTAIR side terminal is located on top of the unit near the power cable while the timer side terminal is located on the back of the timer mounting plate.
- Using a jeweler flat screwdriver, tighten the screws. Do not overtighten!
- You can connect up to a maximum of 10 timers in parallel.



C. INSTALLATION :

- Using the 2 machine screws (supplied), screw the timer mounting plate to the electrical box (not supplied).
- Using the 2 finishing screws (supplied), screw the Decora® wall plate over the timer mounting plate.
- Adjust the timer and the wall plate as necessary so that they are well aligned, straight and leveled.
- Do not overtighten screws!



INSTALLING THE WALL MOUNT CONTROL (INSTALLATION OPTION)

- In addition to the digital control integrated in the microcontroller, it is possible to connect up to two wall-mount digital controls per MINOTAIR unit for even more convenience.

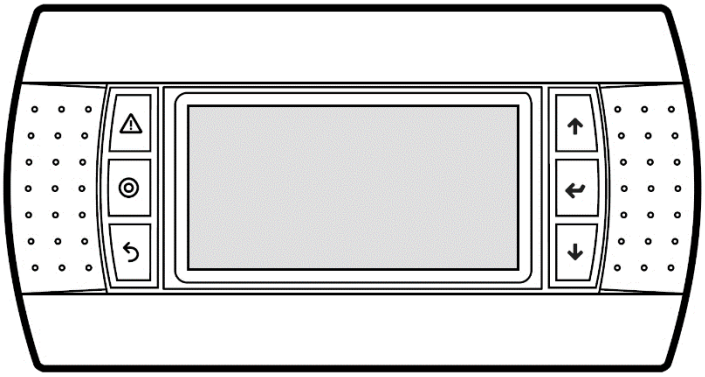


Figure 19 – Wall Mount Digital Control

SELECTING THE LOCATION

- Note that there are no temperature or humidity sensors in the wall mount control, which means it can be installed just about anywhere. However, we recommend an easily accessible location where it can often be consulted. For example, hallways leading to the bedrooms, the living room or the dining room are good locations.

- The digital control is installed on the wall using four screws (supplied). The height should be chosen to facilitate reading.

ADJUSTING DISPLAY CONTRAST

- Once the digital control is installed, it is possible to adjust its contrast. To do so, hold down both ⚠ + ◎ keys and use ↑ or ↓ to increase or decrease contrast on the digital control.

CABLE CONFIGURATION

- Connecting a wall mount digital control is done using a 6-wire telephone cable.
- The connectors must be 6-position RJ12 (6P6C) type.
- Maximum cable length for connections is 150 ft. (45 m).
- One end of the cable connects to the back of the digital control, while the other end connects to the 6-position jack labeled "MINO-CONTROL", located on top of the MINOTAIR.

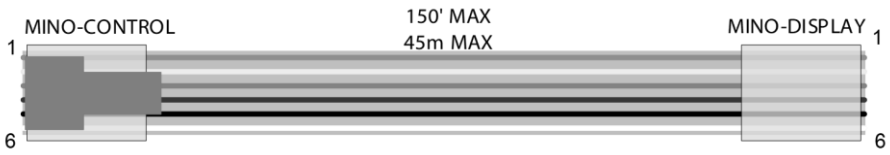


Figure 20 – Cable configuration for a single wall mount digital control.
This configuration as of serial # 21Q30601, use the sad face one otherwise.

- **Warning!** Be sure not to cross endings, as this will render all communications with the microcontroller impossible. Note that this will not damage the digital control, but a *NO LINK* message will appear**.**

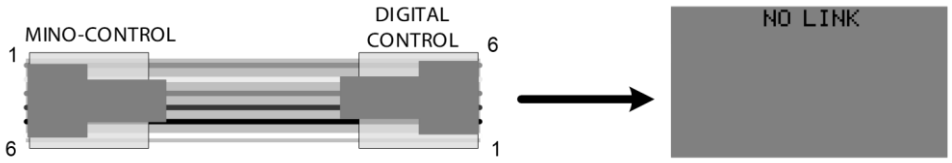


Figure 21 – Wrong configuration. Use the happy face configuration.

- If the installation includes two wallmount digital controls, a cable splitter (optional) must be connected into the "MINO-CONTROL" jack located on top of the device. This will double the "MINO-CONTROL" jack so that each control can have its own cable.

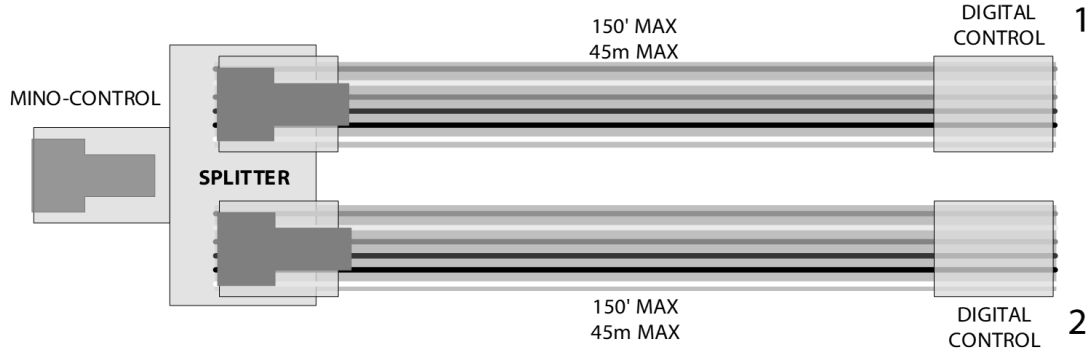


Figure 22 - Cable configuration for two wallmount digital controls

WALL-MOUNTING

- The digital control consists of three main parts (A, B, C in Figure 23):
  A. The back piece,
  B. The electrical board and
  C. The snap-on cover.
- Before mounting, you must disassemble the digital control. To do this, use your fingers to lift one corner of the snap-on cover **C** until it comes off. Be careful not to lose the small black plastic frame around the screen, and be sure to memorize its position to facilitate reassembly later.
- For wall-mounting, you must first affix the back-piece **A** in one of two ways:
  1. On an electrical box. In this case, use the corresponding rounded-head screws (supplied) and make sure the electrical box is mounted horizontally, or
  2. Directly onto the wall. In this case, use the plastic pins (supplied), as required, and the corresponding rounded-head screws (supplied).
- Ensure the back-piece **A** is level.
- Then proceed to connect the phone cable by passing it through the square opening of the back-piece **A** and inserting the connector into the terminal of the electric board **B**.
- Rest the electrical board **B** on the back-piece **A** and fasten the parts together using the flush-head screws (supplied) made for plastic.
- Finally, put back the small black plastic frame around the screen, and fit the snap-on cover **C**.

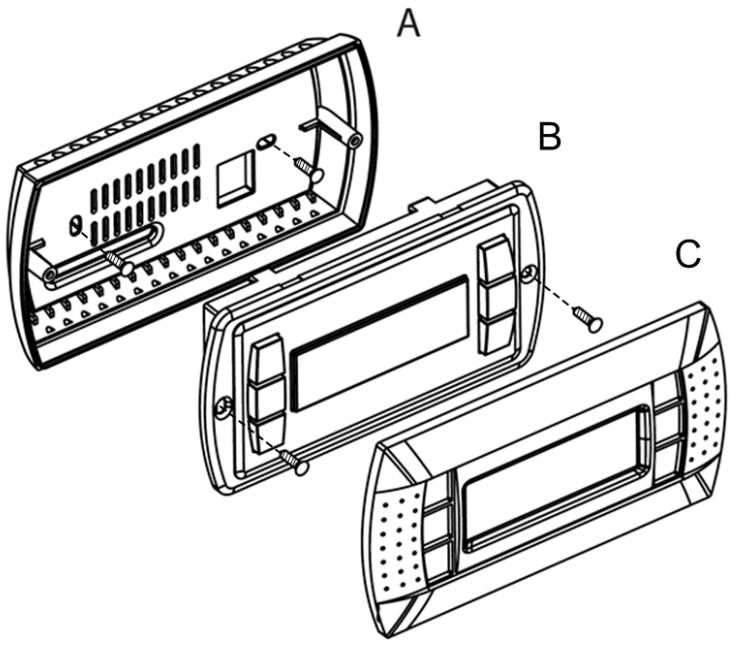


Figure 23 – Wall-Mounting

CONNECTING THE MINOTAIR

- This is the last step before powering on the MINOTAIR.

- A 120 VAC/15A circuit must be used and the connection must be made by a qualified electrician. It is always advised to install a wall switch near the MINOTAIR that can be used to cut power during repair or maintenance activities (Figure 24).

- No other device can share the same circuit as the MINOTAIR. If a condensate pump is required, it must be connected to a different circuit.

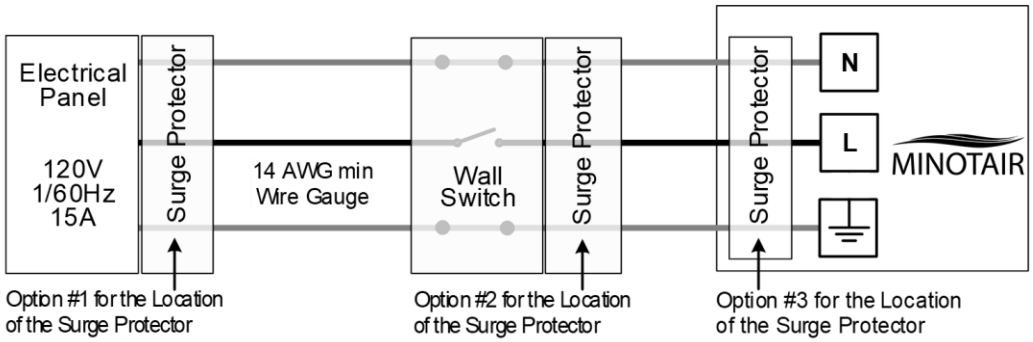


Figure 24 – Connecting the device.

- **IMPORTANT!** If you suspect the power source to be of poor quality (i.e., subject to transient overvoltage, spikes, brownouts, electrical noise, etc.), it is required to install a surge protector to avoid damages to the electronic components contained in the microcontroller and the fans. The surge protector must be installed upstream of the MINOTAIR either at the electrical panel (option 1) or at the MINOTAIR junction box (option 2). If space permits, it can also be installed inside the MINOTAIR electrical compartment (option 3). There is not one option better than the other. Damage caused by the poor quality of the power source is not covered by the warranty.

DIGITAL CONTROL BASICS

The MINOTAIR is controlled through a digital control featuring a backlit display and 6 buttons. The interface is designed around a house theme.

MAIN SCREEN

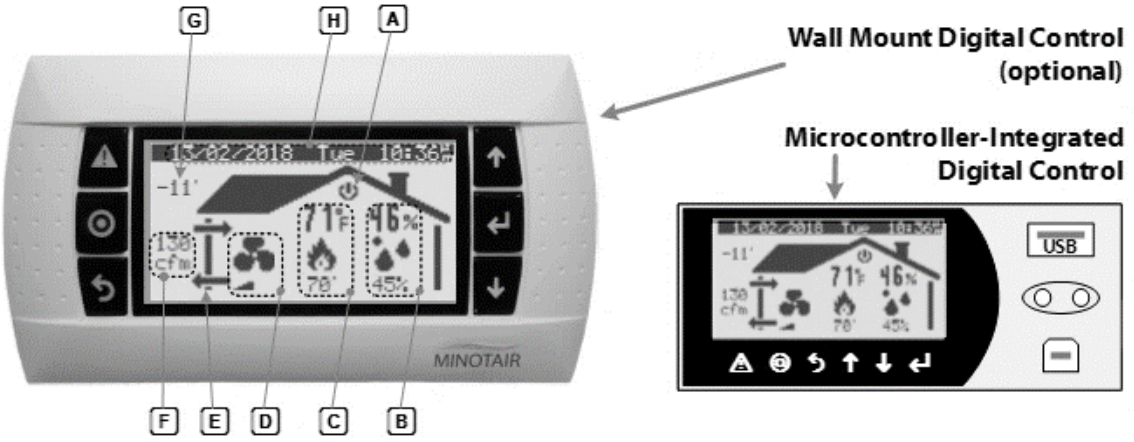


Figure 25 – MINOTAIR digital control main screen[1].

Inside the house

A. Device status {<u>on</u> (⏻), off (⏻)}[2]
B. Indoor relative humidity level in bold, with setpoint humidity displayed under.
C. Indoor temperature in bold {<u>°C</u>, °F}, icon indicating the temperature control mode {<u>heating</u>, cooling}, with setpoint temperature displayed under.
D. Ventilation speed {<u>low</u>, high}.
E. Ventilation mode {<u>Air Exchanger</u>, Recirculation, Heat Pump, and Intermittent 10/20/30/40, Smart}.

Outside the house

F. Current airflow {<u>cfm</u> (cubic feet per minute), l/s (liters per second)}.
G. Outside temperature with its trend { ↗ (upward), ⋯ (stable), ↘ (<u>downward</u>)}.
H. Date, day of the week and current time.

[1] For information purposes only. The actual screen may differ from the image shown here. For simplicity, only the wall mount control is used in subsequent examples. However, the principles are equally applicable to the microcontroller-integrated digital control.
[2] The values shown within brackets represent the available options. The <u>underlined</u> option is the option used in the example.

DIGITAL CONTROL BUTTONS

Figure 26 – Buttons of the digital control.

I. The "*Enter*" ↵ button changes a value or allows a value to be changed by the "*Up*" ↑ and "*Down*" ↓ arrows.
J. The "*Up*" ↑ button increases a value or moves the cursor up.
K. The "*Down*" ↓ button decreases a value or moves the cursor down.
L. The "*Escape*" ↰ button returns to the previous screen.
M. The "*Setpoint*" ◎ button serves to set the temperature and humidity. If depressed for 3 seconds, it displays the main menu to adjust system settings.
N. The "*Alarm*" ⚠ button displays the state of various alarms if applicable. It is also used to turn on and off the unit.

NOTE: The buttons light up when pressed. They shut off after 10 minutes of idle time.

NOTE: The screen lights up when a button is pressed. It shuts off after 10 minutes of idle time, unless it is configured to always stay backlit. This setting is accessible from the main menu.

NOTE: The "*Alarm*" ⚠ button flashes red to indicate an alarm. By pushing on it, the corresponding message will display and the system will reset the alarm if the conditions that triggered it are no longer present. If the conditions remain, the button will continue to light up. Note that each alarm is logged in the events log. If there is more than one simultaneous alarm, they can be reviewed in the log one after the other using the ↑ and ↓ arrows.

LISTING OF SYMBOLS

The digital control uses symbols to represent the current state of different functions. For example, a static flame indicates that the device is ready to call for heat while an animated flame means that heating is occurring.

Ventilation					
On Off	Low Speed	High Speed	or or or Intermittent Mode		
Air Exchanger Mode	Heat Pump Mode	Recirculation Mode	or or Smart Mode		
Temperature					
Heating	Auxiliary Heating	Cooling	Auxiliary Cooling	Free Cooling	Turbo Cooling
Humidity					
or Dehumidification		or Humidification		Winter Conditions	
7-Day Program					
or Day Setpoint		or Night Setpoint		or Away Setpoint	
Various					
or or Exception, Alarm or Self-Diagnostic		Defrost	or System Pause	or or or or Bathroom Timer	

Table 3 – Animated symbols used for various MINOTAIR features.

ADJUSTING DISPLAY CONTRAST

Integrated Control: Hold down both ↩ + ↵ buttons and use ↑ or ↓ to increase or decrease contrast on the digital control.

Wall mount Control: Hold down both ⚠ + ◎ buttons and use ↑ or ↓ to increase or decrease contrast on the digital control.

BOOT SEQUENCE

Like most computers, every time you power on the MINOTAIR or after a power outage, the MINOTAIR initiates a boot sequence that lasts approximately 30 seconds. During this period, the digital control is not in operation and the screen may be blank or display messages like "No Link". Once the boot sequence is complete (Figure 27), the device will resume its operation as it was before it was rebooted or lost power, and will remember its settings.

Figure 27 – 30-second boot sequence screen.

NOTE: If the device is turned on for the first time or if you have just updated the microcontroller, you may be asked to cut power to the MINOTAIR for 30 seconds (Figure 28) by closing the circuit breaker or the circuit switch. This procedure is normal. Switch power back on after 30 seconds.

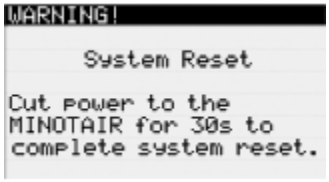


Figure 28 – Switch off power to the MINOTAIR when requested.

TURNING THE DEVICE ON AND OFF

Press ⚠ to turn on the device. Ventilation will start (Figure 29).

NOTE: The MINOTAIR does not display temperature or humidity when it is turned off. The MINOTAIR's ventilation must be in operation for this information to show.

NOTE: The MINOTAIR does not control auxiliary heating and cooling units when it is turned off. The MINOTAIR's ventilation must be in operation to control these devices.

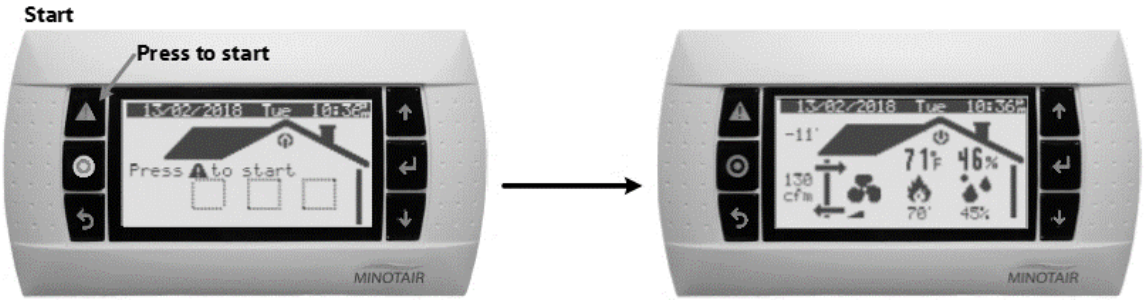


Figure 29 – To turn on the MINOTAIR, press ⚠.

To turn off the device, simply hold down the ⚠ button for 3 seconds. Ventilation will stop and the screen becomes as shown on Figure 30.

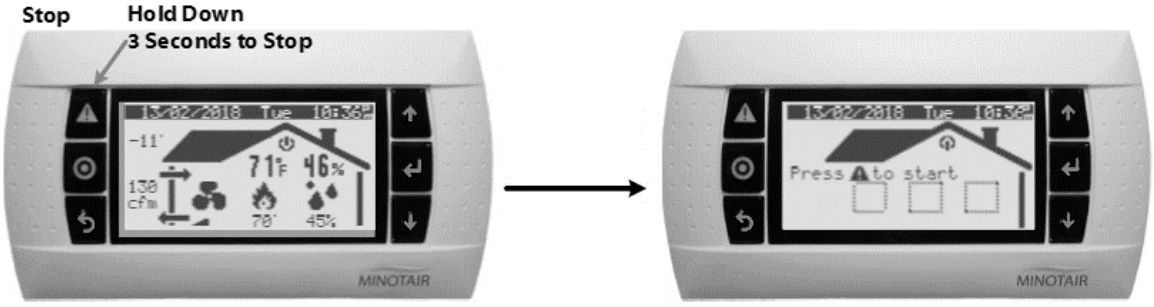


Figure 30 – To turn off the MINOTAIR, hold down ⚠ for 3 seconds.

ADJUSTING INDOOR TEMPERATURE – SHORTCUT METHOD

Press the setpoint button ◎ once.

Press ↑ to move the cursor to the temperature setpoint of the current mode. Press ↵ to display two arrows "↑ ↓" making it possible to increase or decrease the setpoint using the ↑ and ↓ buttons. After 5 seconds of inactivity or pressing a second time on ↵ disables the arrows.

1
2

Figure 31 - Examples of shortcut to adjust the temperature setpoint and units.

1 Setpoints:

- . Desired setpoint when the device is in heating mode. The heating setpoint must always be lower than the cooling setpoint (1°C our 2°F). The device will automatically correct it if needed.
- **.** Desired setpoint when the device is in cooling mode. The cooling setpoint must always be higher than the heating setpoint (1°C or 2°F). The device will automatically correct it if needed.

2 Units:

- **°C**. Temperature will display in Celsius units
- **°F**. Temperature will display in Fahrenheit units.

ADJUSTING INDOOR RELATIVE HUMIDITY – SHORTCUT METHOD

Press the setpoint button ◎ twice.

Press ↑ or ↓ to increase or decrease the relative humidity setpoint.

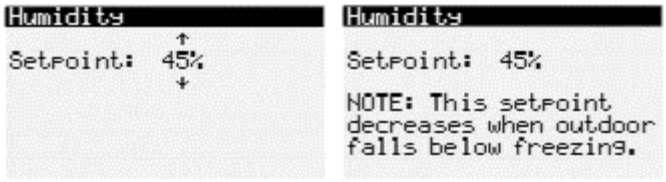


Figure 32 – Shortcut to adjusting the humidity setpoint and the effect of automatic winter decrease.

1 Setpoint:

- **40% to 50%.** Set the desired relative humidity. During the winter months, a 40% indoor humidity level is ideal, while a 45% indoor humidity level is very comfortable.

2 NOTE:

- If humidity was set to *winter automatic mode* in the main menu, the setpoint displayed on the main screen will automatically decrease as the outside temperature falls below freezing, but without ever going under **30%**.

- Note that it could be difficult to maintain the humidity at the desired level due to too high a fresh air setpoint or too much air infiltration. Also, in some severe dryness cases, a whole-house humidifier could become necessary.

ACTIVATE THE VIRTUAL BATHROOM TIMER

Hold down the escape button ⮌.

Press the setpoint button ◎ once to activate the timer for 10 minutes.

Press the setpoint button ◎ a second time to activate the timer for 20 minutes.

Press the setpoint button ◎ a third time to activate the timer for 30 minutes.

Press the setpoint button ◎ a fourth time to stop the timer.

Note that physical bathroom timers always take precedence over the virtual timer.

Figure 33 – Activation of the Virtual Bathroom Timer is done by pressing ⮌ and ◎.

MAIN MENU

The MINOTAIR includes several settings that are accessible from the main menu screen. You can access the main menu by pressing the "Setpoint" ◎ button for 3 seconds.

1. VENTILATION SETTINGS

Press the ◎ button for 3 seconds to display the main menu. Then, using the ↑ and ↓ arrows, navigate to the "Ventilation" submenu and press ↵ to select (Figure 34).

Figure 34 – Main menu – Ventilation settings.

"VENTILATION" SETTINGS SCREEN

There are 11 available options displayed over several screens. Press ↓ or ↑ to move the cursor between options. Once the desired option is selected, press ↵ to change the setting (Figure 35).

The following options are available:

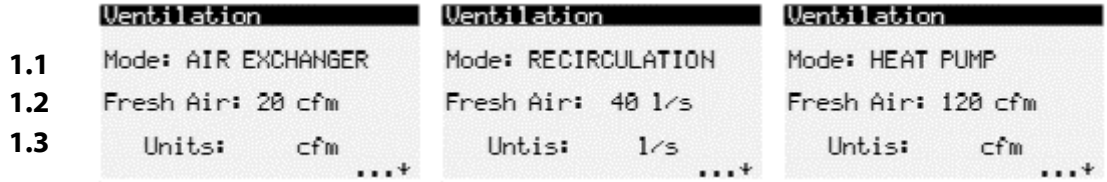


Figure 35 – Examples of options to adjust ventilation mode, fresh air setpoint and units.

1.1 Mode:

- **AIR EXCHANGER**. The device ventilates and continuously renews the air. It filters air while removing pollutants from the house and oxygenates indoor air with fresh air from outside. It dehumidifies and cools air in the summer, and dehumidifies and recovers heat in the winter. However, this mode carries the risk of over-ventilating and increasing the energy required for heating, cooling and maintaining humidity.

- **HEAT PUMP.** The device recirculates the air keeping heat indoor in the winter, and coolness in the summer. It dehumidifies and cools air in the summer and heats air in the winter. It filters air while providing uniform humidity and temperature conditions. The device does not renew air in this mode, and thus should not be used continuously.

- **RECIRCULATION**. The device recirculates and filters air while providing uniform humidity and temperature conditions. This mode consumes very little energy because it does not heat or cool. The device does not renew air in this mode, and thus should not be used continuously.

- **SMART**. The device prioritizes air exchanger mode and switches to heat pump mode during calls for heat or cooling. Switches to recirculation mode when weather conditions are unsuitable for air exchanger or heat pump modes. The MINOTAIR is designed and optimized to run in Smart Mode.

- **INTERMITTENT – 10, 20, 30, 40**. Alternates between air exchanger and recirculation modes in order to provide fresh air over a predefined period of time varying between 10, 20, 30 and 40 minutes per hour. Intermittent-10 mode is ideal during long absences in which the house is unoccupied. Note, however, that this mode is deprecated and is likely to be removed in a future release.

1.2 Fresh Air Setpoint:

- **20 to 180 cfm (10 to 85 l/s**). Set the ventilation supply rate according to the fresh air requirement of the house[3].

  NOTE: It is important to choose a fresh air supply rate that corresponds to the house's requirements. A low supply rate can lead to a decrease in comfort and indoor air quality. On the other hand, a high supply rate can dry out the air and cause cracks in the wood, as well as increasing heating and cooling costs.

1.3 Units:

- **cfm**. Ventilation speed will display in cubic feet per minute.
- **l/s**. Ventilation speed will display in liters per second.

[3] Use the fresh air supply rate calculated in Table 1 – Airflow planning.

"VENTILATION" SETTINGS SCREEN (CONT'D)

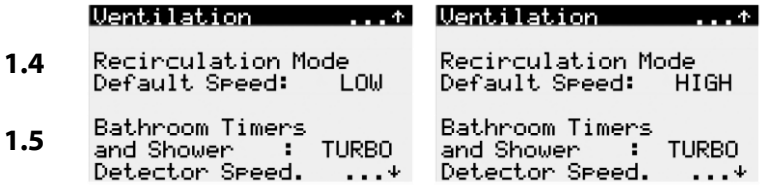


Figure 36 – Examples of options to adjust the default bathroom timers and recirculation speed.

1.4 Recirculation Mode Default Speed:

- **LOW**. Ventilation speed will be equal to the configured fresh air setpoint in the previous "Ventilation" screen, but never less than 80 cfm (40 l/s).
- **HIGH**. Ventilation speed will be increased to the maximum limit of the device i.e., the Turbo speed defined below.

1.5 Bathroom Timers and Shower Detector Default Speed:

- **TURBO**. Ventilation speed will be the maximum airflow rate allowed by the device 180 cfm – 250 cfm (85 l/s – 120 l/s). This cannot be changed.

"VENTILATION" SETTINGS SCREEN (CONT'D)

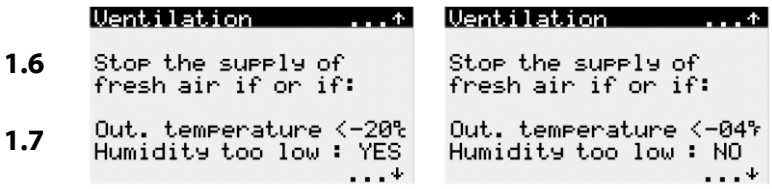


Figure 37 – Examples of options to adjust winter limits.

1.6 Air exchanger mode outside temperature limit:

- **-30°C to 0°C (-22°F to 32°F).** This setting applies to the supply of fresh air during winter months. Set the minimum outside temperature at which the device will stop supplying fresh air. The device will then switch to recirculation or heat pump mode as the case may be.

1.7 Indoor humidity too low:

- **YES.** When indoor humidity drops significantly below the setpoint or below 30%, the device will stop supplying fresh air. The device will then switch to recirculation or heat pump mode as the case may be.
- **NO.** When indoor humidity drops below setpoint, the device will continue to supply fresh air per normal but at the risk of further drying out the indoor air.
- **NOTE:** The concept behind ceasing the supply of fresh air under the aforementioned conditions is based on the fact that there is already a supply of fresh air which occurs naturally, either by the stack effect or according to the degree of air tightness of the house against air infiltration. Thus, beyond a certain natural threshold, adding mechanical ventilation will have the effect of over-ventilating the house.

1.8

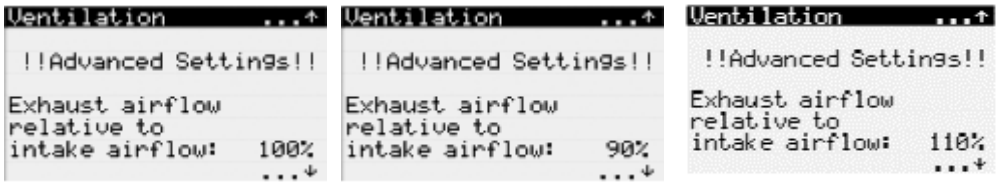


Figure 38 – Examples of options to adjust exhaust airflow.

1.8 Exhaust airflow relative to intake airflow:

- **90% to 110 %.** Set the extraction fan airflow to make it lower or higher than the intake fan airflow in order to balance the airflows with greater accuracy. See "Balancing the MINOTAIR" for more information.

  NOTE: This is an advanced setting and only ventilation professionals equipped with proper measuring equipment should adjust it.

1.9

Figure 39 – Examples of options to adjust the maximum airflow.

1.9 Maximum Airflow:

- **250 cfm – 180 cfm (120 l/s – 85 l/s).** Adjust this setting to the highest airflow rate that will allow the static pressure to remain lower than or equal to 1.5 in H_2O when the unit is operating in either Air Exchanger mode and Recirculation mode at High speed. Start by setting the Minotair to Recirculation mode at High speed with a Fresh Air setpoint of 125 cfm (60 l/s), i.e., will run at 250 cfm (120 l/s) at High speed. Adjust for the highest airflow by waiting 30 seconds between each adjustment. Once you are satisfied with the setting, trigger the bathroom timer to switch to Air Exchanger mode. Readjust the maximum airflow setting downward if the static pressure becomes higher than 1.5 in H_2O. Once done, do not forget to readjust the Fresh Air setting as required.
- **See next page to determine the static pressure.**

"VENTILATION" SETTINGS SCREEN (CONT'D)

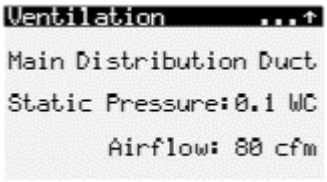


Figure 40 – Static pressure at current airflow.

1.10 Static Pressure:

- This setting screen is useful when you want to validate the ducts installation generates no more than 1.5 in H_2O (or in WC for Water Colum).

- This setting screen is also used to validate the connection of the main air distribution duct to the main return of a forced air ventilation system. Indeed, due to significant differences in pressure between the MINOTAIR and the forced-air system ventilator it is being connected to, the MINOTAIR's minimum airflow must be confirmed. To do this, run the forced-air system ventilator at full speed while running the MINOTAIR at its lowest speed, i.e., 80 cfm (40 l/s), and verify that the static pressure reported by the MINOTAIR is greater than or equal to 0.1 W.C. (25 Pa). If it is not (i.e., the pressure is equal to 0.0 W.C. (0 Pa)), you will need to install a register key and adjust it until the static pressure indicates 0.1 W.C. (25 Pa). Once adjusted, the MINOTAIR constant airflow fans will ensure real-time calibration of supply and exhaust airflows from now on.

  NOTE: The static pressure is displayed only in inches of Water Column (W.C. or H_2O)

1.11 Airflow Rate:

- The airflow rate currently in progress for information purposes.
  NOTE: The airflow is displayed only in cfm units.

2. HEATING AND COOLING SETTINGS

Press the ◎ button for 3 seconds to display the main menu (Figure 41) and use the ↑ and ↓ arrows to navigate to the "Temperature" submenu. Press ↵ to select.

Figure 41 – Main menu – Temperature settings.

"TEMPERATURE" SETTINGS SCREEN

There are 8 available options displayed over several screens. Press ↓ or ↑ to move the cursor between options. Once the desired option is selected, press ↵ to change the setting (Figure 42).

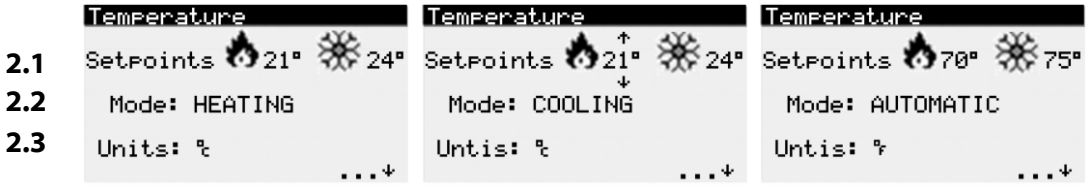


Figure 42 - Examples of options to adjust the temperature setpoint, mode and units.

2.1 Setpoints:

- 🔥. Desired setpoint when the device is in heating mode. The heating setpoint must always be lower than the cooling setpoint (1°C our 2°F). The device will automatically correct it, if needed.

- ❄. Desired setpoint when the device is in cooling mode. The cooling setpoint must always be higher than the heating setpoint (1°C or 2°F). The device will automatically correct it if needed.

2.2 Mode:

- **HEATING**. The device will only function in heating mode.
- **COOLING**. The device will only function in cooling mode.
- **AUTOMATIC**. The device will function in either heating or cooling mode, depending on the season. It switches between modes based on a sophisticated algorithm that protects against false changes of season.

2.3 Units:

- **°C**. Temperature will display in Celsius units
- **°F**. Temperature will display in Fahrenheit units.

"TEMPERATURE" SETTINGS SCREEN (CONT'D)

2.4
2.4.1
2.4.2

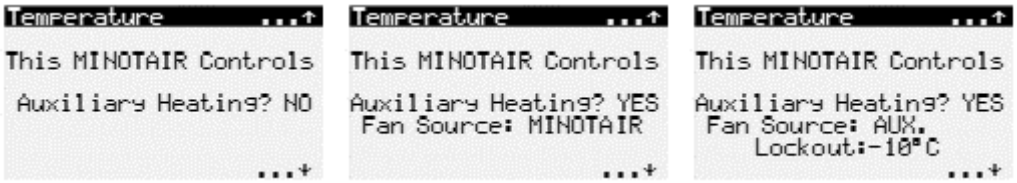


Figure 43 – Examples of options to adjust auxiliary (central) heating units.

The MINOTAIR can control auxiliary heating units such as electric and gas furnaces and heat pumps as long as they can be controlled through a 24-VAC signal.

NOTE. Forced air units must be connected to the "G" terminal to synchronize ventilation with that of the MINOTAIR.

2.4 Auxiliary Heating?

- **NO**. The MINOTAIR does not control any auxiliary heating unit.
- **YES**. The MINOTAIR controls an auxiliary heating unit. The control signal follows a call for heat for which the MINOTAIR was unable to reach the requested temperature setpoint within 5 to 25 minutes depending on outside air temperature, or if indoor temperature is 1°C (1.8°F) under the temperature setpoint.

2.4.1 Fan Source:

- **MINOTAIR**. The MINOTAIR controls a 5-kW electric coil (not supplied) in line with its distribution conduit. The control signal is a 24-VAC voltage to the "W" terminal. See "**Connecting to a 5 kW Electric Coil (Installation Option)**"

- **AUXILIARY**. The MINOTAIR sends a heating signal to the heating terminal "W" located on the connection terminal block and will let the auxiliary unit manage the transition from one stage to another if appropriate. In the case of a heat pump, the signal will rather come from the "Y" terminal. See "**Connecting to an Auxiliary Heat Pump (Installation Option)**"

2.4.2 Lockout:

- **Setpoint**. In the case of a heat pump, the MINOTAIR uses the lockout temperature to determine the limit at which the heat pump will cease to function and instead favor the auxiliary or emergency heat controlled by terminal "W". The lockout setpoint is also used to determine when to call upon the auxiliary heating if the heat pump was unable to reach the desired temperature setpoint within 5 to 25 minutes depending on the outside temperature.

"TEMPERATURE" SETTINGS SCREEN (CONT'D)

2.5

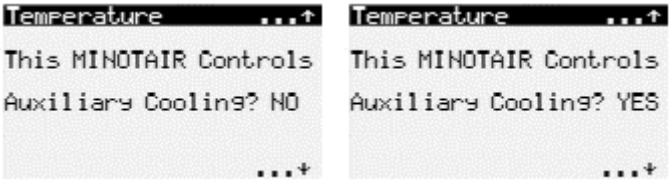


Figure 44 – Examples of options to adjust auxiliary cooling units.

The MINOTAIR can control auxiliary cooling units such as air conditioners and heat pumps as long as they can be controlled through a 24-VAC signal. When these devices are forced air systems, the MINOTAIR can control their ventilation.

NOTE. Forced air units must be connected to the "G" terminal to synchronize ventilation with that of the MINOTAIR.

2.5 Auxiliary Cooling?

- **NO**. This MINOTAIR does not control any auxiliary cooling unit.
- **YES**. This MINOTAIR will send a signal to the "Y" cooling terminal on the terminal board and will let the auxiliary unit manage its own speed switching, if applicable. This signal follows a cooling call for which the MINOTAIR was unable to reach the requested temperature setpoint within 5 to 20 minutes depending on the outside air temperature, or if indoor temperature is 1°C (1.8°F) over the temperature setpoint.

"TEMPERATURE" SETTINGS SCREEN (CONT'D)

2.6

Figure 45 – Examples of options to adjust a remote sensor.

2.6 Use of a remote sensor?

- **NO**. This MINOTAIR uses its internal sensor.
- **YES**. For greater indoor temperature accuracy, this MINOTAIR uses a remote sensor. This option only appears if the MINOTAIR controls an auxiliary heating or air conditioning system.

2.7

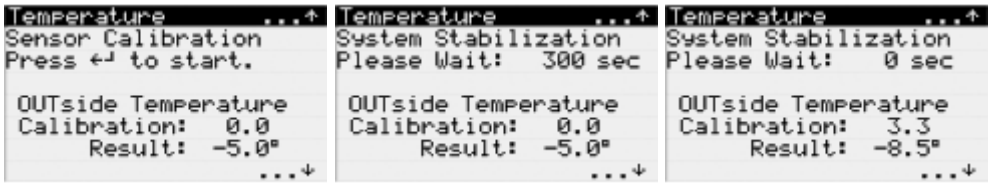


Figure 46 – Examples of options to adjust outside temperature calibration.

2.8

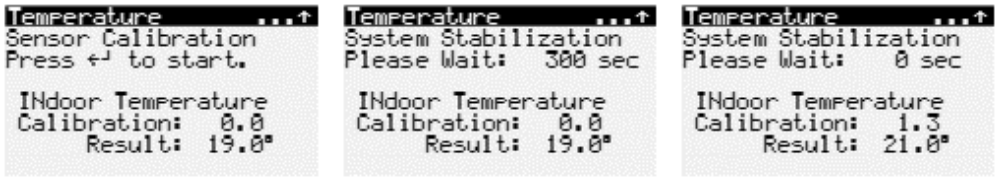


Figure 47 – Examples of options to calibrate the inside temperature sensor.

The MINOTAIR uses sensors to measure outside and indoor temperatures. However, since the sensors are integrated into the device, their temperature readings may differ from what the sensors would have measured if they had been located outside the house (for outside temperature) or in a living space like the living room (for indoor temperature). In fact, temperatures measured by each sensor will be directly impacted by the air intake duct's level of insulation and airflow rate.

To compensate for this discrepancy, the MINOTAIR temperature sensors must be calibrated. The calibration process is performed once the device's installation is complete. For best results, a difference of at least 10°C (20°F) between outside and indoor temperatures is preferred when calibrating. The greater the difference, the more precise the calibration will be.

2.7 Calibrating outside temperature. Press ↵ to start the calibration process. The device will take 360 seconds to stabilize. During this time, measure the outside temperature with a thermometer close to (**but not in**) the fresh air stream. Do not measure in the Once the device is stable, press ↵ to display two arrows "↑ ↓" making it possible to increase or decrease the setpoint using the ↑ and ↓ buttons. Increase the calibration value until the result value is equal to the temperature measured with the thermometer. A normal calibration value should range between 5.0 and 15.0. If the value is much more than this, indoor air is likely infiltrating the intake duct (check the ductwork) or the temperature sensor is defective.

2.8 Calibrating indoor temperature. If the device has already been stabilized, it is not necessary to wait 360 seconds again. After measuring the indoor temperature with a thermometer, press ↵ to display two arrows "↑ ↓". Increase the calibration value until the result value is equal to the temperature measured with the thermometer. A normal calibration value should range between 0.1 and 5.0. If the value is much more than this, cold air is likely infiltrating the return ducts (check the ductwork) or the temperature sensor is defective.

3. INDOOR HUMIDITY SETTINGS

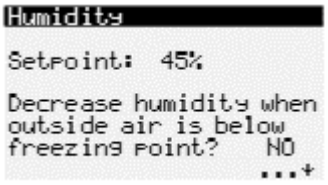
Press the ◎ button for 3 seconds to display the main menu and use the ↑ and ↓ arrows to navigate to the "Humidity" submenu. Press ↵ to select (Figure 48).

Figure 48 – Main menu – Humidity settings.

"HUMIDITY" SETTINGS SCREEN

There are 4 available options displayed over several screens. Press ↓ or ↑ to move the cursor between options. Once the desired option is selected, press ↵ to change the setting (Figure 49).

3.1



3.2

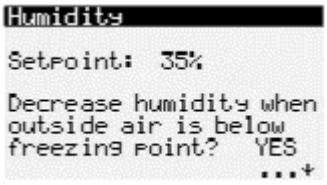


Figure 49 – Examples of options to adjust humidity settings and automatic winter adjustment.

3.1 Setpoint:

- **40% to 50%.** Set the desired relative humidity. During the winter months, a 40% indoor humidity level is ideal, while a 45% indoor humidity level is very comfortable. Note that it could be difficult to maintain the humidity at the desired level due to too high a fresh air setpoint or too much air infiltration. Also, in some severe dryness cases, a whole-house humidifier could become necessary.

3.2 Decrease humidity if outside air is below freezing point?

- **YES**. When the outside temperature falls below freezing, the humidity setpoint will progressively decrease to reach **35 %** at -15°C (5°F), and as low as **30%** at - 20°C (-4°F) or less.
- **NO**. The humidity setpoint will remain unchanged if outside air falls below freezing point.

3.3
3.3.1

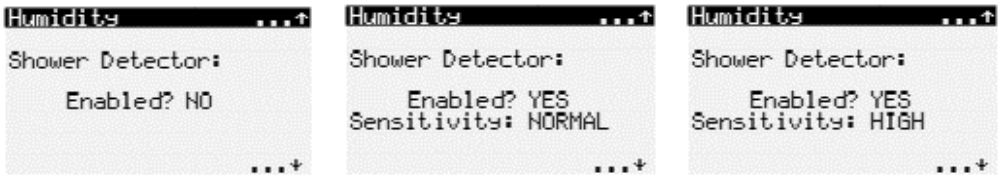


Figure 50 - Examples of options to adjust shower detector settings, part of HumiWatch365© system.

3.3 Shower Detector Enabled?

- **YES**. The shower detector is operational and will exhaust moisture outside if the indoor humidity level was equal to or above the setpoint at the time of detection, or will spread moisture in the house if the indoor humidity level was below the setpoint upon detection.

  NOTE: Depending on the outside temperature, the quality of your windows and the amount of water vapor in the air, there may be fogging on the windows. This is normal and the fog will disappear as the shower detector exhausts water vapor out of the room.

- **NO**. The detector is not operational.

3.3.1 Sensitivity:

- **NORMAL**. This is the default detection sensitivity in most installations. There will be detection when there is an actual shower running. It may take up to 2 minutes before a shower is detected.

- **HIGH**. The detector is much more sensitive. Use this setting if there are several air returns in your installation having the effect of diluting the amount of moisture to the point where it becomes difficult to detect an actual shower running. Note that a high sensitivity may cause false detections. If so, opt for normal sensitivity.

3.4
3.4.1
3.4.2
3.4.3

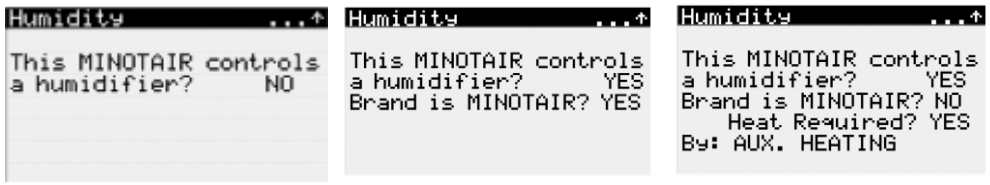


Figure 51 - Examples of options to adjust humidifier settings.

3.4 This MINOTAIR controls a humidifier?

- **YES**. This MINOTAIR controls a humidifier and will call for humidity when needed.
- **NO**. The MINOTAIR does not control any humidifier.

3.4.1 Brand is MINOTAIR?

- **YES**. This humidifier is specially engineered for the MINOTAIR and communicates bidirectionally with it via the MODBUS protocol for perfect system integration. This unique solution acts like a throttle by generating its own water vapor at will and in the perfect quantity to maximize the mixing of the vapor and the MINOTAIR's distribution air, thus avoiding the risk of condensation forming in the ventilation ducts. This is the optimum and most integrated humidifier solution available.
- **NO**. This humidifier is a conventional humidifier.

3.4.2 Heat Required?

- **Not applicable in the case of a MINOTAIR humidifier.**
- **YES**. This humidifier requires an external heat source to humidify the air. The MINOTAIR will start the humidifier when it next calls for heat.
- **NO**. This humidifier generates its own water vapor and can be started without having to wait for a call for heat.

3.4.3 By:

- **Not applicable in the case of a MINOTAIR humidifier.**
- **MINOTAIR**. The required heat source must be the MINOTAIR. This presumes that the moisture generated by the humidifier is mixed with the MINOTAIR's distribution air.
- **AUXILIARY HEATING**. The required heat source must be the warm air generator (the auxiliary heating unit). This presumes that the humidifier sends humidity in the main return duct of the heat generator.

4. PROGRAM SETTINGS

Press the ◎ button for 3 seconds to display the main menu and use the ↑ and ↓ arrows to navigate to the "Program" submenu. Press ↵ to select (Figure 52).

Figure 52 – Main menu – Program settings.

"PROGRAM" SETTINGS SCREEN

There are 4 available options displayed over two screens. Press ↓ or ↑ to move the cursor between options. Once the desired option is selected, press ↵ to change the setting (Figure 53).

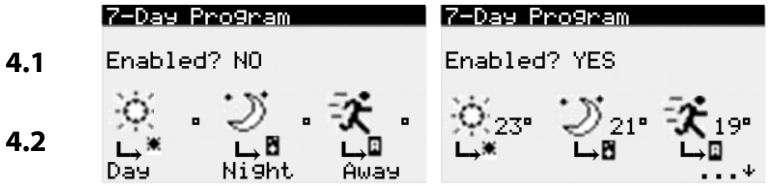


Figure 53 - Examples of options to adjust program settings.

4.1 Enabled?

- **NO**. The 7-day program is not enabled. It is not possible to access the subsequent screen or the temperature setpoints.
- **YES**. The 7-day program is enabled.

4.2 Setpoints:

- Day temperature.
- Night temperature.
- Away temperature.

NOTE: To facilitate the adjustment of the setpoint, pressing ↵ will display two arrows "↑ ↓" making it possible to increase or decrease the setpoint using the ↑ and ↓ buttons. After 5 seconds of inactivity or pressing a second time on ↵ disables the arrows.

The daily profile screen enables you to preprogram the MINOTAIR to operate according to a predefined arrangement depending on the day of the week and the time of day.

4.3

4.4

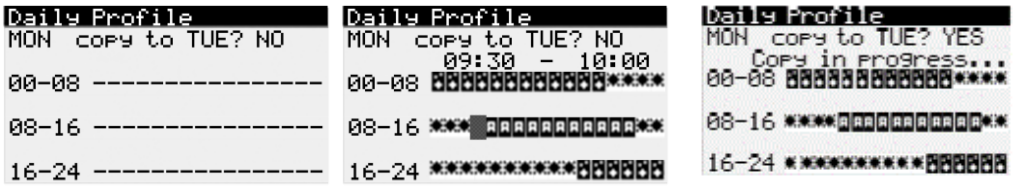


Figure 54 - Examples of options to adjust daily profile settings.

4.3 "*Day*" copy to "*day*"?

- **Current *Day* profile**. Select the profile to display. Press ↑ to switch from one profile to another. Press ↵ to select the day to copy the current profile to. Press ↓ to access the details of the current profile.
- **Copy to *day***. Press ↑ or ↓ to select the day to which to copy the current profile. Press ↵ to jump to the copy option.
  - **NO**. The profile is not copied.
  - **YES**. Press ↑ or ↓ to copy the profile. The current profile is copied to the selected day. Press ↵ to return to the current Day profile.

4.4 Profile details:

- Press ↑ or ↓ to jump from one time slot to the next.
- Press ↵ to select setpoint for corresponding time slot.
  - Day.
  - Night.
  - Away.
  - \- Not Enabled.
    The "Temperature" submenu setpoints are then used.
- Press ↰ to return to Day selection.

5. FILTER SETTINGS

Press the ◎ button for 3 seconds to display the main menu and use the ↑ and ↓ arrows to navigate to the "Filters" submenu. Press ↵ to select (Figure 55).

Figure 55 – Main menu – Filter settings.

"FILTERS" SETTINGS SCREEN

There are 2 available options displayed over several screens. Press ↓ or ↑ to move the cursor between options. Once the desired option is selected, press ↵ to change the setting (Figure 56).

5.1
5.1.1
5.2

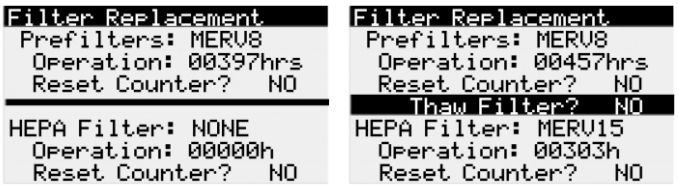


Figure 56 – Examples of options to adjust filter settings.

5.1 Prefilters. The MINOTAIR must be equipped with manufacturer-approved MERV 8 (G4) prefilters to ensure proper functioning. Two prefilters protect the MINOTAIR from dust, which can quickly clog its coils and fan blades. The prefilters must be replaced every three months.

- **Operation**. The number of hours of fan operation since the prefilters were last replaced. This counter is only active when ventilation is running.
- **Reset counter?** Resets the prefilter counter. There needs to be a reset after every change of filters, normally after 3 months of ventilation.

5.1.1 Thaw Filter? At times during the heating season, moisture that comes into contact with the right coil will frost. The formed ice can make the removal of the right filter impossible; the latter being jammed in ice. To remove a jammed filter, it is necessary to defrost the coil. This procedure takes about 3 minutes and will then allow for filter removal without difficulty.

5.2 HEPA Filter. The MINOTAIR is equipped with a High Efficiency MERV 15 (F9) filter, which can eliminate up to 95% of dust and micro-organisms as small as 0.3µm. HEPA filters are recommended for asthma patients. These filters must be replaced every 12 months. Options:

- **MERV15**. The device is equipped with a HEPA MERV15 filter.
- **NONE**. The device is not equipped with a HEPA filter.
- **Operation**. The number of hours of fan operation since the HEPA filter was last replaced. This counter is only active when ventilation is running.
- **Reset counter?** Resets the HEPA filter counter. There needs to be a reset after every change of HEPA filter, normally after 12 months of ventilation.

6. OTHER SETTINGS

Press the ◎ button for 3 seconds to display the main menu and use the ↑ and ↓ arrows to navigate to the "Other Settings" submenu. Press ↵ to select (Figure 57).

Figure 57 – Main menu – Other settings.

"OTHER SETTINGS" SCREEN

There are 4 available options displayed over several screens. Press ↓ or ↑ to move the cursor between options. Once the desired option is selected, press ↵ to change the setting (Figure 58).

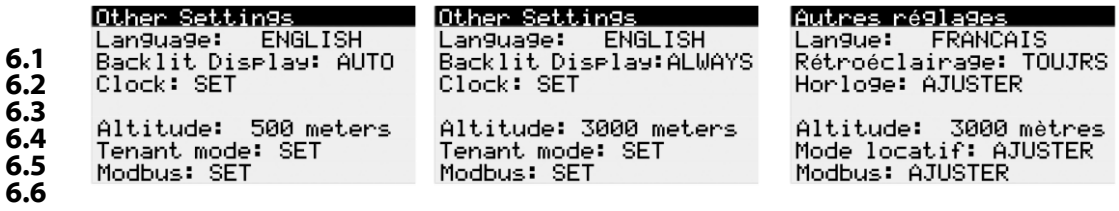


Figure 58 – Examples of options to adjust other settings.

6.1 Language:

- **FRANÇAIS**. The MINOTAIR interface switches to the French language.
- **ENGLISH**. The MINOTAIR interface switches to the English language.

6.2 Backlit display:

- **AUTO**. The digital control screen will light up whenever a button is pressed. The backlight will turn off after 10 minutes of idle time.
- **ALWAYS**. The digital control screen will always stay lit. This option will shorten the life of the neon light used for the backlit display feature. This neon backlight is not covered by the manufacturer's warranty.

6.3 Clock:

- **SET**. Takes you to the screen where you can adjust the time and date of the system clock.

"CLOCK" SCREEN 1

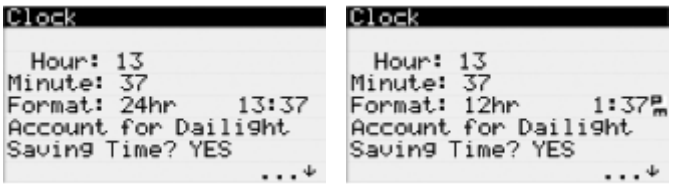


Figure 59 – Examples of options to adjust clock settings 1.

- **Hour**: Adjust the hour between 00 and 23 hours.
- **Minute**: Adjust minutes between 00 and 59 minutes.
- **Format**:
  - **24hr**. Displays the time in 24hr format.
  - **12hr**. Displays the time in 12hr format (AM and PM).
- **Account for daylight saving time?**
  - **YES**. The MINOTAIR will automatically adjust the time at 2 AM on the second Sunday of March, and again at 2 AM on the first Sunday of November.
  - **NO**. The MINOTAIR will ignore daylight saving time.

"CLOCK" SCREEN 2

Figure 60 - Examples of options to adjust clock settings 2.

- **Day**: Enter the day for today's date.
- **Month**: Enter the month for today's date.
- **Year**: Enter the year for today's date.
- **Format**: Adjust the format for today's date.

6.4 Altitude:

- **500-3000**. The altitude in meters corresponding to the geographical location where the MINOTAIR is installed and operating. Can be adjusted in 500 meters increments to take the air density into account. Not taking into account the air density based on the altitude will cause the system to malfunction.

6.5 Tenant Mode:

- **SET**. Takes you to the tenant mode settings.

"TENANT MODE" SCREEN 1

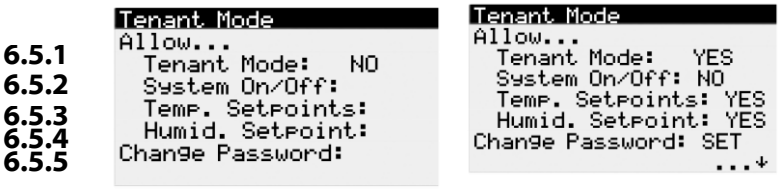


Figure 61 – Examples of options to adjust tenant mode settings.

6.5.1 Tenant Mode

- **NO**. Tenant mode is not activated. End users can access the main menu by pressing the setpoint ◎ button for 3 seconds.
- **YES**. Tenant mode is activated. End users will need to enter a password to access the main menu after pressing the ◎ button for 3 seconds. It is also possible to restrict the ability to power on and power off the unit, change temperature and humidity setpoints.

6.5.2 System On/Off

- **NO.** Do not allow end users to turn system On and Off.
- **YES.** Allow end users to turn system On and Off.

6.5.3 Temp. Setpoints.

- **NO.** Do not allow end users to modify the heating and cooling temperature setpoints, mode and units.
- **YES.** Allow end users to modify the heating and cooling temperature setpoints, mode and units.

6.5.4 Humid. Setpoint.

- **NO.** Do not allow end users to modify the relative humidity setpoint.
- **YES**. Allow end users to modify the relative humidity setpoint.

6.5.5 Change Password:

- **SET.** Allows to change the Tenant Mode password.

Figure 62 – Insert new tenant mode password.

6.5.6 Adjust Limits:

"TENANT MODE" SCREEN 2

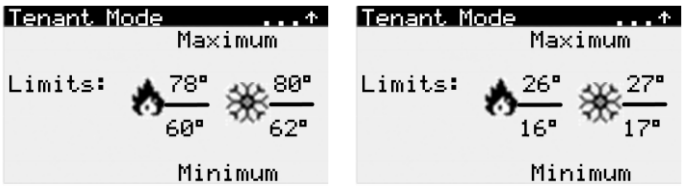


Figure 63 – Adjust the heating and cooling limits allowed in Tenant mode.

- . **(16°C to 26°C) (60°F to 78°F).** Maximum allowed setpoint in Tenant mode when the device operates in heating.
- **. (17°C to 27°C) (62°F to 80°F).** Minimum allowed setpoint in Tenant mode when the device operates in cooling.

6.6 Modbus:

- **SET**. Takes you to the screen where you can adjust the Modbus system parameters.

"MODBUS" SCREEN

Figure 64 – Examples of options to adjust Modbus settings.

- **MINOTAIR Address**: (001-207). The MINOTAIR unique address on the Modbus network. The default address is 003.
- **BaudRate**: Adjust the Baud rate to 19200 or 9600 as required.
- **Parity:** Adjust the parity to Even or None as required by the network.
- **Expansion Card?**
  - **NO**. Default value. You can only have one MINOTAIR on the Modbus network.
  - **YES**. Requires an optional card. Allows to have up to 207 MINOTAIR on the Modbus network.
- **Master Detected**? Displays YES or NO depending on whether the MINOTAIR has detected a master device on the Modbus network. Once detected, the MINOTAIR will no longer try to update this state even if the master is no longer physically on the network. Requires a power cycle to reset this state.

7. SYSTEM INFO

Press the ◎ button to display the main menu and use the ↑ and ↓ arrows to navigate to the "System info" submenu. Press ↵ to select (Figure 65).

Figure 65 – Main menu – System info

"SYSTEM INFO – ODOMETER" SCREEN

On the "System info" screen, press ↓ or ↑ to display various information screens (Figure 51).

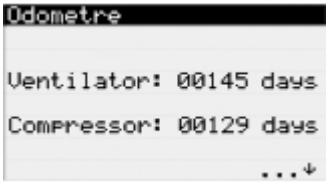


Figure 66 – Examples of information available in the "System info – Odometer" screen.

- **Ventilator**: Number of days the ventilators have been in operation. This counter is incremented only when ventilation is running.
- **Compressor**: Number of days the compressor has been in operation. This counter is incremented only when the compressor is running.

"SYSTEM INFO – SOFTWARE VERSION" SCREEN

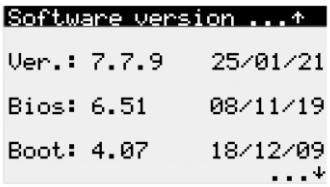


Figure 67 – Examples of information available in the "System info – Software version" screen.

- **Ver.:** Shows the software version of the microcontroller.
- **Bios**: Shows the bios version of the microcontroller.
- **Boot**: Shows the boot version of the microcontroller.

ALARM DESCRIPTIONS

The MINOTAIR is a smart device that can alert you when a situation arises which requires your attention. Its numerous sensors and advanced algorithms do most of the work for you. Furthermore, it speaks to you in a clear language without using complicated codes. This helps you establish a diagnosis, identify possible causes, and, most importantly, decide whether you need to call a technician or not.

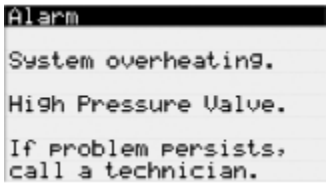
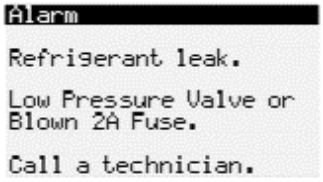
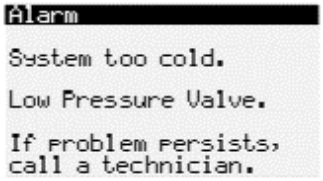
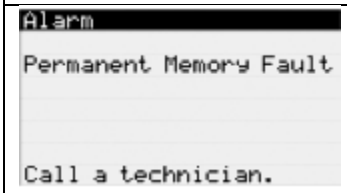
When the MINOTAIR alerts you to a situation, the alarm icon "⚠" appears and flashes (Figure 68), except in the case of filter replacements – in which case the ⚠ is replaced with a "change filters" indicator.

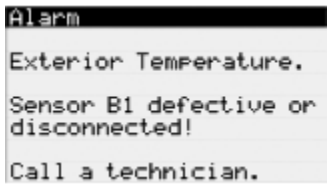
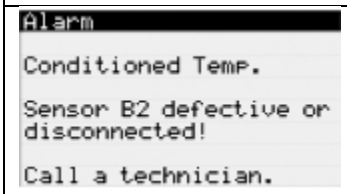
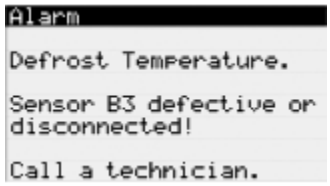
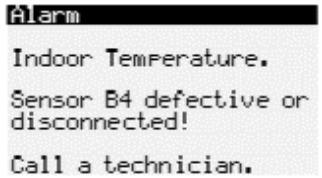
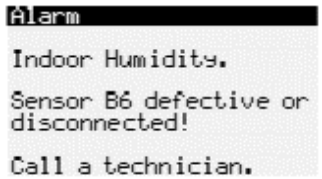
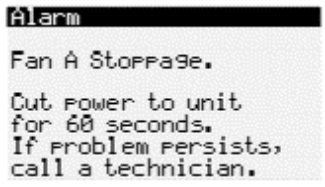
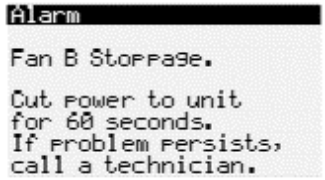
NOTE: During an alarm, the MINOTAIR will try to solve the problem by itself. If it succeeds, it will automatically reset the alarm and add it to the log. If it is not successful after a maximum of five attempts, it will display the alarm to bring it to the attention of the owner.

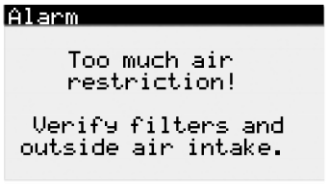
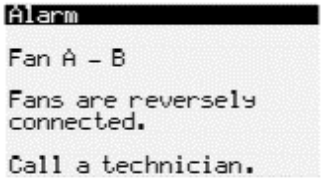
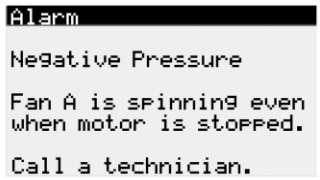
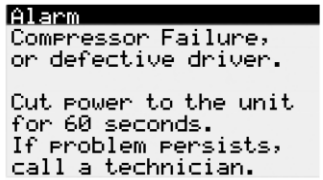
Figure 68 – Alarm button.

Press the ⚠ button to display the description of the current active alarm. Press ⚠ once more to reset the active alarm. Reset is only possible if the conditions that triggered the alarm are no longer present.

Alarm	Description and possible causes	What to do?
	It is time to replace the MINOTAIR's 2 MERV8 prefilters.	1. Replace the 2 MERV8 filters with new filters designed for the MINOTAIR. 2. Reset the filter counter by accessing the menu under "5. Filters", as previously described on page 60.
	It is time to replace the HEPA MERV15 filter if applicable.	1. Replace your HEPA MERV15 filter with a new filter designed for the MINOTAIR. 2. Reset the filter counter by accessing the menu under "5. Filters", as previously described on page 60.

	There are no alarms currently in effect.	1. No actions need to be taken. 2. Press ⚠ or ↩ to return to the main screen.
	• Particularly hot day. • Clogged filters, intake or outlet grilles. • Excess refrigerant. • Defective expansion valve. • Defective or disconnected high-pressure valve.	1. This is not cause for concern, unless the problem is reported several times within the same day or week. 2. Check filters and outside intake and outlet grilles. Replace or clean if needed. 3. Call a qualified technician if the problem persists.
	• Blown 2A Fuse. • Loose valve. • Defective soldering. • Punctured piping. • Defective or disconnected low-pressure valve.	1. If the fuse is blown, you must find the cause before replacing it. 2. Otherwise, this is a problem requiring the intervention of a qualified technician. 3. The microcontroller will cease all operations, but will keep controlling auxiliary units if applicable. In this case, it remains possible to trigger the auxiliary heating or cooling systems by manually setting the indoor temperature setpoint. Note that the displayed temperature and humidity will be distorted by the fact that the ventilation is stopped.
	• Indoor temperature and humidity are too low. • Clogged expansion valve. • Defective or disconnected exhaust fan. • Refrigerant starting to leak. • Defective or disconnected low-pressure valve.	1. This is not cause for concern, unless the problem is reported several times within the same day or week. 2. Check filters and outside intake and outlet grilles. Replace or clean if needed. 3. Call a qualified technician if the problem persists.
	• Defective internal clock. • Clock battery is dead. • Defective controller.	1. This is a problem which requires the intervention of a qualified technician. 2. Do not try to change the battery yourself, because you risk irreversibly damaging the microcontroller. 4. Batteries should have a life span of about 5 to 10 years.
	• Defective memory. • Defective controller.	1. This is a problem which requires the intervention of a qualified technician.

	• Defective or disconnected B1 sensor. • Defective controller.	2. This is a problem which requires the intervention of a qualified technician. 3. The microcontroller will default to a - 40°C (-40°F) outside temperature setting to force recirculation mode.
	• Defective or disconnected B2 sensor. • Defective controller.	1. This is a problem which requires the intervention of a qualified technician.
	• Defective or disconnected B3 sensor. • Defective controller.	1. This is a problem which requires the intervention of a qualified technician. 2. The microcontroller will default to a -15°C (5°F) to force a defrost cycle at regular intervals, in order to avoid freezing in the evaporator.
	• Defective or disconnected B4 sensor. • Defective controller.	1. This is a problem which requires the intervention of a qualified technician. 2. The microcontroller will default to a 21°C (70°F) indoor temperature. 3. Manually set indoor temperature setpoint according to your current heating and cooling needs.
	• Defective or disconnected B6 sensor. • Defective controller.	1. This is a problem which requires the intervention of a qualified technician. 2. The microcontroller will default to a 40% indoor humidity. 3. Manually set indoor humidity setpoint according to your current indoor humidity level needs.
 	• Fan start-up failure due to poor quality of electricity. • Defective or disconnected ID1 sensor. • Defective or disconnected fan. • Defective controller.	1. This is not cause for concern, unless the problem is reported several times in a row 2. The microcontroller will cease all operations, but will keep controlling auxiliary units if applicable. In this case, it remains possible to trigger the auxiliary heating or cooling systems by manually setting the indoor temperature setpoint. Note that the displayed temperature and humidity will be distorted by the fact that the device ventilation is stopped. 3. Call a qualified technician if the problem persists.

	• Dirty filters. • Outside intake grille clogged. • Dirty coils. • Implosion of flexible ducts due to negative static pressure. • Obstructed ventilation ducts or improperly installed. • Ventilation duct diameters are too small. • Supply or return grilles closed or clogged.	1. Check filters and outside intake and outlet grilles. Replace or clean if needed. 2. Microcontroller will cease all operations, but will keep controlling auxiliary units if applicable. In this case, it remains possible to trigger the auxiliary heating or cooling systems by manually setting the indoor temperature setpoint. Note that the displayed temperature and humidity will be distorted by the fact that the ventilation is stopped. 3. Call a qualified technician if the problem persists.
	• Fans A and B are swapped. • House is in severe negative pressure.	1. This is a problem which requires the intervention of a qualified technician. 2. Terminal Y3 controls Fan A (left) while terminal Y4 controls Fan B (right).
	• Air handler interlock is not properly calibrated. • House is in severe negative pressure.	1. See page “Preventive Measures” on page 18. 2. Add make-up air to the house.
	• The SSR relay is defective. • The microcontroller is defective. • The compressor is seized.	1. Call a qualified technician.

MAINTENANCE

The MINOTAIR is a powerful device, but it requires a certain amount of maintenance on a regular basis. Regular maintenance of this device will ensure optimal and worry-free working conditions. Furthermore, failure to perform this maintenance will render the device's warranty null and void. Please do not neglect the maintenance of your MINOTAIR.

Frequency	What to do?
Every 3 months	• Replace filters with filters designed for the MINOTAIR • Inspect the air intake and outlet grilles located outside and remove any clogging if necessary (leaves, dust, snow, etc.). • Inspect the condensate drain and clean if needed.
Every 12 months	• Change HEPA filter, if applicable • Clean humidifier according to the manufacturer's guidelines, if applicable. • Replace the filter cartridge on the humidifier's water line, if applicable.
When needed if you suspect dirt or contamination, or ideally every 36 months	• Disinfect the condensate pan. To do so: 1. Shut off power to the MINOTAIR by closing the circuit breaker or the circuit switch. 2. Using a vice grip, squeeze the flexible condensate pipe at its lowest point to prevent dripping into the floor drain. Do not squeeze too strongly, as it could damage the pipe wall. 3. Access the motorized damper (Figure 3). *You can take this opportunity to vacuum the interior by being careful not to damage the wires and sensors.* 4. Remove the orange plug located on the motorized damper compartment floor ("R" component in Figure 2). 5. Prepare 4 liters (1 gal) of bleach solution diluted in three parts cold water (1 liter bleach in 3 liters water = 4 liters). **WARNING**: Use gloves and wear goggles to handle this solution. Bleach can irritate the skin and discolor clothes. 6. Carefully pour the bleach solution into the motorized damper compartment. The solution will pour into the hole where you pulled the plug earlier. **NOTE**: Aluminum tarnishes when in contact with bleach. This will not affect the operation and durability of the device in any way, nor the warranty. 7. Leave the solution in the condensate pan for approximately 20 minutes. 8. Remove the vice grip and carefully pour 4 liters (1 gal) of additional cold water into the motorized damper compartment. 9. Put back the plug on the motorized damper compartment floor. 10. Close the Main Access Panel and restart the unit.

LIMITED WARRANTY

Dedicated to offering the highest quality products, MINOTAIR Ventilation Inc., the "Manufacturer", is pleased to offer a 5-year limited warranty on parts. The "Warranty" applies to the CATU-V12 and PentaCare V-12 Compact Air Treatment Unit, the "Product".

- This Warranty only applies if the Product was purchased in Canada or the United States. If the Product was purchased elsewhere, please contact the authorized reseller in the country where it was purchased.
- The Manufacturer guarantees that all mechanical, electric and electronic components of the product are free from defects in material and workmanship, under normal use and maintenance. This Warranty is valid for 5 years, starting from the date of the original purchase.
- If the Product becomes defective during the period of this Warranty, provided this defect is not excluded from the Warranty, the Manufacturer will repair or replace, at its own discretion, the Product using new or refurbished parts. In cases where the manufacturer decides to replace the Product, this Warranty will continue to apply to the replacement Product for the residual duration of the original Warranty.
- Warranty claims, other than those described above, are expressly excluded.

  IMPORTANT: We ask that you carefully store your original proof of purchase, because without it the Warranty will be null and void. In the improbable case where you have to make a claim under this Warranty, we will need you to produce your original proof of purchase which we will return to you after the claim has been validated.

LIMITATIONS AND EXCLUSIONS

- This Warranty does not cover consumable items such as filters, fuses, batteries, etc.
- This Warranty does not cover third-party equipment such as humidifiers, condensate pumps, heating coil, etc. Refer to the manufacturers of these devices to learn more about their respective warranties.
- This Warranty does not cover cosmetic damages that do not affect the products' functioning. This includes, without limitation: scratches, bumps, stains, backlight intensity, metal tarnish or discolor, etc.
  IMPORTANT: While our products are tested and inspected in our factory before they are shipped, it is your responsibility to visually inspect the Product for defects upon delivery and to advise us of any defect within 24 hours.
- Any damages or defects resulting from transport, improper handling, wrongful installation or use, or an act of God (fire, tornado, earthquake, flooding, pandemic, etc.), or poor-quality power source (voltage variations, spikes, brownouts, electrical noise, etc.) are excluded from this Warranty.
- All modifications or repairs made by unauthorized personnel (including the owner or tenant) will automatically void the Warranty.
- This Warranty does not cover handling, shipping and labor fees.
- No other person (distributor, reseller, vendor, etc.) is authorized to promise a Warranty on the Manufacturer's part.

DAMAGE CLAIMS

The Manufacturer will not be liable towards the buyer or the owner for any loss or damage caused directly or indirectly and of any nature whatsoever. In no case will the Manufacturer's responsibility be greater than the Product's invoiced price or the MSRP in effect at the time of purchase, whichever is less.

OTHER WARRANTY RIGHTS

This Warranty does not limit the buyer or the owner's legal rights in any way as a consumer.

NOTES: