Regular Board Meeting Agenda

Tuesday, April 12, 2022 | 6:00 PM | District Office Board Room, 8176 N. Westover, Joseph City, AZ 86032

Items on the regular meeting agenda may be discussed in executive session related to employment matters, for the purpose of obtaining legal advice thereon or other matters pursuant to A.R.S. 38-431.03(A). The Governing Board may change the order of agenda items, pursuant to Governing Board Policy BEDB.

1. **OPENING ITEMS**

   1.A. **Call to Order**

   1.B. **Roll Call**

   1.C. **Pledge of Allegiance**

   1.D. **Invocation**

   1.E. **Adoption of Agenda**

   1.F. **Approve Minutes of the March 8, 2022 Regular Board Meeting**

Minutes of Regular Board Meeting of the Governing Board
Joseph City Unified School District
District Office Board Room, 8176 N. Westover, Joseph City, AZ 86032
Tuesday, March 8, 2022

Members present
Eldon Larsen, President; Rhonda Roberson, Clerk; Andrew Bushman; Dayton Flake; Karsten Flake

Administrators present
Bryan Fields, Superintendent; Eric Miller, Principal; Darrel Mosier, Principal; Steve Mills, Business Manager

Others present
None

1. OPENING ITEMS

A. Call to Order
Eldon Larsen called the meeting to order at 5:59 p.m.

B. Roll Call

C. Pledge of Allegiance

D. Invocation

E. Adoption of Agenda
Motion by Rhonda Roberson to adopt the agenda as presented, second by Eldon Larsen.
Final Resolution: Motion carries
Yes: Eldon Larsen, Rhonda Roberson, Andrew Bushman, Dayton Flake, Karsten Flake

F. Approve Minutes of the February 8, 2022 Regular Board Meeting
Motion by Eldon Larsen to approve the minutes of February 8, 2022 as presented, second by Karsten Flake.
Final Resolution: Motion carries
Yes: Eldon Larsen, Andrew Bushman, Dayton Flake, Karsten Flake
Abstaining: Rhonda Roberson

G. Superintendent's Report

2. CALL TO THE PUBLIC
There were no requests to address the Board.

3. POSSIBLE EXECUTIVE SESSION
None

4. CONSENT AGENDA
Motion by Eldon Larsen to approve the Consent Agenda as presented, second by Rhonda Roberson.
Final Resolution: Motion carries
Yes: Eldon Larsen, Rhonda Roberson, Andrew Bushman, Dayton Flake, Karsten Flake

A. Approve Expense Vouchers
Action to ratify district vouchers for period 2/3/22 through 3/2/22.
General and Special Funds: #20 $146,192.53; #21 $152,636.01; #1041 $122,323.87; #1042 $167,031.35; #1043 1,799.59; $1044 $1,316.59
Auxiliary Operations Funds: #1051 $1,667.08; #1056 $1,634.88
Student Activities Fund: #1052 $832.57; #1054 $1,795.64; #1057 $1,279.45

B. Student Activities Fund Report
Revenues, expenditures, and charges in the Student Activities Fund Report; period of 2/1/22 through 2/28/22.

C. Approve Disposal of Surplus Property

5. PERSONNEL REQUESTS

A. Approve Elementary Office/Playground Aide Position
Motion by Eldon Larsen to approve the Elementary Office / Playground Aide Position, second by Karsten Flake.
Final Resolution: Motion carries
Yes: Eldon Larsen, Rhonda Roberson, Andrew Bushman, Dayton Flake, Karsten Flake

B. Approve Extra Duty Stipend for Dyslexia Specialist for FY23
Motion by Eldon Larsen to approve the Extra Duty Stipend of Dyslexia Specialist for FY23, second by Rhonda Roberson.
Final Resolution: Motion carries Yes: Eldon Larsen, Rhonda Roberson, Andrew Bushman, Dayton Flake, Karsten Flake

C. Employee Assignments, Employee Renewals, Volunteers, Employee Resignations
Motion by Eldon Larsen to Approve Employee assignments, volunteers, and accept Employee Resignations, second by Karsten Flake.

Discussion: The Board expressed their thanks to Jean Varney and Patrick Morris for their work in the District.

Final Resolution: Motion carries
Yes: Eldon Larsen, Rhonda Roberson, Andrew Bushman, Dayton Flake, Karsten Flake

EMPLOYEE ASSIGNMENTS:
Ruth Hansen - Dyslexia Specialist (Extra Duty)

RENEWALS
Teachers (see attached list)

VOLUNTEERS
James Cooksey (High School)

RESIGNATIONS
Patrick Morris - Bus Driver
Jean Varney - Teacher

D. Personnel Appointments
Motion by Eldon Larsen to Approve Personnel Appointments; second by Andrew Bushman.
Final Resolution: Motion carries
Yes: Eldon Larsen, Rhonda Roberson, Andrew Bushman, Dayton Flake, Karsten Flake

Felicia Bowler - Substitute Teacher
Drew Colligon - Instructional Aide
Joseph Fischer - Child Care Worker (Youth, Faith & Family Grant)

Ava Hancock - Child Care Worker (Youth, Faith & Family Grant)
Sarya Heward - Child Care Worker (Youth, Faith & Family Grant)
Aaron Johnstun - JV Coach (HS Track)
Ledra Lake - Substitute Teacher
Cambria Miller - Child Care Worker (Youth, Faith & Family Grant)

E. Personnel Appointment
Motion by Andrew Bushman to Approve Personnel Appointment; second by Karsten Flake.
Final Resolution: Motion carries
Yes: Rhonda Roberson, Andrew Bushman, Dayton Flake, Karsten Flake;
Abstain: Eldon Larsen

Robert Larsen - Swimming Pool Manager

F. Discussion and Possible Approval of Pay Increases for 2022-23
Motion by Eldon Larsen to Approve pay increase as proposed; second by Rhonda Roberson .

Discussion: Proposed 2% increase effective July 1, 2022 for pay schedules Teacher | Certified Specialist, Support Staff (except Student Workers and Event Workers), Extra Duty 1, Management Team | Classified Specialist, and for Superintendent.

Final Resolution: Motion carries
Yes: Eldon Larsen, Rhonda Roberson, Andrew Bushman, Dayton Flake, Karsten Flake

6. ACTION ITEMS

A. Approve Superintendent's Performance Payment
Motion by Eldon Larsen to Approve Superintendent's Performance Payment, second by Rhonda Roberson.
Final Resolution: Motion carries
Yes: Eldon Larsen, Rhonda Roberson, Andrew Bushman, Dayton Flake, Karsten Flake

7. DISCUSSION ITEMS
None

8. INFORMATION ITEMS

A. Requests for Future Agenda Items
- Discussion on ESSER funds, Cholla plant closure settlement funds
- Safety issues and concerns

B. Upcoming Meetings and Events Calendar
- Next Regular Board Meeting - April 12, 2021; 6:00 p.m.

9. ADJOURNMENT
Motion to adjourn the meeting by Eldon Larsen, second by Karsten Flake.
Final Resolution: Motion carries
Yes: Eldon Larsen, Rhonda Roberson, Andrew Bushman, Dayton Flake, Karsten Flake
Meeting adjourned at 6:37 p.m.

APPROVED:

_____
Board Clerk or President

1.G. **Superintendent's Report**

Governing Board Report

April 12, 2022 Regular Meeting

Current Events and Updates

B. Fields

- Attached to my report is the engineering analysis of the HVAC systems for the Auditorium, JH/HS Campus, and Elementary Campus.
- I was notified that the District will be receiving $12,780.55 in federal "Supply Chain Assistance Funds" for our food service program. These funds will be coming through the Arizona Department of Education as an effort to offset the increases in food costs due to shortages and supply chain issues.
- We are currently working on filling the following teaching openings at our schools for the start of next year: HS Math, JH/HS Language Arts, Programming/Robotics, Welding/Agriculture, JH Art.
- The teaching contracts have been sent out to everyone who was approved at the last meeting.
- We are currently working with the SFOB on updating the Auditorium Air Conditioning, which will include AC in the Green Room. The anticipated cost for this will be around the $100,000 range.
- We are also in the process of getting quotes for new gymnasium bleachers for the Elementary and High School Gyms. This will qualify as an SFOB application for funds.
- The Forest Service and APS partnered with us on April 8th to present information and to plant trees at both of our campuses as an Arbor Day Enrichment Activity. The event was well attended and 10 trees were planted. These included Apple trees for the Elementary, and Shade trees for the High School.
- Our schools are completing the standardized testing that we have been administering over the past few weeks.
- The elementary roofing project is in gear and currently in the demolition stage. The punch list for the High School roof is being worked on before we make payment on the final retainer.
- The school district is hosting a community meeting on April 20th at 6:00pm in the Board Room, and April 27th at 6:00pm in the Auditorium. The meeting on the 20th is an organizational meeting to prepare for the April 27th meeting where the Arizona Corporation Commission will be present. We will post that there is a possibility that a quorum of Governing Board members may be present at these meetings. This will prevent any open meeting violations from being committed.

Joseph City
Arizona Corporation Commission
Town Hall Meeting

On Cholla Plant Closure

As part of an evaluation of the impacts of coal plant closures on plant communities, the Arizona Corporation Commission is conducting town hall meetings around Arizona seeking input from citizens, businesses and organizations on effects of closure on the community and community needs.

We invite you to attend.

Wednesday, April 27th
6:00 p.m.

B.G. Bennett Auditorium, 4629 2nd North, Joseph City
www.jcusd.org
Questions? Please call 928-288-3307

Joseph City Elementary and High School
Decentralized HVAC Feasibility Study

FOR

Joseph City Unified School District
PO Box 8
8176 Westover
Joseph City, AZ 86032

Prepared 04/08/2022

LSW Project No. 2021-192.000

2333 West Northern Avenue, Suite 9 . Phoenix, Arizona 85021 . Telephone 602.249.1320 . Facsimile 602.336.3276

Joseph City Elementary and High School
Packaged HVAC Feasibility Study
LSW Project No. 2021-192.000

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I. EXECUTIVE SUMMARY

The primary existing heating and cooling system at the Joseph City Unified School District (JCUSD) High School and Elementary School facilities is a central boiler/air-cooled chiller system with a two-pipe system. The Auditorium building at the High school has a central boiler system but doesn't have an air-cooled chiller. The piping at each facility is original to the buildings and has exceeded it expected useful life.

To avoid potential costly damages due to piping failure, it is recommended to replace the existing central systems with packaged unitary systems. Generally, packaged equipment requires less maintenance and is simpler to repair than the existing system.

Our review of the different HVAC options included consideration for the existing building conditions, accessibility for replacement parts, ongoing maintenance, and initial construction impact.

The recommended HVAC option is the same for the High School and Elementary School – replace the central system with electric heat split system units. The recommended HVAC option for the Auditorium is to replace the central boiler system with electric duct heaters. Additional details on the existing system, proposed options, and the recommendation can be found in this study.

II. INTRODUCTION

The Joseph City Unified School District (JCUSD) hired LSW for a feasibility study to replace the existing Heating, Ventilation, and Air Conditioning (HVAC) systems at the High School, Auditorium, and Elementary School with a decentralized HVAC solution. The existing HVAC system at each of the buildings primarily consists of a central boiler and air-cooled chiller plant piped to above ceiling fan coil units and mezzanine air handling units. The existing HVAC systems are original to the construction of their associated buildings which were built between 1973 and 1978. Primarily this feasibility study included the following.

A. Visual observation and review of the existing system at each facility.

B. Review of potential packaged unitary HVAC solutions.

C. Recommendations for HVAC replacement.

LSW staff visited the Elementary School, High School, and Auditorium to observe the general installation conditions of the existing HVAC system and the associated electrical infrastructure. A general outline of the existing systems is included in this study.

In 2017, LSW completed a Heating System Piping Assessment. The main purpose of that assessment was to review the heating system distribution piping for the High School, Auditorium, and Elementary School to help determine the proper course of action to take to improve the water quality at each of these facilities and to help prolong the life of the heating piping systems, if possible. Subsequently, a construction project was completed to implement some of the proposed enhancements in the Heating System Piping Assessment.

While the enhancements appear to have helped extend the life of the piping, the piping will still eventually start to fail. Additionally, as was noted in the Heating System Piping Assessment, there are remaining equipment that were not modified as part of that construction project that may still need to be replaced, due to wear and tear. While many of the parts and equipment of the existing systems have been replaced over the years, it is generally understood that the existing HVAC systems have operated well past their expected useful life, based on the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and Building Owners and Managers Association (BOMA) published service life data for various system components.

The primary focus of this study is to determine the optimal packaged unitary HVAC solution to replace the existing centralized system. The following options were reviewed:

A. Replacement Like for Like

B. Packaged Unitary Equipment, Electric Heat

C. Packaged Unitary Equipment, Gas Heat

D. Electric Duct Heaters (Auditorium Only)

E. Variable Refrigerant Flow System (High School and Elementary School Only)

The recommended HVAC option for the High School, Auditorium, and Elementary School has been determined based on our visual observations, discussion with JCUSD staff, existing building conditions, HVAC option pros and cons, and associated option costs.

III. HIGH SCHOOL

A. FINDINGS AND OBSERVATIONS

The High School was constructed in 1973 and opened in 1974. Since that time, there have been several additions and renovations with the most recent occurring in 2008. Record drawings for this school are very limited or nonexistent for some of the additions and renovations that have occurred.

This feasibility study was limited to areas of the main high school building that are served by the existing central HVAC including the admin, gymnasium, main classrooms, and pool areas. The Technology and Athletic Buildings are not included in this report. The existing HVAC and electrical systems observed are outlined below.

1. Packaged Unitary Equipment: There were a few areas that have been retrofitted to accommodate a packaged unitary equipment solutions due to insufficient capacity or unit failures. The administration area and math addition are currently served by packaged rooftop units, and the computer lab is served by a supplemental wall-mount mini-split air conditioning unit.

2. Building Heating and Cooling Centralized Plant: The existing primary heating and cooling system serving the rest of the High School is achieved by a two-pipe system utilizing the following main centralized equipment: gas-fired boilers, heat exchanger, air-cooled chiller, circulation pumps, air separator, and expansion tank. Heating or cooling water is generated at the plant and then circulated through a piping system to the building. Simultaneous heating and cooling in different spaces of the building is not currently possible due to the nature of a two-pipe system which can only provide heating or cooling, but not both at the same time.

3. HVAC Piping: The heating and cooling system piping for most of the school is schedule 40 steel and is approximately 49 years old. The piping is past its expected useful life. This piping was the focus of the LSW 2017 Heating System Piping Assessment. A subsequent project resulted from the 2017 report to implement recommendations to improve the water quality and extend life of the piping to delay its replacement.

4. HVAC Air Distribution: The heating and cooling system provide heating/cooling via the HVAC piping to individual fan coil units (FCU) or air handling units (AHU). Typically, individual classrooms have a dedicated fan coil unit and larger spaces (e.g. gymnasium, library, etc.) have larger AHUs. The FCUs and AHUs are ducted to supply air to the zones they serve. Outside air is generally ducted from an exterior louver or rooftop intake to

the return side of the FCUs or AHUs. In a few locations, the unconditioned outside air appeared to be ducted directly to an outlet within the space.

5. HVAC Controls: There is an existing analog control system at the school with limited monitoring and control capabilities. The system is as manufactured by Allen Bradley and reportedly the technical support for this system is from an individual in the local community. Typically, zone temperature is measured with a sensor within the return duct which is used to control the FCU and AHU fans and control valves. All valve and damper actuation is pneumatic. Control valves at FCUs and AHUs are 3-way valves to allow for constant flow of the system water. This system is antiquated per current industry standards.

6. Domestic Water Heating and Pool Water Heating System: The domestic water and pool water heating system is comprised of the following main equipment: gas-fired boiler, heat exchangers (one for domestic water and one for pool heating), circulating pumps, and domestic water storage tank.

7. Building Electrical System: The primary electrical service entrance section is located within the Central Plant and is a 2,000A 208/120V-3Ph, 4W SES located at 4629 3rd North Avenue and served by APS meter #Q22570. This SES has photovoltaic system components interconnected with a separate disconnecting means. There does not appear to be any expansion space available within the distribution section. Visual inspection of the area indicates available space within the Central Plant is limited.

8. Building Electrical System: The secondary electrical service entrance section is located at the exterior in a NEMA-3R enclosure just south of 3rd St. and is a 1,600A 208/120V-3Ph, 4W SES and served by APS meter #QEE4425. This SES has physical space available. The calculated code load is 558A, which leaves 1,042A of spare capacity available. This spare capacity is a viable supply source for the proposed HVAC electric heat additional loads.

Based upon our review of the High School HVAC systems, the following deficiencies were noted:

1. The heating/cooling piping is original to the building and has exceeded it's expected useful life and should be replaced. Equipment coils connected to the system should be inspected for any degradation caused by debris from wear and tear of the piping. Additionally, the piping insulation appears to be original and in poor condition. New insulation would help reduce losses in the system.

2. It was reported that outside air (OSA) is ducted directly to some of the classroom spaces. Based on the original plans, it appears that the OSA was ducted to fan coil units to be filtered and conditioned before being introduced to the space. Where OSA is ducted directly to the space, it would not be filtered or conditioned which would lead to poor indoor air conditions. In some cases, the existing OSA duct may be connected to the current fan coil units, but it is uncertain if the amount of OSA is compliant with current code ventilation rates. Any major renovation of the mechanical system will require the OSA rates to comply with the current code, existing inlets will need to be evaluated for capacity and may need to be upsized.

3. The existing two-pipe system configuration doesn't allow for simultaneous heating/cooling of different spaces. This "one or the other" system can lead to over heating or cooling spaces and being unable to maintain temperature setpoints. This type of system is generally better suited to buildings with a uniform load demand.

4. Function of the building has evolved over time and may require additional design considerations. As an example, the computer room which has a high cooling load currently has a supplemental air conditioning unit to help provide sufficient cooling to the space. This may be a result of the two-pipe system or simply because the fan coil was only sized for a standard classroom. HVAC units serving such spaces should be evaluated and provided with adequately sized units.

5. The existing HVAC system is served by constant volume pumps and 3-way valves. Additional energy savings could be obtained by adding controls (e.g. variable frequency drives, etc.) to vary the speed of the pumps to match the load in the system.

6. The pool area is served by two AHUs served by the building two-pipe system. It was previously reported that there are times when other areas of the school need cooling, but the pool area still needs heating resulting in the pool area getting too cold.

B. HVAC OPTIONS

The following HVAC options were analyzed for application at the High School. Refer to Appendix A for an associated cost estimate and Appendix B for sample equipment cut sheets for each option.

1. Option HS-1 – Replacement Like for Like

System description: this option would be to keep the existing system as it is outlined in our findings above but implement system improvements to correct as many of the deficiencies noted and help ensure the system remains operational. Recommended improvements include:

a. Replace all HVAC system piping and insulation.

b. Provide new fan coil and air handling units sized to meet the current usage of each space.

c. Provide code required OSA, filtered and conditioned through each fan coil and air handling unit.

d. Provide upgraded controls for variable system pumping. It is assumed that the new pump controls would be expanded to control the new fan coils and air handling units.

Considerations for this option include:

a. This option may be attractive because this is an upgrade to the existing system, i.e. it's a known system that facilities staff is familiar with and can continue to maintain moving forward.

b. Not all of the existing central plant equipment (e.g. boilers, pumps, chillers) is at the end of its expected service life and can remain in service with this option. Additional investigation during design would need to occur to determine what equipment should remain.

c. Upgrading the existing system will not resolve the two-pipe limitation of not being able to cool and heat simultaneously in different areas of the building.

    i. The pool area has been identified specifically as one area that would need a different solution in order to satisfy the temperature needs of the space. Ideally, these units would be isolated from the rest of the HVAC piping loop in some form in order to condition the pool area independently. Additional design consideration for HVAC solutions of this area should be explored during design.

d. The existing system requires water treatment and maintenance beyond that of a packaged unitary system would require. Over time, if proper water treatment isn't maintained in the loop the

piping and equipment may become subject to fouling or scale which will lead to loss of capacity or failure of the equipment. Leaks in the piping or equipment can also cause damage to the building or furniture.

2. Option HS-2 – Packaged Unitary Equipment, Electric Heat

This option would include removing the existing HVAC piping system and the associated central heating and cooling plant equipment.

System description: packaged unitary equipment is a decentralized piece of equipment that can generate both heating and cooling for a single zone. Cooling is generated through a refrigerant cycle and a direct expansion (DX) coil to cool an airstream. For this application, we have been directed to assume no new equipment can be placed on the existing roof. In order to accommodate no new equipment on the roof, this option proposes packaged electric heat split system units as outlined below.

Existing FCUs and AHUs would be replaced with packaged split system units. Each split system would include an indoor unit, an outdoor unit mounted on the ground, supply and return ductwork to the space, refrigerant piping between the indoor and outdoor unit, condensate drain piping, and controls. Heating would be provided at the indoor unit by an internal electric heating element. OSA would be provided to each indoor unit by utilizing the existing louvers or rooftop intakes.

Considerations for this option include:

a. Packaged split system units are simpler to maintain than the existing central heating/cooling system. Most air conditioning contractors are familiar with split system units and would be able to maintain or repair them. Typical routine maintenance is minor, though it would be multiplied by the quantity of units.

b. Packaged split system units required one outdoor unit for every indoor unit. Due to refrigerant limitations, the outdoor units need to be within ~100 feet of the indoor units. The outdoor units could be grouped together as much as possible but will have to be within their length limit. Special consideration for their location will need to be determined through design to account for outside space available and potential for noise issues.

c. Life expectancy for packaged split system units are around 15-20 years. Though, each unit can be replaced individually instead of all at once which aides budget allocation for replacement because

they can be scheduled to be replaced in smaller groups instead of all at once.

d. High efficiency split system equipment will be necessary to eliminate the need for a code required economizer. An economizer would require larger OSA ducting and intakes as well as a means for relieving air.

e. Utilizing electric heat will have a higher electrical load that will impact the electrical infrastructure. On the other hand, electric heat requires less maintenance and is easy to replace.

3. Option HS-3 – Packaged Unitary Equipment, Gas Heat

This option would include removing the existing HVAC piping system and the associated central heating and cooling plant equipment.

System description: packaged unitary equipment is a decentralized piece of equipment that can generate both heating and cooling for a single zone. Cooling is generated through a refrigerant cycle and a direct expansion (DX) coil to cool an airstream. For this application, we have been directed to assume no new equipment can be placed on the existing roof. In order to accommodate no new equipment on the roof, this option proposes packaged gas furnace split system units as outlined below.

Existing FCUs and AHUs would be replaced with packaged split system units. Each split system would include an indoor unit, an outdoor unit mounted on the ground, supply and return ductwork to the space, refrigerant piping between the indoor and outdoor unit, gas piping, furnace intake and flue, condensate drain piping, and controls. Heating would be provided at the indoor unit by an internal gas furnace. OSA would be provided to each indoor unit by utilizing the existing louvers or rooftop intakes.

Considerations for this option include:

a. All the same consideration for the Packaged Unitary Equipment, Electric Heat apply to this option except that the electrical impact isn't as extensive.

b. As a trade off to the electric heat, gas heat will require gas piping to be piped to each of the FCUs and AHUs. Additionally, combustion and flue ducting will need to be installed for each unit. Typically, combustion and flue ducting would want to be installed at the roof but could be installed through a wall so long as they

maintain a certain distance to building openings or to the ground. Overall, the gas heat will be more disruptive to install.

4. Option HS-4 – Variable Refrigerant Flow System

This option would include removing the existing HVAC piping system and the associated central heating and cooling plant equipment.

System description: variable refrigerant flow (VRF) is a type of unitary equipment that utilizes refrigerant to generate both heating and cooling for multiple zones. Refrigerant is piped between a central outdoor unit and multiple indoor units. The outdoor unit can provide either heating or cooling to the refrigeration loop and each indoor unit will be able to accept or reject heat to the loop as needed to maintain the space temperature. Similar to the split system, the outdoor unit will be mounted on the ground.

Existing FCUs would be replaced with ducted VRF units. Each ducted VRF unit would include supply and return ductwork to the space, refrigerant piping, condensate drain piping, and controls. Multiple outdoor units would be mounted on the ground outside and connected to the refrigerant loop. The larger AHUs would be replaced with packaged split system units similar to the packaged unitary equipment in the previous options. OSA would be provided to each indoor unit by utilizing the existing louvers or rooftop intakes.

Considerations for this option include:

a. The outdoor unit for a VRF system can serve multiple indoor units and have longer refrigeration limits (~400 ft) which allows for fewer outdoor units that can be easily grouped together to be less intrusive. Outdoor locations will still need to be evaluated through design to minimize outside space and noise issues.

b. The VRF system is a high efficiency system that is excellent at spreading heating and cooling through the building while minimizing the condensing unit usage. The inherent high efficiency would qualify for the exception to not require economizers.

c. A VRF system would require training for the maintenance staff because it is a newer technology and is dependent on internal controls to properly function. While the components of the VRF system are similar to a split system unit, the internal controls and potential faults and troubleshooting are different. Receiving manufacturer representative support for the VRF system may be

difficult and may require technicians from larger cities further away.

C. RECOMMENDATIONS

Our review of the different HVAC options includes consideration for the existing High School building conditions, accessibility for replacement parts, ongoing maintenance, and initial construction impact. Based on our review, we recommend that the existing centralized HVAC system be replaced with Option HS-2 – Packaged Unitary Equipment, Electric Heat.

IV. AUDITORIUM

A. FINDINGS AND OBSERVATIONS

We are uncertain as to the exact year that the Auditorium was constructed and first opened, but we believe it was around 1978. Record drawings for the Auditorium MEP systems do not exist. The existing HVAC and electrical systems observed are outlined below.

1. Auditorium and Band Room Air Conditioning: The auditorium cooling is achieved by utilizing packaged split system condensing units and indoor cooling coils within air handling units. The band room was served by a packaged split system unit.

2. Building Heating Centralized Plant: The existing primary heating system serving the Auditorium Building is achieved by a two-pipe system utilizing the following main centralized equipment: gas-fired boilers, circulation pumps, air separator, and expansion tank. Heating water is generated at the plant and then circulated through a piping system to the building.

3. HVAC Piping: The heating system piping for most of the Auditorium is primarily copper and is approximately 43 years old. The piping is past its expected useful life. This piping was the focus of the LSW 2017 Heating System Piping Assessment. A subsequent project resulted from the 2017 report to implement recommendations to improve the water quality and extend life of the piping to delay its replacement.

4. HVAC Air Distribution: The heating system provide heating via the HVAC piping to air handling units (AHU). The AHUs are ducted to supply air to the zones they serve. Outside air is generally ducted from an exterior louver to the return side of the AHUs. The lobby, greenroom and stage areas are served by AHUs with heating coils only.

5. HVAC Controls: There is an existing analog control system at the Auditorium with limited monitoring and control capabilities. The system is as manufactured by Allen Bradley and reportedly the technical support for this system is from an individual in the local community. Typically, zone temperature is measured with a sensor within the return duct which is used to control the AHU fans and control valves. All valve and damper actuation is pneumatic. Control valves at AHUs are 3-way valves to allow for constant flow of the system water. This system is antiquated per current industry standards.

6. Building Electrical System: The primary electrical service entrance section is located within the backstage area and is a 1,600A 208/120V-3Ph, 4W SES

located at 4629 3rd North Avenue and served by APS meter #V91418. This SES has photovoltaic system components interconnected with a separate disconnecting means. There is expansion space available within the 2nd distribution section. This spare capacity is a viable supply source for the proposed HVAC electric heat additional loads.

Based upon our review of the Auditorium HVAC systems, the following deficiencies were noted:

1. The heating/cooling piping is original to the building and has exceeded it's expected useful life and should be replaced. Equipment coils connected to the system should be inspected for any degradation caused by debris from wear and tear of the piping. Additionally, the piping insulation appears to be original and in poor condition. New insulation would help reduce losses in the system.

2. It appears that the OSA is connected to the existing fan coil units and air handling units but it is uncertain if the amount of OSA is compliant with current code ventilation rates. Any major renovation of the mechanical system will require the OSA rates to comply with the current code, existing inlets will need to be evaluated for capacity and may need to be upsized.

3. The existing two-pipe system configuration doesn't allow for simultaneous heating/cooling of different spaces. This "one or the other" system can lead to over heating or cooling spaces and being unable to maintain temperature setpoints. This type of system is generally better suited to buildings with a uniform load demand.

4. The existing HVAC system is served by constant volume pumps and 3-way valves. Additional energy savings could be obtained by adding controls (e.g. variable frequency drives, etc.) to vary the speed of the pumps to match the load in the system.

5. Cooling for the auditorium and band room is already achieved by DX unitary cooling. The lobby, greenroom, and stage areas were reported to not have any cooling. Further investigation would be needed to determine if the lack of cooling causes undesirable temperature conditions.

B. HVAC OPTIONS

The following HVAC options were analyzed for application at the Auditorium. Refer to Appendix A for an associated cost estimate and Appendix B for sample equipment cut sheets for each option.

1. Option A-1 – Replacement Like for Like

System description: this option would be to keep the existing system as it is outlined in our findings above but implement system improvements to correct as many of the deficiencies noted and help ensure the system remains operational. Recommended improvements include:

a. Replace all HVAC system piping and insulation.

b. Provide new air handling units sized to meet the current usage of each space.

c. Provide code required OSA, filtered and conditioned through each air handling unit.

d. Provide upgraded controls for variable system pumping. It is assumed that the new pump controls would be expanded to control the new air handling units.

Considerations for this option include:

a. This option may be attractive because this is an upgrade to the existing system, i.e. it's a known system that facilities staff is familiar with and can continue to maintain moving forward.

b. Not all of the existing central plant equipment (e.g. boilers, pumps, chillers) is at the end of its expected service life and can remain in service with this option. Additional investigation during design would need to occur to determine what equipment should remain.

c. Upgrading the existing system will not resolve the two-pipe limitation of not being able to cool and heat simultaneously in different areas of the building.

d. The existing system requires water treatment and maintenance beyond that of a packaged unitary system would require. Over time, if proper water treatment isn't maintained in the loop the piping and equipment may become subject to fouling or scale which will lead to loss of capacity or failure of the equipment. Leaks in the piping or equipment can also cause damage to the building or furniture.

2. Option A-2 – Packaged Unitary Equipment, Electric Heat

This option would include removing the existing HVAC piping system and the associated central heating plant equipment.

System description: packaged unitary equipment is a decentralized piece of equipment that can generate both heating and cooling for a single zone. Cooling is generated through a refrigerant cycle and a direct expansion (DX) coil to cool an airstream. For this application, we have been directed to assume no new equipment can be placed on the existing roof. In order to accommodate no new equipment on the roof, this option proposes packaged electric heat split system units as outlined below.

Existing AHUs would be replaced with packaged split system units. Each split system would include an indoor unit, an outdoor unit mounted on the ground, supply and return ductwork to the space, refrigerant piping between the indoor and outdoor unit, condensate drain piping, and controls. Heating would be provided at the indoor unit by an internal electric heating element. OSA would be provided to each indoor unit by utilizing the existing louvers or rooftop intakes.

Considerations for this option include:

a. Currently only the Auditorium and the Band Room have cooling. This option would be to replace all units with split system units to add cooling into the other spaces as well as provide electric heat in lieu of the central heating system.

b. Packaged split system units are simpler to maintain than the existing central heating system. Most air conditioning contractors are familiar with split system units and would be able to maintain or repair them. Typical routine maintenance is minor, though it would be multiplied by the quantity of units.

c. Packaged split system units required one outdoor unit for every indoor unit. Due to refrigerant limitations, the outdoor units need to be within ~100 feet of the indoor units. The outdoor units could be grouped together as much as possible but will have to be within their length limit. Special consideration for their location will need to be determined through design to account for outside space available and potential for noise issues.

d. Life expectancy for packaged split system units are around 15-20 years. Though, each unit can be replaced individually instead of all at once which aides budget allocation for replacement because

they can be scheduled to be replaced in smaller groups instead of all at once.

e. High efficiency split system equipment will be necessary to eliminate the need for a code required economizer. An economizer would require larger OSA ducting and intakes as well as a means for relieving air.

f. Utilizing electric heat will have a higher electrical load that will impact the electrical infrastructure. On the other hand, electric heat requires less maintenance and is easy to replace.

3. Option A-3 – Packaged Unitary Equipment, Gas Heat

This option would include removing the existing HVAC piping system and the associated central heating plant equipment.

System description: packaged unitary equipment is a decentralized piece of equipment that can generate both heating and cooling for a single zone. Cooling is generated through a refrigerant cycle and a direct expansion (DX) coil to cool an airstream. For this application, we have been directed to assume no new equipment can be placed on the existing roof. In order to accommodate no new equipment on the roof, this option proposes packaged gas furnace split system units as outlined below.

Existing AHUs would be replaced with packaged split system units. Each split system would include an indoor unit, an outdoor unit mounted on the ground, supply and return ductwork to the space, refrigerant piping between the indoor and outdoor unit, gas piping, furnace intake and flue, condensate drain piping, and controls. Heating would be provided at the indoor unit by an internal gas furnace. OSA would be provided to each indoor unit by utilizing the existing louvers or rooftop intakes.

Considerations for this option include:

a. Currently only the Auditorium and the Band Room have cooling. This option would be to replace all units with split system units to add cooling into the other spaces as well as provide gas heat in lieu of the central heating system.

b. All the same consideration for the Packaged Unitary Equipment, Electric Heat apply to this option except that the electrical impact isn't as extensive.

c. As a trade off to the electric heat, gas heat will require gas piping to be piped to each of the AHUs. Additionally, combustion and flue ducting will need to be installed for each unit. Typically, combustion and flue ducting would want to be installed at the roof but could be installed through a wall so long as they maintain a certain distance to building openings or to the ground. Overall, the gas heat will be more disruptive to install.

4. Option A-4 – Electric Duct Heaters

This option would include removing the existing HVAC piping system and the associated central heating plant equipment.

System description: electric duct heaters are installed in the supply ductwork for each zone. They produce heat through electric resistance heat and would be controlled similar to the hot water coil currently in each AHU at the Auditorium.

Considerations for this option include:

a. Currently only the Auditorium and the Band Room have cooling. This option only replaces the heating source for each AHU zone. Areas without cooling will remain without cooling.

b. Electric duct heaters are simpler to maintain than the existing central heating system.

c. Utilizing electric heat will have a higher electrical load that will impact the electrical infrastructure. On the other hand, electric heat requires less maintenance and is easy to replace.

d. Existing AHU's, ductwork, controls, and OSA can all be maintained with this option. Very little impact to the building is anticipated.

C. RECOMMENDATIONS

Our review of the different HVAC options includes consideration for the existing Auditorium building conditions, accessibility for replacement parts, ongoing maintenance, and initial construction impact. Based on our review, we recommend that the existing centralized heating system be replaced with Option A-4 – Electric Duct Heaters.

V. ELEMENTARY SCHOOL

A. FINDINGS AND OBSERVATIONS

The Elementary School was constructed and opened in 1978. Since that time, there have been several additions and renovations. Record drawings for this school are very limited or nonexistent for some of the additions and renovations that have occurred. Based upon our limited review and discussions with facilities maintenance staff, the later additions and renovations to the Elementary School were done using packaged rooftop heating/cooling units. The central hot water heating piping system serves the original Elementary School building and also the small classroom building located immediately south of the primary Elementary School building via underground hot water piping.

This feasibility study was limited to areas of the elementary school building that are served by the existing central HVAC. The District Administration Offices and Gymnasium are not included in this report. The existing HVAC and electrical systems observed are outlined below.

1. Building Heating and Cooling Centralized Plant: The existing primary heating and cooling system serving the Elementary School is achieved by a two-pipe system utilizing the following main centralized equipment: gas-fired boilers, heat exchanger, air-cooled chiller, circulation pumps, air separator, and expansion tank. Heating or cooling water is generated at the plant and then circulated through a piping system to the building. Simultaneous heating and cooling in different spaces of the building is not currently possible due to the nature of a two-pipe system which can only provide heating or cooling, but not both at the same time.

2. HVAC Piping: The heating and cooling system piping for most of the school is schedule 40 steel and is approximately 43 years old. The piping is past its expected useful life. This piping was the focus of the LSW 2017 Heating System Piping Assessment. A subsequent project resulted from the 2017 report to implement recommendations to improve the water quality and extend life of the piping to delay its replacement.

3. HVAC Air Distribution: The heating and cooling system provide heating/cooling via the HVAC piping to individual fan coil units (FCU) or air handling units (AHU). Typically, individual classrooms have a dedicated fan coil unit and the multipurpose room has larger AHUs. The FCUs and AHUs are ducted to supply air to the zones they serve. Outside air is generally ducted from an exterior louver or rooftop intake to the return side of the FCUs or AHUs.

4. HVAC Controls: There is an existing analog control system at the school with limited monitoring and control capabilities. The system is as manufactured by Allen Bradley and reportedly the technical support for this system is from an individual in the local community. Typically, zone temperature is measured with a sensor within the return duct which is used to control the FCU and AHU fans and control valves. All valve and damper actuation is pneumatic. Control valves at FCUs and AHUs are 3-way valves to allow for constant flow of the system water. This system is antiquated per current industry standards.

5. Building Electrical System: The primary electrical service entrance section is located within the existing Central Plant and is a 1,600A 208/120V-3Ph, 4W SES located at 8176 North Westover Avenue and served by APS meter #V91376. This SES has photovoltaic system components interconnected with separate disconnecting means. There appears to be expansion space available within the distribution sections. This spare capacity is a viable supply source for the proposed HVAC electric heat additional loads. Space within the Central Plant is limited.

6. Building Electrical System: The secondary electrical service entrance section is an unknown size 208/120V-3Ph,4W SES located at 8176 North Westover Avenue and served by APS with an unknown meter number. This SES was not accessible during our site walk and no additional information is available. An existing APS pad mounted transformer serves this SES.

7. Building Electrical System: The secondary electrical service entrance section is located t the exterior of the District Office and is a 400A 240/120V SES located at 8176 North Westover Avenue and served by APS meter #DP6782. This SES has photovoltaic system components interconnected with separate disconnecting means. There does not appear to be any expansion space available within the distribution section. Space within the Central Plant is limited.

Based upon our review of the Elementary School HVAC systems, the following deficiencies were noted:

1. The heating/cooling piping is original to the building and has exceeded it's expected useful life and should be replaced. Equipment coils connected to the system should be inspected for any degradation caused by debris from wear and tear of the piping. Additionally, the piping insulation appears to be original and in poor condition. New insulation would help reduce losses in the system.

2. Based on the original plans, it appears that the OSA is connected to the existing fan coil units and air handling units but it is uncertain if the amount of OSA is compliant with current code ventilation rates. Any major renovation of the mechanical system will require the OSA rates to comply with the current code, existing inlets will need to be evaluated for capacity and may need to be upsized.

3. The existing two-pipe system configuration doesn't allow for simultaneous heating/cooling of different spaces. This "one or the other" system can lead to over heating or cooling spaces and being unable to maintain temperature setpoints. This type of system is generally better suited to buildings with a uniform load demand.

4. Function of the building has evolved over time and may require additional design considerations. HVAC units serving such spaces should be evaluated and provided with adequately sized units.

5. The existing HVAC system is served by constant volume pumps and 3-way valves. Additional energy savings could be obtained by adding controls (e.g. variable frequency drives, etc.) to vary the speed of the pumps to match the load in the system.

B. HVAC OPTIONS

The following HVAC options were analyzed for application at the Elementary School. Refer to Appendix A for an associated cost estimate and Appendix B for sample equipment cut sheets for each option.

1. Option ES-1 – Replacement Like for Like

System description: this option would be to keep the existing system as it is outlined in our findings above but implement system improvements to correct as many of the deficiencies noted and help ensure the system remains operational. Recommended improvements include:

a. Replace all HVAC system piping and insulation.

b. Provide new fan coil and air handling units sized to meet the current usage of each space.

c. Provide code required OSA, filtered and conditioned through each fan coil and air handling unit.

d. Provide upgraded controls for variable system pumping. It is assumed that the new pump controls would be expanded to control the new fan coils and air handling units.

Considerations for this option include:

a. This option may be attractive because this is an upgrade to the existing system, i.e. it's a known system that facilities staff is familiar with and can continue to maintain moving forward.

b. Not all of the existing central plant equipment (e.g. boilers, pumps, chillers) is at the end of its expected service life and can remain in service with this option. Additional investigation during design would need to occur to determine what equipment should remain.

c. Upgrading the existing system will not resolve the two-pipe limitation of not being able to cool and heat simultaneously in different areas of the building.

d. The existing system requires water treatment and maintenance beyond that of a packaged unitary system would require. Over time, if proper water treatment isn't maintained in the loop the piping and equipment may become subject to fouling or scale which will lead to loss of capacity or failure of the equipment. Leaks in the piping or equipment can also cause damage to the building or furniture.

2. Option HS-2 – Packaged Unitary Equipment, Electric Heat

This option would include removing the existing HVAC piping system and the associated central heating and cooling plant equipment.

System description: packaged unitary equipment is a decentralized piece of equipment that can generate both heating and cooling for a single zone. Cooling is generated through a refrigerant cycle and a direct expansion (DX) coil to cool an airstream. For this application, we have been directed to assume no new equipment can be placed on the existing roof. In order to accommodate no new equipment on the roof, this option proposes packaged electric heat split system units as outlined below.

Existing FCUs and AHUs would be replaced with packaged split system units. Each split system would include an indoor unit, an outdoor unit mounted on the ground, supply and return ductwork to the space, refrigerant piping between the indoor and outdoor unit, condensate drain piping, and controls. Heating would be provided at the indoor unit by an

internal electric heating element. OSA would be provided to each indoor unit by utilizing the existing louvers or rooftop intakes.

Considerations for this option include:

a. Packaged split system units are simpler to maintain than the existing central heating/cooling system. Most air conditioning contractors are familiar with split system units and would be able to maintain or repair them. Typical routine maintenance is minor, though it would be multiplied by the quantity of units.

b. Packaged split system units required one outdoor unit for every indoor unit. Due to refrigerant limitations, the outdoor units need to be within ~100 feet of the indoor units. The outdoor units could be grouped together as much as possible but will have to be within their length limit. Special consideration for their location will need to be determined through design to account for outside space available and potential for noise issues.

c. Life expectancy for packaged split system units are around 15-20 years. Though, each unit can be replaced individually instead of all at once which aides budget allocation for replacement because they can be scheduled to be replaced in smaller groups instead of all at once.

d. High efficiency split system equipment will be necessary to eliminate the need for a code required economizer. An economizer would require larger OSA ducting and intakes as well as a means for relieving air.

e. Utilizing electric heat will have a higher electrical load that will impact the electrical infrastructure. On the other hand, electric heat requires less maintenance and is easy to replace.

3. Option HS-3 – Packaged Unitary Equipment, Gas Heat

This option would include removing the existing HVAC piping system and the associated central heating and cooling plant equipment.

System description: packaged unitary equipment is a decentralized piece of equipment that can generate both heating and cooling for a single zone. Cooling is generated through a refrigerant cycle and a direct expansion (DX) coil to cool an airstream. For this application, we have been directed to assume no new equipment can be placed on the existing roof. In order

to accommodate no new equipment on the roof, this option proposes packaged gas furnace split system units as outlined below.

Existing FCUs and AHUs would be replaced with packaged split system units. Each split system would include an indoor unit, an outdoor unit mounted on the ground, supply and return ductwork to the space, refrigerant piping between the indoor and outdoor unit, gas piping, furnace intake and flue, condensate drain piping, and controls. Heating would be provided at the indoor unit by an internal gas furnace. OSA would be provided to each indoor unit by utilizing the existing louvers or rooftop intakes.

Considerations for this option include:

a. All the same consideration for the Packaged Unitary Equipment, Electric Heat apply to this option except that the electrical impact isn't as extensive.

b. As a trade off to the electric heat, gas heat will require gas piping to be piped to each of the FCUs and AHUs. Additionally, combustion and flue ducting will need to be installed for each unit. Typically, combustion and flue ducting would want to be installed at the roof but could be installed through a wall so long as they maintain a certain distance to building openings or to the ground. Overall, the gas heat will be more disruptive to install.

4. Option HS-4 – Variable Refrigerant Flow System

This option would include removing the existing HVAC piping system and the associated central heating and cooling plant equipment.

System description: variable refrigerant flow (VRF) is a type of unitary equipment that utilizes refrigerant to generate both heating and cooling for multiple zones. Refrigerant is piped between a central outdoor unit and multiple indoor units. The outdoor unit can provide either heating or cooling to the refrigeration loop and each indoor unit will be able to accept or reject heat to the loop as needed to maintain the space temperature. Similar to the split system, the outdoor unit will be mounted on the ground.

Existing FCUs would be replaced with ducted VRF units. Each ducted VRF unit would include supply and return ductwork to the space, refrigerant piping, condensate drain piping, and controls. Multiple outdoor units would be mounted on the ground outside and connected to the refrigerant loop. The larger AHUs would be replaced with packaged split system units

similar to the packaged unitary equipment in the previous options. OSA would be provided to each indoor unit by utilizing the existing louvers or rooftop intakes.

Considerations for this option include:

a. The outdoor unit for a VRF system can serve multiple indoor units and have longer refrigeration limits (~400 ft) which allows for fewer outdoor units that can be easily grouped together to be less intrusive. Outdoor locations will still need to be evaluated through design to minimize outside space and noise issues.

b. The VRF system is a high efficiency system that is excellent at spreading heating and cooling through the building while minimizing the condensing unit usage. The inherent high efficiency would qualify for the exception to not require economizers.

c. A VRF system would require training for the maintenance staff because it is a newer technology and is dependent on internal controls to properly function. While the components of the VRF system are similar to a split system unit, the internal controls and potential faults and troubleshooting are different. Receiving manufacturer representative support for the VRF system may be difficult and may require technicians from larger cities further away.

C. RECOMMENDATIONS

Our review of the different HVAC options includes consideration for the existing Elementary School building conditions, accessibility for replacement parts, ongoing maintenance, and initial construction impact. Based on our review, we recommend that the existing centralized HVAC system be replaced with Option ES-2 – Packaged Unitary Equipment, Electric Heat.

END OF REPORT

APPENDIX A

Estimate of Probable Construction Costs

ESTIMATE OF PROBABLE CONSTRUCTION COST

LSW Engineers Arizona, Incorporated
2333 West Northern Avenue, Suite 9
Phoenix, Arizona 85021

QUANTITY TAKE - OFF				ESTIMATE: Feasibility Study	
PROJECT NAME: JCSD Decentralized HVAC Feasibility Study				LSW JOB NO: 2021-192.000	
DESCRIPTION: **HS-1 Replaceent Like for Like**		PREP. BY : Cory K. / Mark R.		DATE: 4/8/2022	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL COST
1	Demolition of Existing HVAC	64,000	SF	$0.75 / SF	$48,000.00
2	Fan Coil Units	25	EA	$5,000 / EA	$125,000.00
3	Air Handling Units	6	EA	$8,000 / EA	$48,000.00
4	Controls	1	LOT	$8,800 / LOT	$8,800.00
5	Piping & Insulation	3,000	LF	$100 / LF	$300,000.00
6	Variable Pumps (VFD)	2	EA	$14,000 / EA	$28,000.00
7	Electrical Branch Connection Demolition	31	EA	$200 / LOT	$6,200.00
8	Electrical Branch Connections New	31	EA	$300 / EA	$9,300.00
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				SUBTOTAL	$573,300.00
ESCALATION				20%	$114,660.00
CONTRACTOR MARK-UP				15%	$85,995.00
				SUBTOTAL	$773,955.00
OVERHEAD				10%	$77,395.50
DESIGN FEE				10%	$77,395.50
CONTINGENCY				10%	$77,395.50
				TOTAL PROBABLE COST	**$1,006,141.50**

ESTIMATE OF PROBABLE CONSTRUCTION COST

LSW Engineers Arizona, Incorporated
2333 West Northern Avenue, Suite 9
Phoenix, Arizona 85021

QUANTITY TAKE - OFF				ESTIMATE: Feasibility Study	
PROJECT NAME: JCSD Decentralized HVAC Feasibility Study				LSW JOB NO: 2021-192.000	
DESCRIPTION: **HS-2 Packaged Unitary Equipment, Elec Heat**		PREP. BY : Cory K. / Mark R.		DATE: 4/8/2022	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL COST
1	Demolition of Existing HVAC	64,000	SF	$0.75 / SF	$48,000.00
2	Split System Units (less than 7.5 tons)	25	EA	$12,000 / EA	$300,000.00
3	Split System Units (greater than 7.5 tons)	6	EA	$24,000 / EA	$144,000.00
4	Controls	1	LOT	$22,200 / LOT	$22,200.00
5	Electrical Demolition	31	EA	$500 / EA	$15,500.00
6	Electrical Distribution	1	LOT	$30,000 / LOT	$30,000.00
7	Electrical Panel Board w/ (30) circuits	6	EA	$9,600 / EA	$57,600.00
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				SUBTOTAL	$617,300.00
ESCALATION				20%	$123,460.00
CONTRACTOR MARK-UP				15%	$92,595.00
				SUBTOTAL	$833,355.00
OVERHEAD				10%	$83,335.50
DESIGN FEE				10%	$83,335.50
CONTINGENCY				10%	$83,335.50
				TOTAL PROBABLE COST	**$1,083,361.50**

ESTIMATE OF PROBABLE CONSTRUCTION COST

LSW Engineers Arizona, Incorporated
2333 West Northern Avenue, Suite 9
Phoenix, Arizona 85021

QUANTITY TAKE - OFF				ESTIMATE: Feasibility Study	
PROJECT NAME: JCSD Decentralized HVAC Feasibility Study				LSW JOB NO: 2021-192.000	
DESCRIPTION: **HS-3 Packaged Unitary Equipment, Gas Heat**		PREP. BY : Cory K. / Mark R.		DATE: 4/8/2022	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL COST
1	Demolition of Existing HVAC	64,000	SF	$0.75 / SF	$48,000.00
2	Split System Units (less than 7.5 tons)	25	EA	$12,000 / EA	$300,000.00
3	Split System Units (greater than 7.5 tons)	6	EA	$24,000 / EA	$144,000.00
4	Controls	1	LOT	$22,200 / LOT	$22,200.00
5	Gas Piping	1,500	LF	$15 / LF	$22,500.00
6	Vent and Combustion Air	31	EA	$600 / EA	$18,600.00
7	Electrical Demolition	31	EA	$400 / EA	$12,400.00
8	Electrical Distribution	1	LOT	$22,000 / LOT	$22,000.00
9	Electrical Panel Board w/ (30) circuits	6	EA	$9,600 / EA	$57,600.00
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				SUBTOTAL	$647,300.00
ESCALATION				20%	$129,460.00
CONTRACTOR MARK-UP				15%	$97,095.00
				SUBTOTAL	$873,855.00
OVERHEAD				10%	$87,385.50
DESIGN FEE				10%	$87,385.50
CONTINGENCY				10%	$87,385.50
				TOTAL PROBABLE COST	**$1,136,011.50**

ESTIMATE OF PROBABLE CONSTRUCTION COST

LSW Engineers Arizona, Incorporated
2333 West Northern Avenue, Suite 9
Phoenix, Arizona 85021

QUANTITY TAKE - OFF				ESTIMATE: Feasibility Study	
PROJECT NAME: JCSD Decentralized HVAC Feasibility Study				LSW JOB NO: 2021-192.000	
DESCRIPTION: **HS-4 Variable Refrigerant Flow**		PREP. BY : Cory K. / Mark R.		DATE: 4/8/2022	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL COST
1	Demolition of Existing HVAC	64,000	SF	$0.75 / SF	$48,000.00
2	VRF Units	25	EA	$16,000 / EA	$400,000.00
3	Split System Units (greater than 7.5 tons)	6	EA	$24,000 / EA	$144,000.00
4	Controls	1	LOT	$27,200 / LOT	$27,200.00
5	Electrical Demolition	31	EA	$500 / EA	$15,500.00
6	Electrical Distribution	1	LOT	$32,000 / LOT	$32,000.00
7	Electrical Panel Board w/ (30) circuits	6	EA	$9,600 / EA	$57,600.00
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				SUBTOTAL	$724,300.00
ESCALATION				20%	$144,860.00
CONTRACTOR MARK-UP				15%	$108,645.00
				SUBTOTAL	$977,805.00
OVERHEAD				10%	$97,780.50
DESIGN FEE				10%	$97,780.50
CONTINGENCY				10%	$97,780.50
				TOTAL PROBABLE COST	**$1,271,146.50**

ESTIMATE OF PROBABLE CONSTRUCTION COST

LSW Engineers Arizona, Incorporated
2333 West Northern Avenue, Suite 9
Phoenix, Arizona 85021

QUANTITY TAKE - OFF				ESTIMATE: Feasibility Study	
PROJECT NAME: JCSD Decentralized HVAC Feasibility Study				LSW JOB NO: 2021-192.000	
DESCRIPTION: **A-1 Replaceent Like for Like**		PREP. BY : Cory K. / Mark R.		DATE: 4/8/2022	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL COST
1	Demolition of Existing HVAC	22,000	SF	$0.75 / SF	$16,500.00
2	Fan Coil Units	4	EA	$5,000 / EA	$20,000.00
3	Air Handling Units	2	EA	$8,000 / EA	$16,000.00
4	Controls	1	LOT	$1,800 / LOT	$1,800.00
5	Piping & Insulation	600	LF	$100 / LF	$60,000.00
6	Variable Pumps (VFD)	2	EA	$14,000 / EA	$28,000.00
7	Electrical Demolition	6	EA	$200 / EA	$1,200.00
8	Electrical Distribution	1	LOT	$15,000 / LOT	$15,000.00
9	Electrical Panel Board w/ (30) circuits	1	EA	$9,600 / EA	$9,600.00
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				SUBTOTAL	$168,100.00
ESCALATION				20%	$33,620.00
CONTRACTOR MARK-UP				15%	$25,215.00
				SUBTOTAL	$226,935.00
OVERHEAD				10%	$22,693.50
DESIGN FEE				10%	$22,693.50
CONTINGENCY				10%	$22,693.50
				TOTAL PROBABLE COST	**$295,015.50**

ESTIMATE OF PROBABLE CONSTRUCTION COST

LSW Engineers Arizona, Incorporated
2333 West Northern Avenue, Suite 9
Phoenix, Arizona 85021

QUANTITY TAKE - OFF				ESTIMATE: Feasibility Study	
PROJECT NAME: JCSD Decentralized HVAC Feasibility Study				LSW JOB NO: 2021-192.000	
DESCRIPTION: **A-2 Packaged Unitary Equipment, Elec Heat**		PREP. BY : Cory K. / Mark R.		DATE: 4/8/2022	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL COST
1	Demolition of Existing HVAC	22,000	SF	$0.75 / SF	$16,500.00
2	Split System Units (less than 7.5 tons)	4	EA	$12,000 / EA	$48,000.00
3	Split System Units (greater than 7.5 tons)	2	EA	$24,000 / EA	$48,000.00
4	Controls	1	LOT	$4,800 / LOT	$4,800.00
5	Electrical Demolition	6	EA	$400 / EA	$2,400.00
6	Electrical Distribution	1	LOT	$15,000 / LOT	$15,000.00
7	Electrical Panel Board w/ (42) circuits	1	EA	$9,600 / EA	$9,600.00
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				SUBTOTAL	$144,300.00
ESCALATION				20%	$28,860.00
CONTRACTOR MARK-UP				15%	$21,645.00
				SUBTOTAL	$194,805.00
OVERHEAD				10%	$19,480.50
DESIGN FEE				10%	$19,480.50
CONTINGENCY				10%	$19,480.50
				TOTAL PROBABLE COST	**$253,246.50**

ESTIMATE OF PROBABLE CONSTRUCTION COST

LSW Engineers Arizona, Incorporated
2333 West Northern Avenue, Suite 9
Phoenix, Arizona 85021

QUANTITY TAKE - OFF				ESTIMATE: Feasibility Study	
PROJECT NAME: JCSD Decentralized HVAC Feasibility Study				LSW JOB NO: 2021-192.000	
DESCRIPTION: **A-3 Packaged Unitary Equipment, Gas Heat**		PREP. BY : Cory K. / Mark R.		DATE: 4/8/2022	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL COST
1	Demolition of Existing HVAC	22,000	SF	$0.75 / SF	$16,500.00
2	Split System Units (less than 7.5 tons)	4	EA	$12,000 / EA	$48,000.00
3	Split System Units (greater than 7.5 tons)	2	EA	$24,000 / EA	$48,000.00
4	Controls	1	LOT	$4,800 / LOT	$4,800.00
5	Gas Piping	300	LF	$15 / LF	$4,500.00
6	Vent and Combustion Air	6	EA	$600 / EA	$3,600.00
7	Electrical Demolition	6	EA	$400 / EA	$2,400.00
8	Electrical Distribution	1	LOT	$15,000 / LOT	$15,000.00
9	Electrical Panel Board w/ (30) circuits	1	EA	$9,600 / EA	$9,600.00
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
				SUBTOTAL	$152,400.00
ESCALATION				20%	$30,480.00
CONTRACTOR MARK-UP				15%	$22,860.00
				SUBTOTAL	$205,740.00
OVERHEAD				10%	$20,574.00
DESIGN FEE				10%	$20,574.00
CONTINGENCY				10%	$20,574.00
				TOTAL PROBABLE COST	**$267,462.00**

ESTIMATE OF PROBABLE CONSTRUCTION COST

LSW Engineers Arizona, Incorporated
2333 West Northern Avenue, Suite 9
Phoenix, Arizona 85021

QUANTITY TAKE - OFF				ESTIMATE: Feasibility Study	
PROJECT NAME: JCSD Decentralized HVAC Feasibility Study				LSW JOB NO: 2021-192.000	
DESCRIPTION: **A-4 Electric Duct Heaters**		PREP. BY : Cory K. / Mark R.		DATE: 4/8/2022	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL COST
1	Demolition of Existing HVAC	22,000	SF	$0.75 / SF	$16,500.00
2	Duct Heaters	6	EA	$6,000 / EA	$36,000.00
3	Controls	1	LOT	$1,800 / LOT	$1,800.00
4	Electrical Distribution	1	LOT	$15,000 / LOT	$15,000.00
5	Electrical Panel Board w/ (30) circuits	1	EA	$9,600 / EA	$9,600.00
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
				SUBTOTAL	$78,900.00
ESCALATION				20%	$15,780.00
CONTRACTOR MARK-UP				15%	$11,835.00
				SUBTOTAL	$106,515.00
OVERHEAD				10%	$10,651.50
DESIGN FEE				10%	$10,651.50
CONTINGENCY				10%	$10,651.50
				TOTAL PROBABLE COST	**$138,469.50**

ESTIMATE OF PROBABLE CONSTRUCTION COST

LSW Engineers Arizona, Incorporated
2333 West Northern Avenue, Suite 9
Phoenix, Arizona 85021

QUANTITY TAKE - OFF				ESTIMATE: Feasibility Study	
PROJECT NAME: JCSD Decentralized HVAC Feasibility Study				LSW JOB NO: 2021-192.000	
DESCRIPTION: **ES-1 Replaceent Like for Like**		PREP. BY : Cory K. / Mark R.		DATE: 4/8/2022	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL COST
1	Demolition of Existing HVAC	36,000	SF	$0.75 / SF	$27,000.00
2	Fan Coil Units	20	EA	$5,000 / EA	$100,000.00
3	Air Handling Units	3	EA	$8,000 / EA	$24,000.00
4	Controls	1	LOT	$6,200 / LOT	$6,200.00
5	Piping & Insulation	2,000	LF	$100 / LF	$200,000.00
6	Variable Pumps (VFD)	2	EA	$14,000 / EA	$28,000.00
7	Electrical Demolition	23	EA	$300 / EA	$6,900.00
8	Electrical Distribution	1	LOT	$32,000 / LOT	$32,000.00
9	Electrical Panel Board w/ (42) circuits	4	EA	$9,600 / EA	$38,400.00
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
				SUBTOTAL	$462,500.00
ESCALATION				20%	$92,500.00
CONTRACTOR MARK-UP				15%	$69,375.00
				SUBTOTAL	$624,375.00
OVERHEAD				10%	$62,437.50
DESIGN FEE				10%	$62,437.50
CONTINGENCY				10%	$62,437.50
				TOTAL PROBABLE COST	**$811,687.50**

ESTIMATE OF PROBABLE CONSTRUCTION COST

LSW Engineers Arizona, Incorporated
2333 West Northern Avenue, Suite 9
Phoenix, Arizona 85021

QUANTITY TAKE - OFF				ESTIMATE: Feasibility Study	
PROJECT NAME: JCSD Decentralized HVAC Feasibility Study				LSW JOB NO: 2021-192.000	
DESCRIPTION: **ES-2 Packaged Unitary Equipment, Elec Heat**		PREP. BY : Cory K. / Mark R.		DATE: 4/8/2022	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL COST
1	Demolition of Existing HVAC	36,000	SF	$0.75 / SF	$27,000.00
2	Split System Units (less than 7.5 tons)	20	EA	$12,000 / EA	$240,000.00
3	Split System Units (greater than 7.5 tons)	3	EA	$24,000 / EA	$72,000.00
4	Controls	1	LOT	$15,600 / LOT	$15,600.00
5	Electrical Demolition	23	EA	$300 / EA	$6,900.00
6	Electrical Distribution	1	LOT	$25,000 / LOT	$25,000.00
7	Electrical Panel Board w/ (42) circuits	4	EA	$9,600 / EA	$38,400.00
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
				SUBTOTAL	$424,900.00
ESCALATION				20%	$84,980.00
CONTRACTOR MARK-UP				15%	$63,735.00
				SUBTOTAL	$573,615.00
OVERHEAD				10%	$57,361.50
DESIGN FEE				10%	$57,361.50
CONTINGENCY				10%	$57,361.50
				TOTAL PROBABLE COST	**$745,699.50**

ESTIMATE OF PROBABLE CONSTRUCTION COST

LSW Engineers Arizona, Incorporated
2333 West Northern Avenue, Suite 9
Phoenix, Arizona 85021

QUANTITY TAKE - OFF				ESTIMATE: Feasibility Study	
PROJECT NAME: JCSD Decentralized HVAC Feasibility Study				LSW JOB NO: 2021-192.000	
DESCRIPTION: **ES-3 Packaged Unitary Equipment, Gas Heat**		PREP. BY : Cory K. / Mark R.		DATE: 4/8/2022	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL COST
1	Demolition of Existing HVAC	36,000	SF	$0.75 / SF	$27,000.00
2	Split System Units (less than 7.5 tons)	20	EA	$12,000 / EA	$240,000.00
3	Split System Units (greater than 7.5 tons)	3	EA	$24,000 / EA	$72,000.00
4	Controls	1	LOT	$15,600 / LOT	$15,600.00
5	Gas Piping	1,000	LF	$15 / LF	$15,000.00
6	Vent and Combustion Air	23	EA	$600 / EA	$13,800.00
7	Electrical Demolition	23	EA	$300 / EA	$6,900.00
8	Electrical Distribution	1	LOT	$19,000 / LOT	$19,000.00
9	Electrical Panel Board w/ (30) circuits	4	EA	$9,600 / EA	$38,400.00
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
				SUBTOTAL	$447,700.00
ESCALATION				20%	$89,540.00
CONTRACTOR MARK-UP				15%	$67,155.00
				SUBTOTAL	$604,395.00
OVERHEAD				10%	$60,439.50
DESIGN FEE				10%	$60,439.50
CONTINGENCY				10%	$60,439.50
				TOTAL PROBABLE COST	**$785,713.50**

ESTIMATE OF PROBABLE CONSTRUCTION COST

LSW Engineers Arizona, Incorporated
2333 West Northern Avenue, Suite 9
Phoenix, Arizona 85021

QUANTITY TAKE - OFF				ESTIMATE: Feasibility Study	
PROJECT NAME: JCSD Decentralized HVAC Feasibility Study				LSW JOB NO: 2021-192.000	
DESCRIPTION: **ES-4 Variable Refrigerant Flow**		PREP. BY : Cory K. / Mark R.		DATE: 4/8/2022	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL COST
1	Demolition of Existing HVAC	36,000	SF	$0.75 / SF	$27,000.00
2	VRF Units	20	EA	$16,000 / EA	$320,000.00
3	Split System Units (greater than 7.5 tons)	3	EA	$24,000 / EA	$72,000.00
4	Controls	1	LOT	$19,600 / LOT	$19,600.00
5	Electrical Demolition	23	EA	$300 / EA	$6,900.00
6	Electrical Distribution	1	LOT	$32,000 / LOT	$32,000.00
7	Electrical Panel Board w/ (42) circuits	4	EA	$9,600 / EA	$38,400.00
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
				SUBTOTAL	$515,900.00
ESCALATION				20%	$103,180.00
CONTRACTOR MARK-UP				15%	$77,385.00
				SUBTOTAL	$696,465.00
OVERHEAD				10%	$69,646.50
DESIGN FEE				10%	$69,646.50
CONTINGENCY				10%	$69,646.50
				TOTAL PROBABLE COST	**$905,404.50**

APPENDIX B

Equipment Cut Sheets

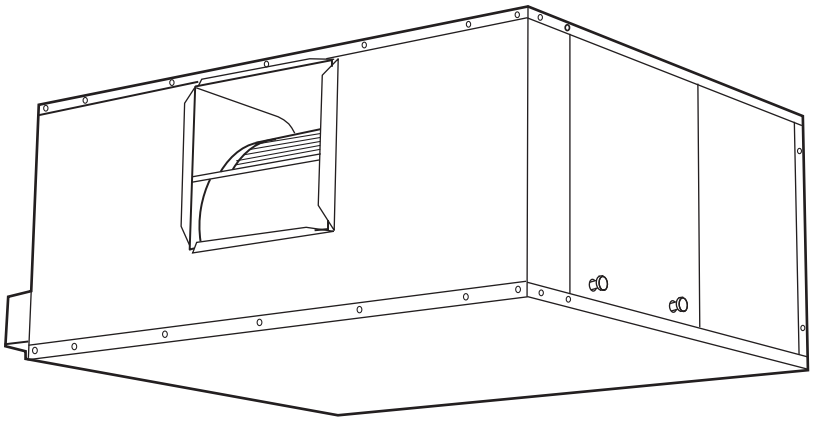
Carrier
United Technologies

Product Data

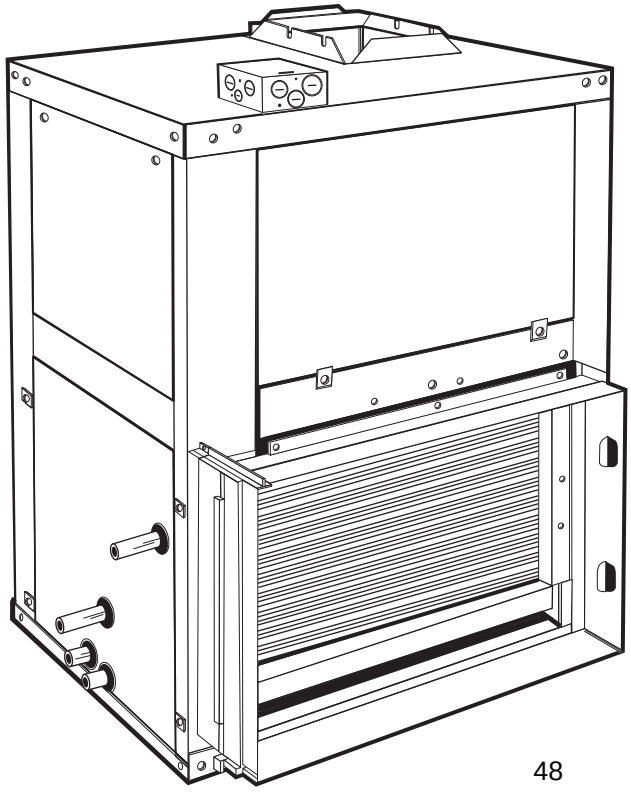
AIRSTREAM™ 42BHE,BVE06-40 System Fan Coils

600 to 4000 Nominal cfm

AIRSTREAM™



42BHE UNIT



42BVE UNIT

48

Carrier's versatile belted fan coil units satisfy design requirements:

- A selection of 8 sizes covers nominal capacities from 600 to 4000 cfm
- Choice of motors, from 1/4 to 5 hp, eliminates oversizing
- Wide range of coil options for 2-pipe or 4-pipe systems
- Optional DX (direct expansion) coils with expansion valve and distributor
- Single and three-phase electric heat (1.0 to 39.9 kW)

Features/Benefits

The 42BHE, BVE belt drive fan coil units provide year-round comfort air conditioning with central station operating economy.

A variety of coil options reduces first cost

Four, 6 or 8-row cooling coils combine needed capacities with the most efficient heat transfer surface. For 4-pipe systems, select from two split-coil options. Standard coils consist of aluminum fins securely bonded to 1/2-in. OD seamless copper tubes. Each fin's aluminum collar ensures accurate control of the fin spacing, while completely covering the tubes to lengthen coil life. All coils also feature manual air vents, with optional automatic air vents available. Special coils are also available with stainless steel end sheets and bottom coil baffles. For custom applications, special coils are available with lower pressure drops.

Features/Benefits (cont)

Fan wheels are designed to provide low operating costs

The forward-curved, centrifugal, double-inlet fans are statically and dynamically balanced at the factory to minimize transmission of vibration to the building structure.

In addition, the blower is isolated from the cabinet by rubber isolators, and the blower is isolated from the duct connections by foam.

All motors (single and three phase) are UL (Underwriters Laboratories) listed or equivalent, factory wired, single speed with thermal overload protection and are continuous duty rated. Motors are supplied with permanently lubricated bearings, class-B insulation and are open drip-proof. The motor mount has an adjustable platform for easy belt adjustment. The motor is resilient mounted (up to 2 hp) or rigid base mounted (3 to 5 hp) for vibration free installation. Drives are pre-set at the factory for the specific airflow at static pressures as ordered. An adjustable pitch pulley allows cfm balancing to meet system requirements.

Complete factory assembly minimizes on-the-jobsite costs and problems

Compact, lightweight units are designed for easy mounting. For horizontal units, knockouts designed to accept $^{3}/_{8}$-in. threaded rods are provided on the top and bottom of each corner of the unit. External vibration isolation and flex connections for ducts is recommended. One-in. duct collars on discharge and on return are furnished standard. These integral duct collars cut installation time and labor expense.

Durable construction means easy-to-maintain units

The 42BHE,BVE fan coil casings are fabricated from heavy-gage galvanized G90 steel, reinforced for maximum rigidity and structural strength. Optional one-inch double wall construction, perforated or solid lined, is also available. Removable side panels with toolless camlock fasteners allow easy access for servicing interior components.

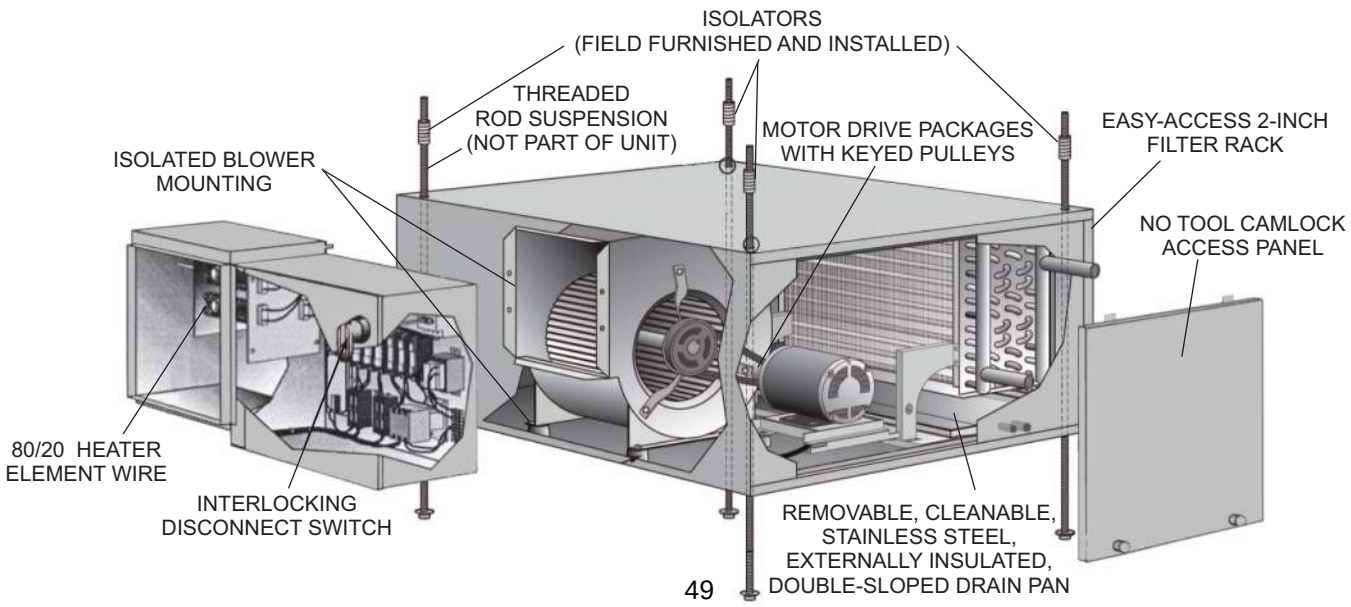
One-inch matte surface, fiberglass thermal/acoustical insulation lines the fan coil cabinets to prevent sweating and to muffle sound transmission. Premium anti-microbial fiberglass, foil faced, and closed cell insulations are also available to address IAQ (indoor air quality) concerns.

The stainless steel, double-sloped condensate drain pan is removable for ease of cleaning, and all models include primary and secondary drain connections to provide back up in case the main connection is plugged.

Slide-in return-duct collar filter makes it possible to remove and replace the filter without disturbing return air ductwork. A standard 2 in. and optional 4 in. filter rack allow different filter types, thickness, and efficiency to address IAQ requirements.

Table of contents

INTERNAL FEATURES OF A 42BHE FAN COIL UNIT



Model number nomenclature

42B HE 06 B C3 R6 07 05 B E

42B — AirStream System Fan Coil Unit

Product Type
HE — Horizontal Unit
VE — Vertical Unit

Unit Size - Nominal Airflow (cfm)
06 — 600
08 — 800
10 — 1000
12 — 1200
16 — 1600
20 — 2000
30 — 3000
40 — 4000

Coil
1 — 4/2 DX/HW Same End
2 — 6 Row DX
4 — 6/1 DX/HW Same End
6 — 6/2 DX/HW Same End
7 — 4 Row DX
B — 4 Row (Std)
H — 4/1 Same End
K — 4/2 Same End
L — 6 Row
N — 6/1 Same End
Q — 6/2 Same End
R — 8 Row
X — 4/1 DX/HW Same End

Motor Voltage
C3 — 115/1/60
D3 — 208/1/60
D4 — 208/3/60
E3 — 230/1/60
E4 — 230/3/60
F3 — 277/1/60
G4 — 460/3/60
U3 — 220/1/50††
V4 — 380/3/50††

Arrangement**
L1 — Left Hand with 1 in. Double Wall Tuf-Skin Insulation and Solid Inner Liner
L2 — Left Hand with 1 in. Double Wall Tuf-Skin Insulation and Perforated Inner Liner
L3 — Left Hand with 1 in. Double Wall Closed Cell Insulation and Solid Inner Liner
L4 — Left Hand with 1 in. Double Wall Closed Cell Insulation and Perforated Inner Liner
L6 — Left Hand with 1 in. Tuf-Skin Insulation
L8 — Left Hand with 1 in. Foil Face Insulation
L9 — Left Hand with 1 in. Closed Cell Insulation
R1 — Right Hand with 1 in. Double Wall Tuf-Skin Insulation and Solid Inner Liner
R2 — Right Hand with 1 in. Double Wall Tuf-Skin Insulation and Perforated Inner Liner
R3 — Right Hand with 1 in. Double Wall Closed Cell Insulation and Solid Inner Liner
R4 — Right Hand with 1 in. Double Wall Closed Cell Insulation and Perforated Inner Liner
R6 — Right Hand with 1 in. Tuf-Skin Insulation
R8 — Right Hand with 1 in. Foil Face Insulation
R9 — Right Hand with 1 in. Closed Cell Insulation

Actual CFM†

Total Static Pressure*

Motor HP
A — 1/4 HP
B — 1/3 HP
C — 1/2 HP
D — 3/4 HP
E — 1 HP
F — 1 1/2 HP
G — 2 HP
H — 3 HP
J — 5 HP

Filters
E — 2 in. Pleated Filter
F — 1 in. Pleated Filter
G — 1 in. Throwaway Filter (Qty 2)
H — 2 in. MERV 11 with 2 in. Pleated Pre-Filter

LEGEND
DX — Direct Expansion
HW — Hot Water

*To be determined by Carrier sales engineer.
Example: 05=0.5 in. wg
†To be determined by Carrier sales engineer.
Example: 07=700 actual CFM
**For epoxy-coated insulation option, submit ETO (Engineer to Order) request.
††Data for 50 Hz motors can be found in Fan Coil Builder software program.

Physical data

UNIT SIZE 42BHE, BVE	06	08	10	12	16	20	30	40
NOMINAL CFM	600	800	1000	1200	1600	2000	3000	4000
42BHE OPERATING WT (lb) (no heat/ with heat)	235/266	269/268	292/327	296/329	360/395	404/440	505/542	637/674
42BVE OPERATING WT (lb) (no heat/ with heat)	232/263	234/265	283/316	287/320	337/371	412/448	504/541	606/644
FILTERS (2 in. pleated) Number...Size (in.) Face Area (sq ft)	1...16 1/2 x 24 2.8	1...16 1/2 x 24 2.8	1...18 1/4 x 33 4.2	1...18 1/4 x 33 4.2	2...18 1/4 x 21 1/2 5.5	2...20 3/4 x 22 6.3	2...29 x 22 8.9	2...29 x 29 11.7
HYDRONIC COILS Size (in.) Face Area (sq ft)	15 x 20 2.1	15 x 20 2.1	15 x 29 3.0	15 x 29 3.0	15 x 39 4.1	18 x 40 4.9	27 x 40 7.7	27 x 54 10.3
Fins per inch	10							
Coil Water Volume (approx. gal. per row of coil)	0.240	0.240	0.324	0.324	0.420	0.492	0.768	1.020
FANS Qty...Size (in.)	1...9 x 4	1...9 x 6	1...10 x 4	1...10 x 7	1...11 x 10	1...12 x 9	1...12 x 12	1...15 x 12
HYDRONIC COIL CONN. (in.) 8 Row (Cooling)	1 nominal, 1.125 OD						1 1/2 nominal, 1.625 OD	
4 and 6 Row (Cooling)	3/4 nominal, 0.875 OD				1 nominal, 1.125 OD		1 1/2 nominal, 1.625 OD	
1 Row (Heating)	1/2 nominal, 0.625 OD						1 1/2 nominal, 1.625 OD	
2 Row (Heating)	1/2 nominal, 0.625 OD				1 nominal, 1.125 OD		1 1/2 nominal, 1.625 OD	
DX COIL CONN. LIQUID LINE (in.)	1/4 nominal, 0.375 OD						1/2 nominal, 0.625 OD	
DX COIL CONN. SUCTION LINE (in.)	3/4 nominal, 0.875 OD				1 nominal, 1.125 OD		1 1/2 nominal, 1.625 OD	
DRAIN CONN. SIZES (in.)	3/4 MPT							

Options and accessories

42BHE, BVE OPTIONS AND ACCESSORIES

ITEM	OPTION*	ACCESSORY†
Automatic Air Vents	X	
Controls	X	
Electric Heat	X	
Filters	X	
Heating/Cooling Coils	X	
Insulation	X	
Mixing Boxes		X
Motors	X	
Double Wall Cabinet Construction	X	
Seismic Structural Upgrade (not available with double wall)	X	
Condensate Overflow Switch	X	
Motor Controls	X	
Disconnect Switch	X	

*Factory-installed option.
†Field-installed accessory.

The 42BHE and 42BVE fan coil units are designed to offer maximum flexibility in an application, accessibility for service, quiet operation and durability.

Factory-installed options

Automatic air vents — Automatic air vents have fiber washers, which allow air in the pipes to pass through, automatically bleeding the system. The fiber washers eliminate the need to manually remove air from the system. When wet, washers swell and seal the system.

Coils — Coils are available in a choice of two-pipe system with 4-row cooling/heating or four-pipe system with 4, 6 or 8-row cooling and 1 or 2 row heating. Reheat operation is standard. Preheat is available as an option for hydronic coil. For DX/HW (hot water) coils, preheat position is standard. Steam coils are available with a factory special quote.

Controls — Factory-installed optional controls include an interlocking disconnect switch, heater power fusing, 24-v Class 2 transformer (40-va), 8-pole control terminal strip, auto reset temperature limit switch, airflow safety switch, motor power fusing, motor control contactor, and a 24-v condensate overflow switch.

Electric heat — Total electric heat eliminates the requirement for a boiler. Heating and/or cooling may be available on an individual basis throughout the year. Resistance electric heat is available from 1.0 kW to 39.9 kW (refer to electric heater data table for availability per unit) with single-stage or multiple-stage, single power source.

Voltages:

- 115-v, 208-v, 230-v and 277-v single-phase 60 Hz
- 208-v, 230-v and 480-v three-phase 60 Hz
- 220-v single-phase 50 Hz
- 380-v three-phase 50 Hz

Electric heat is available with the following staging options (3-phase staging is balanced).

- 1 to 12 kW 1 stage only — single phase
- 3 to 12 kW 1 or 2 stage only — single phase
- 1 to 39.9 kW 1 stage only — 3 phase
- 4 to 39.9 kW 1 or 2 stage only — 3 phase
- 12 to 39.9 kW 1, 2, or 3 stage — 3 phase

Heater coils are constructed of high-grade resistance wire that is supported by ceramic insulators on plated steel brackets. These heat elements are suspended directly in front of the outlet after the blower and the coil. An auto and manual thermal limit switch protect the heater in the event of air failure.

Filters — Two-in. pleated filters are standard. One-in. pleated, two 1-in. throwaway, or 2-in. MERV (minimum efficiency reporting value) 11 filters with 2-in. pleated pre-filter are available. The 2-in. MERV 11 filters with 2-in. pleated pre-filter include a filter rack.

Insulation — Tuf-Skin™ II (1-in. thick) insulation is standard. Also available is 1-in. closed cell, 1-in. epoxy coated fiberglass edge sealed, or 1-in. foil-faced insulation.

Motors — A wide selection of standard motors provides efficient operation in ducted applications with excellent performance with up to 2.5 in. of total static pressure. All standard motors contain internal thermal overload protection. The overload automatically resets when the temperature returns to a safe limit. These thermal overloads, when coupled with the motor contactor, replace the need for a motor starter. Available motor options include:

- 115-v, 208-v, 230-v and 277-v single-phase 60 Hz
- 208-v, 230-v and 460-v three-phase 60 Hz
- 220-v single-phase 50 Hz
- 380-v three-phase 50 Hz
- Open drip-proof motors
- External junction box

Field-installed accessories

Mixing boxes — Mixing boxes can be used when outside air is required for ventilation. Pre-assembled at the factory and shipped separately with base rails for field installation, mixing boxes include a linkage kit consisting of two crankarms, 2 swivels and either a 25 in. long (for sizes 06-16) or a 34 in. long (for sizes 20-40) $^{5}/_{16}$ in. rod for field installation of an actuator.

Carrier

Turn to the experts

Product Data

Packaged Air-Handling Units

6-30 Tons

60 Hz

Puron

40RUA 07-30 (Direct Expansion)
40RUS 08-30 (Chilled Water)
Packaged Air Handling Units with Puron® Refrigerant

Features/Benefits

40RU Series air-handling units are the best choice for packaged air handlers. Model 40RUA units have direct-expansion coils. 40RUS units are chilled water packaged air handling units. All models offer excellent fan performance, a unique combination of indoor air quality features, and easy installation. Their versatility and state-of-the-art features provides economical performance.

Carrier's easy-to install and economical 40RU units provide reliable service and versatile packaged 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 an immobilized anti-microbial agent to inhibit the growth of bacteria and fungi on the insulation.
- High-static design meets a wider range of applications than competitive packaged air handler lines.
- Ultra Low Leak Economizer accessory provides ventilation air and "free" cooling with built in Fault Detection and Diagnostic (FDD) capabilities.
- Cooling coils with mechanically bonded fins provide peak heat transfer.
- Hot water coil, steam coil, and electric heat accessories are available.
- Standard factory-installed thermostatic expansion valves (TXV) with removable power element on 40RUA units.
- Die-formed galvanized steel casings provide durability and structural integrity. Optional paint is available.
- Optional Staged Air Volume (SAV™) system with 2-speed indoor fan VFD controller (07-30 models).

Indoor air quality features

The unique combination of features in the 40RU 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. Unit sizes 10 tons and above feature dual-circuit face-split coils.

2 in. (51 mm) disposable filters remove dust and airborne particles from the occupied space.

Thermal insulation contains an immobilized anti-microbial agent to inhibit the growth of bacteria and fungi on the insulation.

Pitched drain pan can be adjusted for a right-hand or left-hand connection to provide positive drainage and prevent standing condensate.

Economizer accessory precisely controls the blend of outdoor air and room air to achieve comfort levels. When the outside air is suitable, outside air dampers can fully open to provide "free" cooling. Economizer is an Ultra Low Leak design that 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.

Economy

The 40RU Series packaged air handlers have low initial costs, and they continue to save money by providing reduced installation expense and energy-efficient performance.

Quick installation is ensured by the multi-position design. Units can be installed in either the horizontal or vertical (upflow) configuration without modifications. All units have drain-pan connections on both sides, and pans can be pitched for right-hand or left hand operation with a simple adjustment.

Fan motors and contactors are pre-wired and TXVs are factory-installed on 40RU models.

High-efficiency, precision balanced fans minimize air turbulence, surging, and unbalanced operation, thereby cutting operating expenses.

Economizer accessory precisely controls the blend of outdoor air and room air to achieve comfort levels. When the outside air is suitable, outside air dampers can fully open to provide "free" cooling. Economizer is an Ultra Low Leak design that 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.

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Features/Benefits (cont)

Rugged dependability

Die-formed galvanized steel panels ensure structural integrity under all operating conditions. Mechanically bonded coil fins provide improved heat transfer. Galvanized steel fan housings are securely mounted to a die-formed galvanized steel deck.

Rugged pillow-block bearings (sizes 14-30) are securely fastened to the solid steel fan shaft with split collets and clamp locking devices. Smaller unit sizes have spider-type bearings.

Coil flexibility

Model 40RU air handling units have galvanized steel casings; inlet and outlet connections are on the same end.

Chilled water coils have 1/2 in. (12.7 mm) diameter copper tubes mechanically bonded to aluminum sine-wave fins. All chilled water coils have non-ferrous headers.

Direct-expansion (DX) coils are designed for use with Puron® R-410A refrigerant and have copper tubes mechanically bonded to aluminum sine-wave fins.

Direct-expansion coils include matched, factory-installed thermostatic expansion valves (TXVs) with matching distributor nozzles.

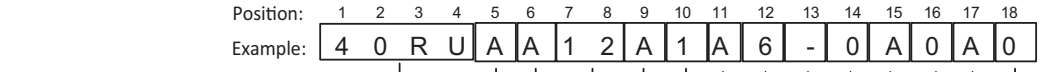
Easier installation and service

The multi-position design and component layout allow for quick unit installation and operation. The DX coils have factory-installed TXVs with matching distributor nozzles. Units can be converted from horizontal to vertical operation by simply repositioning the unit.

Drain pan connections are duplicated on both sides of the unit. The filters, motor, drive, TXVs, and coil connections are easily accessed by removing a single side panel.

Model number nomenclature

40RU MODEL NUMBER NOMENCLATURE



Model Type
Packaged Air-Handling Unit With Puron® R-410A Refridgerant

Type of Coil
A – Standard 4 Row DX
S – Chilled Water Coil

Refrigeration Options – Drive
A – None

Nominal Tonnage

07 – 6.0 Ton (RUA Only)	16 – 15.0 Ton
08 – 7.5 Ton	25 – 20.0 Ton
10 – 8.5 Ton (RUS Only)	28 – 25.0 Ton
12 – 10.0 Ton	30 – 30.0 Ton
14 – 12.5 Ton	

Fan Motor Speed Controller
A – None – Standard
T – 2 Speed Fan Controller (VFD)

Indoor Fan Motor Options – Belt Drive
1 – Standard Motor / Standard Drive
2 – Standard/Alternate Motor / Medium Drive
3 – High Static Motor / High Drive
4 – Standard Static, High Efficient Motor/ Standard Drive (25, 28 and 30 sizes only)
5 – Standard/Alternate High Efficient Motor/ Medium Drive
6 – High Static, High Efficient Motor/High Drive †

Coil Options
A – Standard Aluminum Fin / Copper Tube

Voltage *
1 – 575-3-60
3 – 208/230-1-60 (07, 08 and RUS 10 sizes only)
5 – 208/230-3-60 (Size 16 with alternate motor and all 25-30 models)
6 – 460-3-60

Revision Number
- – Standard

Future Use
0 – Standard

Future Use
A – Standard

Cabinet Paint
0 – None
1 – Painted

Future Use
A – Standard

Packaging
0 – Standard

* All 40RU*07-14 units with a “6” voltage designation are triplr voltage; ie., 208/230/460/-3/60.
Size 40RU*16 is also triple voltage in the “6” configuration unles the High Static motor option is used that is discrete 460-0-60.
Units that rewuire 2-Speed indoor fan motor must use dedicated voltage models listed. The VFD used is ot multi-voltage.

†30 size models and single-phase 07, 08, and 10 sizes designate standard motor and high static drive.

Model number nomenclature (cont)

SINGLE SPEED MOTOR

Position 10	Motor Description	Voltage	Unit Size								
			07	08	10	12	14	16	25	28	30
1	Std Static, Std Efficient Motor / Std Drive	All	x	x	x	x	x	x	—	—	—
2	Std Static, Std Efficient Motor / Med Drive	All	x	x	x	x	x	x	—	—	—
3	High (Alternate) Static, Std Efficient Motor / High Drive	575-3-60	x	x	x	x	—	—	—	—	—
		208/230-1-30	x	x	x	—	—	—	—	—	—
		208/23-3-60 460-3-60	x	x	x	x	x	—	—	—	—
4	Std Static, High Efficient Motor / Std Drive	All	—	—	—	—	—	—	x	x	x
5	Std Static, High Efficient Motor / Med Drive	575-3-60	—	—	—	—	—	—	x	—	x
		208/230/460-3-60	—	—	—	—	—	—	—	—	x
	High (Alternate) Static, High Efficient Motor / Med Drive	575-3-60	—	—	—	—	—	—	—	x	—
		208/230-3-60 460-3-60	—	—	—	—	—	—	—	x	—
6	High (Alternate) Static, High Efficient Motor / High Drive	575-3-60	—	—	—	—	x	x	x	x	x*
		208/230-3-60 460-3-60	—	—	—	—	—	x	x	x	x

* Size 30 is designated standard motor and high static drive.

2-SPEED MOTOR

Position 10	Motor Description	Voltage	Unit Size								
			07	08	10	12	14	16	25	28	30
1	Std Static, Std Efficient Motor / Std Drive	All	x	x	x	x	x	x	—	—	—
	Std Static, High Efficient Motor / Std Drive	All	—	—	—	—	—	—	x	x	x
2	Std Static, Std Efficient Motor / Med Drive	All	x	x	x	x	x	x	—	—	—
	Std Static, Std Efficient Motor / Med Drive	575-3-60	—	—	—	—	—	—	x	—	—
		208/230/460-3-60	—	—	—	—	—	—	x	—	—
	High (Alternate) Static, High Efficient Motor / Med Drive	575-3-60	—	—	—	—	—	—	—	x	—
		208/230-3-60 460-3-60	—	—	—	—	—	—	—	x	—
3	High (Alternate) Static, Std Efficient Motor / High Drive	575-3-60	x	x	x	x	—	—	—	—	—
		208/23-3-60 460-3-60	x	x	x	x	x	—	—	—	—
	High (Alternate) Static, High Efficient Motor / High Drive	575-3-60	—	—	—	—	x	x	x	x	x*
		208/230-3-60 460-3-60	—	—	—	—	—	x	x	x	x

* Size 30 is designated standard motor and high static drive.

Physical data

40RUA 6-30 TON DIRECT EXPANSION WITH PURON REFRIGERANT UNITS

UNIT 40RUA	07	08	12	14	16	25	28	30
NOMINAL CAPACITY (Tons)	6	7-1/2	10	12-1/2	15	20	25	30
OPERATING WEIGHT (lb)								
Base Unit with TXV (4 Row)	399	404	425	695	713	730	1050	1062
Plenum	175	175	175	225	225	225	325	325
Economizer	185	185	185	340	340	340	340	340
Hot Water Coil	195	195	195	285	285	285	345	345
Steam Coil	215	215	215	340	340	340	405	405
FANS								
Qty...Diam. (in.)	1...15	1...15	1...15	2...15	2...15	2...15	2...18	2...18
Nominal Airflow (cfm)	2400	3000	4000	5000	6000	8000	10,000	12,000
Airflow Range (cfm)	1800-3000	2250-3750	3000-5000	3750-6250	4500-7500	6000-10,000	7500-12,500	9000-15,000
Nom. Motor Hp (Standard Motor)* 208/230-160	1.3	2.4	—	—	—	—	—	—
208/230-3-60 and 460-3-60	2.4	2.4	2.4	2.9	3.7	5.0	7.5	10.0
575-3-60	1.0	2.0	2.0	3.0	3.0	5.0	7.5	10.0
Motor Speed (rpm) 208/230-1-60	1725	1725	—	—	—	—	—	—
208/230-3-60 and 460-3-60	1725	1725	1725	1725	1725	1760	1760	1755
575-3-60	1725	1725	1725	1725	1725	1745	1755	1755
REFRIGERANT	Puron® (R-410A)							
Shipping Charge (lb)	Nitrogen Purge							
Metering Device	TXV							
Operating Charge (lb) (approx per circuit)†	3.0	3.0	1.5/1.5	2.0/2.0	2.5/2.5	3.5/3.5	4.5/4.5	5.0/5.0
DIRECT-EXPANSION COIL	Enhanced Copper Tubes, Aluminum Sine-Wave Fins							
Max Working Pressure (psig)	650							
Material	Al / Cu							
Coil Type	RTPF							
Face Area (sq ft)	6.67	8.33	10.01	13.25	17.67	19.88	24.86	29.83
No. of Splits	1	1	2	2	2	2	2	2
Split Type...Percentage	—	—	Face...50/50					
No. of Circuits per Split	12	15	9	12	16	18	20	24
Rows...Fins/in.	4...15	4...15	4...15	4...15	4...15	4...15	4...15	4...15
STEAM COIL								
Max Working Press. (psig at 260°F)	20							
Total Face Area (sq ft)	6.67	6.67	6.67	13.33	13.33	13.33	15.0	15.0
Rows...Fins/in.	1...9	1...9	1...9	1...10	1...10	1...10	1...10	1...10
HOT WATER COIL								
Max Working Pressure (psig)	150							
Total Face Area (sq ft)	6.67	6.67	6.67	13.33	13.33	13.33	15.0	15.0
Rows...Fins/in.	2...8.5	2...8.5	2...8.5	2...8.5	2...8.5	2...8.5	2...12.5	2...12.5
Water Volume								
(gal)	8.3			13.9			14.3	
(ft^3)	1.1			1.85			1.90	
PIPING CONNECTIONS								
Quantity...Size (in.)								
DX Coil — Suction (ODF)	1...1-1/8	1...1-1/8	2...1/1/8	2...1-1/8	2...1-1/8	2...1-1/8	2...1-3/8	2...1-3/8
DX Coil — Liquid Refrig, (ODF)	1...5/8		2-5/8					
Steam Coil, In (MPT)	1...2-1/2		1...2-1/2					
Steam Coil, Out (MPT)	1...1-1/2		1...1-1/2					
Hot Water Coil, In (MPT)	1...1-1/2		1...1-1/2	1...2				
Hot Water Coil, Out (MPT)	1...1-1/2		1...1-1/2	1...2				
Condensate (PVC)	1...5/8 ODM / 1...1/4 IDF							
FILTERS	Throwaway — Factory-Supplied							
Quantity...Size (in.)	4...16 x 24 x 2			4...16 x 20 x 2 /4...16 x 24 x 2			4...20 x 24 x 2/ 4...16 x 25 x 2	
Access Location	Right or Left Side							

*Refer to Alternate Fan Motor Data table for alternate motor data (pages 8-9).
†Units are shipped without refrigerant charge.

Physical data (cont)

40RUS 7.5 -30 TON CHILLED WATER UNITS

UNIT 40RUS	08	10	12	14	16	25	28	30
NOMINAL CAPACITY (Tons)	7-1/2	8-1/2	10	12-1/2	15	20	25	30
OPERATING WEIGHT (lb)								
Base Unit	390	391	391	661	677	683	1035	1042
Plenum	175	175	175	225	225	225	325	325
Economizer	185	185	185	340	340	340	450	450
Hot Water Coil	195	195	195	285	285	285	345	345
Steam Coil	215	215	215	340	340	340	405	405
FANS								
Qty...Diam. (in.)	1...15	1...15	1...15	2...15	2...15	2...15	2...18	2...18
Nominal Airflow (cfm)	3000	3400	4000	5000	6000	8000	10,000	12,000
Airflow Range (cfm)	2250-3750	2250-4250	3000-5000	3750-6250	4500-7500	6000-10,000	7500-12,500	9000-15,000
Nominal Motor Hp (Standard Motor)* 208/230-1-60	2.4	2.4	—	—	—	—	—	—
208/230-3-60 and 460-3-60	2.4	2.4	2.4	2.9	3.7	5.0	7.5	10.0
575-3-60	2.0	2.0	2.0	3.0	3.0	5.0	7.5	10.0
Motor Speed (rpm) 208/230-1-60	1725	1725	—	—	—	—	—	—
208/230-3-60 and 460-3-60	1725	1725	1725	1725	1725	1745	1745	1745
575-3-60	1725	1725	1725	1725	1725	1745	1755	1755
CHILLED WATER COIL	Enhanced Copper Tubes, Aluminum Sine-Wave Fins							
Max Working Pressure (psig)	435							
Face Area (sq ft) — Upper	8.3	9.0	9.8	8.3	8.3	11.0	12.4	15.5
Face Area (sq ft) — Lower	—	—	—	5.5	8.3	8.3	12.4	12.4
Rows...Fins/in.	3...15							
Water Volume (gal)	3.0	3.3	3.5	4.7	5.6	6.4	8.9	9.9
(ft^3)	0.40	0.47	0.46	0.63	0.75	0.85	1.19	1.32
STEAM COIL								
Max Working Pressure (psig at 260°F)	20							
Total Face Area (sq ft)	6.67	6.67	6.67	13.33	13.33	13.33	15.0	15.0
Rows...Fins/in.	1...9	1...9	1...9	1...10	1...10	1...10	1...10	1...10
HOT WATER COIL								
Max Working Press. (in. wg)	150							
Total Face Area (sq ft)	6.67	6.67	6.67	13.33	13.33	13.33	15.0	15.0
Rows...Fins/in.	2...8.5	2...8.5	2...8.5	2...8.5	2...8.5	2...8.5	2...12.5	2...12.5
Water Volume								
(gal)	8.3			13.9			14.3	
(ft^3)	1.1			1.85			1.90	
PIPING CONNECTIONS								
Quantity...Size (in.)								
Chilled Water — In	1...1-3/8 ODF	1...1-3/8 ODF	1...1-3/8 ODF	2...1-3/8 ODM	2...1-3/8 ODM	2...1-3/8 ODM	2...2-1/8 ODM	2...2-1/8 ODM
Chilled Water — Out	1...1-3/8 ODF	1...1-3/8 ODF	1...1-3/8 ODF	2...1-3/8 ODM	2...1-3/8 ODM	2...1-3/8 ODM	2...2-1/8 ODM	2...2-1/8 ODM
Steam Coil, In (MPT)	1...2-1/2		1...2-1/2	1...2-1/2				
Steam Coil, Out (MPT)	1...1-1/2		1...1-1/2	1...1-1/2				
Hot Water Coil, In (MPT)	1...1-1/2		1...1-1/2	1...2				
Hot Water Coil, Out (MPT)	1...1-1/2		1...1-1/2	1...2				
Condensate (PVC)	1...5/8 ODM / 1 1/4 IDF							
FILTERS	Throwaway — Factory-Supplied							
Quantity...Size (in.)	4...16 x 24 x 2			4...16 x 20 x 2			4...20 x 24 x 2	
				4...16 x 24 x 2			4...20 x 25 x 2	
Access Location	Right or Left Side							

*Refer to Alternate Fan Motor Data table for alternate motor data (pages 8-9).

Physical data (cont)

FAN MOTOR DATA
STANDARD MOTOR — SINGLE SPEED

UNIT	40RUA 07	40RUA/S 08	40RUS 10	40RUA/S 12	40RUA/S 14	40RUA/S 16	40RUA/S 25	40RUA/S 28	40RUA/S 30
208/230-1-60									
Speed (rpm)	1725	1725	1725	—	—	—	—	—	—
Hp	1.3	2.4	2.4	—	—	—	—	—	—
Frame (NEMA)	56Y	56Y	56Y	—	—	—	—	—	—
Shaft Dia (in.)	5/8	5/8	5/8	—	—	—	—	—	—
230-3-60 and 460-3-60									
Speed (rpm)	1750	1750	1750	1750	1750	1750	1755	1760	1755
Hp	2.4	2.4	2.4	2.4	2.9	3.7	5.0	7.5	10.0
Frame (NEMA)	56Y	56Y	56Y	56Y	56Y	56HZ	184T	S213T	S215T
Shaft Dia (in.)	5/8	5/8	5/8	5/8	7/8	7/8	1-1/8	1-3/8	1-3/8
575-3-60									
Speed (rpm)	1725	1725	1725	1725	1725	1725	1755	1750	1755
Hp	1.0	2.0	2.0	2.0	3.0	3.0	5.0	7.5	10.0
Frame (NEMA)	56	56HZ	56HZ	56HZ	56HZ	56HZ	184T	S213T	D215T
Shaft Dia (in.)	5/8	7/8	7/8	7/8	7/8	7/8	1-1/8	1-3/8	1-3/8

LEGEND

NEMA — National Electrical Manufacturers Association (U.S.A.)

ALTERNATE MOTOR — SINGLE SPEED

UNIT	40RUA 07	40RUA/S 08	40RUS 10	40RUA/S 12	40RUA/S 14	40RUA/S 16	40RUA/S 25	40RUA/S 28	40RUA/S 30
208/230-1-60									
Speed (rpm)	1725	1725	1725	—	—	—	—	—	—
Hp	2.4	2.4	2.4	—	—	—	—	—	—
Frame (NEMA)	56Y	56Y	56Y	—	—	—	—	—	—
Shaft Dia (in.)	5/8	5/8	5/8	—	—	—	—	—	—
230-3-60 and 460-3-60									
Speed (rpm)	1750	1750	1750	1750	1750	1755	1760	1755	1755
Hp	2.9	2.9	2.9	3.7	3.7	5.0	7.5	10.0	10.0
Frame (NEMA)	56Y	56Y	56Y	56HZ	56HZ	184T	S213T	S215T	S215T
Shaft Dia (in.)	7/8	7/8	7/8	7/8	7/8	1-1/8	1-3/8	1-3/8	1-3/8
575-3-60									
Speed (rpm)	1725	1725	1725	1725	1745	1745	1755	1750	1755
Hp	2.0	3.0	3.0	3.0	5.0	5.0	7.5	10.0	10.0
Frame (NEMA)	56HZ	56HZ	56HZ	56HZ	184T	184T	S213T	S215T	S215T
Shaft Dia (in.)	7/8	7/8	7/8	7/8	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8

LEGEND

NEMA — National Electrical Manufacturers Association (U.S.A.)

MOTOR EFFICIENCY 40RUA/S

MOTOR HP	EPACT MINIMUM	MOTOR EFFICIENCY
1.3*	—	70%
2.4	—	76.8%
2.9	—	77.1%
3.7	—	81.5%
5.0	89.5%	89.25%
7.5	91.7%	91.7%
10.0	91.7%	91.7%

LEGEND

*Single-phase only.

EPACT — Energy Policy and Conservation Act of 1992

Physical data (cont)

FAN MOTOR DATA
STANDARD MOTOR — 2-SPEED

UNIT	40RUA/S 08	40RUS 10	40RUA/S 12	40RUA/S 14	40RUA/S 16	40RUA/S 25	40RUA/S 28	40RUA/S 30
208/230-3-60 and 460-3-60								
Speed (rpm)	1680	1680	1680	1735	1750	1755	1760	1755
Hp	2.4	2.4	2.4	2.9	3.7	5.0	7.5	10.0
Frame (NEMA)	56HY	56HY	56HY	56HY	56HY	184T	S213T	S215T
Shaft Dia (in.)	5/8	5/8	5/8	7/8	7/8	1-1/8	1-3/8	1-3/8
575-3-60								
Speed (rpm)	1680	1680	1680	1710	1710	1755	1750	1755
Hp	2.4	2.4	2.4	3.7	3.7	5.0	7.5	10.0
Frame (NEMA)	56HY	56HY	56HY	56HY	56HY	184T	S213T	S215T
Shaft Dia (in.)	5/8	5/8	5/8	7/8	7/8	1-1/8	1-3/8	1-3/8

FAN MOTOR DATA
ALTERNATE MOTOR — 2-SPEED

UNIT	40RUA/S 08	40RUS 10	40RUA/S 12	40RUA/S 14	40RUA/S 16	40RUA/S 25	40RUA/S 28	40RUA/S 30
208/230-3-60 and 460-3-60								
Speed (rpm)	1680	1680	1680	1735	1750	1755	1760	1755
Hp	2.4	2.4	2.4	2.9	3.7	5.0	7.5	10.0
Frame (NEMA)	56HY	56HY	56HY	56HY	56HY	184T	S213T	S215T
Shaft Dia (in.)	5/8	5/8	5/8	7/8	7/8	1-1/8	1-3/8	1-3/8
575-3-60								
Speed (rpm)	1680	1680	1680	1710	1710	1755	1750	1755
Hp	2.4	2.4	2.4	3.7	3.7	5.0	7.5	10.0
Frame (NEMA)	56HY	56HY	56HY	56HY	56HY	184T	S213T	S215T
Shaft Dia (in.)	5/8	5/8	5/8	7/8	7/8	1-1/8	1-3/8	1-3/8

MOTOR EFFICIENCY 40RUA/S — 2-SPEED MOTOR

MOTOR HP	EPACT MINIMUM	MOTOR EFFICIENCY
2.4	—	80.0%
2.9	—	86.5%
3.7	—	83.6%
5.0	89.5%	89.5%
7.5	91.7%	91.7%
10.0	91.7%	91.7%

LEGEND

EPACT — Energy Policy and Conservation Act of 1992

Physical data (cont)

STANDARD DRIVE DATA, 60 Hz (English)

UNIT	40RUA 07	40RUA/S 08	40RUS 10	40RUA/S 12	40RUA/S 14	40RUA/S 16	40RU/S 25	40RUA/S 28	40RUA/S 30
MOTOR DRIVE									
Motor Pulley Pitch Diameter (in.)	2.4-3.4	2.8-3.8	2.8-3.8	3.4-4.4	2.8-3.8	2.8-3.8	3.7-4.7	4.3-5.3	4.3-5.3
Pulley Factory Setting Full Turns Open	2.5	2.5	2.5	2.5	2.5	2.5	3.0	3.0	3.0
FAN DRIVE									
Pulley Pitch Dia (in.)	8.8	8.8	8.8	8.8	9.0	9.0	9.4	11.0	11.0
Pulley Bore (in.)	1	1	1	1	1-7/16	1-7/16	1-7/16	1-15/16	1-15/16
Belt No. — Section	1—A	1—A	1—A	1—A	1—A	1—A	1—B	2—B*	2—B*
Belt Pitch (in.)	40.3	41.3	41.3	42.3	42.3	42.3	41.8	(2) 42.8 (2) 43.8	(2) 42.8 (2) 43.8
FAN SPEEDS (rpm)									
Factory Settings	568	647	647	764	632	632	771	752	752
Range	470-666	549-745	549-745	666-863	537-728	537-728	679-863	682-841	674-831
Max Allowable Speed (rpm)	1200	1200	1200	1200	1200	1200	1200	1100	1100
Change per 1/2 turn of Moveable Motor Pulley Flange	19.6	19.6	19.6	19.7	19.1	19.1	15.3	13.1	13.1
MAX FULL TURNS FROM CLOSED POSITION	5	5	5	5	5	5	6	6	6
SHAFTS CENTER DISTANCE (in.)	10.44-12.32	10.44-12.32	10.44-12.32	10.44-12.32	10.44-12.32	10.44-12.32	9.12-10.99	6.67-9.43	6.67-9.43

*Four belts shipped with unit. Use correct set of 2 belts sized according to the pulley setting.

MEDIUM-STATIC DRIVE DATA, 60 Hz (English)

UNIT	40RUA 07	40RUA/S 08	40RUS 10	40RUA/S 12	40RUA/S 14	40RUA/S 16	40RUA/S 25	40RUA/S 28	40RUA/S 30
MOTOR DRIVE									
Motor Pulley Pitch Diameter (in.)	3.4-4.4	3.4-4.4	3.4-4.4	3.4-4.4	3.4-4.4	3.7-4.7	4.3-5.3	4.3-5.3	4.3-5.3
Pulley Factory Setting Full Turns Open	2.5	2.5	2.5	2.5	2.5	3.0	3.0	3.0	3.0
FAN DRIVE									
Pulley Pitch Dia (in.)	8.8	8.0	8.0	8.0	8.2	8.6	9.4	9.4	9.4
Pulley Bore (in.)	1	1	1	1	1-7/16	1-7/16	1-7/16	1-15/16	1-15/16
Belt No. — Section	1—A	1—A	1—A	1—A	1—A	1—B	1—B	2—B*	2—B*
Belt Pitch (in.)	42.3	40.3	40.3	40.3	41.3	41.8	41.8	(2) 38.8 (2) 39.8	(2) 38.8 (2) 39.8
FAN SPEEDS (rpm)									
Factory Setting	764	841	841	841	820	842	881	881	881
Range	666-863	733-949	733-949	733-949	715-926	742-943	798-984	798-984	798-984
Max Allowable Speed (rpm)	1200	1200	1200	1200	1200	1200	1200	1100	1100
Change per 1/2 Turn of Moveable Motor Pulley Flange	19.7	21.6	21.6	21.6	21.1	16.7	15.3	15.3	15.3
MAX FULL TURNS FROM CLOSED POSITION	5	5	5	5	5	6	6	6	6
SHAFTS CENTER DISTANCE (in.)	10.44-12.32	10.44-12.32	10.44-12.32	10.44-12.32	10.44-12.32	10.44-12.32	9.16-10.99	6.67-9.43	6.67-9.43

*Four belts shipped with unit. Use correct set of 2 belts sized according to the pulley setting.

Physical data (cont)

HIGH-STATIC DRIVE DATA, 60 Hz (English)

UNIT	40RUA 07	40RUA/S 08	40RUS 10	40RUA/S 12	40RUA/S 14	40RUA/S 16	40RUA/S 25	40RUA/S 28	40RUA/S 30
MOTOR DRIVE									
Motor Pulley Pitch Diameter (in.)	3.4-4.4	3.4-4.4	3.4-4.4	3.4-4.4	3.7-4.7	4.3-5.3	4.3-5.3	4.3-5.3	4.3-5.3
Pulley Factory Setting Full Turns Open	2.5	2.5	2.5	2.5	3.0	3.0	3.0	3.0	3.0
FAN DRIVE									
Pulley Pitch Dia (in.)	7.0	6.0*	6.0	6.0	7.4	7.9	7.4	8.6	8.6
Pulley Bore (in.)	1	1	1	1	1-7/16	1-7/16	1-7/16	1-15/16	1-15/16
Belt No. — Section	1—A	1—A	1—A	1—A	1—B	1—B	2—B	2—B	2—B
Belt Pitch (in.)	41.3	37.3	37.3	37.3	39.8	39.8	36.8	37.8	37.8
FAN SPEEDS (rpm)									
Factory Setting	961	1121	1121	1121	979	1060	1118	1024	1024
Range	838-1084	978-1200*†	978-1200†	978-1200†	873-1096	950-1171	1014-1200†	873-1075	873-1075
Max Allowable Speed (rpm)	1200	1200	1200	1200	1200	1200	1200	1100	1100
Change per 1/2 Turn of Moveable Motor Pulley Flange	24.6	28.7	28.7	28.7	19.4	18.4	19.4	16.7	16.7
MAX FULL TURNS FROM CLOSED POSITION	5	5	5	5	6	6	6	6	6
SHAFTS CENTER DISTANCE (in.)	10.44-12.32	10.44-12.32	10.44-12.32	10.44-12.32	10.44-12.32**	9.16-10.99	8.16-10.02	6.67-9.43	6.67-9.43

*Values for 3-phase motor shown. For single-phase motor, pulley pitch diameter is 7 in. and resulting fan speed is 837-1096 rpm.

**575-v unit has a center distance of 9.16-10.99.

†It is possible to adjust drive so that fan speed exceeds maximum allowable. DO NOT exceed 1200 rpm.

STANDARD DRIVE DATA, 60 Hz (SI)

UNIT	40RUA 07	40RUA/S 08	40RUS 10	40RUA/S 12	40RUA/S 14	40RUA/S 16	40RU/S 25	40RUA/S 28	40RUA/S 30
MOTOR DRIVE									
Motor Pulley Pitch Diameter (mm)	61.0-86.4	71.1-96.5	71.1-96.5	96.4-111.8	71.1-96.5	71.1-96.5	93.4-119.4	109.2-134.6	109.2-134.6
Pulley Factory Setting Full Turns Open	2.5	2.5	2.5	2.5	2.5	3.0	3.0	3.0	3.0
FAN DRIVE									
Pulley Pitch Dia (mm)	224	224	224	224	229	229	239	279	279
Pulley Bore (mm)	25.4	25.4	25.4	25.4	36.5	36.5	36.5	49.2	49.2
Belt No. — Section	1—A	1—A	1—A	1—A	1—A	1—A	1—B	2—B*	2—B*
Belt Pitch (mm)	1024	1049	1049	1074	1074	1074	1062	(2) 1087 (2) 1112	(2) 1087 (2) 1112
FAN SPEEDS (r/s)									
Factory Settings	9.5	10.8	10.8	12.8	10.6	10.6	12.9	12.6	12.6
Range	7.8-11.1	9.2-12.4	9.2-12.4	11.1-14.4	9.0-12.2	9.0-12.2	11.3-14.4	11.4-14.1	11.3-13.9
Max Allowable Speed (r/s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	18.3	18.3
Change per 1/2 turn of Moveable Motor Pulley Flange	0.327	0.327	0.327	0.329	0.319	0.319	0.256	0.219	0.219
MAX FULL TURNS FROM CLOSED POSITION	5	5	5	5	5	5	6	6	6
SHAFTS CENTER DISTANCE (mm)	265.18-312.93	265.18-312.93	265.18-312.93	265.18-312.93	265.18-312.93	265.18-312.93	231.18-279.15	169.42-239.52	169.42-239.52

*Four belts shipped with unit. Use correct set of 2 belts sized according to the pulley setting.

Physical data (cont)

MEDIUM-STATIC DRIVE DATA, 60 Hz (SI)

UNIT	40RUA 07	40RUA/S 08	40RUS 10	40RUA/S 12	40RUA/S 14	40RUA/S 16	40RUA/S 25	40RUA/S 28	40RUA/S 30
MOTOR DRIVE									
Motor Pulley Pitch Diameter (mm)	86.4-111.8	86.4-111.8	86.4-111.8	86.4-111.8	86.4-111.8	94.0-119.4	109.2-134.6	109.2-134.6	109.2-134.6
Pulley Factory Setting Full Turns Open	2.5	2.5	2.5	2.5	2.5	3.0	3.0	3.0	3.0
FAN DRIVE									
Pulley Pitch Dia (mm)	224	203	203	203	208	218	239	239	239
Pulley Bore (mm)	25.4	25.4	25.4	25.4	36.5	36.5	36.5	49.2	49.2
Belt No.—Section	1—A	1—A	1—A	1—A	1—A	1—B	1—B	2—B*	2—B*
Belt Pitch (mm)	1074	1024	1024	1024	1049	1062	1062	(2) 986 (2)1011	(2) 986 (2)1011
FAN SPEEDS (r/s)									
Factory Setting	12.7	14.0	14.0	14.0	13.7	14.0	14.7	14.7	14.7
Range	11.1-14.4	12.2-15.8	12.2-15.8	12.2-15.8	11.9-15.4	12.4-15.7	13.3-16.4	13.3-16.4	13.3-16.4
Max Allowable Speed (r/s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	18.3	18.3
Change per 1/2 Turn of Moveable Motor Pulley Flange	0.328	0.360	0.360	0.360	0.352	0.278	0.255	0.255	0.255
MAX FULL TURNS FROM CLOSED POSITION	5	5	5	5	6	6	6	6	6
SHAFTS CENTER DISTANCE (mm)	265-313	265-313	265-313	265-313	265-313	265-313	232-279	169-240	169-240

*Four belts shipped with unit. Use correct set of 2 belts sized according to the pulley setting.

HIGH-STATIC DRIVE DATA, 60 Hz (SI)

UNIT	40RUA 07	40RUA/S 08	40RUS 10	40RUA/S 12	40RUA/S 14	40RUA/S 16	40RUA/S 25	40RUA/S 28	40RUA/S 30
MOTOR DRIVE									
Motor Pulley Pitch Diameter (mm)	86.4-111.8	86.4-111.8	86.4-111.8	86.4-111.8	94.0-119.4	109.2-134.6	109.2-134.6	109.2-134.6	109.2-134.6
Pulley Factory Setting Full Turns Open	2.5	2.5	2.5	2.5	3.0	3.0	3.0	3.0	3.0
FAN DRIVE									
Pulley Pitch Dia (mm)	178	152*	152	152	188	201	188	203	203
Pulley Bore (mm)	25.4	25.4	25.4	25.4	36.5	36.5	36.5	49.2	49.2
Belt No. — Section	1—A	1—A	1—A	1—A	1—B	1—B	2—B	2—B	2—B
Belt Pitch (mm)	1049	947	947	947	1011	1011	935	935	960
FAN SPEEDS (r/s)									
Factory Setting	16.0	18.7	18.7	18.7	16.3	17.7	18.6	17.1	17.1
Range	14.0-18.1	16.3-20.0*†	16.3-20.0†	16.3-20.0†	14.4-18.3	15.8-19.5	16.9-20.0†	14.6-17.9	14.6-17.9
Max Allowable Speed (r/s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	18.3	18.3
Change per 1/2 Turn of Moveable Motor Pulley Flange	0.410	0.478	0.478	0.478	0.323	0.307	0.323	0.278	0.278
MAX FULL TURNS FROM CLOSED POSITION	5	5	5	5	6	6	6	6	6
SHAFTS CENTER DISTANCE (mm)	265-313	265-313	265-313	265-313	265-313**	232-279	207-255	169-240	169-240

* Values for 3-phase motor shown. For single-phase motor, pulley pitch diameter is 178 mm and resulting fan speed is 14.0-18.3 r/s.

† It is possible to adjust drive so that fan speed exceeds maximum allowable. DO NOT exceed 20 r/s.

** 575-v unit has a center distance of 233-279.

Options and accessories

ITEM	OPTION*	ACCESSORY†
Alternate Fan Motor	X	
Alternate Drive	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
Optional VFD Display Kit	X	
Overhead Suspension Package		X
Prepainted Units	X	
Programmable Thermostats		X
Return Air Grille		X
Steam Heating Coil		X
Subbase		X

*Factory-installed option.
†Field-installed option.

Factory-installed options

Alternate fan motors and drives

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

Prepainted steel units

Prepainted 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

The 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 2/3 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 2/3 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.

Field-installed accessories

Optional VFD display Kit

There is an optional VFD display kit offered (as an accessory) to allow the user to troubleshot any VFD faults in the field after startup. Adjusting motor speed via VFD may result in decreased motor/VFD life.

NOTE: Do not use the VFD display kit to adjust the frequency and voltage in the VFD to required performance requirements. This could lead to decreased life of the motor and VFD.

Two-row hot water coils

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

One-row steam coil

One-row steam coils have 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.

Electric resistance heat coils

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.

Economizers - temperature dry bulb controlled

Ultra Low Leak - EconoMi$er X

This economizer accessory comes with solid-state W7220 controller, gear-driven, modulating damper, and spring return actuator. It is supply/outdoor air sensors, and CO_2 sensor compatible, for use in electro-mechanical controls only. It 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

The standard economizer accessory comes with gear driven damper blades and a W7212 controller (use --HH--57AC-078 for enthalpy control).

Discharge plenum

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

Return-air grille

The return-air grille provides a protective barrier over the return-air opening and gives a finished appearance to units installed in the occupied space. This accessory is available unpainted or painted.

Subbase

The subbase provides a stable, raised platform and room for condensate drain trap connection for vertical floor-mounted units. This accessory is available unpainted or painted.

Options and accessories (cont)

Overhead suspension package

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

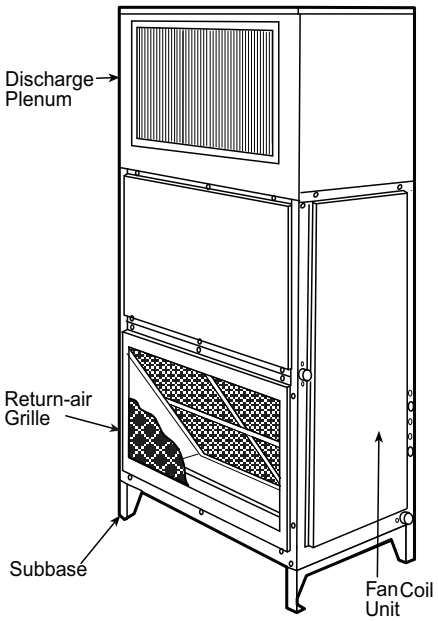
CO_2 sensors

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.

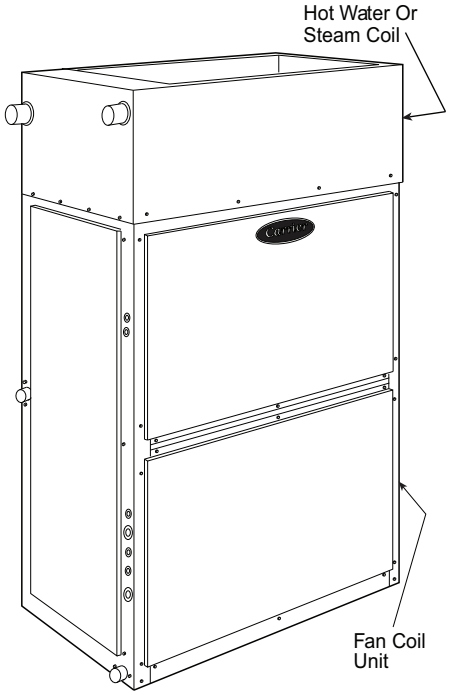
Condensate drain trap

The 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.

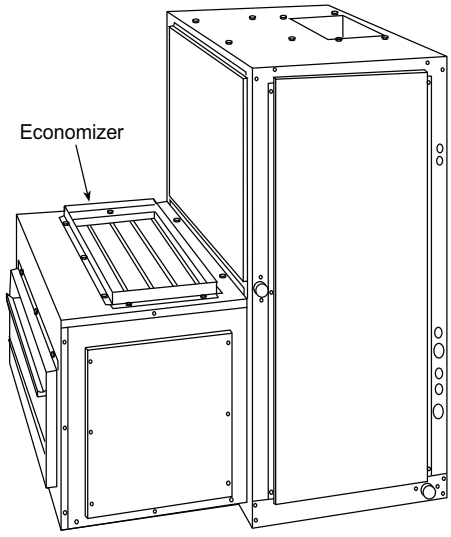
40RU WITH DISCHARGE PLENUM RETURN-AIR GRILLE AND SUBBASE



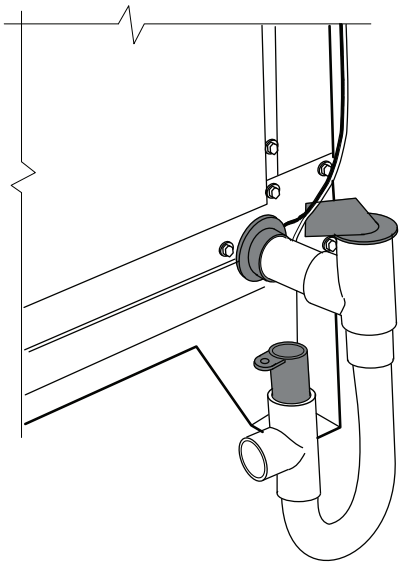
40RU WITH HOT WATER OR STEAM COIL



40RU WITH ECONOMIZER



40RU WITH CONDENSATE TRAP



66

Carrier

Turn to the experts

Product Data

Commercial Split Systems
Air Conditioning Condensing Units

6 to 20 Tons

Gemini®

38AUZ07,08,12,14 Shown

38AUZ, AUD 07-25 Single and Dual Circuit Condensing Units with Puron® R-410A Refrigerant

Features/Benefits

These dependable outdoor air cooled condensing units match Carrier's indoor-air handlers to meet a wide selection of cooling solutions.

Carrier's air-cooled air conditioning split systems:

- Provide a logical solution for commercial needs
- Have rugged, dependable construction
- Available with single or dual refrigerant circuits.
- Have cooling capability up to 125°F (52°C) ambient and down to 35°F (2°C) ambient standard

Constructed for long life

The 38AUZ single circuit and 38AUD dual circuit, air cooled condensing units are designed and built to last. The high efficient designed outdoor coil construction allows for a more efficient design in a smaller cabinet size that utilizes an overall reduction in refrigerant charge. Where conditions require, special coil coating coil protection option is available. Cabinets are constructed of prepainted galvanized steel, delivering unparalleled protection from the environment. Inside and outside surfaces are protected to ensure long life, good looks, and reliable operation. Safety controls are used for enhanced system protection and reliability. Each unit utilizes the Comfort Alert™ diagnostic and troubleshoot control system. This protects the units operation and provides valuable diagnostic information when required.

Factory-installed options (FIOPs)

Certified and pre-engineered factory-installed options (FIOPs) allow units to be installed in less time, thereby reducing installed cost.

FIOPs include:

- low ambient controls which provide cooling operation down to –20°F (–29°C) ambient temperatures
- non-fused disconnect
- special coil coating coil protection
- louvered hail guard

Efficient operation

These air cooled condensing units will provide EERs up to 12.0 (tested in accordance with AHRI standard 340/360).

This high efficiency operation will help reduce overall operating cost and energy consumption.

Controls for performance dependability

The 38AU condensing units offer operating controls and components designed for performance dependability. The high efficiency hermetic scroll compressor is engineered for long life and durability. The compressors include vibration isolation for quiet operation. The high-pressure switch protects the entire refrigeration system from abnormally high operating pressures. A low-pressure switch protects the system from loss of charge. These units also include anti-short-cycling protection, which helps to protect the units against compressor failure.

All units include a crankcase heater to eliminate liquid slugging at start-up. Each unit comes standard with the Comfort Alert control system. This provides:

- System Go LED indicator
- Fault LED indicator
- Compressor fault LED indicator
- Phase loss protection
- Phase reversal protection
- Safety pressure indicator
- Anti-short cycle protection

Innovative Carrier 40RUA packaged air handlers are custom matched to 38AUZ/D condensing units.

Information on matching 40RUA DX packaged air handler follows for convenience. See separate product data for more details. The 40RUA Series has excellent fan performance, efficient direct-expansion (DX) coils, a unique combination of indoor-air quality features, and is easy to install. Its versatility and state-of-the-art features help to ensure economical performance of the split system both now and in the future.

Indoor-air quality (IAQ) features

The unique combination of IAQ features in the 40RUA Series air handlers help to ensure that only clean, fresh, conditioned air is delivered to the occupied space.

Direct-expansion 4 row cooling coils prevent the build-up of humidity in the room, even during part-load conditions.

Standard 2-in. (51mm) disposable filters remove dust and airborne particles from the occupied space for cleaner air.

The pitched, non-corroding drain pan can be adjusted for a right-hand or left-hand connection to suit many applications and provide positive drainage and prevent standing condensate.

The accessory economizer can provide ventilation air to improve indoor-air quality by using demand control ventilation. When used in conjunction with Carrier Comfort System and CO_2 sensors, the economizer admits fresh outdoor air to replace stale, recirculated indoor air.

Economy

The 40RUA Series packaged air handlers provide reduced installation expense and energy-efficient performance.

Quick installation is ensured by the multipoise design. Units can be installed in either the horizontal or vertical configuration without modifications. Fan motors and contactors are pre-wired and thermostatic expansion valves (TXVs) are factory-installed on all 40RUA models.

High efficiency, precision-balanced fans minimize air turbulence, surging, and unbalanced operation, cutting operation expenses.

The economizer accessory precisely controls the blend of outdoor air and room air to achieve comfort levels. When the outside air enthalpy is suitable, outside air dampers can fully open to provide "free" cooling without energizing mechanical cooling.

Rugged dependability

The 40RUA series units are made to last. The die-formed galvanized steel panels ensure structural integrity under all operating conditions. Galvanized steel fan housings are securely mounted to a die-formed galvanized steel fan

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deck. Rugged pillow-block bearings (40RUA14) are securely fastened to the solid steel fan shaft with split collets and clamp locking devices. Smaller unit sizes have spider-type bearings.

Coil flexibility

Model 40RUA direct-expansion coils have galvanized steel casings; inlet and outlet connections are on the same end. The coils are designed for use with Puron (R-410A) refrigerant and have $^{3}/_{8}$-in. diameter copper tubes mechanically bonded to aluminum sine-wave fins. The coils include matched, factory-installed thermostatic expansion valves (TXVs) with matching distributor nozzles and offer a removable power element and extended connections.

Easier installation and service

The multipoise design and component layout ensures quick unit installation and operation. Units can be converted from horizontal to vertical operation by simply repositioning the unit. Drain pan connections are duplicated on both sides of the unit. The filters, motor, drive, TXVs, and coil connections are all easily accessed by removing a single side panel.

Model number nomenclature

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
3	8	A	U	D	C	1	2	A	0	A	6	A	0	A	0	A	0

Model Type
38AU = Carrier Condensing Unit
Puron® R–410A Refrigerant

Type of Coil
Z = Single Circuit, A/C Scroll Compressor
D = Dual Circuit, A/C Scroll Compressor

Refrigerant Options
A = None
B = Low Ambient
C = Hot Gas Bypass (38AUD size 12, 16, 25 only)
D = Single Circuit / 2-Stage (38AUZ size 07, 08 only)
E = Single Circuit / 2-Stage with Low Ambient (38AUZ size 07, 08 only)

Nominal Tonnage
07 = 6 Tons
08 = 7.5 Tons
12 = 10 Tons
14 = 12.5 Tons
16 = 15 Tons
25 = 20 Tons

Not Used
A = Not Used

Not Used
0 = Not Used

Coil Options (RTPF)
A = Cu/Al
B = Precoat (Cu/Al)
C = E-Coat (Cu/Al)
E = Cu/Cu
M = Cu/Al with Louvered Hail Guard
N = Precoat (Cu/Al) with Louvered Hail Guard
P = E-Coat (Cu/Al) with Louvered Hail Guard
R = Cu/Cu with Louvered Hail Guard

Voltage
1 = 575/3/60
5 = 208/230/3/6
6 = 460/3/60

Design Rev
A = Initial Release
B = 38AUZ(D,E)08 only

Base Unit Controls
0 = Electro-Mechanical Controls

Not Used
A = Place Holder

Service Options
0 = None
1 = Un-powered Convenience Outlet
2 = Powered Convenience Outlet

Electrical Options
A = None
C = Non-Fused Disconnect

Packaging
0 = Standard
1 = LTL

AHRI capacity ratings

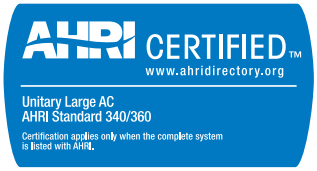
AHRI CAPACITY RATINGS

UNIT	COOLING STAGES	NOMINAL CAPACITY (tons)	NET COOLING CAPACITY (MBH)	TOTAL POWER (kW)	EER	IEER	IEER WITH 2-SPEED VFD
38AUZ(A,B)07/40RU07	1	6.0	70.0	6.1	11.5	12.2	12.9
38AUZ(A,B)08/40RU08	1	7.5	92.0	8.2	11.2	11.8	12.9
38AUZ12/40RU12	1	10.0	117.0	11.4	10.3	12.0	12.9
38AUZ12/40RU14	1	10.0	117.0	10.4	11.2	N/A	12.9
38AUZ14/40RU14	1	12.5	148.0	13.5	11.0	12.0	12.4
38AUZ16/40RU16	2	15.0	184.0	16.4	11.2	13.2	14.3
38AUZ25/40RU25	2	20.0	240.0	21.8	11.0	12.5	13.6
38AUZ(D,E)07/40RU07	2	6.0	70.0	5.8	12.0	12.9	14.0
38AUZ(D,E)08/40RU08	2	7.5	92.0	8.2	11.2	13.0	14.0
38AUD12/40RU12	2	10.0	117.0	11.4	10.3	11.6	13.0
38AUD12/40RU14	2	10.0	117.0	10.4	11.2	N/A	13.0
38AUD14/40RU14	2	12.5	148.0	13.5	11.0	12.0	12.5
38AUD16/40RU16	2	15.0	184.0	16.4	11.2	11.8	12.6
38AUD25/40RU25	2	20.0	240.0	21.8	11.0	11.2	12.0

LEGEND

AHRI — Air Conditioning, Heating, and Refrigeration
ASHRAE — American Society of Heating, Refrigeration, and Air-Conditioning, Inc.
EER — Energy Efficiency Ratio
IEER — Integrated Energy Efficiency Ratio

NOTES:
1. Rated in accordance with AHRI Standard 340/360, as appropriate.
2. Ratings are based on:
   Cooling Standard: 80°F (27°C) db, 67°F (19°C) wb indoor air temp and 95°F (35°C) db outdoor air temp.



SOUND POWER LEVELS, dB

UNIT	COOLING STAGES	A-WEIGHT OCTAVE OUTDOOR SOUND (DB)								
		TOTAL	63	125	250	500	1000	2000	4000	8000
38AUZ07	1&2	84.6	63.1	68.9	73.4	79.5	80.2	76.4	72.0	64.9
38AUZ08	1&2	84.6	63.1	68.9	73.4	79.5	80.2	76.4	72.0	64.9
38AUZ12	1	83.2	60.4	65.8	77.1	76.8	77.1	75.8	70.2	64.7
38AUD12	2	83.8	62.9	69.6	74.4	77.9	79.3	76.1	70.7	61.1
38AUZ14	1	82.6	60.5	65.1	70.3	77.2	78.0	75.4	71.2	63.9
38AUD14	2	85.2	64.8	68.9	71.4	82.8	79.0	74.2	69.0	61.9
38AUZ16	2	84.2	60.1	69.7	72.8	78.7	79.5	76.3	72.9	67.8
38AUD16	2	82.8	55.5	64.8	73.6	77.2	78.2	74.8	70.7	64.3
38AUZ25	2	82.6	60.5	65.1	70.3	77.2	78.0	75.4	71.2	63.9
38AUD25	2	85.2	64.8	68.9	71.4	82.8	79.0	74.2	69.0	61.8

LEGEND

dB — Decibel

NOTE: Outdoor sound data is measured in accordance with AHRI standard 270-2008.

Physical data

38AU07-14 PHYSICAL DATA**

UNIT	SINGLE CIRCUIT MODELS with RTPF — ROUND TUBE/PLATE FIN COIL DESIGN					
	38AUZ(A,B)07	38AUZ(D,E)07	38AUZ(A,B)08	38AUZ(D,E)08	38AUZ12	38AUZ14
Refrigeration System						
# Circuits / # Comp. / Type	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll
Refrigerant Type	Puron® R-410A					
R-410A shipping charge A/B (lbs, 60 Hz)	9.0	9.0	9.0	9.0	9.0	9.0
System charge w/ fan coil* (60 Hz)	14.0	14.0	17.0	19.0	20.0	43.0
Metering device	TXV	TXV	TXV	TXV	TXV	TXV
High-press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505	630 / 505	630 / 505
Low-press. Trip / Reset (psig)	54 / 117	54 / 117	54 / 117	54 / 117	54 / 117	54 / 117
Compressor						
Model	ZP61	ZPS60	ZP83	ZPS83	ZP104	ZP137
Oil Charge A/B (oz)	56	56	60	58	110	110
Speed (rpm, 60 Hz)	3500 / 2900	3500 / 2900	3500 / 2900	3500	3500	3500
Condenser Coil						
Material	Al/Cu	Al/Cu	Al/Cu	Al/Cu	Al/Cu	Al/Cu
Coil type	RTPF	RTPF	RTPF	RTPF	RTPF	RTPF
Rows / FPI	2 / 17	2 / 17	2 / 17	2 / 17	2 / 17	3 / 17
total face area (ft^2)	17.5	17.5	17.5	23.0	25.1	31.8
Condenser Fan / Motor						
Qty / Motor drive type	2 / direct	2 / direct	2 / direct	2 / direct	2 / direct	2 / direct
Motor HP / RPM	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100
Fan diameter (in.)	22	22	22	22	22	22
Nominal Airflow (cfm)	6,000	6,000	6,000	6,000	6,000	6,000
Watts (total)	610	610	610	610	610	610
Piping Connections						
Qty / Suction (in. ODS)	1 / 1 1/8	1 / 1 1/8	1 / 1 1/8	1 / 1 1/8	1 / 1 3/8	1 / 1 3/8
Qty / Liquid (in. ODS)	1 / 3/8	1 / 3/8	1 / 1/2	1 / 1/2	1 / 1/2	1 / 5/8

LEGEND

FPI — Feet per inch

* Approximate system charge with about 25 ft piping of sizes indicated with matched 40RUA.

38AU**12-25 PHYSICAL DATA

UNIT	MODELS with RTPF — ROUND TUBE/PLATE FIN COIL DESIGN					
	38AUD12	38AUD14	38AUZ16	38AUD16	38AUZ25	38AUD25
Refrigeration System						
# Circuits / # Comp. / Type	2 / 2 / Scroll	2 / 2 / Scroll	1 / 2 / Scroll	2 / 2 / Scroll	1 / 2 / Scroll	2 / 2 / Scroll
Refrigerant Type	Puron® R-410A					
R-410A shipping charge A/B (lbs, 60 Hz)	9.0 / 9.0	9.0 / 9.0	9.0	9.0 / 9.0	9.0	9.0 / 9.0
System charge w/ fan coil* (60 Hz)	11.0 / 11.0	22.0 / 22.0	43.0	22.0 / 22.0	38.0	19.0 / 19.0
Metering device	TXV	TXV	TXV	TXV	TXV	TXV
High-press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505	630 / 505	630 / 505
Low-press. Trip / Reset (psig)	54 / 117	54 / 117	54 / 117	54 / 117	54 / 117	54 / 117
Compressor						
Model	ZP51 (2)	ZP67 (2)	ZP83 (2)	ZP83 (2)	ZP104 (2)	ZP104 (2)
Oil Charge A/B (oz)	42 / 42	56 / 56	60 / 60	60 / 60	110 / 110	110 / 110
Speed (rpm, 60 Hz)	3500 / 2900	3500 / 2900	3500	3500 / 2900	3500	3500 / 2900
Condenser Coil						
Material	Al/Cu	Al/Cu	Al/Cu	Al/Cu	Al/Cu	Al/Cu
Coil type	RTPF	RTPF	RTPF	RTPF	RTPF	RTPF
Rows / FPI	2 / 17	3 / 17	2 / 17	2 / 17	2 / 17	2 / 17
total face area (ft2)	25.1	31.8	23.5 x 2	23.5 x 2	25.0 x 2	25.0 x 2
Condenser fan / motor						
Qty / Motor drive type	2 / direct	2 / direct	3 / direct	3 / direct	4 / direct	4 / direct
Motor HP / RPM	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100
Fan diameter (in.)	22	22	22	22	22	22
Nominal Airflow (cfm)	6,000	6,000	9,000	9,000	12,000	12,000
Watts (total)	610	610	970	970	1150	1150
Piping Connections						
Qty / Suction (in. ODS)	2 / 1 1/8	2 / 1 3/8	1 / 1 3/8	2 / 1 3/8	1 / 1 5/8	2 / 1 3/8
Qty / Liquid (in. ODS)	2 / 3/8	2 / 1/2	1 / 5/8	2 / 1/2	1 / 5/8	2 / 1/2

40RUA PHYSICAL DATA

size	07	08	12	14	16	25	28	30
Nominal Tonnage	**6**	**7.5**	**10**	**12.5**	**15**	**20**	**25**	**30**
Refrigerant								
Refrigerant Type	Puron® R-410A							
Shipping Charge (lbs)	Nitrogen purge							
Metering Device	TXV							
Operating Charge (lb)	3.0	3.0	1.5/1.5	2.0/2.0	2.5/2.5	3.5/3.5	4.5/4.5	5.0/5.0
Direct-Expansion Coil								
Max Working Pressure (psig)	650							
Material	Al/Cu							
Coil Type	RTPF							
Face Area (sq ft)	6.67	8.33	10.01	13.25	17.67	19.88	24.86	29.83
No. of Circuits per Split	12	15	9	12	16	18	20	24
Row/Fins per in.	4/15	4/15	4/15	4/15	4/15	4/15	4/15	4/15

Physical data (cont)

38AUZ Piping Recommendations (Single-Circuit)

MODEL & NOMINAL CAPACITY	LINEAR LINE (FT)	0 - 24	25 - 49		50 - 74		75 - 99		100 - 124		125 - 149		150 - 174		175 - 200	
	EQUIV. LINE (FT)	0 - 37	38 - 74		75 - 112		113 - 149		150 - 187		188 - 224		225 - 262		263 - 300	
38AUZ_07 TC 68.5, SC 5.57°F	Liquid Line size	3/8"	3/8"	1/2"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"
	Liquid PD (F)	2.0	4.0	0.7	1.1	0.3	1.4	0.4	1.8	0.5	2.1	0.6	2.5	0.7	2.8	0.8
	Max Lift (ft)	18	7	34	31	39	44	57	41	57	35	54	31	53	27	52
	Max Lift PD (F)	3.5	4.6	3.5	3.5	3.5	5.0	5.0	5.0	5.0	4.9	5.0	5.0	5.0	5.0	5.0
	Suction Line size	7/8"	7/8"	1-1/8"	7/8"	1-1/8"	7/8"	1-1/8"	7/8"	1-1/8"	1-1/8"		1-1/8"		1-1/8"	
	Suction Ln PD (F)	0.9	1.8	0.5	2.7	0.8	3.6	1.0	4.5	1.3	1.6		1.8		2.1	
	Charge (lb)	10.8	11.8	13.7	15.2	18.5	16.9	21.3	18.7	24.2	21.4	27.1	23.4	30.0	25.3	32.8
	#/TR	1.90	2.07	2.41	2.67	3.25	2.97	3.74	3.28	4.25	3.8	4.75	4.1	5.26	4.4	5.75
38AUZ(A,B) 08 TC 91.9, SC 11.8°F	Liquid Line size	1/2"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"
	Liquid PD (F)	0.6	1.3	0.3	1.9	0.5	2.5	0.7	3.2	0.9	3.8	1.0	4.4	1.2	5.1	1.4
	Max Lift (ft)	25	50	50	75	75	100	100	97	97	90	90	82	121	74	119
	Max Lift PD (F)	2.7	5.4	4.5	8.1	6.7	10.8	9.0	11.2	8.9	11.2	8.5	11.2	11.2	11.2	11.2
	Suction Line size	7/8"	7/8"	1-1/8"	7/8"	1-1/8"	1-1/8"		1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-1/8"	1-3/8"
	Suction Ln PD (F)	1.5	3.1	0.8	4.6	1.2	1.6		2.1	0.7	2.5	0.8	2.9	1.0	3.3	1.1
	Charge (lb)	13.6	15.4	16.1	17.2	20.5	19.5	23.3	21.5	27.1	23.4	30.2	25.4	33.2	27.3	36.3
	#/TR	1.78	2.02	2.11	2.25	2.68	2.55	3.05	2.81	3.54	3.06	3.95	3.32	4.34	3.57	4.75
38AUZ(D,E) 08 TC 92.0, SC 11.3°F	Liquid Line size	1/2"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"
	Liquid PD (F)	0.6	1.3	0.3	1.9	0.5	2.5	0.7	3.2	0.9	3.8	1.0	4.4	1.2	5.1	1.4
	Max Lift (ft)	25	50	50	75	75	100	100	97	97	90	90	82	121	74	119
	Max Lift PD (F)	2.7	5.4	4.5	8.1	6.7	10.8	9.0	11.2	8.9	11.2	8.5	11.2	11.2	11.2	11.2
	Suction Line size	7/8"	7/8"	1-1/8"	7/8"	1-1/8"	1-1/8"		1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-1/8"	1-3/8"
	Suction Ln PD (F)	1.5	3.1	0.8	4.6	1.2	1.6		2.1	0.7	2.5	0.8	2.9	1.0	3.3	1.1
	Charge (lb)	15.6	19.0	19.7	20.8	24.1	23.1	26.9	25.1	30.7	26.0	32.8	27.0	34.8	27.9	37.1
	#/TR	2.08	2.53	2.63	2.77	3.21	3.08	3.59	3.35	4.09	3.47	4.37	3.60	4.64	3.73	4.95
38AUZ_12 TC 113.1, SC 7.1°F	Liquid Line size	1/2"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	5/8"		5/8"	
	Liquid PD (F)	0.9	1.9	0.5	2.8	0.8	3.8	1.0	4.7	1.3	5.7	1.6	1.8		2.1	
	Max Lift (ft)	25	40	50	28	54	34	68	22	65	11	63	59		55	
	Max Lift PD (F)	2.9	5.0	4.5	5.0	5.0	6.5	6.4	6.5	6.4	6.5	6.5	6.4		6.4	
	Suction Line size	7/8"	1-3/8"	1-3/8"	1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-1/8"	1-3/8"
	Suction Ln PD (F)	2.4	1.2	1.2	1.8	0.6	2.4	0.9	3.1	1.1	3.7	1.3	4.3	1.5	4.9	1.7
	Charge (lb)	15.7	18.0	20.0	19.8	23.1	21.6	26.1	23.6	29.2	25.5	32.3	34.1	35.3	36.9	38.4
	#/TR	1.67	1.89	2.09	2.10	2.45	2.29	2.77	2.50	3.10	2.71	3.43	3.62	3.75	3.92	4.08
38AUZ_14 TC 146.1, SC 3.9°F	Liquid Line size	5/8"	5/8"	3/4"	5/8"	3/4"	5/8"	3/4"	5/8"	3/4"	5/8"	3/4"	5/8"	3/4"	3/4"	7/8"
	Liquid PD (F)	0.4	0.8	0.4	1.2	0.6	1.6	0.8	2.0	1.1	2.4	1.1	2.8	1.5	1.7	0.6
	Max Lift (ft)	23	16	23	10	18	28	38	21	36	14	35	9	30	25	43
	Max Lift PD (F)	1.8	1.84	1.84	1.8	1.8	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
	Suction Line size	1-1/8"	1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-3/8"		1-3/8"	1-5/8"	1-3/8"	1-5/8"	1-3/8"	1-5/8"	1-3/8"	1-5/8"
	Suction Ln PD (F) (Cap Red)	1.1	2.2	0.8	3.3 (-2.3%)	1.2	1.6		2.0	0.8	2.4 (-0.7%)	1.0	2.8 (-1.4%)	1.2	3.2 (-2.1%)	1.3
	Charge (lb)	31.8	34.7	37.6	37.6	41.8	41.1	46.1	44.2	51.6	47.3	56.1	50.3	60.6	63.4	76.9
	#/TR	2.62	2.86	3.09	3.09	3.44	3.38	3.79	3.64	4.24	3.89	4.61	4.14	4.98	5.21	6.32
38AUZ_16 TC 185.7, SC 18.4°F	Liquid Line size	5/8"	5/8"		5/8"		5/8"		5/8"		5/8"		5/8"	3/4"	5/8"	3/4"
	Liquid PD (F)	0.7	1.3		2.0		2.7		3.4		4.0		4.7	2.5	5.4	2.8
	Max Lift (ft)	25	50		75		100		125		150		153	175	145	175
	Max Lift PD (F)	2.8	5.65		8.5		11.3		14.1		16.9		17.9	17.5	17.9	17.9
	Suction Line size	1-3/8"	1-3/8"		1-3/8"		1-3/8"		1-3/8"	1-5/8"	1-3/8"	1-5/8"	1-3/8"	1-5/8"	1-3/8"	1-5/8"
	Suction Ln PD (F) (Cap Red)	1.4	1.0		1.5		2.0		2.5 (-0.9%)	1.1	3 (-1.8%)	1.3	3.5 (-2.7%)	1.5	4 (-3.6%)	1.7
	Charge (lb)	35.1	38.1		41.2		44.2		47.3	48.4	50.4	51.7	53.4	63.7	56.5	68.3
	#/TR	2.9	3.11		3.36		3.61		3.86	3.95	4.11	4.22	4.36	5.20	4.61	5.57
38AUZ_25 TC 233.3, SC 13.0°F	Liquid Line size	5/8"	5/8"		5/8"		5/8"		5/8"	3/4"	5/8"	3/4"	5/8"	3/4"	5/8"	3/4"
	Liquid PD (F)	1.1	2.1		3.2		4.3		5.4	2.8	6.4	3.3	7.5	3.9	8.6	4.4
	Max Lift (ft)	25	50		93		98		85	116	71	108	59	102	46	95
	Max Lift PD (F)	3.2	6.4		9.6		12.5		12.5	12.5	12.4	12.5	12.5	12.5	12.5	12.5
	Suction Line size	1-3/8"	1-3/8"		1-3/8"	1-5/8"	1-3/8"	1-5/8"	1-3/8"	1-5/8"	1-5/8"	2-1/8"	1-5/8"	2-1/8"	1-5/8"	2-1/8"
	Suction Ln PD (F) (Cap Red)	0.8	1.6		2.4 (-0.8%)	1.0	3.3. (-2.2%)	1.4	4 (-3.6%)	1.7	2.0	0.4	2.4 (-0.7%)	0.5	2.7 (-1.2%)	0.6
	Charge (lb)	31.1	34.1		37.2	37.9	40.2	41.1	43.3	50.7	47.7	58.5	51.0	63.6	54.3	68.7
	#/TR	2.52	2.77		3.02	3.07	3.26	3.34	3.51	4.11	3.87	4.75	4.13	5.16	4.40	5.57

38AUD Piping Recommendations (Dual-Circuit)

MODEL & NOMINAL CAPACITY	LINEAR LINE (FT)	0 - 24	25 - 49		50 - 74		75 - 99		100 - 124		125 - 149		150 - 174		175 - 200	
	EQUIV. LINE (FT)	0 - 37	38 - 74		75 - 112		113 - 149		150 - 187		188 - 224		225 - 262		263 - 300	
38AUD_12 TC 55.9 Each, SC 12.7°F	Liquid Line size	3/8"	3/8"		3/8"		3/8"	1/2"	3/8"	1/2"	3/8"	1/2"	1/2"	5/8"	1/2"	5/8"
	Liquid PD (F)	1.4	2.7		5.5		5.5	0.9	6.9	1.1	8.2	1.4	1.6	0.5	1.8	0.5
	Max Lift (ft)	25	50		75		82	100	66	125	49	133	130	144	128	144
	Max Lift PD (F)	3.4	6.8		10.2		12.1	9.0	12.1	11.2	12.1	12.1	12.1	12.1	12.1	12.1
	Suction Line size	3/4"	7/8"		7/8"		7/8"	1-1/8"	7/8"	1-1/8"	1-1/8"		1-1/8"		1-1/8"	
	Suction Ln PD (F) (Cap Red)	1.4	1.2		1.8		2.5 (-0.8%)	0.8	3.1 (-1.9%)	0.9	1.1		1.3		1.5	
	Charge (lb)	9.0	10.0		11.0		12.1	15.7	13.1	17.7	14.9	19.6	21.5	28.2	23.5	31.0
	#/TR	0.73	0.81		0.89		0.97	1.27	1.05	1.42	1.20	1.58	1.74	2.27	1.89	2.50
38AUD_14 TC 69.8 Each, SC 14.2°F	Liquid Line size	3/8"	3/8"		3/8"		3/8"	1/2"	3/8"	1/2"	1/2"		1/2"	5/8"	1/2"	5/8"
	Liquid PD (F)	2.1	4.1		6.2		8.2	1.5	10.3	1.8	2.2		2.6	0.7	2.9	0.8
	Max Lift (ft)	128	50		75		69	155	42	125	145		140	163	135	162
	Max Lift PD (F)	4.0	8.1		12.1		13.6	9.4	13.6	11.7	13.6		13.6	13.6	13.6	13.6
	Suction Line size	7/8"	7/8"		7/8"	1-1/8"	1-1/8"		1-1/8"		1-1/8"		1-1/8"		1-1/8"	
	Suction Ln PD (F) (Cap Red)	1.0	1.9		2.9 (-1.5%)	0.8	1.1		1.4		1.6		1.9		2.2 (-0.3%)	0.7
	Charge (lb)	17.0	18.0		19.0	19.5	20.6	23.7	21.8	25.7	27.6		29.5	36.2	31.5	39.0
	#/TR	1.36	1.44		1.52	1.56	1.65	1.90	1.74	2.05	2.21		2.36	2.89	2.52	3.12
38AUD_16 TC 92.9 Each, SC 15.1°F	Liquid Line size	3/8"	3/8"		3/8"	1/2"	1/2"		1/2"		1/2"	5/8"	1/2"	5/8"	1/2"	5/8"
	Liquid PD (F)	3.4	6.9		10.3	1.9	2.6		3.2		3.9	1.0	4.5	1.2	5.1	1.4
	Max Lift (ft)	25	50		32	75	144		125		127	150	121	159	112	157
	Max Lift PD (F)	5.5	11.1		13.0	8.2	10.9		13.7		14.5	13.6	14.5	14.5	14.5	14.5
	Suction Line size	7/8"	7/8"	1-1/8"	1-1/8"		1-1/8"		1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-1/8"	
	Suction Ln PD (F) (Cap Red)	1.5	3.1 (-1.9%)	0.8	1.2		1.6		2 (-0.1%)	0.7	2.5 (-0.8%)	0.8	2.9 (-1.5%)	1.0	3.3 (-2.2%)	1.1
	Charge (lb)	17.0	18.0	18.3	19.5	21.8	23.7		25.7	26.6	27.6	34.4	29.5	37.4	31.5	40.5
	#/TR	1.35	1.43	1.46	1.55	1.73	1.89		2.04	2.11	2.19	2.73	2.35	2.97	2.50	3.22
38AUD_25 TC 121.2 Each, SC 10.6°F	Liquid Line size	3/8"	1/2"		1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	5/8"	5/8"		5/8"	3/4"
	Liquid PD (F)	5.6	2.2		3.3	0.9	4.3	1.2	5.4	1.5	6.5	1.8	2.1		2.4	1.3
	Max Lift (ft)	25	50		64	75	70	108	55	104	42	100	97		92	107
	Max Lift PD (F)	7.7	6.3		8.5	7.1	10.0	9.4	9.9	10.0	10.0	10.0	10.0		9.9	10.0
	Suction Line size	1-1/8"	1-1/8"		1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-1/8"	1-3/8"	1-3/8"		1-3/8"		1-3/8"	
	Suction Line PD (F) (Cap Red)	0.7	1.3		2.0	0.7	2.7 (-1.2%)	1.0	3.4 (-2.4%)	1.2	1.4		1.7		1.9	
	Charge (lb)	15.2	17.9		19.8	23.2	21.7	26.2	23.7	29.3	26.7	32.4	35.4		38.5	48.5
	#/TR	1.20	1.41		1.56	1.83	1.72	2.07	1.87	2.31	2.11	2.56	2.80		3.04	3.83

LEGEND

#/TR — Charge to unit capacity ratio, lbs per ton (at 45°F SST, 95°F ODA)

Cap Red — Capacity reduction caused by suction line pressure drop GT 2°F

Liquid PD (F) — Liquid line pressure drop, saturated temperature, °F

Max Lift — Maximum liquid lift (Indoor unit ABOVE outdoor unit only), at maximum permitted pressure drop.

LEGEND

Max Lift PD (F) — Pressure drop including Maximum liquid lift value

SC — Sub-cooling, °F (at liquid line valve)

Suction Line PD (F) — Suction Line Pressure Drop, Saturated Temperature, °F

TC — Total Capacity, MBH (at 45°F Saturated Suction, 95°F Outdoor Air Temp)

NOTE: 38AUD units require TWO sets of refrigeration piping.

40VMH024-096
High Static Indoor Unit for
Variable Refrigerant Flow (VRF) Systems

Engineering Data Book

Catalog No. 20-40VMH001-03 Printed in U.S.A. Form 40VMH-2ED Pg 1 03-20 Replaces: 40VMH-1ED

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HIGH STATIC DUCT BASIC INFORMATION

External Appearance

Fig. 1 —40VMH024/030/036---3

Fig. 2 —40VMH048/054---3

Fig. 3 —40VMH072/096--3

Specifications

Table 1 —Data Table

MODEL			40VMH024---3	40VMH030---3
Power Supply		V/Ph/Hz	208/230-1-60	208/230-1-60
Total Cooling Capacity *		Btu/h	24,000	30,000
Sensible Cooling Capacity *			16,520	20,500
Heating Capacity *		Btu/h	27,000	34,000
Electrical Supply	MCA	A	5.7	7.1
	MOCP	A	15.0	15.0
Casing			Galvanized Steel	
Filter			Included	
Dimensions (H x W x D)		in.	16-1/2 x 37-1/2 x 27-3/16	16-1/2 x 37-1/2 x 27-3/16
Net Weight		lbs	110.0	114.6
Heat Exchanger Type			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Blower / Motor	Fan Type		Centrifugal fan	
	Motor Type		DC motor	
	Air Flow Rate (H/M/L)	CFM	735/600/524	971/753/647
	Motor Output	W	750	750
Min. External Static Pressure (Factory Setting)		in. WG	0.20	0.20
Max. External Static Pressure		in. WG	0.80	0.80
Piping Connections	Gas Side	in.	5/8	5/8
	Liquid Side	in.	3/8	3/8
	Drain Port	in.	1	1
Condensate Lift		in.	27-1/2	27-1/2
Refrigerant Control			Electronic Expansion Valve	
Connectable Outdoor Unit			38VMH – Heat Pump 38VMR – Heat Recovery 38VMH-1P – Single Phase Heat Pump	
Wiring	Power Wiring	AWG	Sized per NEC and Local Codes based on Nameplate Electrical Data	
	Control Wiring	AWG	2-core stranded shielded cable 18AWG	

NOTES:

* Rated per AHRI (Air Conditioning, Heating, and Refrigeration Institute) 1230 Standard
Cooling: Indoor 80°F (27°C) db / 67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db / 43°F (6°C) wb

Table 2 —Data Table

MODEL			40VMH036---3	40VMH048---3
Power Supply		V/Ph/Hz	208/230-1-60	208/230-1-60
Total Cooling Capacity *		Btu/h	36,000	48,000
Sensible Cooling Capacity *		Btu/h	24,420	32,600
Heating Capacity *		Btu/h	40,000	54,000
Electrical Supply	MCA	A	7.3	7.6
	MOCP	A	15.0	15.0
Casing			Galvanized Steel	
Filter			Included	
Dimensions (H x W x D)		in.	16-1/2 x 37-1/2 x 27-3/16	16-1/2 x 51-3/16 x 27-3/16
Net Weight		lbs	114.6	159.2
Heat Exchanger Type			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Blower / Motor	Fan Type		Centrifugal fan	
	Motor Type		DC motor	
	Air Flow Rate (H/M/L)	CFM	1188/1029/882	1429/1200/1041
	Motor Output	W	750	750
Min. External Static Pressure (Factory Setting)		in. WG	0.20	0.20
Max. External Static Pressure		in. WG	0.80	0.80
Piping Connections	Gas Side	in.	5/8	5/8
	Liquid Side	in.	3/8	3/8
	Drain Port	in.	1	1
Condensate Lift		in.	27-1/2	27-1/2
Refrigerant Control			Electronic Expansion Valve	
Connectable Outdoor Unit			38VMH – Heat Pump 38VMR – Heat Recovery 38VMH-1P – Single Phase Heat Pump	
Wiring	Power Wiring	AWG	Sized per NEC and Local Codes based on Nameplate Electrical Data	
	Control Wiring	AWG	2-core stranded shielded cable 18AWG	

NOTES:

* Rated per AHRI (Air Conditioning, Heating, and Refrigeration Institute) 1230 Standard
Cooling: Indoor 80°F (27°C) db / 67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db / 43°F (6°C) wb

Table 3 —Data Table

MODEL			40VMH054---3	40VMH072---3
Power Supply		V/Ph/Hz	208/230-1-60	208/230-1-60
Total Cooling Capacity *		Btu/h	53,500	72,000
Sensible Cooling Capacity *		Btu/h	38,790	50,920
Heating Capacity *		Btu/h	60,000	81,000
Electrical Supply	MCA	A	7.8	9.7
	MOCP	A	15.0	15.0
Casing			Galvanized Steel	
Filter			Included	
Dimensions (H x W x D)		in.	16-1/2 x 51-3/16 x 27-3/16	20 x 56-11/16 x 36-3/8
Net Weight		lbs	159.2	254.2
Heat Exchanger Type			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Blower / Motor	Fan Type		Centrifugal fan	
	Motor Type		DC motor	
	Air Flow Rate (H/M/L)	CFM	1835/1618/1412	2235/1794/1559
	Motor Output	W	750	750 + 750
Min. External Static Pressure (Factory setting)		in. WG	0.20	0.20
Max. External Static Pressure		in. WG	0.80	1.00
Piping Connections	Gas Side	in.	5/8	7/8
	Liquid Side	in.	3/8	3/8
	Drain Port	in.	1	1-5/8
Condensate Lift		in.	27-1/2	-
Refrigerant Control			Electronic Expansion Valve	
Connectable Outdoor Unit			38VMH – Heat Pump 38VMR – Heat Recovery 38VMH-1P – Heat Pump	38VMH – Heat Pump 38VMR – Heat Recovery
Wiring	Power Wiring	AWG	Sized per NEC and Local Codes based on Nameplate Electrical Data	
	Control Wiring	AWG	2-core stranded shielded cable 18AWG	

NOTES:

* Rated per AHRI (Air Conditioning, Heating, and Refrigeration Institute) 1230 Standard
Cooling: Indoor 80°F (27°C) db / 67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db / 43°F (6°C) wb

Table 4 —Data Table

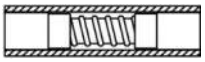
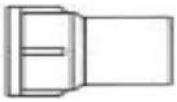
MODEL			40VMH096---3
Power Supply		V/Ph/Hz	208/230-1-60
Total Cooling Capacity *		Btu/h	96,000
Sensible Cooling Capacity *		Btu/h	64,570
Heating Capacity *		Btu/h	108,000
Electrical Supply	MCA	A	10.2
	MOCP	A	15.0
Casing			Galvanized Steel
Filter			Included
Dimensions (H x W x D)		in.	20 x 56-11/16 x 36-3/8
Net Weight		lbs	254.2
Heat Exchanger Type			Inner Groove Copper Tube and Hydrophilic Aluminum fin
Blower / Motor	Fan Type		Centrifugal fan
	Motor Type		DC motor
	Air Flow Rate (H/M/L)	CFM	2824/2400/2076
	Motor Output	W	750 + 750
Min. External Static Pressure (Factory Setting)		in. WG	0.20
Max. External Static Pressure		in. WG	1.00
Piping Connections	Gas Side	in.	7/8
	Liquid Side	in.	3/8
	Drain Port	in.	1-5/8
Condensate Lift		in.	-
Refrigerant Control			Electronic Expansion Valve
Connectable Outdoor Unit			38VMH – Heat Pump 38VMR – Heat Recovery
Wiring	Power Wiring	AWG	Sized per NEC and Local Codes based on Nameplate Electrical Data
	Control Wiring	AWG	2-core stranded shielded cable 18AWG

NOTES:

* Rated per AHRI (Air Conditioning, Heating, and Refrigeration Institute) 1230 Standard
Cooling: Indoor 80°F (27°C) db / 67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db / 43°F (6°C) wb

Accessories

Table 5 —Table of Accessories

NAME OF ACCESSORIES		QUANTITY	OUTLINE	USAGE
PQ connection wire		2		Connects the outdoor unit, indoor unit, and sub MDC
Connecting Wire		1		For occupy sensor
Pipe Insulation material		2		Heat insulation
Condensate Connection	024-054	1		For Drainage
Clamp		1		Connects the drain hose to the condensate connection
Copper Nut		1		Use for Pipe connection
LED Display Panel		1		Operation and error display
Copper Pipe	024-054	2		Use for inlet and outlet connection
	072-096	1		
Condensate Connection	072-096	1		For drainage

PIPING DIAGRAM

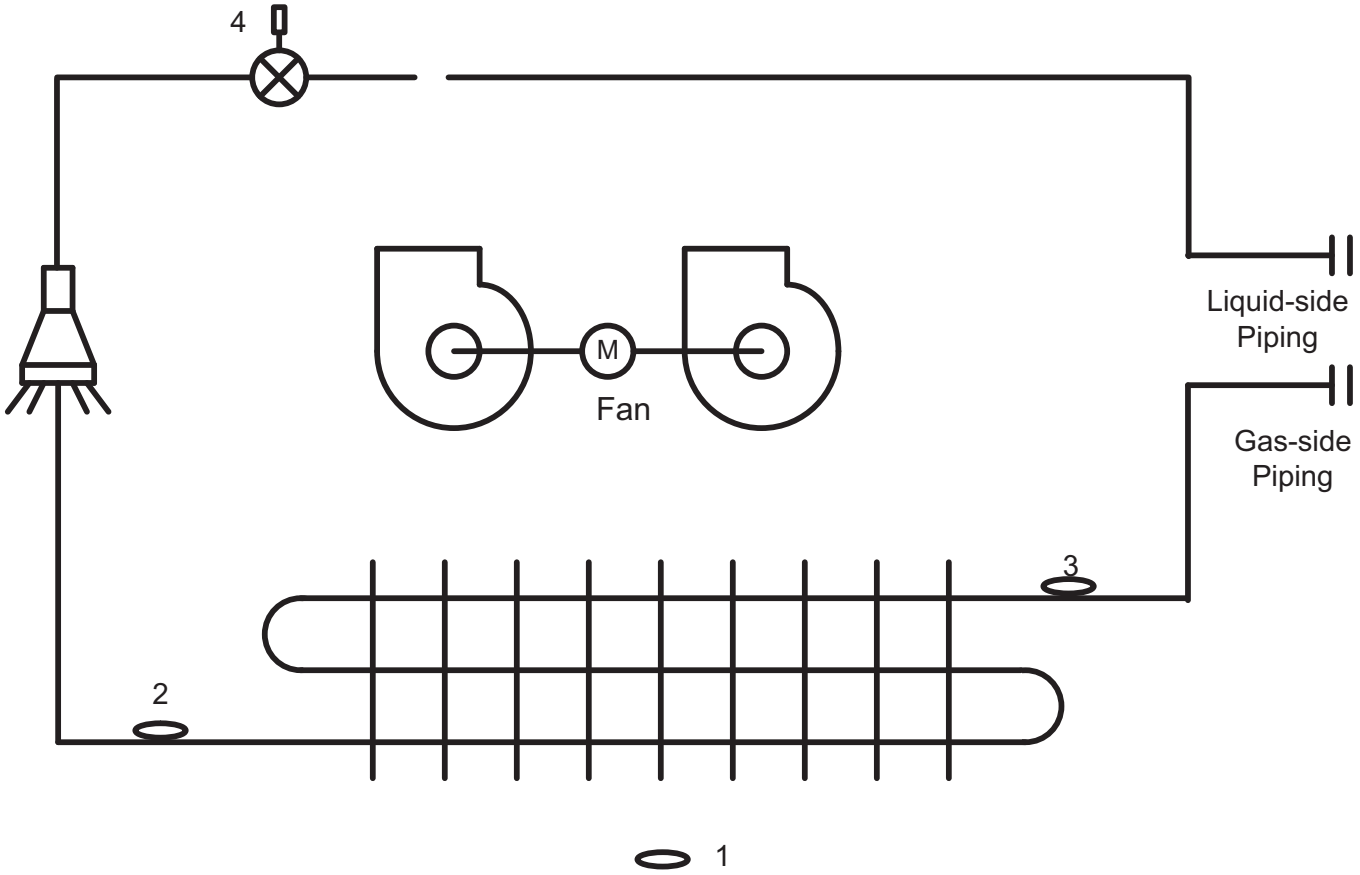


Fig. 4 —Piping

Table 6 —Piping

NO.	SYMBOL	NAME
1	T1	Room temperature sensor
2	T2A	Inlet pipe temperature sensor
3	T2B	Outlet pipe temperature sensor
4	EEV	Electronic expansion valve

Table 7 —Gas/Liquid Line Sizes

MODEL	GAS	LIQUID
40VMH024/030/036/048/054	5/8	3/8
40VMH072/096	7/8	3/8

VRF System

38VMR072-336 Outdoor Unit for Variable Refrigerant Flow (VRF) Heat Recovery Systems

Engineering Data Book

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Replaces: 38VMR-3ED

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HEAT RECOVERY BASIC INFORMATION

Specifications

38VMA***RDS(L)5-1

Table 1 —Data Table

MODEL NAME			38VMA072RDS5-1	38VMA096RDS5-1
Power Source		V-Ph-Hz	208/230-3-60	
Nominal Cooling Capacity *1		Btu/h	72,000	96,000
Nominal Heating Capacity		Btu/h	80,000	108,000
Operating Range Cooling	Indoor	WB°F	59~75	
	Outdoor	DB°F	5~125	
Operating Range Heating	Indoor	DB°F	54~86	
	Outdoor	WB°F	-13~64	
Electrical Supply	MCA	A	43	45
	Recommended fuse Size	A	50	
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 1	
	Crankcase	W	30 x 2	
Fan	Type x Quantity		Propeller Fan x 2	
	Air flow rate	CFM	6,900	7,600
	Max. External static pressure *2		0.24 in. WG	
Fan Motor	Type		Brushless DC MOTOR	
	Output	W	180+180	210+210
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Condenser Coil	Coil Qty.		1	
	FT^2		30-1/2	
	Rows		3	
	FPI		17	
Refrigerant	Type		R410A	
	Factory charge	lbs.	26.5	
Dimensions		H (in)	64-3/8	
		W (in)	52-3/4	
		D (in)	31-1/8	
Net Weight		lbs	672	
Sound Pressure Level *3		dBA	58.4	61.7
Protective Devices	High Pressure Protection		High pressure switch at 580psi	
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent Protection	
Piping Connections	Low Pressure	in.	3/4	7/8
	High Pressure	in.	5/8	3/4
Indoor Unit	Total capacity *4		50%-150%	
	Quantity (MAX)		15	20

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 2 —Data Table

MODEL NAME			38VMA120RDS5-1	38VMA144RDL5-1
Power Source		V-Ph-Hz	208/230-3-60	
Nominal Cooling Capacity *1		Btu/h	120,000	144,000
Nominal Heating Capacity *1		Btu/h	126,000	160,000
Operating Range Cooling	Indoor	WB°F	59~75	
	Outdoor	DB°F	5~125	
Operating Range Heating	Indoor	DB°F	54~86	
	Outdoor	WB°F	-13~64	
Electrical Supply	MCA	A	46	70
	Recommended fuse Size	A	50	80
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 1	INVERTER-driven Scroll Hermetic x 2
	Crankcase	W	30 x 2	30 x 4
Fan	Type x Quantity		Propeller Fan x 2	
	Air flow rate	CFM	8,100	10,100
	Max. External static pressure *2		0.24 in. WG	
Fan Motor	Type		Brushless DC MOTOR	
	Output	W	250 + 250	260 + 260
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Condenser Coil	Coil Qty.		1	2
	FT^2		30-1/2	26
	Rows		3	3
	FPI		17	17
Refrigerant	Type		R410A	
	Factory charge	lbs.	26.5	44.2
Dimensions		H (in.)	64-3/8	64-3/8
		W (in.)	52-3/4	78-3/8
		D (in.)	31-1/8	31-1/8
Net Weight		lbs	672	1137
Sound Pressure Level *3		dBA	62.7	63.3
Protective Devices	High Pressure Protection		High pressure switch at 580psi	
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection	
Piping Connections	Low Pressure	in.	1-1/8	
	High Pressure	in.	3/4	7/8
Indoor Unit	Total capacity *4		50%-150%	
	Quantity (MAX)		24	29

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 3 —Data Table

MODEL NAME			38VMA168RDS5-1	38VMA192RDS5-1
Power Source		V-Ph-Hz	208/230-3-60	
Nominal Cooling Capacity *1		Btu/h	168,000	192,000
Nominal Heating Capacity *1		Btu/h	188,000	215,000
Operating Range Cooling	Indoor	WB°F	59~75	
	Outdoor	DB°F	5~125	
Operating Range Heating	Indoor	DB°F	54~86	
	Outdoor	WB°F	-13~64	
Electrical Supply	MCA	A	70	71
	Recommended Fuse Size	A	80	
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 2	
	Crankcase	W	30 x 4	
Fan	Type x Quantity		Propeller Fan x 2	
	Air flow rate	CFM	10,100	11,300
	Max. External static pressure *2		0.24 in. WG	
Fan Motor	Type		Brushless DC MOTOR	
	Output	W	260 + 260	340 + 340
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Condenser Coil	Coil Qty.		2	
	FT^2		26	
	Rows		3	
	FPI		17	
Refrigerant	Type		R410A	
	Factory charge	lbs	44.2	
Dimensions		H (in.)	64-3/8	
		W (in.)	78-3/8	
		D (in.)	31-1/8	
Net Weight		lbs	1,137	
Sound Pressure Level *3		dBA	63.3	64.9
Protection Devices	High Pressure Protection		High pressure switch at 580psi	
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection	
Connecting Pipes	Low Pressure	in.	1-1/8	
	High Pressure	in.	7/8	
Indoor Unit Connectable	Total capacity *4		50%-150%	
	Quantity (MAX unit number)		34	39

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 4 —Data Table

MODEL NAME			38VMA216RDS5-1	38VMA240RDS5-1
Power Source		V-Ph-Hz	208/230-3-60	
Nominal Cooling Capacity *1		Btu/h	216,000	240,000
Nominal Heating Capacity *1		Btu/h	243,000	257,000
Operating Range Cooling	Indoor	WB°F	59~75	
	Outdoor	DB°F	5~125	
Operating Range Heating	Indoor	DB°F	54~86	
	Outdoor	WB°F	-13~64	
Electrical Supply	MCA	A	81	
	Recommended Fuse Size	A	100	
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 2	
	Crankcase	W	30 x 4	
Fan	Type x Quantity		Propeller Fan x 2	
	Air flow rate	CFM	12,300	
	Max. External static pressure *2		0.24 in. WG	
Fan Motor	Type		Brushless DC MOTOR	
	Output	W	440 + 440	
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Condenser Coil	Coil Qty.		2	
	FT^2		26	
	Rows		3	
	FPI		17	
Refrigerant	Type		R410A	
	Factory charge	lbs.	44.2	
Dimensions		H (in.)	64-3/8	
		W (in.)	78-3/8	
		D (in.)	31-1/8	
Net Weight		lbs	1,137	
Sound Pressure Level *3		dBA	67.1	
Protective Devices	High Pressure Protection		High pressure switch at 580psi	
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection	
Piping Connections	Low Pressure	in.	1-1/8	1-3/8
	High Pressure	in.	1-1/8	
Indoor Unit	Total capacity *4		50%-150%	
	Quantity (MAX)		44	49

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 5 —Data Table

MODEL NAME			38VMA240RDL5-1	38VMA264RDS5-1
Power Source		V-Ph-Hz	208/230-3-60	
Nominal Cooling Capacity *1		Btu/h	240,000	264,000
Nominal Heating Capacity *1		Btu/h	270,000	295,000
Operating Range Cooling	Indoor	WB°F	59~75	
	Outdoor	DB°F	5~125	
Operating Range Heating	Indoor	DB°F	54~86	
	Outdoor	WB°F	-13~64	
Electrical Supply	MCA	A	101	104
	Recommended Fuse Size	A	110	
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 3	
	Crankcase	W	30 x 6	
Fan	Type x Quantity		Propeller Fan x 4	
	Air flow rate	CFM	14,500	15,500
	Max. External static pressure *2		0.24 in. WG	
Fan Motor	Type		Brushless DC MOTOR	
	Output	W	225 x 4	265 x 4
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Condenser Coil	Coil Qty.		2	
	FT^2		28-3/4	
	Rows		3	
	FPI		16	
Refrigerant	Type		R410A	
	Factory charge	lbs.	77.2	
Dimensions		H (in.)	64-3/8	
		W (in.)	105-7/8	
		D (in.)	31-1/8	
Net Weight		lbs	1,627	
Sound Pressure Level *3		dBA	63.9	64.8
Protective Devices	High Pressure Protection		High pressure switch at 580psi	
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection	
Piping Connections	Low Pressure	in.	1-3/8	
	High Pressure	in.	1-1/8	
Indoor Unit	Total capacity *4		50%-150%	
	Quantity (MAX)		49	54

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 6 —Data Table

MODEL NAME			38VMA288RDS5-1	38VMA312RDS5-1
Power Source		V-Ph-Hz	208/230-3-60	
Nominal Cooling Capacity *1		Btu/h	288,000	312,000
Nominal Heating Capacity *1		Btu/h	323,000	343,000
Operating Range Cooling	Indoor	WB°F	59~75	
	Outdoor	DB°F	5~125	
Operating Range Heating	Indoor	DB°F	54~86	
	Outdoor	WB°F	-13~64	
Electrical Supply	MCA	A	104	106
	Recommended Fuse Size	A	110	
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 3	
	Crankcase	W	30 x 6	
Fan	Type x Quantity		Propeller Fan x 4	
	Air flow rate	CFM	15,500	16,500
	Max. External static pressure *2		0.24 in. WG	
Fan Motor	Type		Brushless DC MOTOR	
	Output	W	265 x 4	310 x 4
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Condenser Coil	Coil Qty.		2	
	FT^2		28-3/4	
	Rows		3	
	FPI		16	
Refrigerant	Type		R410A	
	Factory charge	lbs	77.2	
Dimensions		H (in.)	64-3/8	
		W (in.)	105-7/8	
		D (in.)	31-1/8	
Net Weight		lbs	1,627	
Sound Pressure Level *3		dBA	64.8	66.4
Protection Devices	High Pressure Protection		High pressure switch at 580psi	
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection	
Connecting Pipes	Low Pressure	in.	1-3/8	1-5/8
	High Pressure	in.	1-1/8	
Indoor Unit	Total capacity *4		50%-150%	
	Quantity (MAX)		59	64

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 7 —Data Table

MODEL NAME			38VMA336RDS5-1
Power Source		V-Ph-Hz	208/230-3-60
Nominal Cooling Capacity *1		Btu/h	336,000
Nominal Heating Capacity *1		Btu/h	353,000
Operating Range Cooling	Indoor	WB°F	59~75
	Outdoor	DB°F	5~125
Operating Range Heating	Indoor	DB°F	54~86
	Outdoor	WB°F	-13~64
Electrical Supply	MCA	A	106
	Recommended Fuse Size	A	110
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 3
	Crankcase	W	30 x 6
Fan	Type x Quantity		Propeller Fan x 4
	Air flow rate	CFM	16,500
	Max. External static pressure *2		0.24 in. WG
Fan Motor	Type		Brushless DC MOTOR
	Output	W	310 x 4
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin
Condenser Coil	Coil Qty.		2
	FT^2		28-3/4
	Rows		3
	FPI		16
Refrigerant	Type		R410A
	Factory charge	lbs.	77.2
Dimensions		H (in.)	64-3/8
		W (in.)	105-7/8
		D (in.)	31-1/8
Net Weight		lbs	1,627
Sound Pressure Level *3		dBA	67.2
Protective Devices	High Pressure Protection		High pressure switch at 580psi
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection
Piping Connections	Low Pressure	in.	1-5/8
	High Pressure	in.	1-1/8
Indoor Unit	Total capacity *4		50%-150%
	Quantity (MAX)		64

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 8 —Data Table

MODEL NAME			38VMA072RDS6-1	38VMA096RDS6-1
Power Source		V-Ph-Hz	460-3-60	
Nominal Cooling Capacity *1		Btu/h	72,000	96,000
Nominal Heating Capacity *1		Btu/h	80,000	108,000
Operating Range Cooling	Indoor	WB°F	59~75	
	Outdoor	DB°F	5~125	
Operating Range Heating	Indoor	DB°F	54~86	
	Outdoor	WB°F	-13~64	
Electrical Supply	MCA	A	20	22
	Recommended Fuse Size	A	30	
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 1	
	Crankcase	W	30 x 2	
Fan	Type x Quantity		Propeller Fan x 2	
	Air flow rate	CFM	6,900	7,600
	Max. External static pressure *2		0.24 in. WG	
Fan Motor	Type		Brushless DC MOTOR	
	Output	W	180 + 180	210 + 210
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Condenser Coil	Coil Qty.		1	
	FT^2		30-1/2	
	Rows		3	
	FPI		17	
Refrigerant	Type		R410A	
	Factory charge	lbs.	26.5	
Dimensions		H (in.)	64-3/8	
		W (in.)	52-3/4	
		D (in.)	31-1/8	
Net Weight		lbs	672	
Sound Pressure Level *3		dBA	58.4	61.7
Protective Devices	High Pressure Protection		High pressure switch at 580psi	
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection	
Piping Connections	Low Pressure	in.	3/4	7/8
	High Pressure	in.	5/8	3/4
Indoor Unit	Total capacity *4		50%-150%	
	Quantity (MAX)		15	20

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 9 —Data Table

MODEL NAME			38VMA120RDS6-1	38VMA144RDL6-1
Power Source		V-Ph-Hz	460-3-60	
Nominal Cooling Capacity *1		Btu/h	120,000	144,000
Nominal Heating Capacity *1		Btu/h	126,000	160,000
Operating Range Cooling	Indoor	WB°F	59~75	
	Outdoor	DB°F	5~125	
Operating Range Heating	Indoor	DB°F	54~86	
	Outdoor	WB°F	-13~64	
Electrical Supply	MCA	A	22	35
	Recommended Fuse Size	A	30	40
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 1	INVERTER-driven Scroll Hermetic x 2
	Crankcase	W	30 x 2	30 x 4
Fan	Type x Quantity		Propeller Fan x 2	
	Air flow rate	CFM	8,100	10,100
	Max. External static pressure *2		0.24 in. WG	
Fan Motor	Type		Brushless DC MOTOR	
	Output	W	250 + 250	260 + 260
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Condenser Coil	Coil Qty.		1	2
	FT^2		30-1/2	26
	Rows		3	3
	FPI		17	17
Refrigerant	Type		R410A	
	Factory charge	lbs.	26.5	44.2
Dimensions H x W x D		H (in.)	64-3/8	64-3/8
		W (in.)	52-3/4	78-3/8
		D (in.)	31-1/8	31-1/8
Net Weight		lbs.	672	1137
Sound Pressure Level *3		dBA	62.7	63.3
Protective Devices	High Pressure Protection		High pressure switch at 580psi	
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection	
Piping Connections	Low Pressure	in.	1-1/8	
	High Pressure	in.	3/4	7/8
Indoor Unit	Total capacity *4		50%-150%	
	Quantity (MAX)		24	29

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 10 —Data Table

MODEL NAME			38VMA168RDS6-1	38VMA192RDS6-1
Power Source		V-Ph-Hz	460-3-60	
Nominal Cooling Capacity *1		Btu/h	168,000	192,000
Nominal Heating Capacity *1		Btu/h	188,000	215,000
Operating Range Cooling	Indoor	WB°F	59~75	
	Outdoor	DB°F	5~125	
Operating Range Heating	Indoor	DB°F	54~86	
	Outdoor	WB°F	-13~64	
Electrical Supply	MCA	A	35	
	Recommended Fuse Size	A	40	
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 2	
	Crankcase	W	30 x 4	
Fan	Type x Quantity		Propeller Fan x 2	
	Air flow rate	CFM	10,100	11,300
	Max. External static pressure *2		0.24 in. WG	
Fan Motor	Type		Brushless DC MOTOR	
	Output	W	260 + 260	340 + 340
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Condenser Coil	Coil Qty.		2	
	FT^2		26	
	Rows		3	
	FPI		17	
Refrigerant	Type		R410A	
	Factory charge	lbs.	44.2	
Dimensions		H (in.)	64-3/8	
		W (in.)	78-3/8	
		D (in.)	31-1/8	
Net Weight		lbs	1,137	
Sound Pressure Level *3		dBA	63.3	64.9
Protective Devices	High Pressure Protection		High pressure switch at 580psi	
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection	
Piping Connections	Low Pressure	in.	1-1/8	
	High Pressure	in.	7/8	
Indoor Unit	Total capacity *4		50%-150%	
	Quantity (MAX)		34	39

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 11 —Data Table

MODEL NAME			38VMA216RDS6-1	38VMA240RDS6-1
Power Source		V-Ph-Hz	460-3-60	
Nominal Cooling Capacity *1		Btu/h	216,000	240,000
Nominal Heating Capacity *1		Btu/h	243,000	257,000
Operating Range Cooling	Indoor	WB°F	59~75	59~75
	Outdoor	DB°F	5~125	5~125
Operating Range Heating	Indoor	DB°F	54~86	54~86
	Outdoor	WB°F	-13~64	-13~64
Electrical Supply	MCA	A	38	38
	Recommended Fuse Size	A	40	40
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 2	
	Crankcase	W	30 x 4	30 x 4
Fan	Type x Quantity		Propeller Fan x 2	
	Air flow rate	CFM	12,300	12,300
	Max. External static pressure *2		0.24 in. WG	0.24 in. WG
Fan Motor	Type		Brushless DC MOTOR	
	Output	W	440 + 440	440 + 440
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Condenser Coil	Coil Qty.		2	
	FT^2		26	
	Rows		3	
	FPI		17	
Refrigerant	Type		R410A	R410A
	Factory charge	lbs.	44.2	44.2
Dimensions		H (in.)	64-3/8	64-3/8
		W (in.)	78-3/8	78-3/8
		D (in.)	31-1/8	31-1/8
Net Weight		lbs.	1,137	1,137
Sound Pressure Level *3		dBA	67.1	67.1
Protective Devices	High Pressure Protection		High pressure switch at 580psi	
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection	
Piping Connections	Low Pressure	in.	1-1/8	1-3/8
	High Pressure	in.	1-1/8	1-1/8
Indoor Unit	Total capacity *4		50%-150%	50%-150%
	Quantity (MAX)		44	49

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 12 —Data Table

MODEL NAME			38VMA240RDL6-1	38VMA264RDS6-1
Power Source		V-Ph-Hz	460-3-60	
Nominal Cooling Capacity *1		Btu/h	240,000	264,000
Nominal Heating Capacity *1		Btu/h	270,000	295,000
Operating Range Cooling	Indoor	WB°F	59~75	
	Outdoor	DB°F	5~125	
Operating Range Heating	Indoor	DB°F	54~86	
	Outdoor	WB°F	-13~64	
Electrical Supply	MCA	A	52	54
	Recommended Fuse Size	A	60	
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 3	
	Crankcase	W	30 x 6	
Fan	Type x Quantity		Propeller Fan x 4	
	Air flow rate	CFM	14,500	15,500
	Max. External static pressure *2		0.24 in. WG	
Fan Motor	Type		Brushless DC MOTOR	
	Output	W	225 x 4	280 x 4
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Condenser Coil	Coil Qty.		2	
	FT^2		28-3/4	
	Rows		3	
	FPI		16	
Refrigerant	Type		R410A	
	Factory charge	lbs.	77.2	
Dimensions		H (in.)	64-3/8	
		W (in.)	105-7/8	
		D (D)	31-1/8	
Net Weight		lbs.	1,627	
Sound Pressure Level *3		dBA	64.0	65.8
Protective Devices	High Pressure Protection		High pressure switch at 580psi	
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection	
Piping Connections	Low Pressure	in.	1-3/8	
	High Pressure	in.	1-1/8	
Indoor Unit	Total capacity *4		50%-150%	
	Quantity (MAX)		49	54

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 13 —Data Table

MODEL NAME			38VMA288RDS6-1	38VMA312RDS6-1
Power Source		V-Ph-Hz	460-3-60	
Nominal Cooling Capacity *1		Btu/h	288,000	312,000
Nominal Heating Capacity *1		Btu/h	323,000	343,000
Operating Range Cooling	Indoor	WB°F	59~75	
	Outdoor	DB°F	5~125	
Operating Range Heating	Indoor	DB°F	54~86	
	Outdoor	WB°F	-13~64	
Electrical Supply	MCA	A	54	55
	Recommended Fuse Size	A	60	
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 3	
	Crankcase	W	30 x 6	30 x 6
Fan	Type x Quantity		Propeller Fan x 4	
	Air flow rate	CFM	15,500	16,500
	Max. External static pressure *2		0.24 in. WG	
Fan Motor	Type		Brushless DC MOTOR	
	Output	W	280 x 4	330 x 4
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Condenser Coil	Coil Qty.		2	
	FT^2		28-3/4	
	Rows		3	
	FPI		16	
Refrigerant	Type		R410A	
	Factory charge		77.2	
Dimensions		H (in.)	64-3/8	
		W (in.)	105-7/8	
		D (in.)	31-1/8	
Net Weight		lbs.	1,627	
Sound Pressure Level *3		dBA	65.8	66.7
Protective Devices	High Pressure Protection		High pressure switch at 580psi	
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection	
Piping Connections	Low Pressure	in.	1-3/8	1-5/8
	High Pressure	in.	1-1/8	
Indoor Unit	Total capacity *4		50%-150%	
	Quantity (MAX)		59	64

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Table 14 —Data Table

MODEL NAME			38VMA336RDS6-1
Power Source		V-Ph-Hz	460-3-60
Nominal Cooling Capacity *1		Btu/h	336,000
Nominal Heating Capacity *1		Btu/h	357,000
Operating Range Cooling	Indoor	WB°F	59~75
	Outdoor	DB°F	5~125
Operating Range Heating	Indoor	DB°F	54~86
	Outdoor	WB°F	-13~64
Electrical Supply	MCA	A	55
	Recommended Fuse Size	A	60
Compressor	Type x Quantity		INVERTER-driven Scroll Hermetic x 3
	Crankcase	W	30x6
Fan	Type x Quantity		Propeller Fan x 4
	Air flow rate	CFM	16,500
	Max. External static pressure *2		0.24 in. WG
Fan Motor	Type		Brushless DC MOTOR
	Output	W	330 x 4
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin
Condenser Coil	Coil Qty.		2
	FT^2		28-3/4
	Rows		3
	FPI		16
Refrigerant	Type		R410A
	Factory charge	lbs.	77.2
Dimensions		H (in.)	64-3/8
		W (in.)	105-7/8
		D (in.)	31-1/8
Net Weight		lbs.	1,627
Sound Pressure Level *3		dBA	67.2
Protection Devices	High Pressure Protection		High pressure switch at 580psi
	Inverter circuit (Comp. / Fan)		Overheat and Overcurrent protection
Connecting Pipes	Low Pressure	in.	1-5/8
	High Pressure	in.	1-1/8
Indoor Unit Connectable	Total capacity *4		50%-150%
	Quantity (MAX unit number)		64

REMARKS:
* 1 Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db
Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb
* 2 ESP can vary by menu settings from 0in.WG (Default), 0.08 in. WG, 0.16 in. WG to 0.24 in. WG.
* 3 These values, measured in anechoic chamber, are normally somewhat higher as a result of actual ambient conditions.
* 4 See “Combination Ratio Restrictions” on page 18.

Rating Performance Data

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Table 15 —Performance Data

OUTDOOR UNIT MODEL	RATING COOLING CAPACITY *1	EER (BTU/W)	IEER	RATING HEATING CAPACITY *2	COP (W/W)	SCHE
38VMA072RDS5-1 (RDS6-1)	69,000	13.2	24.2	77,000	3.85	27.4
38VMA096RDS5-1 (RDS6-1)	92,000	12.4	24.3	103,000	3.63	27.7
38VMA120RDS5-1 (RDS6-1)	114,000	11.4	23.2	120,000	3.40	26.7
38VMA144RDL5-1 (RDL6-1)	136,000	12.3	24.0	150,000	3.60	26.5
38VMA168RDS5-1 (RDS6-1)	158,000	11.5	22.9	180,000	3.54	25.2
38VMA192RDS5-1 (RDS6-1)	182,000	11.0	23.6	204,000	3.33	25.5
38VMA216RDS5-1 (RDS6-1)	204,000	10.9	21.7	222,000	3.29	26.5
38VMA240RDS5-1 (RDS6-1)	220,000	10.4	21.0	230,000	3.20	26.5
38VMA240RDL5-1 (RDL6-1)	228,000	11.0	21.1	256,000	3.57	28.0
38VMA264RDS5-1 (RDS6-1)	248,000	10.4	21.0	282,000	3.49	27.5
38VMA288RDS5-1 (RDS6-1)	274,000	9.8	20.5	298,000	3.42	27.0
38VMA312RDS5-1 (RDS6-1)	296,000	9.5	19.8	314,000	3.36	26.5
38VMA336RDS5-1 (RDS6-1)	308,000	9.3	19.0	322,000	3.23	25.5

NON-DUCTED

Table 16 —Performance Data

OUTDOOR UNIT MODEL	RATING COOLING CAPACITY *1	EER (BTU/W)	IEER	RATING HEATING CAPACITY *2	COP (W/W)	SCHE
38VMA072RDS5-1 (RDS6-1)	69,000	14.1	24.6	77,000	4.10	30.0
38VMA096RDS5-1 (RDS6-1)	92,000	13.2	23.7	103,000	3.75	30.0
38VMA120RDS5-1 (RDS6-1)	114,000	11.4	22.8	120,000	3.45	30.0
38VMA144RDL5-1 (RDL6-1)	136,000	13.0	24.4	150,000	3.98	26.5
38VMA168RDS5-1 (RDS6-1)	158,000	11.8	23.1	180,000	3.59	27.0
38VMA192RDS5-1 (RDS6-1)	182,000	11.3	23.9	204,000	3.38	28.2
38VMA216RDS5-1 (RDS6-1)	204,000	11.2	23.0	222,000	3.34	27.3
38VMA240RDS5-1 (RDS6-1)	220,000	10.4	22.4	230,000	3.20	27.0
38VMA240RDL5-1 (RDL6-1)	228,000	11.2	22.4	256,000	3.71	30.0
38VMA264RDS5-1 (RDS6-1)	248,000	10.7	22.0	282,000	3.52	29.6
38VMA288RDS5-1 (RDS6-1)	274,000	10.4	21.0	298,000	3.38	29.3
38VMA312RDS5-1 (RDS6-1)	296,000	9.3	20.2	314,000	3.20	28.5
38VMA336RDS5-1 (RDS6-1)	308,000	9.3	19.5	322,000	3.20	28.0

NOTE: Rated per AHRI (Air-Conditioning, Heating and Refrigeration Institute) 1230 Standard.

Cooling: Indoor 80°F db/67°F wb; Outdoor 95°F db

Heating: Indoor 70°F db; Outdoor 47°F db/43°F wb

Equivalent piping Length: 25 ft.

Level Difference: 0ft

Combination Ratio Restrictions

$$\text{Combination ratio} = \frac{\text{Total capacity index of the indoor units}}{\text{Capacity index of the outdoor unit}}$$

e.g. Outdoor unit 38VMA240RDS5-1(6-1) has 240 as the capacity index.
It is recommended to keep a proper combination ratio for the entire system.

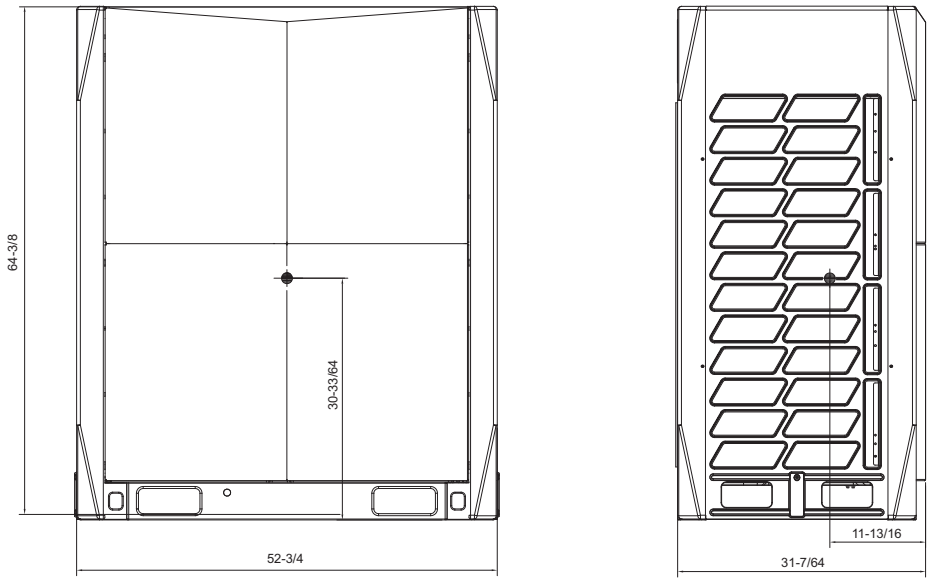
Table 17 —Combination Ratio

MIN. COMBINATION RATIO	MAX. COMBINATION RATIO			
	40VMH only *1 40VMV only *4	When 40VMA and indoor units connected	Including 40VMH *1 or 40VMV at least one unit	Other indoor unit models
50%	100%	100% *2	130% *3	150%

NOTES:

1. When 40VMH048, 054, 072, 096---3 is installed.
2. When outside air processing units (40VMA) and standard indoor units are connected, the total capacity index of the 40VMA must be limited to 30% or less of the capacity index of the outdoor unit. When 40VMA and 40VMZ indoor units are connected with no additional indoor units, the 30% rule does not apply.
3. When the total capacity of 40VMH048, 054, 072, 096---3 exceeds 30%, the combination must not exceed 100%.
4. This rule does not apply to the newest version of the 40VMV(A).

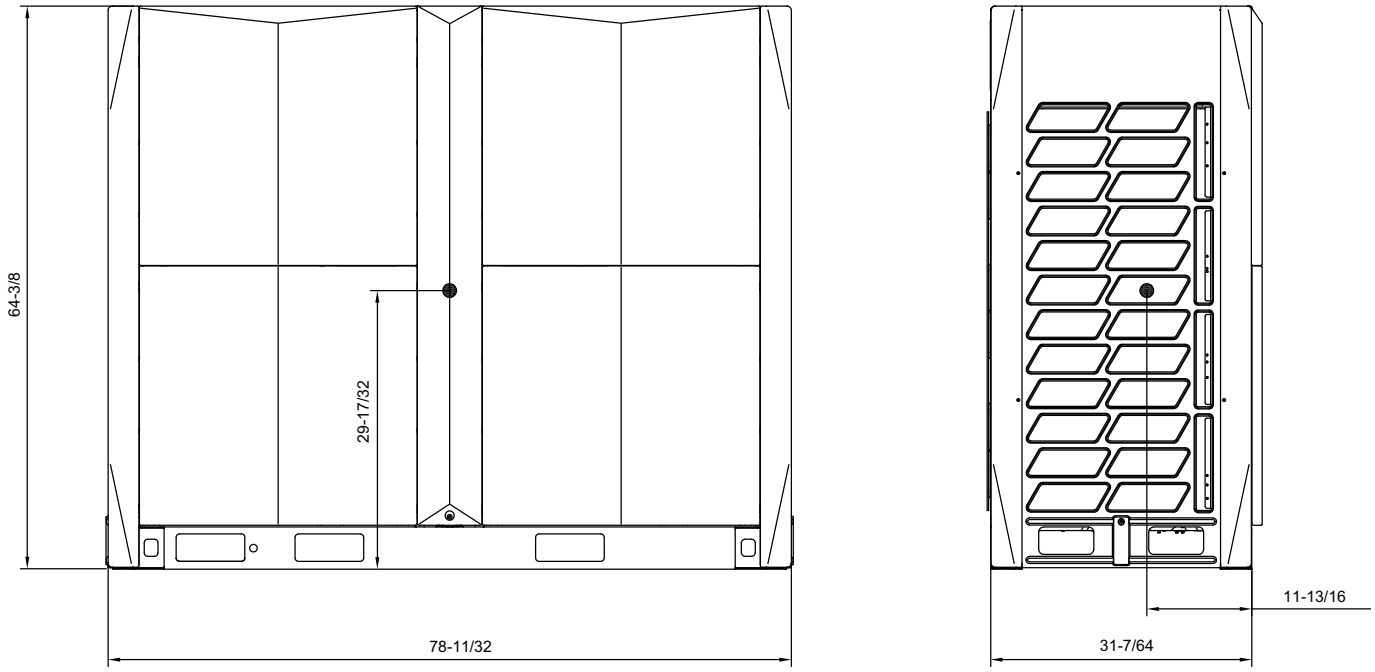
Center Of Gravity



NOTE: All dimensions are shown in inches.

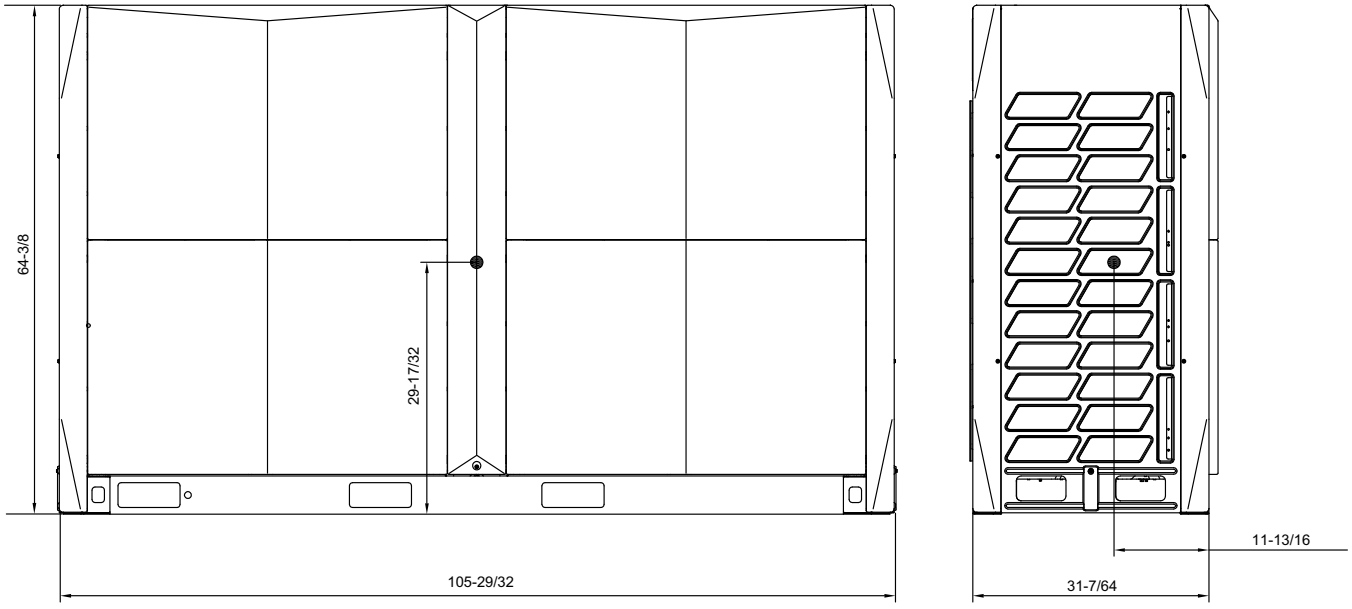
Fig. 1 —38VMA072, 096, 120RDS Models

Center Of Gravity (Cont.)



NOTE: All dimensions are shown in inches.

Fig. 2 —38VMA144RDL, 38VMA168, 192, 216, 240RDS Models



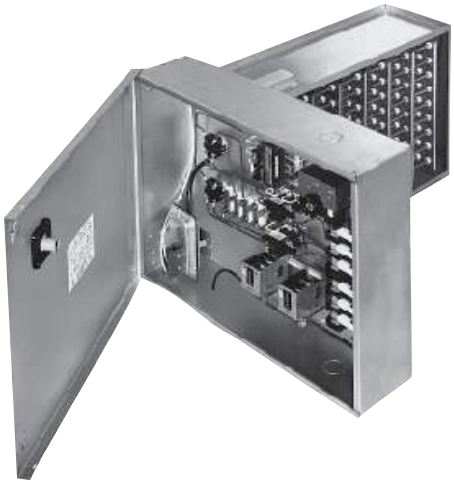
NOTE: All dimensions are shown in inches.

Fig. 3 —38VMA240RDL, 38VMA264, 288, 312, 336RDS Models

Standard Duct Heater Open Coil

QUA Slip-In and QUZ Flanged Heaters

Figure 44.



Indeeco has developed QUA (Figure 44) and QUZ (Figure 46) heater lines to satisfy most typical space heating requirements, simplifying specification, ordering and delivery.

Both standard and quick ship delivery programs are available for the full line of QUA and QUZ heaters.

KW Ratings

QUA and QUZ heaters are available up to 456 KW. The KW ratings are limited both by frame size and electrical characteristics. Heater availability can be determined by contacting an Indeeco representative, who can provide a computerized heater selection with exact heater dimensions in minutes.

Frame Sizes

The use of a standard open coil QUA slip-in heater will both reduce cost and permit rapid shipment. QUA frame sizes range from the smallest at 8" wide by 6" high to the largest 48" wide by 40" high or 72" wide by 30" high. The QUA offering has been opened up to allow for any duct size in between these sizes and includes fractional widths and heights dimensions (i.e. 24.625" by 17.25"). Indeeco can manufacture a custom slip-in frame size if your requirements exceed the QUA offering.

The 80% Rule – Indeeco recommends the heater should occupy at least 80% of the actual inside area of the duct, as shown in Figure 45. Only small amounts of air will bypass the heater around its perimeter and normal turbulence will rapidly mix this unheated air with heated air downstream.

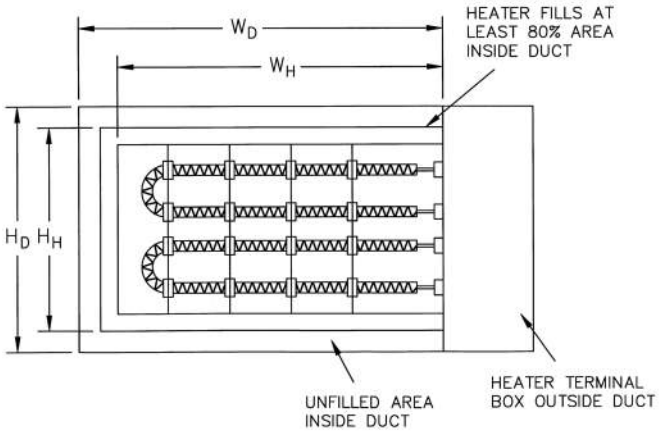


Figure 45.

All QUA heaters may be installed in ducts with up to 1" of interior lining, but the heater must be selected to fit the inside duct dimensions. For example, to fit a duct with 36" x 16" outside dimensions, but with 1" of interior insulation, specify a 35" x 14" heater.

QUZ flanged open coil heater frame sizes range from the smallest at 8" wide by 6" high to the largest at 48" wide by 38" high or 72" wide by 28" high or any duct size in between these sizes (i.e. 35.75" by 27.75").

Figure 46.

Standard Duct Heater Open Coil

Table VII

Commonly used duct widths and heights are shown in the charts below, in-between widths and heights are also available as standard QUA (slip-in) and QUZ (flanged) duct heaters.

Sizes and Maximum KW Ratings

Duct Width	Duct Height 6″	8″	10″	12″	14″	16″	18″	20″	24″	30″	36″	40″
8″	6	9	12	16	19	22	25	28	35	45	54	61
10″	8	12	16	20	24	28	33	37	45	57	70	78
12″	10	15	20	25	30	35	40	45	55	70	85	96
14″	11	17	23	29	35	41	47	53	65	83	101	113
16″	13	20	27	34	41	48	55	62	75	96	117	131
18″	15	23	31	39	46	54	62	70	85	109	132	148
20″	17	26	34	43	52	61	69	78	96	122	148	165
22″	19	28	38	48	57	67	77	86	106	135	164	183
24″	21	31	42	52	63	74	84	95	116	148	179	200
26″	22	34	45	57	68	80	91	103	126	160	195	218
28″	24	37	49	62	74	86	99	111	136	173	211	235
30″	26	39	53	66	79	93	106	119	146	186	226	253
32″	28	42	57	71	85	99	114	128	156	199	242	270
34″	30	45	60	75	91	106	121	136	166	212	257	288
36″	32	48	64	80	96	112	128	144	176	225	273	305
38″	34	51	68	85	102	119	136	153	187	238	289	323
40″	35	53	71	89	107	125	143	161	197	251	304	340
42″	37	56	75	94	113	131	150	169	207	263	320	358
44″	39	59	79	98	118	138	158	177	217	276	336	375
48″	43	64	86	108	129	151	172	194	237	302	367	410
54″	48	73	97	121	146	170	194	219	268	341	—	—
60″	54	81	108	135	162	189	216	244	298	379	—	—
66″	59	89	119	149	179	209	239	268	328	418	—	—
72″	65	97	130	163	195	228	261	293	359	456	—	—

Type QUA Slip-in Heater

Maximum KW ratings in available frame sizes shown at left.

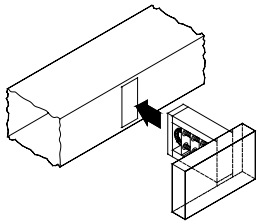


Figure 47.

Installation of Slip-in Heater

Duct Width	Duct Height 6″	8″	10″	12″	14″	16″	18″	22″	28″	30″	34″	38″
8″	11	14	18	22	25	29	33	40	51	55	62	69
10″	13	18	22	27	32	36	41	50	64	68	78	87
12″	16	22	27	33	38	44	49	60	77	82	93	104
14″	19	25	32	38	45	51	57	70	90	96	109	122
16″	22	29	36	44	51	58	66	80	102	110	125	139
18″	24	33	41	49	57	66	74	91	115	124	140	157
20″	27	36	45	55	64	73	82	101	128	137	156	174
22″	30	40	50	60	70	80	91	111	141	151	171	192
24″	33	44	55	66	77	88	99	121	154	165	187	209
26″	35	47	59	71	83	95	107	131	167	179	203	227
28″	38	51	64	77	90	102	115	141	180	193	218	244
30″	41	55	68	82	96	110	124	151	193	206	234	262
32″	44	58	73	88	102	117	132	161	205	220	250	279
34″	46	62	78	93	109	125	140	171	218	234	265	296
36″	49	66	82	99	115	132	148	182	231	248	281	314
38″	52	69	87	104	122	139	157	192	244	262	296	331
40″	55	73	91	110	128	147	165	202	257	275	312	349
42″	57	77	96	115	135	154	173	212	270	289	328	366
44″	60	80	101	121	141	161	182	222	283	303	343	384
48″	66	88	110	132	154	176	198	242	308	331	375	419
54″	74	99	124	148	173	198	223	273	347	—	—	—
60″	82	110	137	165	193	220	248	303	386	—	—	—
66″	91	121	151	182	212	242	273	333	424	—	—	—
72″	99	132	165	198	231	264	297	364	463	—	—	—

Type QUZ Flanged Heater

Maximum KW ratings in available frame sizes shown at left.

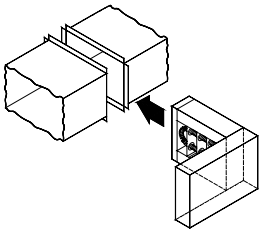


Figure 48.

Installation of Flanged Heater

Note: Maximum KW ratings may vary based on voltage and phase combinations.

Standard Duct Heater Open Coil

Detail Dimensions

The wide variety of QUA and QUZ (Figures 47 and 48) heaters makes it impractical to list the exact heater dimensions for every possible heater. For dimensional details, contact your local Indeeco representative.

Voltage and Phase

Heaters are available in the voltage and phase combinations shown below. All are for operation at 50 or 60 Hz.

When three-phase is specified, each heating stage will be furnished with a multiple of three elements to give a balanced three-phase load.

Voltage	120 208 240 277	208 240 380 400 415 480 600
Phase	1	3

Control Circuit Options & Special Features

QUA and QUZ heaters are available with Control Options G, J and K and a full range of Special Features. These are described briefly in Table VIII and in more detail in the standard Control Options section of this catalog, pages 10 and 11.

Number of Heating Stages

Single and three-phase QUA and QUZ heaters are available with multiple heating stages. To comply with our UL and NEC maximum circuit sizes, no stage is rated at more than 48 amps.

Table VIII

Control Options

Control Option	Disconnect Switch	Thermal Cutouts	Airflow Switch	Contactors	Control Transformer	Fuses	PE Switches	SCR	Thermostat
G Basic	■	■	■	■	■	■[1]			
J Pneumatic	■	■	■	■[2]	■[3]	■[1]	■		
K Proportional	■	■	■	■[2]	■	■[1]		■	■[4]

Notes:
1. Fuses supplied only on heaters over 48 amps.
2. Contactors supplied only when other devices cannot carry heater load.
3. Transformer only supplied on heaters rated higher than 277 volts.
4. Choice of room or duct thermostat, 135 ohms, 2200 ohms, 0-10 VDC or 4-20 mA inputs.

See pages 12 and 13 for full description of thermostats.

Standard Duct Heater Open Coil

Special Features

While QUA slip-in and QUZ flanged heaters may be specified with one of the standard control circuit options, individual job requirements may demand slight variations from the standards. The most common variations are covered by Indeeco's set of Special Features which may be used to modify QUA/QUZ heaters both mechanically and electrically. These are listed in Table IX with a brief description, availability, and notes on any limitations of their use.

Table X provides a summary of thermostats offered with Indeeco QUA/QUZ heaters. See pages 12 and 13 for more detailed descriptions.

Table IX

Special Features	Special Feature Code	Description	Page Ref.	Availability & Limitations
Mechanical				
Horizontal Airflow	U8	Allows heater to be used in applications where airflow is either right (U4) or left (U6)	23	Available on all heaters.
Vertical Airflow	U9	Allows heater to be used in applications where airflow is either vertical up (U3) or vertical down (U5.)	23	Available on all heaters.
Pressure Plate	V1	40% open perforated plate installed onto the inlet side of the heater frame to help even out irregular airflow patterns.	35	Available on all heaters. Exact airflow direction must be specified U3, U4, U5 or U6.
Protective Screen	V/V2	Wire mesh screen for attachment to the heater frame. Can be furnished for one or both sides.	36	Available on all heaters. Screens are shipped loose for field installation.
Stainless Steel Frame and Terminal Box	H2	Heater frame and terminal box constructed of 304 stainless steel.		Available on all heaters.
Aluminized Steel Frame and Terminal Box	H1	Heater frame and terminal box constructed of aluminized steel.		Available on all heaters.
Insulated Duct Construction for Slip-in Heaters	GG2	Used in ducts lined with more than 1" thick interior insulation. Inside duct dimensions and insulation thickness must be specified. Maximum 6" thick lining.	36	Available on all heaters.
Unheated Sections	G2	Extended terminal pins to provide an unheated section adjacent to the heater terminal box. Maximum extended terminal pin length of 6".	36	Available on all heaters.
Substitute Negative Pressure Switch	Q5/Q6	Allows heater to be used on inlet side of fan.	15	Available on all heaters.
Right/Down Terminal Box Overhang	L4/L5	Heater will be supplied with terminal box overhang on right (if horizontal airflow installation) or downward (if vertical airflow installation).	23	Available on all heaters.

Standard Duct Heater Open Coil

Table IX (continued)

Special Features	Special Feature Code	Description	Page Ref.	Availability & Limitations
Mechanical (cont.)				
Insulated Terminal Box	B2	Prevents condensation inside terminal box when heater is installed in air conditioning duct running through un-airconditioned area.	35	Available on all heaters.
Dust-Tight Terminal Box	B7	Allows installation in dusty areas and satisfies local codes requiring dust-tight box, if installed in area used as return air plenum.	34	Available on all heaters.
Remote Panelboard	B5	All controls except thermal cutouts, airflow switch and pilot switch will be supplied in a separate NEMA 1 panelboard.	37	Available on all heaters except when transformer and contactors are deleted.
Electrical				
Add "Stage On" Pilot Light(s)	P1	To indicate when each heating stage is producing heat.	17	Available on all heaters except Option K SCR stages.
Add "Low Airflow" and "Heater On" Pilot Lights	P2, P3	Separate pilot lights to indicate that power has been supplied to the heater, that it is ready for operation, and whether airflow has been interrupted.	17	Available on all heaters. When fan relay has been substituted for airflow switch, only "Heater On" will be supplied.
Fan Relay	N(000)	When static pressure in the duct is too low (below .07" WC) to operate the airflow switch or when airflow switch is not desired. (000) denotes holding coil 24, 120, 208, 240, or 277 volts.	15	Available on Option G & K heaters except Option G heaters where deletion of contactors and transformers is specified.
Add Indeeco Electronic Step Controller	S	Allows better temperature control of high capacity heater by using multiple stages controlled by electronic thermostat and step controller.	19-20	Only available on Option G heaters with 2 or more heating stages.
Low Watt Density Coils	D3, D4	To meet specifications which call for low watt density coils.		Available on all heaters.
Add Built-in PE Transducer	E32, S19	To allow for pneumatic control.	13	Available on Option K heaters or Option G heaters with step controller and 6 or more stages.
Transformer Primary Fusing	T1	Standard for all heaters with 120 VAC and Class I control circuits. Available with all heaters with 24 VAC and Class II control circuits.		Available with all heaters with built-in transformer.

Standard Duct Heater Open Coil

Table IX (continued)

Special Features	Special Feature Code	Description	Page Ref.	Availability & Limitations
Electrical (cont.)				
Delete Transformer		Allows control circuit to be obtained from source outside the heater or, when line voltage is equal to control voltage, directly from power lines within the heater.	16	Only available on Option G heaters. Must be specified if control voltage is not 120 or 24 volts. Customer must specify control volts.
Delete Transformer & Contactors		Allows for control of heater directly using load carrying thermostats.	16	Available only on single stage, single-phase, Option G heaters with KW not exceeding the following. Voltage | 120 277 Max KW | 1.8 4.1
Transformer Secondary Fusing	T3	External fused and grounded transformer secondary for Class II 24 volt control circuits.		Available on all heaters.
Additional User Control Circuit Voltage		Heater control circuit transformer sized for additional user VA. A control terminal block is furnished for field connection.		Available on all heaters. Consult factory for 1 week or 72 hour heater availability.
Delete Disconnect		Allows for use of field installed disconnecting means. (Must be within sight of the heater.)	16	Available on all heaters.
Fused Disconnect Switch	Q1	Door interlocking disconnect with line fusing for heaters loads up to 48 amps or less.	16	Available on all heaters.
Linear Limit Automatic Reset Thermal Cutout	Z/Z1	Automatic reset linear limit thermal cutout wired in series with the disc type automatic reset to provide redundant primary over temperature protection.	14	Available on all heaters. Exact airflow direction must be specified U3, U4, U5 or U6.
Add Fuses for Heaters Rated 48 Amps or Less	F1	Allows for addition of one set of fuses to low amperage heaters that do not need internal fusing to meet UL and NEC requirements	16	Available on all heaters whose KW is lower than or equal to the following. (Other heaters include fusing as standard): Line Volts | KW (at 48 amps) 1 Phase 3 Phase 120 5.7 - 208 9.9 17.2 240 11.5 19.9 277 13.2 - 480 23.0 39.9
Remote enable terminals	R1	Enables heater operation with remote dry contacts.		Available on all heaters.

Standard Duct Heater Open Coil

Table X

Summary of Thermostats Available with Option G or K Heaters (No Thermostats are supplied on Option J Heaters)

Type of Thermostat			Used with Control Option	Catalog Number	Comments
ROOM	Pilot Duty	1 Stage	G	1006998 (Fig.11)	Rated for 30 volts max. Offered with Duct Heater Selection
		1 Stage	G	1023721 (Fig. 12)	Digital Display, Rated for 30 volts max. Special Ordered
		2 Stage	G	1007030 (Fig. 13)	Digital Display, Rated for 30 volts max.
		2 or 3 Stage	G	1023723 (Fig. 14)	Programmable with Digital Display, Rated for 30 volts max.
	† Proportional Electronic		G or K	SCR Controlled or Vernier Controlled. 1016941 (Fig. 16)	With Option G, can be used only when step controller is also specified
DUCT	Pilot Duty	1 Stage	G	1023953 (Fig. 18)	Rated for 277 volts max.
		2 Stage	G	1007044 (Fig. 19)	Rated for 240 volts. max.
	† Proportional Electronic		G or K	SCR Controlled or Vernier Controlled. 1016941 and 1016942 (Fig. 16)	With Option G, can be used only when step controller is also specified.
	† No Thermostat (Special inputs for controller or SCR when customer supplied thermostat is used)		G or K	— — —	2200 ohm Input 135 ohm Input 4-20 mA Input 0-10 VDC Input

†A thermostat or input must be specified with all Option K heaters and all Option G heaters with step controllers. Step controllers with 4-20 mA or 0-10 VDC will be furnished with proportional control.

Standard Duct Heater Open Coil

QUA/QUZ – Sample Specification

A job specification can be prepared by using the following information. Simply darken the applicable circles. Material which is part of the basic specification has already been darkened. Additional copies of this specification guide are available from your local Indeeco representative.

- 1. Duct heaters shall be Indeeco
  - o Type QUA Standard Slip-in Heaters
  - o Type QUZ Standard Flanged Heaters
- 2. Approvals – Heaters and panelboards (if required) shall meet the requirements of the National Electrical Code and shall be listed by Underwriters Laboratories for zero spacing between the duct and combustible surfaces and for use with heat pumps and air conditioning equipment.
- 3. Heating elements shall be open coil, 80% nickel, 20% chromium, Grade A resistance wire. Type C alloys containing iron or other alloys are not acceptable. Coils shall be machine crimped into stainless steel terminals extending at least 1" into the airstream and all terminal hardware shall be stainless steel. Coils shall be supported by ceramic bushings staked into supporting brackets.
- 4. Heater frames and terminal boxes shall be corrosion resistant steel. Unless otherwise indicated, the terminal box shall be NEMA 1 type construction and shall be provided with a hinged, latching cover and multiple concentric knockouts for field wiring.
- 5. All heaters shall be furnished with a disc type, automatic reset thermal cutout for primary over-temperature protection. All heaters shall also be furnished with disc type, load carrying manual reset thermal cutouts, factory wired in series with heater stages for secondary protection. Heat limiters or other fusible overtemperature devices are not acceptable.
- 6. Heaters shall be rated for the voltage, phase, and number of heating stages indicated in the schedule. All three-phase heaters shall have equal, balanced, three-phase stages. All internal wiring shall be stranded copper with 105°C insulation and shall be terminated in crimped connectors or box lugs.
- 7. Terminal blocks shall be provided for all field wiring and shall be sized for installation of 75°C copper wire rated in accordance with NEC requirements.
- 8. Heaters shall be furnished, either with the Control Option specified in the schedule and described below, or with the specific components listed in the schedule.
- Option G – Thermal cutouts, airflow switch, contactors, fuses (if over 48 amps), control circuit transformer (where required) and built-in, snap-acting, door interlocked disconnect switch.

o Option J – Thermal cutouts, airflow switch, PE switches, contactors (where required), fuses (if over 48 amps), control circuit transformer (where required), and built-in snap-acting door interlocked disconnect switch.

o Option K – Thermal cutouts, airflow switch, contactors (where required), SCR (with step controller if heater draws over 96 amps three-phase or 192 amps single-phase), fuses (if over 48 amps), control circuit transformer, and built-in snap-acting door interlocked disconnect switch.

o 9. When specified in the schedule, or below, heaters will be supplied with the following Special Features:

- o Airflow switch for negative pressure operation
- o Insulated terminal box
- o Dust-tight terminal box
- o Stainless steel frame and terminal box
- o Aluminized steel frame and terminal box
- o Insulated duct construction for slip-in heaters (>1" ≤6" thick lining)
- o Unheated section (≤6" terminal pin)
- o Pressure plate
- o Protective screen(s); o one side o both sides
- o Controls mounted in NEMA 1 remote panelboard
- o Deletion of transformer
- o Deletion of transformer and contactor
- o Transformer primary fusing (standard for Class I)
- o Transformer secondary fusing (Class II)
- o Aditional user control circuit voltages (specify user VA)
- o Deletion of disconnect switch
- o Fused disconnect switch (≤ 48 amps)
- o Fusing for heaters rated 48 amps or less
- o "Low Airflow" pilot light
- o "Heater On" pilot light
- o Each "Stage On" pilot light(s)
- o Fan relay (instead of airlfow switch)
- o Fan relay (in additional to airflow switch)
- o Remote enable heater operation
- o Step controller
- o Linear limit automatic rest thermal cutout
- o 25 watts per square inch resistance coils
- o 35 watts per square inch resistance coils
- o Built-in PE transducer

o 10. When specified in the schedule, or below, heaters shall be supplied with the following thermostats:

- o Pilot duty single stage room thermostat
- o Pilot duty digital display single stage room thermostat
- o Pilot duty two stage digital display room thermostat
- o Pilot duty two or three stage programmable with digital display room thermostat
- o Proportional electronic room thermostat
- o Pilot duty single stage duct thermostat
- o Pilot duty two stage duct thermostat
- o Proportional electronic duct thermostat with set point adjuster
- o Special inputs (135 ohms, 2200 ohms, 4-20 mA, 0-10 VDC)

Joseph City Schools

Summary of Financial Operations (Unaudited)
March 31, 2022

Fund		Budget	YTD Expenses	Encumbrances	Budget Balance
001	Maintenance & Operation	$5,699,365	$4,401,096	$1,256,295	$ 41,974
010-013	Classroom Site Funds	$ 431,004	$ 105,038	$ 39,403	$ 286,563
100-130	Title I	$ 260,000	$ 124,509	$ 57,832	$ 77,658
140-150	Title II - Profesional Development	$ 40,000	$ 5,171	$ -	$ 34,829
200-209	Title VII - Indian Education	$ 15,000	$ 8,893	$ 156	$ 5,951
220-229	IDEA/Special Education Grants	$ 175,000	$ 70,701	$ 19,009	$ 154,707
230	Johnson-O'Malley (JOM)	$ 4,500	$ 1,284	$ 167	$ 3,049
260-270	Career & Technical Ed (CTE) - Federal	$ 16,000	$ 5,737	$ 30	$ 10,234
290-291	Medicare Reimbursement	$ 25,000	$ 197	$ 403	$ 24,400
326-346	ESSER / CARES / ESG	$1,746,229	$ 306,151	$ 450,388	$ 989,690
374	E-Rate	$ 2,000	$ 1,500	$ -	$ 500
390-396	REAP (Federal Rural Assistance)	$ 45,000	$ 6,002	$ 11,027	$ 27,971
400	Career & Technical Ed (CTE) - State	$ 10,000	$ 2,495	$ 1,280	$ 6,225
466	Healthy Drug-Free Community	$ 170,000	$ 36,869	$ 10,602	$ 122,529
506	School Plant (Sale)	$ 5,000	$ -	$ -	$ 5,000
510	Food Service	$ 300,000	$ 202,161	$ 40,246	$ 57,593
515	Civic Center	$ 10,000	$ 153	$ 291	$ 9,556
520	Preschool Tuition	$ 12,000	$ 5,422	$ 2,181	$ 4,398
525	Auxiliary Operations	$ 110,000	$ 88,739	$ 17,599	$ 3,662
526	Extracurricular Activities Tax Credit	$ 20,000	$ 9,392	$ 921	$ 9,687
530	Gifts & Donations	$ 50,000	$ 2,271	$ 895	$ 46,834
535-539	CTE & Vocational Education Projects	$ 5,000	$ 4,691	$ 2,010	$ (1,701)
550	Insurance Proceeds	$ 60,000	$ -	$ -	$ 60,000
565	Litigation Recovery	$ 35,000	$ -	$ -	$ 35,000
570	Indirect Costs	$ 35,000	$ 21,490	$ 10,729	$ 2,781
585	Insurance Refunds	$ 5,000	$ 2,000	$ -	$ 3,000
596	NAVIT	$ 45,000	$ 21,579	$ 8,180	$ 15,241
610	Capital Outlay	$ 404,120	$ 350,597	$ 18,103	$ 35,420
620	Adjacent Ways	$ 75,000	$ 5,631	$ 3,317	$ 66,052
665	Energy and Water Savings	$ 49,000	$ -	$ -	$ 49,000
686	SFB Emergency Deficiency Correction	$ 140,000	$ -	$ -	$ 140,000
691	SFB Building Renewal Grant	$1,600,000	$ 755,587	$ 763,632	$ 80,781
850	Student Activities	$ 60,000	$ 25,035	$ 3,971	$ 30,995

2. **CALL TO THE PUBLIC**

Individuals who wish to address the Board are requested to complete the appropriate form prior to the meeting and give the form to the Board Secretary. Members of the Board may not discuss items that are not specifically identified on the agenda. Therefore, pursuant to A.R.S. § 38-431.01(H), action taken as a result of public comment will be limited to directing staff to study the matter or scheduling the matter for a future agenda. The Board requests that all comments be limited to five minutes or less, that speakers refrain from the use of speech or language that is offensive or inappropriate, pursuant to Board policy KFA and that speakers refrain from voicing complaints against school personnel or any person connected with the District, as it may impact due process rights. Policies KE, KEB, and KED are provided by the Board for disposition of legitimate complaints, including those involving individuals. Forms required for use of these policies can be obtained from the Joseph City Schools website. The President will limit discussion whenever he deems such action appropriate to the proper conduct of the meeting.

3. **POSSIBLE EXECUTIVE SESSION (*)**

For any agenda item indicated with an asterisk (*), the Board may vote to convene in Executive Session pursuant to A.R.S. 38-431.03 (A) (1) for personnel matters when notified; (2) discussion or consideration of records exempt by law from public inspection; (3) for consultation with attorney; (4) for consultation with attorney when in pending or contemplated litigation. Discussion or consideration of personnel matters may include employment, assignment, appointment, promotion, demotion, dismissal, salaries, disciplining or resignation of a public officer, appointee or employee.

4. **CONSENT AGENDA**

Vote on Consent Agenda. All items listed will be considered as a group and will be approved with one motion unless a Board Member requests an item be removed from the consent agenda and considered as a separate item.

4.A. **Approve Expense Vouchers**

Action to ratify district vouchers for period 3/3/22 through 4/6/22.
General and Special Funds: #22 $142,583.30; #23 $135,176.11; #1045 $84,651.29; #1046 $1,693.59; #10447 $69,650.80; #1048 $869.71; #1049 $79,897.42; #1050 $24,859.20
Auxiliary Operations Funds: #1059 $140.00; #1060 $2,312.43; #1062 $3,970.55; #1063 $2,119.87; #1066 $786.60; #1067 $2,516.44
Student Activities Fund: #1061 $1,229.38; #1064 $528.00

4.B. **Student Activities Fund Report**

Revenues, expenditures and charges in the Student Activities Fund Report; period of March 1, 2022 through March 31, 2022.

Student Activities Summary Report

Fiscal Year: 2021-2022

From: 3/1/2022 **To: 3/31/2022**

☐ Print Detail ☐ Page Break by Activity

☐ Exclude Encumbrances ☑ Reverse Signs ☐ Subtotal By Journal

	Range Beg. Balance	Range Revenue	Range Expenditures	Balance	Encumbrances	Available Balance
000.000 Undesignated DO NOT USE	.00	.00	.00	.00	.00	.00
102.610 Joseph City Jr High School Student Council	1,259.32	20.00	.00	1,279.32	.00	1,279.32
102.612 Joseph City Jr High School Softball	(11.39)	.00	.00	(11.39)	.00	(11.39)
102.619 Joseph City Jr High School Volleyball	198.27	.00	.00	198.27	.00	198.27
102.629 Joseph City Jr High School Track	260.11	.00	.00	260.11	.00	260.11
102.637 Joseph City Jr High School Class of 2024	.00	.00	.00	.00	.00	.00
102.638 Joseph City Jr High School Class of 2025	.00	.00	.00	.00	.00	.00
102.639 Joseph City Jr High School Class of 2026	188.93	.00	.00	188.93	.00	188.93
102.640 Joseph City Jr High School Class of 2027	1,160.99	.00	.00	1,160.99	.00	1,160.99
102.641 Joseph City Jr High School Class of 2028	132.00	.00	.00	132.00	.00	132.00
102.642 Joseph City Jr High School Class of 2029	.00	.00	.00	.00	.00	.00
203.601 Joseph City High School Band	351.95	.00	.00	351.95	.00	351.95
203.602 Joseph City High School Baseball	326.74	.00	.00	326.74	.00	326.74
203.605 Joseph City High School Chess Club	.00	.00	.00	.00	.00	.00
203.606 Joseph City High School Card and Game Club	146.14	.00	.00	146.14	.00	146.14
203.607 Joseph City High School Drama	1,954.49	.00	(1,229.38)	725.11	2,337.38	3,062.49
203.608 Joseph City High School Future Business Leaders of America	12.59	.00	.00	12.59	.00	12.59
203.609 Joseph City High School Girls Basketball	2,757.54	302.80	(131.33)	2,929.01	131.33	3,060.34
203.610 Joseph City High School Student Council	4,818.41	.00	.00	4,818.41	.00	4,818.41
203.611 Joseph City High School National Honor Society	549.96	.00	.00	549.96	.00	549.96
203.612 Joseph City High School Softball	1,484.31	3,440.00	.00	4,924.31	(1,164.48)	3,759.83
203.613 Joseph City High School Momentum Club/Audition Choir	409.15	.00	.00	409.15	.00	409.15

Student Activities Summary Report

Fiscal Year: 2021-2022

From: 3/1/2022 **To: 3/31/2022**

☐ Print Detail ☐ Page Break by Activity

☐ Exclude Encumbrances ☑ Reverse Signs ☐ Subtotal By Journal

	Range Beg. Balance	Range Revenue	Range Expenditures	Balance	Encumbrances	Available Balance
203.614 Joseph City High School Wrestling	4,225.13	.00	.00	4,225.13	(1,645.20)	2,579.93
203.615 Joseph City High School Cheerleaders	3,091.51	.00	.00	3,091.51	.00	3,091.51
203.616 Joseph City High School Welding	106.33	.00	.00	106.33	.00	106.33
203.617 Joseph City High School Woods	104.72	.00	.00	104.72	.00	104.72
203.618 Joseph City High School Boys Basketball	1,920.73	.00	(528.00)	1,392.73	.00	1,392.73
203.619 Joseph City High School Volleyball	8,339.73	.00	.00	8,339.73	.00	8,339.73
203.620 Joseph City High School FACS	35.74	.00	.00	35.74	.00	35.74
203.624 Joseph City High School Basketball Cheerleaders	.00	.00	.00	.00	.00	.00
203.625 Joseph City High School FFA	(292.52)	.00	.00	(292.52)	.00	(292.52)
203.626 Joseph City High School Happy Club	880.07	.00	.00	880.07	.00	880.07
203.627 Joseph City High School Robotics	359.85	.00	.00	359.85	.00	359.85
203.628 Joseph City High School Cross Country	220.60	.00	.00	220.60	.00	220.60
203.629 Joseph City High School Track	191.04	.00	.00	191.04	.00	191.04
203.630 Joseph City High School Football	1,400.26	.00	.00	1,400.26	.00	1,400.26
203.631 Joseph City High School Technology Club	109.95	.00	.00	109.95	.00	109.95
203.632 Joseph City High School Class of 2019	.00	.00	.00	.00	.00	.00
203.633 Joseph City High School Class of 2020	.00	.00	.00	.00	.00	.00
203.634 Joseph City High School Class of 2021	.00	.00	.00	.00	.00	.00
203.635 Joseph City High School Class of 2022	4,046.80	.00	.00	4,046.80	.00	4,046.80
203.636 Joseph City High School Class of 2023	6,457.22	.00	.00	6,457.22	.00	6,457.22
203.637 Joseph City High School Class of 2024	388.76	.00	.00	388.76	.00	388.76
203.638 Joseph City High School Class of 2025	326.32	.00	.00	326.32	.00	326.32
500.300 Districtwide UNDESIGNATED	(124.74)	.00	.00	(124.74)	.00	(124.74)

Student Activities Summary Report

Fiscal Year: 2021-2022

From: 3/1/2022 **To: 3/31/2022**

☐ Print Detail ☐ Page Break by Activity

☐ Exclude Encumbrances ☑ Reverse Signs ☐ Subtotal By Journal

	Range Beg. Balance	Range Revenue	Range Expenditures	Balance	Encumbrances	Available Balance
500.600 Districtwide UNDESIGNATED	(66.79)	.00	.00	(66.79)	.00	(66.79)
GRAND TOTALS	47,720.22	3,762.80	(1,888.71)	49,594.31	(340.97)	49,253.34

End of Report

4.C. **Acceptance of Donations**

- Donors Choose award to Diedra Smith classroom - 4 iPads; Value $1,722.56
- Donors Choose award to Diedra Smith classroom - Seating Rug, 25 Chairs; Value $988.81
- Donors Choose Award to Dan Bushman classroom - 3 laptops with keyboards; Value $792.41
- Donors Choose Award to Jess Bushman classroom - Stream table for studying erosion; Value $500
- Donors Choose Award to Andy Foree classroom - LED stage lighting; Value $1,100

4.D. **Ratification of Elementary School Fundraiser "School-Store"**

This fundraising project allows parents to purchase their normal everyday products from places such as Walmart through the "School-Store" which then reimburses a small percentage back to the Elementary school.

School Profit Earnings

School Profit From Current Email Program:	$198.87
Profit Balance Available	**$198.87**

Request Check

Caring For Classrooms Gift Card Donations

Number of Gift Cards Donated:	163
Value of Gift Cards Donated:	$5235.00

2021-22 School Email Activity Summary

Participating Students:	143
Email Invitations Sent:	1056
Total Products Purchased:	$1490.65
Total Profits Earned:	$198.87
Total Gift Cards Donated:	$5235.00
Total School Rewards:	$5433.87
School Rewards Per Student:	$38.00

2021-22 School Email Activity Detail

Grade	Number Participating Students	Products Purchased	Amount Earned	Gift Cards Donated
Grade K	16	$86.95	$16.10	$615.00
Grade 01	19	$156.82	$19.67	$770.00
Grade 02	25	$418.55	$44.17	$915.00
Grade 03	22	$294.69	$42.00	$755.00
Grade 04	33	$162.90	$21.96	$1370.00
Grade 05	21	$304.74	$45.73	$465.00
Grade 08	1	$0.00	$0.00	$0.00
Grade PK	6	$66.00	$9.24	$345.00

5. **PERSONNEL REQUESTS (*)**

Discussion and possible action to approve employee assignments, approve volunteers and accept employee resignations.

5.A. **Possible Disciplinary Action of Employee - Jim Stradling**

5.B. **Employee Renewals, Volunteers, Employee Resignations**

Discussion and possible action to approve employee renewals, approve volunteers and accept employee resignations.

RENEWALS:
Support Staff, Management Team, Classified Specialists (See attached lists)

VOLUNTEERS:
Annelie Hansen

RESIGNATIONS:
Brenda Bryant - Teacher

Employee Work Assignment/Contract Renewals
FY2022-23

Support Staff

Agnew	Coretta	Instructional Aide II
Balda	Jody	Pool Manager
Banford	Amy	Instructional Aide II
Buckley	Shealyn	Secretary I - Jr/Sr High School
Castellano	Kory	Teacher Assistant II
Colligon	Brian	Bus Driver
Colligon	Brian	Custodian
Colligon	Drew	Instructional Aide II
Combs	Darcy	Instructional Aide III
Farnes	Mitchell	Technology Specialist
Farr	Stephanie	Finance Specialist II
Fields	Bridger	Lifeguard
Fischer	Hayden	Lifeguard
Fish	Rhiannon	Secretary II - Special Education
Frost	Brooke	Instructional Aide II
Gayer	Lisa	Instructional Aide I
Grant	Ashley	Instructional Aide I
Hardy	Desiree	Instructional Aide I
Hayes	Sarah	Instructional Aide I
Hutchens	Cara	Instructional Aide II
Hutchens	Neleigha	Instructional Aide I
James	Rosita	Custodian
Jensen	Mary	Custodian
Johnston	Tiffanny	Health Aide
Johnstun	Aaron	Instructional Aide I / Teacher Asst II
Johnstun	Dana	Receiving Clerk
Johnstun	Spencer	Bus Driver
Kinlicheenie	Latrell	Seasonal Skilled Worker I
Krebs	Gerard	Bus Driver
Krebs	Gerard	Maintenance Tech I
Larsen	Robert	Pool Manager
Layden	Caleb	Seasonal Skilled Worker I
Miller	Amy	Teacher Assistant II
Miller	Kylie	Pool Assistant Manager
Morris	Charmayne	Substitute Custodian
Moss	Jocelyn	Bus Aide
Nells	Selena	Finance Specialist II
Paddock	Darlene	Bus Driver
Pugh	Robert	Substitute Bus Driver
Randall	Julie	Instructional Aide II/NAVIT Tech
Rice	Tyler	Auditorium Manager

Rogers	Kelly	Custodian
Rush	Hailey	Campus Aide
Smith	Anna	Seasonal Skilled Worker I
Smith	Tyson	Maintenance Tech II / Mechanic
Strong	Julie	Admin Assistant - Superintendent / Board
Taylor	Lorraine	Accompanist
Westover	Jennifer	Secretary II - Jr/Sr High School
Whetten	Anthony	Teacher Assistant III
Young	Claire	Instructional Aide III
Young	Irene	Custodian
Young	Judy	Seasonal Skilled Worker I

Management Team and Classified Specialists

Miller	Eric	Jr/Sr High School Principal
Mosier	Darrel	Elementary Principal
Fields	Bryan	Superintendent
Gardner	Jason	Technology Coordinator
Mills	Julie	Data Specialist / Librarian
Mills	Steven	Business Manager
Neal	Brad	Maintenance Coordinator
Johnstun	Terry	Custodial Coordinator / Asset Control
Diaz	Deo	Transportation Coodinator

6. **ACTION ITEMS**

6.A. Approve Out of State Travel for Qualifying Students and Chaparones to Compete in Future Business Leaders of America (FBLA) Nationals in Chicago, IL

FBLA Arizona NLC 2022 – Chicago, IL

Hotel Information: Palmer House A Hilton Hotel Address: 17 E Monroe Street Chicago, IL 60603

Monday, June 27 (casual dress, wear you FBLA school shirt)

- Travel Day
- Missey Goodman will pick up registration for all Arizona
- Pick up Pizza gift card and NLC Registration (meeting room TBD)

Tuesday, June 28 (Casual dress, wear your Arizona FBLA NLC shirt)

- **Excursion #1 Shedd Aquarium, Navy Pier, The Bean (on your own)**
- **Excursion #2 360 at Willis Tower & 2-hour Double Decker Bus Tour (on your own)**
- **Excursion #3 Chicago Cubs Game and Dinner (5:00 pm departure from hotel)**

Wednesday, June 29 (professional dress all day)

- NLC Competitive Events, Workshops, & Expo Hall - Day 1 (8:30 AM – 6:30 PM)
- NLC Opening Session (6:30 PM – 8:30 PM)

Thursday, June 30 (professional dress for competition, casual for Blue Man Group)

- NLC Competitive Events, Workshops, & Expo Hall - Day 2 (8:00 AM – 5:30 PM)
- **Excursion #4 Blue Man Group and Dinner (5:30 PM departure from hotel)**

Friday, July 1 (professional dress all day)

- NLC Competitive Events, Workshops, & Expo Hall - Day 3 (8:00 AM – 6:00 PM)
- Arizona Delegation Meeting (time and location TBD)
- Awards of Excellence Part 1 (6:30 PM – 8:30 PM)

Saturday, July 2 (casual for celebration luncheon, Award of Excellence professional dress)

- Annual Delegation Meeting & Celebration Luncheon (11:00 PM – 2:00 PM) - Luncheon Cruise (meet in lobby at 10:30????)
- NLC Awards of Excellence (6:30 PM – 9:00 PM)

Sunday, July 3 (casual dress, wear your FBLA NLC shirt)

- Travel Day

NLC 2022 – Breakdown of Arizona Expenses (per person)
June 27 – July 2, 2022
Chicago, Illinois

Arizona Base Package					
	SINGLE	**DOUBLE**	**TRIPLE**	**QUAD**	**GUEST**
6 Nights Hotel	$1,614.00	$807.00	$586.00	$440.00	
NLC & State Registration (includes insurance, and 1 lunch July 2)	$400.00	$400.00	$400.00	$400.00	$305.00
TOTAL	**$2,014.00**	**$1,207.00**	**$986.00**	**$840.00**	**$305.00**

Arizona Optional Packages	
Chicago Cubs Game *(transportation, dinner, and Cubs admission)*	$75.00
Shedd Aquarium *(admission)*	$30.00
2-hour Double Decker bus & 360 Chicago at Willis Tower	$75.00
Blue Man Group (admission and Dinner)	$100.00
TOTAL OPTIONAL PACKAGE:	$280.00

****Registration must be submitted through the FBLA Arizona online system no later than May 4, 2022.**

****All remaining fees are due to FBLA Arizona no later than May 20, 2022.**

6.B. **Approve a Requirement for Junior-Senior High School Students to Wear Physical Education Uniforms**

Students would be responsible to purchase and wear Physical Education uniforms in grades 6th - 12th. If approved as presented, this will go into effect starting with the 2022 - 2023 school year.

6.C. **Approve Employee Benefits and Health Insurance for 2022-23**

Employee Benefits | 2022-23

Joseph City Schools
Tradition of Excellence

Joseph City Unified School District offers a comprehensive benefits package to enhance the total compensation of its staff. This package includes employer paid medical, life and disability insurance, participation in the Arizona State Retirement System, optional dental and vision plans, performance pay and professional development opportunities, as well as paid holidays and leave.

Summary of Benefits

Employee Group	Health Insurance	Dental, Vision, Additional Life	Life Insurance	Disability Insurance	Arizona State Retire. System	Paid Vacation Leave	Paid Personal/ Sick Leave	Other Paid Leave	Paid Holidays	Tuition Assist
Teachers | Certified Specialists										
Benefit	Yes District pays: 100% for employee $1,980 for families $1,500 to HSA	Yes Available at employee's expense	Yes $50,000 District pays 100%	Yes District provides long and short term	Yes Contribution shared by District and Employee	No	Yes Up to 96 hours per year	Yes Professional, Bereavement	No Salary spread evenly over all days	Yes
Eligibility	Must work at least 30 hours per week	Must work at least 30 hours per week	Must work at least 20 hours per week	Must work at least 20 hours per week for 20 weeks	Must work at least 20 hours per week for 20 weeks	None	Prorated for part-time schedule	Prorated for part-time schedule	None	Employed two years; subject to approval
Support Staff | Classified Specialists										
Benefit	Yes District pays: 100% for employee $1,980 for families $1,500 to HSA	Yes Available at employee's expense	Yes $50,000 District pays 100%	Yes District provides long and short term	Yes Contribution shared by District and Employee	10 days 1st year / 15 days 8th year / 20 days 17th year	Yes Up to 136 hours per year	Yes Professional, Bereavement	Yes Up to 12 days per year	Yes
Eligibility	Must work at least 30 hours per week	Must work at least 30 hours per week	Must work at least 20 hours per week	Must work at least 20 hours per week for 20 weeks	Must work at least 20 hours per week for 20 weeks	Must work 12 months per year	Must work at least 30 hours per week for Personal Leave	Prorated for part-time schedule	Prorated for part-time schedule	Employed two years; subject to approval
Substitutes | Seasonal | Temporary | Extra Duty										
Benefit	No	No	No	No	No	No	Yes Up to 40 hours per year Sick Leave	No	No	No
Eligibility	None	None	None	None	None	None	All employees	None	None	None

Joseph City Unified School District
Health & Welfare Benefit Plans

Fiscal Year 2022-23

The following benefit programs are recommended for approval for the 2022-23 Plan Year:

1. Medical Plan

- Continue to offer medical coverage through Kairos.
- Continue to offer the Copay Plan, HDHP 1500 and HDHP 2500 plans.
- The district will fund $590.00 per employee per month ($7,080 per year) toward the Copay Plan and HDHP 1500 base premium. The HDHP 2500 premium will be funded at $569.00 per employee per month ($6,828 per year).
    - District HSA contribution will continue to be $1,500 per employee per year for those enrolled in either HDHP 1500 or HDHP 2500
    - The 2022-23 rates represent an increase of +5.0% from current. Total cost to the district for rate increases and HSA contribution increase is estimated at $14,448 per year.
- The district will continue to fund an additional $165.00 per employee per month ($1,980 per year) toward the Copay Plan and HDHP 1500 plans for Spouse, Children and Family plan premiums. The district will fund an additional $185.00 per employee per month ($2,220 per year) toward the HDHP 2500 plan for Spouse, Children and Family plan premiums. Total cost to the district is estimated at $23,760 per year. This is budget neutral compared to FY21/22.
- Allow employees to re-direct any or all of their district HSA contribution to offset the employee's share of premiums.
- Continue to allow employees to opt out of Medical Plan coverage if they qualify for coverage elsewhere. The buy-out amount paid to employee by the district is $1,500 per year. There is no increase in the cost to the district per employee compared to FY12/22.
- **Total increased cost to the district is estimated at $14,448 per year.**

Comments:

The Copay Plan had 4 changes:

- Primary Care copay increased to $25 (from $20)
- Specialist Visit copay increased to $50 (from $40)
- Urgent Care copay increased to $50 (from $40)
- Mail Order generic copay decreased to $20 (from $25)

Both HDHP 1500 and HDHP 2500 plans had 1 change:

- Mail-Order generic copay decreased to $20 (from $25) after deductible

2. Dental Plan

- Continue to offer the existing dental plan with Kairos.
- The 2022-23 rates represent a +0.0% increase.
- No plan design changes versus the District's current plan(s)
- Allow employees to re-direct any or all of their district HSA contribution to offset the employee's share of premiums.

Comments:

The dental plan renewal is based on the entire Kairos pool of participants. The plan is voluntary so any increased cost will be absorbed by the employees via payroll deduction.

3. Vision Plan

- Continue to offer the existing dental plan with Superior Vision.
- The 2022-23 rates represent a +0.0% increase as the 22/23 plan year is the 2nd of a 4 year rate guarantee.
- No plan design changes versus the District's current plan(s).
- Allow employees to re-direct any or all of their district HSA contribution to offset the employee's share of premiums.

Comments:

The vision plan is voluntary so any increased cost will be absorbed by the employees via payroll deduction.

4. Basic Life & ADD Plan

- Continue to offer the Basic Life & ADD Plan through Kairos (underwritten by MetLife).
- The 2022-23 rates represent a budget change of +0.0% from current.
- No plan design changes versus the District's current plan(s).

5. Short Term Disability Plan

- Continue to offer the Short-Term Disability Plan through Equitable.
- The 2022-23 rates represent a +0.0% increase as the 22/23 plan year is the 2nd of a 2 year rate guarantee.
- No plan design changes versus the District's current plan(s).

6. Supplemental Life Insurance / Tax Sheltered Savings Plans

- The district offers other tax-sheltered savings plans to employees at no cost to the district.

Health Insurance Rates
2022-23

Plan	No. of Employees Enrolled	Total Monthly Rate	District Monthly Contribution for Employee Coverage	District Monthly Contribution for Family Coverage	Employee Monthly Cost	Employee Cost per Pay Period	Annual Employee Cost	Monthly Employee Cost Increase over FY22
Medical Copay Plan								
Employee only	7	$667.00	$590.00	$0.00	$77.00	$35.54	$924.00	$4.00
Employee + Spouse	0	$1,332.00	$590.00	$165.00	$577.00	$266.31	$6,924.00	$35.00
Employee + Child(ren)	1	$1,246.00	$590.00	$165.00	$491.00	$226.62	$5,892.00	$31.00
Employee + Family	0	$1,433.00	$590.00	$165.00	$678.00	$312.92	$8,136.00	$40.00
Medical HDHP 1500								
HSA Contribution $1500/yr								
Employee only	24	$590.00	$590.00	$0.00	$0.00	$0.00	$0.00	$0.00
Employee + Spouse	1	$1,180.00	$590.00	$165.00	$425.00	$196.15	$5,100.00	$28.00
Employee + Child(ren)	5	$1,104.00	$590.00	$165.00	$349.00	$161.08	$4,188.00	$25.00
Employee + Family	5	$1,268.00	$590.00	$165.00	$513.00	$236.77	$6,156.00	$32.00
Medical HDHP 2500								
HSA Contribution $1500/yr								
Employee only	0	$569.00	$569.00	$0.00	$0.00	$0.00	$0.00	$0.00
Employee + Spouse	0	$1,138.00	$590.00	$185.00	$363.00	$167.54	$4,356.00	$26.00
Employee + Child(ren)	0	$1,065.00	$590.00	$185.00	$290.00	$133.85	$3,480.00	$23.00
Employee + Family	0	$1,224.00	$590.00	$185.00	$449.00	$207.23	$5,388.00	$30.00
Dental - Kairos								
Employee only		$41.00	$0.00	$0.00	$41.00	$18.92	$492.00	$0.00
Employee + Spouse		$83.00	$0.00	$0.00	$83.00	$38.31	$996.00	$0.00
Employee + Child(ren)		$69.00	$0.00	$0.00	$69.00	$31.85	$828.00	$0.00
Employee + Family		$107.00	$0.00	$0.00	$107.00	$49.38	$1,284.00	$0.00
Vision - Superior Vision								
Employee only		$5.53	$0.00	$0.00	$5.53	$2.55	$66.36	$0.00
Employee + Spouse		$11.06	$0.00	$0.00	$11.06	$5.10	$132.72	$0.00
Employee + Child(ren)		$12.98	$0.00	$0.00	$12.98	$5.99	$155.76	$0.00
Employee + Family		$19.90	$0.00	$0.00	$19.90	$9.18	$238.80	$0.00

Employee Paid Leave Guide | 2022-23

Joseph City Schools
Tradition of Excellence

Employee Group	Work hours per week	Leave hours earned per pay period					Maximum hours earned per year					Maximum possible accumulated hours		
		Sick	Per-sonal	Annual (years of service)			Sick	Per-sonal	Annual (years of service)			Sick	EIB	Annual 0-7 yrs 8-16 yrs 17+ yrs
				0 to 7	8 to 16	17+			0 to 7	8 to 16	17+			
Teachers | Certified Specialists														
Full time		2.34	4.50				40	56				40	1000	
Half time		1.17	2.25				40	28				40	1000	
Support Staff														
Classified 12-Month	40	2.67	6.50	3.30	5.00	6.60	40	96	80	120	160	40	1000	160 240 320
Classified 12-Month	30	2.00	4.88	2.48	3.72	5.00	40	72	60	90	120	40	1000	160 240 320
Classified 12-Month	1-29	1 hr for every 30 hrs worked					40					40		
Classified 10-Month	40	2.67	5.00				40	64				40	1000	
Classified 10-Month	30	2.00	3.80				40	48				40	1000	
Classified 10-Month *Extended*	40	2.67	4.50				40	56				40	1000	
Classified 10-Month	1-29	1 hr for every 30 hrs worked					40					40		
Substitutes | Seasonal | Temporary | Extra Duty														
At-Will	Any	1 hr for every 30 hrs worked					40					40		
Administrators														
Certified	40	2.67	5.50	6.70	6.70	6.70	40	80	160	160	160	40	1000	320
Classified	40	2.67	6.50	6.70	6.70	6.70	40	96	160	160	160	40	1000	320

Q&A

What can I use my leave for and how do I request leave?
The Leave Policy and Procedures Guide can be found on the Staff page of our District website at **jcusd.org/staff**. Click on the Employment Info menu, then Benefits.

How do I earn EIB (Earned Illness Bank) hours?
Only Teachers, Certified Specialists, Support Staff and Administrators who work 30 hours or more per week are elligible for EIB. EIB is earned only when unused Personal Leave and unused Sick Leave hours are moved into EIB on June 30 each year by the District Office.

How much Annual Leave can save up?
The maximum possible accumulated hours for Annual leave is two times your maximum hours earned per year.

I can't find an Employee Group or Work Hours Per Week in the chart above that fits my job. How can I figure out my leave?
If your assignment is based on an **extended** Duty Calendar or has different work hours per week than those listed above, your Personal and Annual leave hours earned per pay period and your maximum hours earned per year will be prorated proportionately. Here's a quick way to estimate. ***Example:*** *Maximum Personal Leave hours earned per year for Classified 10 month employee working 35 hours a week... (Use 40 hr per week employee as a baseline) 64 hrs per year divided by 40 hrs mulitplied by 35 hrs =* ***56 hrs Personal Leave per year***

6.D. **Approve Fee Schedule for Community Use of School Facilities**

These are the fees charged to use facilities for the upcoming swimming pool season and for the next school year.

COMMUNITY USE OF
SCHOOL FACILITIES

SCHOOL FACILITIES USER FEES

Class I ***Fees*** No charge for District Mission related use.

School-sponsored activities	Teacher Organizations
School Clubs	P.T.A. / Organizations
Boy Scouts	Booster clubs
Girl Scouts	Arizona Youth Soccer Organization
Little League Program	

Class II ***Fees*** See below

Community college	Civic organizations
Community-sponsored concerts	Educational organizations
Churches	Government organizations
Recitals	Service organizations
Cultural organizations	Extended day resource programs
Other nonprofit groups	

Class III ***Individual User Fees*** See below

Class IV ***Fees*** See below

Commercial or profit-making organizations

Facility	**Class II/III**	**Class IV**
Classroom-Standard	$ 15.00 per hour	$ 20.00 per hour
Board room	$ 20.00 per hour	$ 25.00 per hour
Computer lab	$ 30.00 per hour	$ 60.00 per hour
Specialized classroom	$ 25.00 per hour	$ 50.00 per hour
Auditorium*	$ 50.00 per hour *2 hour minimum*	$ 100.00 per hour *2 hour minimum*
Gymnasium High school and elementary	$ 45.00 per hour	$ 70.00 per hour
Gymnasium - Old	$ 20.00 per hour	$ 40.00per hour
High school/elementary Cafeteria and kitchen*	$ 30.00 per hour *2 hour minimum*	$ 70.00 per hour *2 hour minimum*
High school/elementary Cafeteria only	$ 20.00 per hour *2 hour minimum*	$ 60.00 per hour *2 hour minimum*

Football stadium w/o lights	$ 40.00 per hour *2 hour minimum*	$ 70.00 per hour *2 hour minimum*
Football stadium with lights	$ 70.00 per hour *2 hour minimum*	$ 100.00 per hour *2 hour minimum*
Outdoor playfield w/o lights	$ 40.00 per hour *2 hour minimum*	$ 70.00 per hour *2 hour minimum*
Pool*	$ 60.00 per hour *2 hour minimum*	$ 100.00 per hour *2 hour minimum*
Activity/Multipurpose room	$ 45.00 per hour	$ 60.00 per hour

* Requires personnel on-site - extra charges apply.

Pool Rates:

Lessons- $25.00 a session per student

Lap Swim and Special Classes- $25.00 per person per month (Change to $35 a month)

Open Swim Sessions- $2.00 per person per entry

Family Pass- $100 per year for one household pass into all open swim sessions held on afternoons and nights.

Racquetball:

$15 per person a month and must be paid thru December 31 each year. This will be prorated down each month according to the time of the year that the payment is made.

Fitness Club:

$140 per person per year and goes through December 31. This will be prorated down to $70.00 starting July 1. Fitness club membership provides access to the racquetball courts, lap swim/special classes, morning basketball, and the weight room (when available). Facilities will only be opened at designated times and when they do not conflict with school activities. Facility times and dates are subject to change no refunds are allowed.

Goods and Services Contributed

A person, group or organization may contribute goods or render services as full or partial payment of the user fee. The value of the goods will be determined by the District based upon established market price, trade in value, posted prices or where these methods prove impractical, appraisal or barter may be employed so long as the procedure is advantageous to the District. The value of services rendered shall be based upon the hourly wages of a beginning employee of this or another Arizona School District performing similar functions as determined by the District. Should disagreement between the contributor and the District occur as to the value of the goods or services offered, the District reserves the right to refuse to accept the offer.

6.E. **Approve Increase in Hourly Rate Paid to Certified Summer Teachers**

It is recommended that the hourly rate paid for certified summer program teachers be increased from the $25 current hourly rate, to $30 per hour starting this summer.

7. DISCUSSION ITEMS

The Governing Board will not vote on Discussion Items and any action taken as a result of this discussion will be limited to directing staff to study the matter or scheduling the matter for a future agenda.

7.A. **Discuss Status of ESSER Funds, Other Funding Sources and Related Budget Issues**

ESSER/COVID Funds
7/1/2020 through 4/12/2022

Expenditures & Encumbrances

Personnel	$	398,657
Supplies, equipment, technology		305,207
Utilities		17,153
Insurance		5,000
Buses, vehicles		212,225
Indirect costs		9,929
TOTAL expenditures & encumbrances	**$**	**948,172**
Grant Award	**$**	**2,188,433**
Uncommitted Funds	*$*	*1,240,261*

Override Funds
FY21-22

Expenditures & Encumbrances

Personnel (maintain salaries & benefits)	$	274,488
Personnel (maintain class sizes)		175,000
Technology		90,000
Curriculum materials		89,000
TOTAL expenditures & encumbrances	**$**	**628,488**

8. **INFORMATION ITEMS**

8.A. **Requests for Future Agenda Items**

This agenda item is for the Governing Board to have a running record of potential items to be placed on future agendas. There will be no discussion on the substance, merits, or issues relating to the proposed agenda item.

8.B. **Upcoming Meetings and Events Calendar**

- Next Regular Board Meeting - May 10th, 2022; 6:00 p.m.

9. **ADJOURNMENT**

Call to adjourn the meeting