REQUEST FOR PROPOSAL

BUILDING REPAIR AND

HVAC RENOVATION AND UPGRADE

TO THE SCREVEN COUNTY LIBRARY

Project Name: Screven County Library Building Repair and HVAC Renovation and Upgrade

Proposal Deadline: May 5, 2023

Project Deadline: 90 days from proposal award date

Return To: Screven County Board of Commissioners
Attn. Lori Burke, County Manager
P.O. Box 159
216 Mims Road
Sylvania, Ga. 30467

You are cordially invited by The Screven County Board of Commissioners to submit a proposal on the above referenced project. Please find attached a proposal package containing a proposal sheet and schedule of items. Please fill in all information on the attached documents and return by the above indicated deadline. If you should have any questions please contact Lori Burke, County Manager at 912-564-7535.

Pursuant to enactment of the General Assembly, the successful bidder will be required to provide a payment bond and a performance bond or an irrevocable letter of credit in the amount of 100% of the contract as required by law, O.C.G.A. ss 13-10-1, 32-4-60 ET SEQ., 36-10-4 and 36-82- 100 ET SEQ.

Please mark on the outside of the proposal package **Screven County Library Building Repair and HVAC Renovation and Upgrade**

The Screven County Board of Commissioners is seeking competitive proposals from qualified, reliable vendors for the repair of the building and renovation and renovation and upgrade to the Heating, Ventilation, and Air Conditioning (HVAC) System at the Screven County Public Library, 106 S. Community Drive, Sylvania, GA 30467. The successful vendor will be responsible for removing and disposing of the existing equipment, providing any new equipment, and all labor, supervision, materials, equipment, transportation, and services necessary to perform high quality work as further described in the Scope of Work.

Background:

The Screven County Library opened in 1988 and is currently operational six days a week, excluding holidays. The one-level building is approximately 13,000 square feet. All of the original major HVAC equipment components have been replaced over the past 35 years with the exception of the Multipurpose Room fan-coil unit.

The original mechanical plant consisted of the following:

- A single large tonnage (30+ ton) multi-zone air-handling unit with direct expansion cooling coil and individual zone electric heating coils served the main library area. Original plans indicates that a total of 13 zones were provided.
- A single cooling only condensing unit served the large main air-handling unit. - A nominal 10-ton split system served the adjacent multipurpose room. The system consisted of a nominal 10 ton up-flow fan-coil unit with electric heater, direct expansion cooling coil and two matching remote 5 tons condensing units.

Scope of Work: The scope of this project will be based on the attached engineering report, HVAC Survey and Analysis for the Screven County Public Library.

Building

1. Improvement of the current ceiling insulation and air barrier shall be instituted. All damaged gypsum board barriers should be repaired. All damaged ceiling tiles shall be replaced, insulation repaired, and possible roof leaks investigated.
2. Mechanical room plenum shall be sealed as tight as possible. Existing double doors shall be gasketed for an air-tight assembly to prevent the entry of dirt and debris. Sealing shall include the threshold.

HVAC

1. Clean the current HVAC systems including all ductwork and air devices to remove existing dirt and mold growth.
2. Replace the existing filter sections for the new 15- and 20-ton air-handling units with gasketed filter assembly to prevent the by-pass of contaminated return air.
3. The current 15- and 20-ton air-handling units shall be retrofitted with staged or variable fan speed controls to provide decreased air flow and increased humidity removal during low cooling load conditions. The existing control system should be modified for a minimum of 2 stages of cooling if not currently present. Finally, all remaining controls shall be checked and calibrated for proper operation.
4. Install ionic air cleaners in the return coil section and the supply air ductwork of each fan-coil unit. Air cleaners will reduce the growth of future mold within the HVAC systems.
5. Additional space de-humidification units shall be installed to assist the current HVAC equipment in humidity removal. Units should be continuous in operation to reduce humidity levels when central equipment is not operating.
6. The existing multipurpose room system should be replaced with new equipment providing variable supply fan speed control and staged cooling. The replacement equipment should be down-sized according to current and expected space usage. Connection of the adjacent toilet areas onto this system

is recommended. Needed capacity should be calculated based upon current occupancy level, time of day, lighting loads, and outdoor air requirements.

7. Repair damaged ductwork insulation in the attic space.
8. Inspect and repair any current flexible ductwork in the attic space.
9. Revise the current control system to improve comfort for select areas, such as the Director's Office and the Multipurpose Room. Self-contained variable flow heating and cooling diffusers are recommended. Self-contained variable air volume (VAV) diffusers are recommended.
10. Repair the existing outdoor air take dampers and interface with the control system for operation when toilet exhaust fans are in operation.
11. Any areas where conditioned and unconditioned air are mixing need to be addressed (vapor barrier, plenum, soffits, and batts).

- Demolition
  All demo materials are to be removed and disposed of off-site. This includes removing and properly disposing of the existing HVAC system(s) and damaged components.

- Warrantees
  It is expected that all projects recommended, and equipment replaced will have normal manufacturers or construction warrantees appropriate to the project.

HVAC SURVEY & ANALYSIS

Screven County Public Library

106 Community Street

Sylvania, Georgia 30467

SUBMITTED BY:

Matheson Enterprises, Inc.

James E. Matheson, P.E.

June 28, 2021

EXECUTIVE SUMMARY

A survey of the existing mechanical room and the internal heating/ventilating/air-conditioning (HVAC) equipment present at Screven County Library, 106 Community Street, Sylvania, Georgia, was conducted on May 4, 2021. The physical survey consisted of visual observations only. Equipment was not opened, and no detailed tests were conducted. Additional building information was obtained by review of existing plans and previous reports of individual building components.

A follow-up visit was also provided on June 10, 2021, to verify additional existing conditions. A short meeting with the local HVAC contractor who installed the most recent equipment was also conducted, to better understand the current controls configuration.

The original installation of the HVAC systems occurred in 1988. All of the original major HVAC equipment components have been replaced over the past 34 years with the exception of the Multi-purpose Room fan-coil unit.

The building is currently served by three split system heat pumps. The Multi-Purpose Room is served by a nominal 10 ton split system heat pump. The main library is served by one nominal 15 ton split system, and one nominal 20 ton split system. Each system is comprised of an indoor fan-coil with an electric heater section, and a remote heat pump unit. The age, manufacturer, and capacity of each major equipment component is indicated on the "Current Equipment Schedule: prepared as a part of this report.

Evidence of excessive humidity conditions within the facility is readily visible on the current ceiling tiles. An above ceiling inspection revealed voids in the current building envelope barriers. This allows outdoor humidity to enter the building without conditioning and elevate the indoor humidity conditions.

Additionally, the return air method for the library units is not ducted or filtered properly, creating contaminated ductwork and dirt stains at the air device locations.

The current HVAC systems lack the ability to lower indoor humidity levels sufficiently during periods of elevated outdoor humidity conditions.

Repair of the current building vapor barrier is needed. Modification or replacement of the existing HVAC equipment to provide better de-humidification is warranted. Repair of the return air filter assemblies and air distribution system is also essential in improving the indoor environment. In addition, contaminates which remain in the systems should be addressed with ionic air cleaners to further attack the growth of mold within the facility and internal components of the HVAC systems.

An overall modification/replacement strategy for the HVAC components and ductwork within the facility is presented in the following report.

HVAC SURVEY & ANALYSIS

Screven County Public Library

Sylvania, Georgia

Existing Conditions

The original building was constructed, and HVAC systems installed in 1988.

The original mechanical plant consisted of the following:

- A single large tonnage (30+ ton) multi-zone air-handling unit with direct expansion cooling coil and individual zone electric heating coils served the main library area. Original plans indicates that a total of 13 zones were provided.
- A single cooling only condensing unit served the large main air-handling unit.
- A nominal 10 ton split system served the adjacent multipurpose room. The system consisted of a nominal 10 ton up-flow fan-coil unit with electric heater, direct expansion cooling coil and two matching remote 5 tons condensing units.

Since the original installation, all major HVAC components, except for the Multipurpose Room fan-coil unit, have been replaced.

Numerous wall temperature sensors and thermostats were observed. Based upon conversations with the occupants and the latest HVAC contractor, it appears that the three current systems are controlled by a single wall thermostat for each system. Previous zone temperature sensors and additional wall thermostats are assumed to be inactive.

A short interview with the recent HVAC installer, Lowell Hagan with Hagan Heating & Air, indicates that the exact configuration of the present controls and active components are unknown.

-Main Library Area

The single multi-zone air-handling unit serving the main library has been replaced with two separate split system heat pumps. On-site observation indicates that a 15-ton air-handler with accessory electric heater section, now serves the south portion of the main library area. A second 20-ton air-handler with accessory heater section serves the northern area of the main building. Each air-handler is interfaced with a matching remote ground mounted heat pump unit. The exact coverage area for each system is unclear due to the difficulty with attic access.

The original main library multi-zone air-handler was installed utilizing a return air plenum. The plenum consists of the space above the ceiling and the mechanical room. The ceiling plenum is composed of gypsum board attached to the bottom of the wood roof framing with an acoustical tile ceiling below. Fiberglass batt insulation is installed on top of the gypsum board for thermal isolation. This method of return air remains today.

Other ceiling areas in the main library area which are not part of the return air plenum appear to have only fiberglass batts suspended by wire mesh secured to the bottom of the wooden roof trusses. The loose construction of this assembly results in uncontrolled outdoor air and humidity into the building. Unfortunately, several areas of water entry and damaged ceiling tiles are visible.

Additionally, exterior soffit areas have damaged and missing gypsum board barriers which allow the entry of outdoor air into the attic space over the library ceilings.

As a result of the uncontrolled outdoor air entry thru the plenum, the original outdoor air intake damper for the mechanical room has been disconnected or possibility not repaired after failure.

Further inspection above the ceiling revealed missing insulation on the supply ductwork in several locations. Although no damage flexible ductwork sections were found during the attic review, if encountered their condition should be repaired during any renovation procedures.

As indicated above, the mechanical room for the two new library fan-coil units is an open return air plenum, lacking ductwork from the ceiling plenum to the unit return air intake. The current filter sections allow the by-pass of contaminated air due to voids between filters and lack of gasketing to seal the filter edges. This contaminated air is then delivered into the unit, and down the supply ductwork into the facility. Dirt collects on the interior of the unit, in the ductwork and air devices, and becomes an excellent food source for mold growth.

-Multipurpose Room

The original multipurpose room air-handling unit remains, however the remote heat pump units have been replaced since the initial installation. Currently there are two nominal 5 ton remote heat pump units serving the existing fan-coil unit. One is a 5-ton Carrier unit manufactured in 2003. The other unit appears to be the same manufacturer and age, but the identification plate is not legible.

The system has a ducted return air, so the outdoor air infiltration problems associated with the main library area are not present.

The multipurpose room air diffusers indicate dirt and ceiling contamination at the discharge points. The existence of mold in this area was confirmed by the recent mold testing conducted by Gingair on March 29, 2921.

Analysis

Review of the existing conditions at the facility indicates that reduction of mold growth should be a primary goal of any HVAC renovations and modifications.

Evidence of high humidity and dirt contamination is present on the acoustical ceiling tiles, on the gypsum surfaces, and on the ceiling air devices.

The current HVAC systems lack the ability to greatly reduce the interior humidity levels under part load conditions. All current HVAC systems have constant volume fans. When the cooling loads are low, but the humidity are relatively high, this produces cool air without the removal of appreciable amounts of moisture.

Current methods of providing increased moisture removal employ the use of variable or multiple stage fans. The newer library air-handling units have this as a factory option, which may be possible with field modification. The original multipurpose room fan-coil does not appear to be a candidate for field modification.

Another critical issue is the lack of a continuous vapor barrier between the vented attic space and the occupied space below the ceiling. The building ceiling/roof insulation consists of fiberglass batts laying between the horizontal roof framing members. The insulation is installed with a kraft paper facing down, and it is not uniform in its coverage.

Furthermore, the damaged gypsum barriers between the outdoor conditions allows greater quantities of humidity to enter the attic space.

The lack of a continuous vapor barrier allows the passage of outdoor moisture into the building unimpeded. This condition imposes a greater de-humidification load on the air-conditioning systems.

As part of this analysis, a comparison of adequate equipment sizes for similar facilities was performed.

A comparison of installed cooling capacity versus floor area of the facility indicates that the current equipment is sized for peak outdoor conditions with maximum occupancy levels. This assumption is based upon the reviewer's experience with similar project, and not a detailed load calculation. The current cooling capacity is approximately 330 sq/ft/ per ton of cooling for the main library, and 190 sq.ft. per ton for the multipurpose room. Typical levels would be 350 sq.ft./ton for the library and 250 sq.ft./ton for the multipurpose room at peak conditions.

Since the occupancy level and lighting levels of the current space usage are well below peak conditions, this means the cooling cycles run less frequently and less humidity is removed.

The existing control system also results in discomfort in the main library area since only two zones of control exist for varying areas of usage. The same unit that provides cooling and heating the Main Book Room also serves the Director's Office. This means that for much of the time the comfort in one area must be compromised in the other area. Short of a major equipment replacement, modification of the ductwork and controls for only select areas should be instituted to improve this condition.

Given the existing building envelope conditions, and the relatively new age of the main library equipment, improvement of the current equipment should be pursued in lieu of replacement. Replacement of the original multipurpose room fan-coil units and matching heat pumps is warranted due to their age and a performance.

Improvement of the current ceiling assembly should also be pursued and instituted where possible. Efforts to provide a more uniform insulation coverage should be incorporated into the renovation process.

Recommendations:

Building

1) Improvement of the current ceiling insulation and air barrier shall be instituted. All damaged gypsum board barriers should be repaired. All damaged ceiling tiles shall be replaced, insulation repaired, and possible roof leaks investigated.
2) Mechanical room plenum shall be sealed as tight as possible. Existing double doors shall be gasketed for an air-tight assembly to prevent the entry of dirt and debris. Sealing shall include the threshold.

HVAC

1) The current HVAC systems shall be cleaned, including all ductwork and air devices to remove existing dirt and mold growth.
2) The existing filter sections for the new 15- and 20-ton air-handling units shall be replaced with a gasketed filter assembly to prevent the by-pass of contaminated return air.

3) The current 15- and 20-ton air-handling units shall be retrofitted with staged or variable fan speed controls to provide decreased air flow and increased humidity removal during low cooling load conditions. The existing control system should be modified for a minimum of 2 stages of cooling if not currently present. Finally, all remaining controls shall be checked and calibrated for proper operation.
4) Install ionic air cleaners in the return coil section and the supply air ductwork of each fan-coil unit. Air cleaners will reduce the growth of future mold within the HVAC systems. The I-Mod devices by GPS systems are recommended.
5) Additional space de-humidification units shall be installed to assist the current HVAC equipment in humidity removal. Units should be continuous in operation to reduce humidity levels when central equipment is not operating.
6) The existing multipurpose room system should be replaced with new equipment providing variable supply fan speed control and staged cooling. The replacement equipment should be down-sized according to current and expected space usage. Connection of the adjacent toilet areas onto this system is recommended. Verification of the exact configuration of the present ductwork was not possible due to limited access. Needed capacity should be calculated based upon current occupancy level, time of day, lighting loads, and outdoor air requirements.
7) Repair damaged ductwork insulation in the attic space.
8) Inspect and repair any current flexible ductwork in the attic space.
9) Revise the current control system to improve comfort for select areas, such as the Director's Office and the Conference Meeting Room. Self-contained variable flow heating and cooling diffusers are recommended. Self-contained variable air volume (VAV) diffusers manufactured by Accutherm, Inc are recommended.
10) Repair the existing outdoor air take dampers and interface with the control system for operation when toilet exhaust fans are in operation.

Recommendation Details

Building

1) Improvement of the current roof/ceiling insulation and vapor barrier is essential to gaining control of the high humidity issues.

   The current energy code would not consider the present fiberglass batts on the ceiling grid as meeting the required insulation values.

   Assuming the current batts are retained, will require a diligent effort to restore continuous coverage and reduce airflow to a minimum between the attic and occupied space.. Missing and damaged insulation sections shall be replaced.

   All roof leaks should be addreseed to maintain the current insulation and vapor barriers.

   Missing and damaged gypsum air barriers between the exterior soffits and attic area shall be repaired.

2) The current mechanical room air plenum shall be sealed as tight as possible. New perimeter door gasketing and floor threshold with sweep shall be installed to prevent direct contaminate inflow to the room.

HVAC

1) All existing ductwork shall be cleaned internally to remove contaminates and mold growth. Although flexible ductwork was not oberved in the accessible attic spaces, additional care for cleaning and possible replacement of the flexible ductwork shall be part of the cleaning process.

   All air devices, grilles, and diffusers shall be cleaned or replaced if a thorough cleaning is not possbile due to corrosion

   Cleaning of the mechanical room plenum is also necessary. All walls and hard surfaces should be decontaminated, and unneccessary materials should be removed from the room.

2) The existing filter racks for the current 15 and 20-ton fan-coil units should be removed, Provide new assemblies which provide a gasketed seal around the perimeter of each individual filter and maintain support for the filters. Fabrication of a transition duct between the fan-coil and new filter assembly may be required. The maximum filter velocity shall be 500 fpm, with a final filter resistanace of 0.22" for a MERV 9 pleated filter.

   Examples of acceptable filter racks and filters are included in the supplemental data section of this report.

3) The existing 15 and 20-ton fan-coil units should be retro-fitted with variable or staged supply fan operation.

   The Carrier data sheet for the current library fan-coil units indicate that this is a factory installed option. The supplier may be able to provide a field installation kit. If this is not available from the manufacturer, the components consist of a variable speed drive for the fan motor and a simple programming module for the unit. The manufacturer should be able to provide assistance for this process. The remote monitoring and display panel should be a part of this modification.

   The supply fan should be programmed to operate at a capacity of approximately 70% during the first stage of cooling. This reduced air flow will provide increased de-humidification.

   The existing 20-ton system has two separate remote heat pumps, so the refrigerant staging already exists. The 15-ton system may require some modification of the refrigerant system, however the fan-coil unit currently has 2 circuits, and the heat pump has two stages of opeation.

   Data sheets for these units and the variable fan speed option are included in the supplemental data section of this report.

4) Upon completion of the duct cleaning process and filter rack replacement, ionic air cleaners should be installed to reduce future contamination mold growth.

   It is important to protect growth in the coil area, as well as in the supply ductwork. Products by GPS Solutions are recommended for this application, with installations between the filters and coil, and a second installation in the discharge ductwork.

Ultraviolet lamps are sometimes used in the coil section, but require frequent replacements. The ionic cleaners experience a rapid depletion of ions in the coil section, but do not require the frequent maintenance. Therefore, the installation of two ionic air cleaners per unit is recommend for longevity and ease of maintenance.

Supporting data for this product is included in the supplemental data section of this report.

5) Additional space de-humidification is needed to offset the other deficiencies within the facility. Installation of standalone dehumidifers is recommended to adddress this condition.

Large commercial de-humidifiers are quite expensive and would be difficult to interface within the current building. As a compromise to this approach, multiple small less expensive units are proposed. They offer ease of installation, first cost savings, and less complicated power requirements.

The smaller, readily available units can operate continuously to provide moisture removal when the main heating and cooling systems are off during periods of non-occupancy. This is ideal for addressing the building envelope deficiencies.

Units produced by April-Aire are recommended for installation in the attic space of the building. They only require a 110 volt power circuit, a drain to the building waste system and ductwork for return and supply wall or ceiling diffusers.

Two units are recommended for the main book room, one for the production area, and a fourth unit for the multi-purpose room.

Locations shall be selected for ease of servicing, and units shall be furnished with the optional remote control panel.

Supporting data for this equipment is included in the supplemental data section of this report.

6) Replace the existing 10 ton split system serving the multi-purpose room due to its age and lack of variable speed fan control.

The current unit is vastly oversized for periods of low occupancy. Therefore, only a minimum amount of moisture is removed by this system most of the time due to the limited use of the space.

Any replacement system should be downsized for the present anticipated peak occupancy, current lighting loads and time of peak occupancy. A slightly undersized system will provide much better humidity control for all hours of operation, while only allowing elevated temperature for a short period of time. Pre-cooling of the space is recommended in iieu of oversizing the equipment.

Also, the current system does not appear to be easily modified for variable air flow. Total replacment of the system is the most viable option.

Replacement with a Carrier variable fan heat pump system is recommended to maintain similar equipment types throughout the complex.

Replace the existing system serving the multipurpose room with a variable speed fan-coil and 2-speed remote heat pump system. Integral controls shall be provided to reduced airflows and cooling capacity during periods of low load.

Example system models are included in the supplemental data section of this report.

All equipment shall comply with the current energy code standards.

The electrical requirements for all new HVAC components shall be verified with the existing electrical power distribution systems. The available voltage, phase, panel, circuit breaker and disconnect capacities shall be coordinated for adequate and code compliant service prior to the ordering any of the HVAC components. New circuits shall be provided for the new ionic air cleaners and outdoor damper motors.

7) All voids and tears in the existing attic ductwork insulation shall be repaired. Most of the existing damage is limited to resealing with new vapor barrier tape. However, failure to address this condition now will result in a rapid deterioation of the remaining insulation.

   Additionally, the duct insulation present at the current ceiling diffusers shall be repaired for full coverage of all cold surfaces. The back side of the diffusers shall be fully insulated to prevent condensation and corrosion of the air devices.

8) All flexible duct connnections shall be checked for secure attachment to the adjacent rigid ductwork or air devices/ insulation coverage shall be complete over all cold surfaces. Any damaged of deterioating flexible ductwork shall be replaced.

9) The current control system shall be checked for proper operation and calibration.

   A centrally located space temperature sensor shall be present for each retained and new splt system.

   Staging of the cooling cycles shall be provided as indicated in the recommendations above.

   The current programmable wall thermostats should be replaced with controls which can incorporate the variable speed functions of the new equipment and modifications.

   Replacement control systems shall be user friendly, and shall contain night setback and time of day scheduling.

   Areas of differing conditions on the same split system, such as the Director’s office and main book room shall be provided with self-contained VAV heating/cooling diffusers for the smaller area.

   A VAV heating/cooling Accutherm diffusers I are recommended for the Director’s office and Meeting Room..

   Product data for this diffuser is included in the supplemental data section of this report.

10) The existing outdoor air dampers for all split systems shall be repaired and interfaced with the building controls. Dampers shall be programmed to remain closed during non-occupancy hours. Dampers shall be interfaced with the operation of the toilet exhaust fans.

    Demand control ventilation shall be considered for the main mechanical room dampers to limit the necessary outdoor air intake. A CO2 sensor and modulating damper control will be required for this task.

Supporting Data –

- Site Photos – on following pages.
- Current Equipment Schedule, including Model, Serial Numbers and age.
- Proposed Equipment Data Sheets
- Original Mechanical Plan
- Revised Mechanical Plan

Site Photos

Ceiling Tile Damage - insulation on wire mesh above

Plenum Insulation Failure

Dirty Ceiling Diffuser

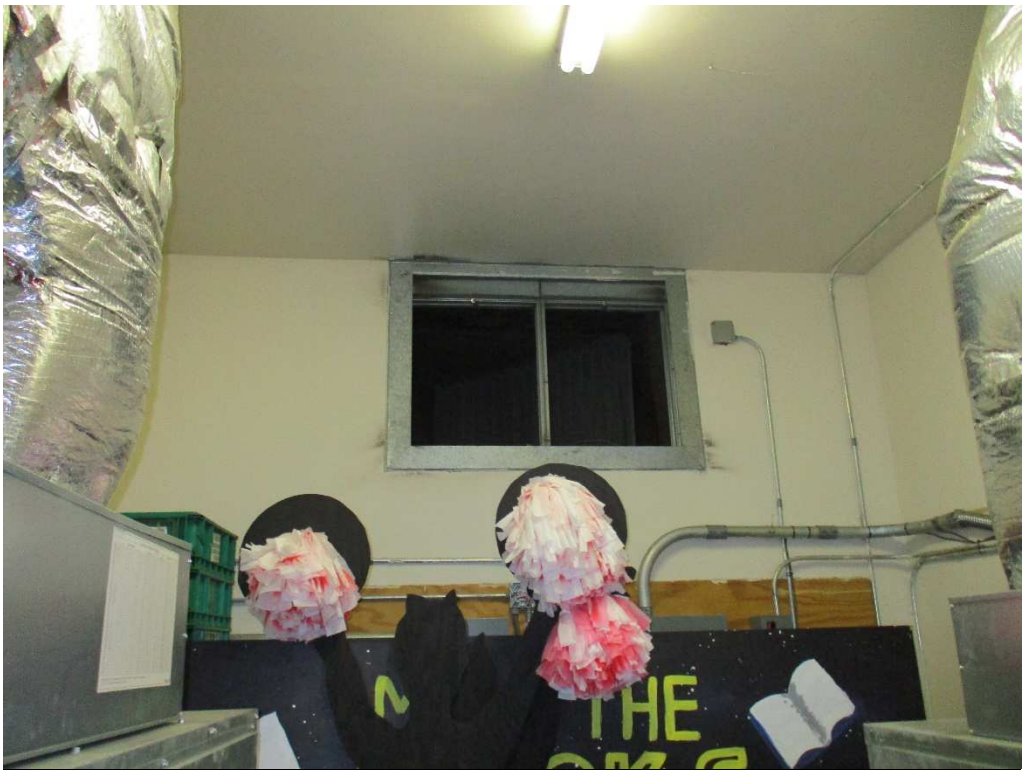
Plenum Moisture Damage

Damaged Gypsum Ceiling Barrier

Un-insulated Soffit area – Open to attic

Roof Insulation over gypsum board plenum

Library Fan-Coil Units – Mechanical Room Plenum



Plenum Return Opening into Mechanical Room

Library Fan-Coil Filter not secured

Library fan-Coil filters with voids

Library Fan-Coil Filters with void at end

Library Remote Heat Pump Units

Mechanical Room Outdoor Air intake – disconnected.

Original Multi-Purpose Room Fan-Coil

Mechanical Room Door Seals by-pass outdoor air

Multi-purpose room heat pump units

Damaged Duct Insulation

Current Equipment Schedule

Equipment	Model Number	Serial Number	Year
Main Library 20-ton Split-System			
Nominal 20-ton Fan-Coil Unit	Carrier 40RUQA24	1313U12196	2013
Nominal 10-ton Heat Pump Unit	Carrier 38AUQA12	0613C90353	2013
Nominal 10-ton Heat Pump Unit	Carrier 38AUQA12	0613C90354	2013
Main Library 15-ton Split-System			
Nominal 15-ton Fan-Coil Unit	Carrier 40RUQA16	1319U28712	2019
Nominal 15-ton Heat Pump Unit	Carrier 38AUQA16	1719P40920	2019
Multi-Purpose Room 10-ton Split-System			
Nominal 10-ton Fan-Coil Unit	Carrier 40RR012	Q896113	1989
Nominal 5-ton Heat Pump Unit	Carrier 38YCC060560	1793E34727	2003
Nominal 5-ton Heat Pump Unit	unknown	unknown	??

Proposed Equipment Data

New Filter Racks – Use with 2” MERV filters

THE WORLD LEADER IN CLEAN AIR SOLUTIONS

Type A-8 Filter Holding Frames and Latches

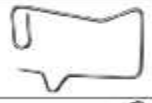
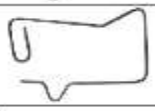
Type A-8 Filter Holding Frames

The Type A-8 filter holding frame comes in seven standard sizes that can be used individually or may be combined to fit virtually any size filter bank. Each frame includes our premium closed cell EPDM rubber gaskets to ensure a proper seal between the frame and filter to minimize dirty air bypass. Frames are also available without gaskets or with dovetail gaskets. Also available are Type A-8 latches designed to hold the filter in place and create a positive seal. Type A-8 frames are constructed of galvanized steel and 304 stainless steel, and also available in 316 stainless steel.

Size	Part Number 16 ga. Galv	Part Number 18 ga. 304SS
12 x 21 x 3	312-600-000	312-600-100
16 x 20 x 3	312-600-001	312-600-101
18 x 28 x 3	312-600-002	312-600-102
20 x 20 x 3	312-600-003	312-600-103
20 x 24 x 3	312-600-004	312-600-104
20 x 25 x 3	312-600-005	312-600-105
24 x 24 x 3	312-600-006	312-600-106

Type A-8 Latches

AAF Flanders offers a variety of Type A-8 latches to secure disposable panel filters or 12" box style high efficiency filters (with or without a prefilter) into a Type A-8 filter holding frame. The Type A-8 latches attach to one of two sets of knockouts on the Type A-8 frame. Simply attach the appropriate latch that best fits the depth of the filter. It is recommended to use 4 latches per frame.

Part Number	Material	Application	Farr Model	Picture
315-004-000	Galvanized Steel	Secures a 4" filter, or a 2" filter with a single header filter in an A-8 frame	C-98	
315-004-100	Stainless Steel	Secures a 4" filter, or a 2" filter with a single header filter in an A-8 frame	C-98S	
315-004-001	Galvanized Steel	12" spring latch with ¾" tang to secure 12" deep double header AAF filter	C-80	

AAF | Flanders

Variable Volume Option for Existing Fan-Coils

OPTIONS AND ACCESSORIES

ITEM	OPTION*	ACCESSORY†
Alternate Fan Motors	X	
Alternate Drives	X	
Staged Air Volume System	X	
CO_2 Sensors		X
Condensate Drain Trap		X
Discharge Plenum		X
Economizer Ultra LOW LEAK–FDD		X
Economizer Standard Leak		X
Electric Heat		X
Hot Water Heating Coils		X
Overhead Suspension Package		X
Prepainted Units	X	
Programmable Thermostats		X
Return Air Grille		X
Steam Heating Coil		X
Subbase		X
Display Kit for SAV system with VFD		X

* Factory–installed option.

† Field–installed accessory

Factory-installed options

Alternate fan motors and drives are available to provide the widest possible range of performance.

Prepainted steel units are available from the factory for applications that require painted units. Units are painted with American Sterling Gray color.

Staged Air Volume (SAV) system saves energy and installation time by utilizing a Variable Frequency Drive (VFD) to automatically adjust the indoor fan motor speed in sequence with the units cooling operation. Per ASHRAE 90.1 2010 standard section 6.4.3.10.b, during the first stage of cooling operation the VFD will adjust the fan motor to provide 2/3rd of the total cfm established for the unit. When a call for the second stage of cooling is required, the VFD will allow the total cfm for the unit established (100%). During the heating mode the VFD will allow total design cfm (100%) operation and during the ventilation mode the VFD will allow operation to 2/3rd of total cfm.

Compared to single speed indoor fan motor systems, Carrier's SAV system can save substantial energy, 25%+*, versus single speed indoor fan motor systems.

*Data based on .10 ($/kWh) in an office application utilizing Carrier's HAP 4.6 simulation software program.

The VFD used in Carrier's SAV system has soft start capabilities to slowly ramp up the speeds, thus eliminating any high inrush air volume during initial start–up. It also has internal over current protection for the fan motor and a field installed display kit that allows adjustment and in depth diagnostics of the VFD.

This SAV system is available on models with 2–stage cooling operation with electrical mechanical controls.

The SAV system is very flexible for initial fan performance set up and adjustment. The standard factory shipped VFD is pre–programmed to automatically stage the fan speed between the first and second stage of cooling. The unit fan performance static pressure and cfm can be easily adjusted using the traditional means of pulley adjustments. The other means to adjust the unit static and cfm performance is to utilize the field installed Display Kit and adjust the frequency and voltage in the VFD to required performance requirements. In either case, once set up, the VFD will automatically adjust the speed between the cooling stage operations.

Field-installed accessories

CO_2 sensors can be used in conjunction with the economizer accessory to help meet indoor air quality requirements. The sensor signals the economizer to open when the CO_2 level in the space exceeds the set point. A Carrier Comfort System programmable thermostat can be used to override the sensor if the outside–air temperature is too high or too low.

Condensate drain trap includes an overflow shutoff switch that can be wired to turn off the unit if the trap becomes plugged. Kit also includes a wire harness that can be connected to an alarm if desired. The transparent trap is designed for easy service and maintenance.

Discharge plenum directs the air discharge directly into the occupied space; integral horizontal and vertical louvers enable redirection of airflow. Accessory is available unpainted or painted. Field assembly is required (only applicable for vertical application).

Economizers – temperature dry bulb controlled –

Ultra LOW LEAK – EconoMiSer X with solid–state W7220 controller, gear–driven, modulating damper, spring return actuator. Supply and outdoor air sensors, and CO2 sensor compatible, for use in electro mechanical controls only. Also includes return and outside air damper leakage that meets California Title 24 section 140.4 requirements. Controller meets California Title 24 Section 120.2 Fault Detection and Diagnostic (FDD) requirements.

STANDARD – EconoMi$er IV – with gear driven damper blades and W7212 controller (Use –HH–57AC–078 for enthalpy control).

Electric resistance heat coils have an open–wire design and are mounted in a rigid frame. Safety cutouts for high temperature conditions are standard. Terminal block for single–point power connection is included.

Two–row hot water coils have copper tubes mechanically bonded to aluminum plate fins and non–ferrous headers.

Overhead suspension package includes necessary brackets to support units in horizontal ceiling installations.

Return–air grille provides a protective barrier over the return–air opening and gives a finished appearance to units installed in the occupied space. Accessory is available unpainted or painted.

One–row steam coil has copper tubes and aluminum fins. The Inner Distributing Tube (IDT) design provides uniform temperatures across the coil face. The steam coil has a broad operating pressure range; up to 20 psi (138 kPag) at 260°F (126°C). The IDT steam coils are especially suited to applications where sub–freezing air enters the unit.

Subbase provides a stable, raised platform and room for condensate drain trap connection for vertical floor–mounted units. Accessory is available unpainted or painted.

Ionic Air Cleaners – GPS I-Mod

PRODUCT DATA SHEET

GPS-iMOD®

Modular Needlepoint Bipolar Ionization Air Ionization System

PRODUCT DESCRIPTION

The patented GPS-iMOD is a modular needlepoint bipolar ionization system that is field assembled to any length required up to 240 inches in 8-inch increments.

STANDARD FEATURES

Power Supply: Voltage selector switch, illuminated On/Off switch, operation status LED, six HV output ports, integral Building Automation System (BAS) alarm contacts, auxiliary terminals for connection of an optional GPS-RIDE ECT-P Ion Sensor. **GPS-iMOD Bar:** 8' Sections, nine brushes per section, up to 240" total length, magnets for easy mounting.

SPECIFICATIONS

Input Voltage	24/120/208-240VAC
Amps	0.5A/0.12A/0.092A
Temperature Range	-40°F to 200°F
Humidity Range	0-100% RH
Frequency	50/60HZ
Output Voltage	5.5kV RMS
Output Frequency	50/60Hz
Total Ion Output	>140M ions/in per inch of bar
Power Entry	UL Listed, Panel-Rated Line Cord with 3 Prong Plug
Electrical Listings	UL, cUL
Compliance & Certifications	UL 2998, UL 867, OSHPD Seismic, CRPS, IAQP, CE
Power Unit Dimensions	9.2"L x 3.2"W x 1.75"H
Power Unit Weight	4 lbs lbs
Bar Weight	0.24 lbs per 8" section
Bar Section Dimensions	8.25"L x 2.05"W x 1.67"H
Alarm Contact Rating	250 VAC 5A N/O "dry" contact

*Length = 8.2" x iMOD Quantity + 1.25"

BENEFITS

TARGETS PARTICLES
When ions disperse throughout a space, they combine with particles suspended in the air. This creates a snowball effect in which particles of opposite polarities begin to cluster together, making them easier to capture in filtration systems.

REDUCES PATHOGENS
During the NPBI process, contact with ions disrupts pathogens' surface proteins, rendering them inactive and unable to replicate.

TACKLES ODORS
GPS' NPBI technology reduces odor-causing VOCs, leaving indoor air smelling fresher.

SAVES ENERGY
By keeping indoor air cleaner, NPBI reduces the amount of air required from outside to keep things fresh — saving ventilation equipment costs and energy consumption.

GPS®

www.globalplasmasolutions.com

GPS-040-11 R7 iMOD DS

Ionic Air Cleaners - Data

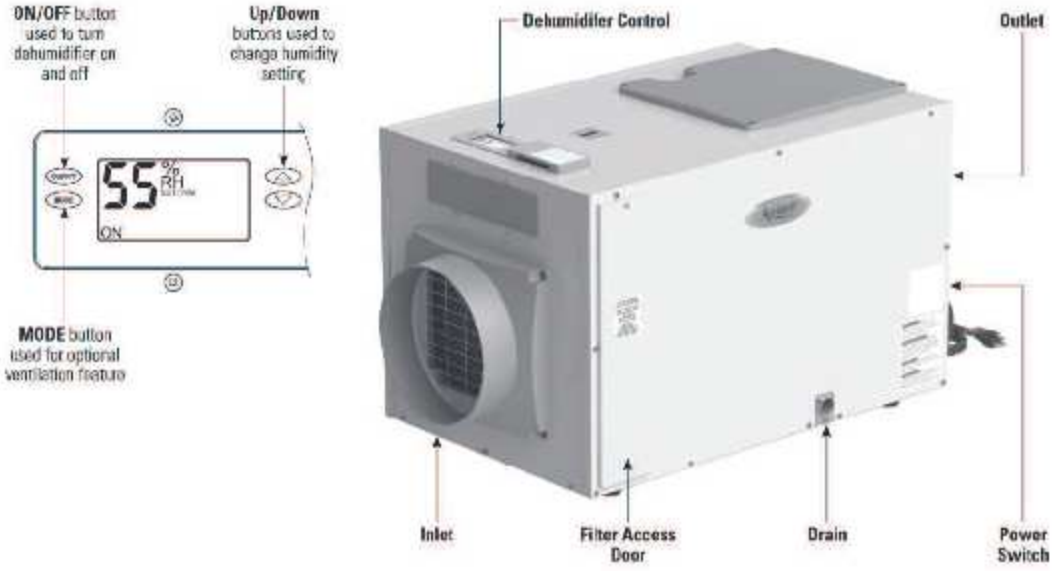
Dehumidifier Unit Aprilaire Model 1872

Aprilaire

Model 1870 & 1870W Dehumidifier Owner's Manual

PLEASE LEAVE THIS MANUAL WITH THE HOMEOWNER

Installer by:_____ Installer Phone:_____ Date Installed:_____



WHOLE HOME DEHUMIDIFICATION

The Aprilaire® Dehumidifier controls the humidity level in your entire home. A powerful blower inside the dehumidifier draws air into the cabinet, filters the air and removes moisture, then discharges the dry air into the HVAC system or dedicated area of the home. Inside the cabinet, a sealed refrigeration system removes moisture by moving the air through a series of tubes and fins that are kept colder than the dew point of the incoming air. The dew point is the temperature at which moisture in the air will condense, much like what occurs on the outside of a cold glass on a hot summer day. The condensed moisture drips into the dehumidifier drain pan to a drain tube routed to the nearest floor drain or condensate pump. After the moisture is removed, the air moves through a second coil where it is reheated before being sent back into the home. The air leaving the dehumidifier will be warmer and drier than the air entering the dehumidifier.

You can reduce the amount of humidity that enters the home by closing windows, doors, and fireplace flues when outdoor humidity is high, and by drying clothes outside. Direct exhaust from kitchen vents and bath fans is the best means of controlling humidity due to cooking and showers/baths. The dehumidifier is not designed to prevent window condensation in winter. Use ventilation to lower indoor humidity levels in the winter.

Dehumidifier Unit

SETTING THE DESIRED HUMIDITY LEVEL

The dehumidifier on-board control will display the humidity setting when not running, and displays the measured humidity when running.

The UP and DOWN arrow buttons allow the humidity level to be set from 40% to 80% relative humidity. Use the ON/OFF button to turn the dehumidifier ON or OFF.

Set the control at 55%RH when first installed. Allow the dehumidifier to run until it reaches the setting before deciding if you want to change the setting.

- **If you prefer the air to be more dry,** decrease the humidity setting.
- **If you prefer the air to be less dry,** increase the humidity setting.

Your comfort is the best measure of how to adjust your setting. When first installed, your dehumidifier has to remove all the moisture that is initially in your home. The home acts like a sponge so the moisture in the materials of your home is at the same level as the air. After drying the air, the materials of the home will release moisture back into the air until they are again at the same level. As a result, it is not uncommon for the dehumidifier to operate for an extended period when first installed.

ENERGY SAVINGS TIPS

Energy Savings Tip #1: Adjust the humidity setting to be as high as is comfortable to reduce dehumidifier run time. If it feels clammy or "smells musty", lower the humidity setting. To save energy, turn the dehumidifier to OFF when you open your windows, just as you would with air conditioning.

Energy Savings Tip #2: If vacating your home for an extended period in the summer, set the RH at 55% and set your thermostat as high as you are comfortable setting it to in the cooling mode. Consult with appropriate professionals regarding the highest temperature that is safe for your pets or possessions. This will keep the humidity at a controlled level while minimizing the amount of cooling energy used.

HOW DOES THE DEHUMIDIFIER WORK?

Once per hour the dehumidifier will measure the humidity level of the air and compare it to the humidity setting. If the humidity in your home is higher than the setting, the dehumidifier will dehumidify the air until the humidity level drops below the setting. **NOTE:** The dehumidifier will continue to dehumidify until the humidity level is 3%RH below the setting.

When the dehumidifier turns on, the blower circulates the air for 3 minutes before measuring the humidity level of the air. The on-board control will display AIR SAMPLING, along with the measured humidity on the control screen.

If the humidity of the air is higher than the setting, the compressor turns on and the control will display DEHUMIDIFYING, along with the measured humidity on the control screen.

Your dehumidifier is equipped with two features that protect against unwanted energy consumption. Defrost is a normal operating mode that helps to prevent significant ice formation on the refrigeration system coil. The dehumidifier display will show "DEFROSTING" when operating in this mode. This mode can occur when there is not enough air moving through the dehumidifier or if the temperature and/or humidity of the incoming air is too low. The second protection feature is the E8 code. E8 on the dehumidifier display indicates that the air entering the dehumidifier is below 50°F or above 104°F, or the dew point of the incoming air is below 40°F. There would be a significant reduction in dehumidifier efficiency if the dehumidifier operated outside of these conditions. Low dew point conditions can be seen in some basements or crawl spaces and usually occur in the Winter and Spring months. The dehumidifier continues to monitor the incoming air and when the conditions are within the operating range, E8 will be removed from the display and dehumidification will begin as needed.

OPTIONAL – HEATING AND COOLING SYSTEM BLOWER OPERATION

Your installing contractor may have configured the dehumidifier to turn on the heating and cooling system blower when the dehumidifier turns on to allow for improved circulation of the dry air.

Dehumidifier Unit Controls

EXTERNAL CONTROL OPTIONS

Your Aprilaire dehumidifier can be controlled with an optional external control that is conveniently located in the living space. The Aprilaire Model 76, 8620, and 8910 are recommended controls. The Model 76 is a dedicated dehumidifier control and the 8620 and 8910 integrate dehumidification control as part of the thermostat minimizing the number of controls on the wall.

The Model 76 can also act as a remote control if the dehumidifier is located in a crawl space. Install the Model 76 in your living space and make changes to the dehumidifier setting or find out what the humidity level is in the crawl space from the comfort and convenience of the living space.

If one of these controls or any other external control is installed, please refer to their owner's manuals for operating instructions. Aprilaire owner's manuals are available at www.aprilaire.com.

If you are interested in having an external control installed, please consult your installing contractor.

Model 76 Control

Model 8620 Thermostat or Model 8910* Home Comfort Control™

8620 Main Display Screen

8620 Humidity Control Screen

**Model 8910 consists of a thermostat and equipment control module to accommodate the installation of various IAQ accessories.*

HOW DOES THE OPTIONAL VENTILATION WORK?

If you had your contractor install the optional ventilation feature, they calculated how much fresh air was needed based on various factors (i.e. home size, number of occupants, local building codes, etc.). Knowing how much is needed and the rate at which fresh air will be brought into your home, the contractor set up the dehumidifier control to operate ventilation a certain amount of time per hour to provide the needed fresh air. When ventilation operates, a damper in a duct that brings air in from the outside opens, and your heating and cooling system blower will run to distribute the fresh air.

If you need to change the amount of time to operate ventilation, press the MODE button twice to display the ventilation time setting. Use the UP or DOWN button to adjust the number of minutes per hour (0–60, set to zero to turn it off) that ventilation is to run. The control will return to the dehumidifier setting display automatically.

For additional information, go to www.aprilaire.com to find out more about the benefits of home ventilation.

MAINTENANCE

CLEAN OR REPLACE THE AIR FILTER

After initial installation the air filter should be checked and cleaned every 6 months. The CLEAN FILTER service reminder will display on the on board control screen every 6 months. To clear the service message, press the UP and DOWN arrows simultaneously for 3 seconds.

Filter Cleaning Procedure

1. Turn the ON/OFF switch OFF.
2. Remove the filter access door from either side of the dehumidifier.
3. Slide the filter out of the dehumidifier.
4. Flush the filter with warm water and a mild detergent solution.
5. Shake off the excess water from the filter.
6. Replace the filter, making sure the filter is secured in both the top and bottom filter rails.
7. Replace the filter access door.
8. Turn the ON/OFF switch ON.
9. Press the UP and DOWN buttons simultaneously for 3 seconds to clear the service message.

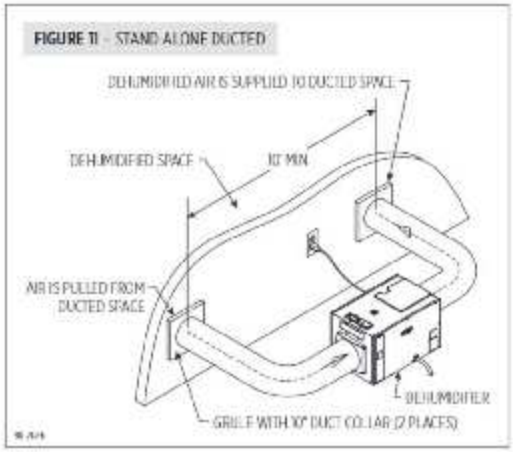
Dehumidifier Unit Installation

DUCTING TO WHOLE HOME WITHOUT AN AIR HANDLER

In this installation the dehumidifier is not ducted to the HVAC system.

REQUIRED COMPONENTS:

- 10" Ductwork
- Grilles with 10" Duct Collars



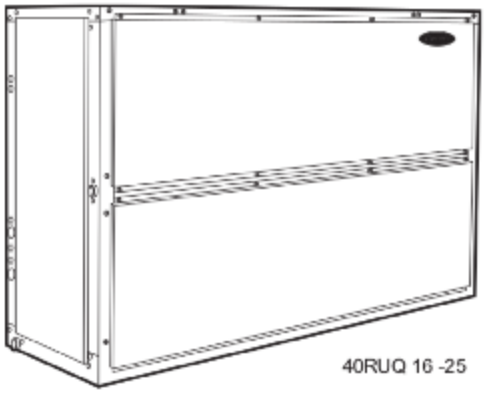
New Multi-purpose Fan-Coil – Carrier 40RU Series

40RUQ07–25
Split System Heat Pump
Indoor Unit (Air–Handling Unit)
With Puron® Refrigerant
60 Hz

Carrier
United Technologies
turn to the experts

Product Data

40RUQ 07 - 12



40RUQ 16 -25

C1088/

Puron

ASHRAE 90.1 COMPLIANT

Carrier's versatile packaged heat pump air-handling units satisfy design requirements with:

- Multi-position design for horizontal or vertical installation without modification.
- Standard sloped drain pans and cleanable insulation treated with Environmental Protection Agency (EPA) registered antimicrobial agent improve indoor air quality.
- High-static design meets a wider range of applications than competitive packaged air handler lines.
- Economizer accessory provides ventilation air and "free" cooling.
- Cooling coils with mechanically bonded fins provide peak heat transfer.
- Hot water coil, steam coil, and electric heat accessories are available.
- Standard factory-installed thermo-static expansion valves (TXV) with removable power element on 40RUQ units.
- Die-formed galvanized steel casings provide durability and structural integrity. Optional paint is available.

FEATURES/BENEFITS

Easy-to-install and economical 40RU units provide reliable service.

The 40RUQ Series units with direct-expansion coils are the best choice for packaged heat pump air handlers. All models offer excellent fan performance, a unique combination of indoor air quality features, easy installation, and affordable prices. Their versatility and state-of-the-art features will provide economical performance now and in the future.

Indoor air quality features

The unique combination of features in the 40RUQ Series air handlers ensures that clean, fresh, conditioned air is delivered to the occupied space.

Cooling coils prevent the build-up of humidity in the room, even during part-load conditions.

New Multi-Purpose Heat Pump Unit- Carrier 38AU Series

38AUQ
60 Hz Heat Pump Outdoor Unit
Split System with Puron® (R–410A) Refrigerant
6 to 20 Nominal Tons
Sizes: 07–25

Carrier
United Technologies
turn to the experts

Product Data

Gemini

D10108

Fig. 1 - 38AUQ - 07-12 shown

ASHRAE 90.1 COMPLIANT

Puron

Gemini split system heat pump systems save energy and provide outstanding heating and cooling all year with:

- All-season comfort in any climate
- High energy savings capability
- Suitability for new construction or replacement

FEATURES/BENEFITS

System indoor and outdoor sections offer outstanding performance in either the cooling or heating mode

Heat pump system energy savings opportunity

Electrical energy consumption is always a prime concern when selecting an air-conditioning system for a commercial application. An easy, effective way to save energy is to install a heat pump. When building plans call for a heat pump, consider a matched Carrier 38AUQ/40RUQ heat pump system. These systems not only offer highly efficient cooling, they also provide a clean, safe, efficient source of heat. In fact, they are capable of delivering more than 3 units of heat energy for each unit of electrical power consumed.

Heat pump uniqueness

The outstanding performance of these heat pump systems is due to the heat pump's ability to absorb and transfer heat — from outdoors to indoors for heating, and from indoors to outdoors for cooling. System indoor and outdoor sections operate as evaporators or condensers, depending on whether heating or cooling is required. The heating cycle starts with the outdoor coil absorbing heat from the surrounding air (even outside air at extremely cold temperatures), and ends with the indoor coil releasing or rejecting heat to the air around it.

38AUQ application versatility

Whether for a new application or replacement, these Carrier split system heat pumps offer time-proven performance for year round comfort in any climate. With matching 40RUQ air handler, the units standard cooling operation ranges up to 125°F (52°C) and down to 35°F (2°C) ambient temperatures. If lower ambient cooling temperatures are required, Carrier's Motor Master controller will allow operation down to -20°F (-29°C) ambient temperatures.

Special Zone Variable Air Volume Diffusers - Accutherm

Special Zone Variable Air Volume Diffusers

High Performance Air Systems

Comfort

Occupant comfort and system efficiency stem from appropriately sized zones of control. Creating many small zones will provide exceptional levels of control, leading to outstanding occupant comfort. VAV diffusers are a cost-effective and practical way to provide this level of personalized control. Each VAV diffuser is supplied with an integrated thermostat and damper allowing it to act as an individual VAV zone of control. The damper is continuously adjusted to vary the volume of airflow (warm or cold) into the room in response to room temperature and setpoint.

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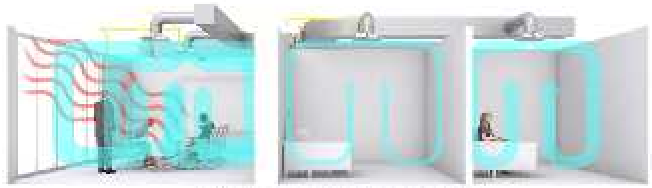
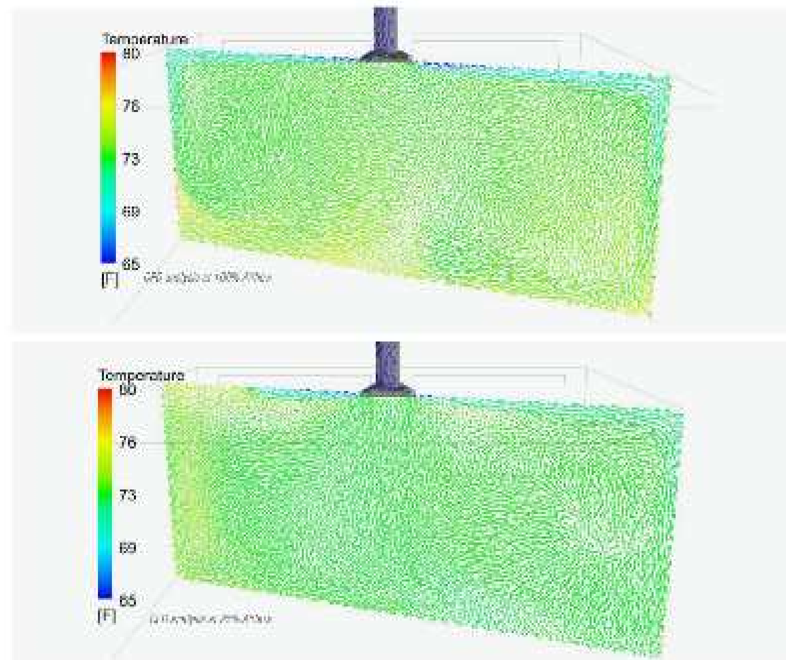


[illegible]

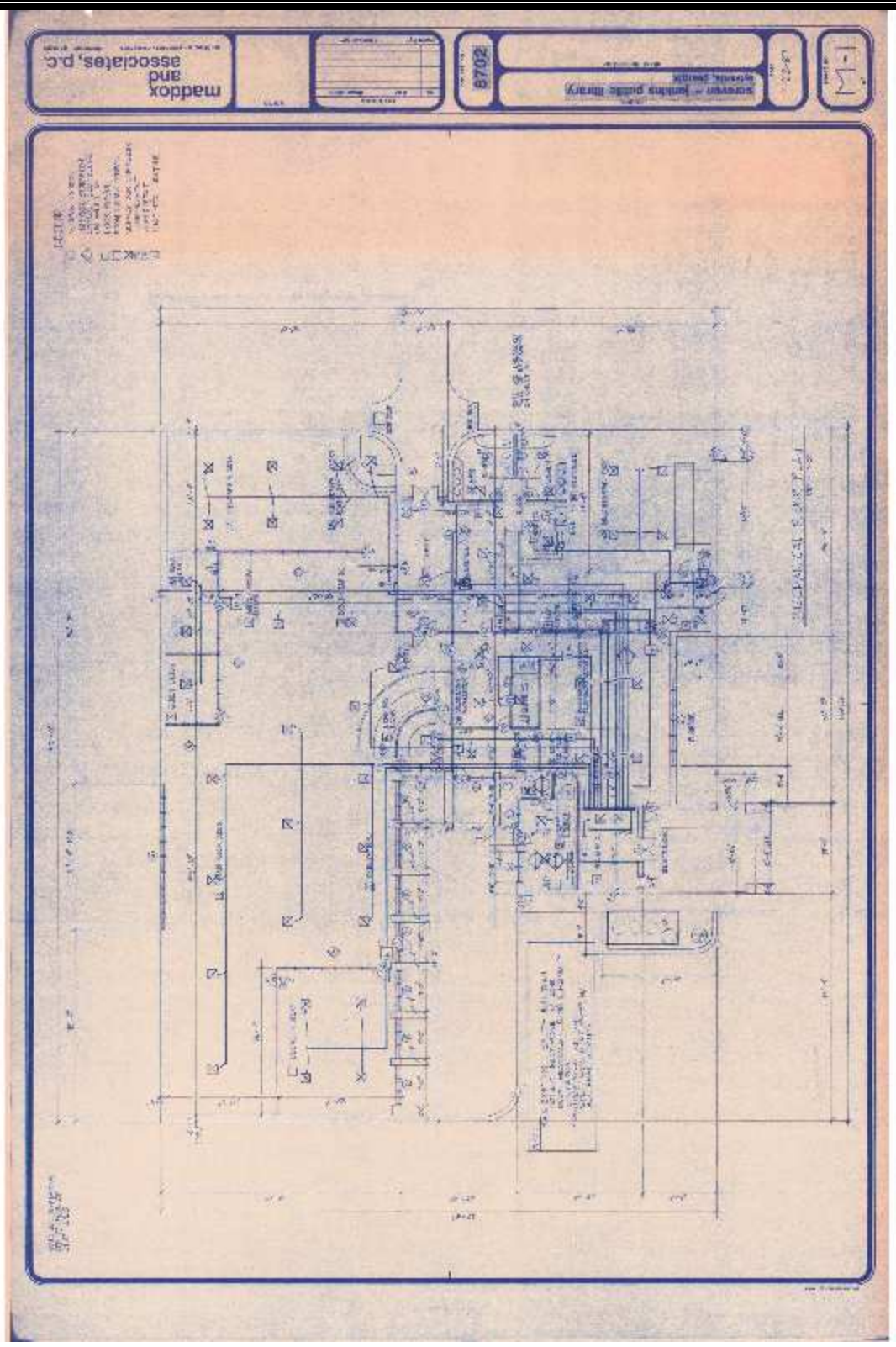
Each space has individual setpoints and independently adjusts to load changes.

In addition to small zones of control, VAV diffusers enhance occupant comfort with excellent throw, room air movement, and temperature distribution. VAV diffusers use an adjustable damper to provide a variable discharge area that maintains a constant high discharge velocity even at low supply air volumes. High discharge velocity maintains Coanda, the ability of [illegible] to the ceiling, preventing dumping even at low flow rates. High velocity supply also promotes room air movement by causing large amounts of induced (or secondary) air to be drawn up and entrained into the primary air, mixing rapidly and reaching room temperature within a few feet of the diffuser and only a few inches of drop. Meanwhile, the occupied area is filled with gently moving air and no pockets of stagnation.



Comfort is maintained over the full range of operation from low flow through to high flow

Mechanical Plan



Current Mechanical Plan Mark-up