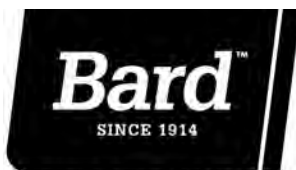

OPERATION INSTRUCTIONS

ENERGY RECOVERY VENTILATOR WITH EXHAUST

**Models: 920-0074 QWSERV
 920-0138 QWSERV
 with Intelligent Defrost**

**For Use With Bard
2 Through 5 Ton
QW*S Series**



Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
Since 1914...Moving ahead, just as planned.

Manual: 2100-533D
Supersedes: 2100-533C
File: Volume II, Tab 14
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BARD MANUFACTURING COMPANY, INC.
BRYAN, OHIO USA 43506

ELECTRICAL SPECIFICATIONS

| Model | Voltage | Amps | Control Voltage |
|----------|-----------|------|-----------------|
| 920-0074 | 230 / 208 | 2.2 | 24V |

| Model | For Use with the Following Units |
|----------|----------------------------------------------------------------------|
| 920-0074 | QW2S-A, -B, -C QW3S-A, -B, -C QW4S-A, -B, -C QW5S-A, -B, -C |

GENERAL DESCRIPTION

The Energy Recovery Ventilator was designed to provide energy efficient, cost effective ventilation to meet I. A. Q. (Indoor Air Quality) requirements while still maintaining good indoor comfort and humidity control for a variety of applications such as schools, classrooms, lounges, conference rooms, beauty salons and others. It provides a constant supply of fresh air for control of airborne pollutants including CO₂, smoke, radon, formaldehyde, excess moisture, virus and bacteria.

The ventilator incorporates patented rotary heat exchange state-of-the-art technology to remove both heat & moisture and provides required ventilation to meet the requirements of ASHRAE 62.1 standard.

It is designed as a single package which is factory installed. The package consists of a unique rotary Energy Recovery Cassette that can be easily removed for cleaning or maintenance. It has two 15-inch diameter heat transfer wheels for efficient heat transfer. The heat transfer wheels use a permanently bonded dry desiccant coating for total heat recovery.

Ventilation is accomplished with 2 blower/motor assemblies each consisting of a drive motor and dual blowers for maximum ventilation at low sound levels. Motor speeds can be adjusted so that air is exhausted at the same rate that fresh air is brought into the structure thus not pressuring the building. The rotating energy wheels provide the heat transfer effectively during both summer and winter conditions.

NOTE: Operation is not recommended below 5°F outdoor temperature because freezing of moisture in the heat transfer wheel can occur.

920-0138 WITH INTELLIGENT DEFROST

This model is equipped with a thermostat which is sensing the intake ventilation air. It is factory set to initiate a defrost sequence when operations are below 10°F. This defrost time is set for a 4-minute defrost for every 32 minutes of ERV operation. This control circuit controls the intake damper assembly allowing the ERV to operate with zero intake air to allow conditioned room air to defrost the cassette wheels.

CONTROL REQUIREMENTS

1. Indoor blower motor must be run whenever the ERV is run.
2. Select the correct motor speed on the ERV. Using Table 1 of the ERV Installation Instructions determine the motor speed needed to get the desired amount of ventilation air needed. For instance, do not use the high speed tap on a ERV if only 200 CFM of ventilation air is needed. Use the low speed tap. Using the high speed tap would serve no useful purpose and would effect the overall efficiency of the air conditioning system. System operation costs would also increase.
3. Run the ERV only during periods when the conditioned space is occupied. Running the ERV during unoccupied periods wastes energy, decreases the expected life of the ERV, and can result in a large moisture buildup in the structure. The ERV can remove up to 60 to 70% of the moisture in the incoming air, not 100% of it. Running the ERV when the structure is unoccupied allows moisture to build up in the structure because there is little or no cooling load. Thus, the air conditioner is not running enough to remove the excess moisture being brought in. Use a control system that in some way can control the system based on occupancy.

NOTE: The Energy Recovery Ventilator is NOT a dehumidifier.



IMPORTANT

Operating the ERV during unoccupied periods can result in a build up of moisture in the classroom.

RECOMMENDED CONTROL SEQUENCES

Several possible control scenarios are listed below:

1. Use a programmable electronic thermostat with auxiliary terminal to control the ERV based on daily programmed occupancy periods. Bard markets and recommends Bard Part No. 8403-060 programmable electronic thermostat for heat pump applications.
2. Use a motion sensor in conjunction with a mechanical thermostat to determine occupancy in the classroom. Bard markets the CS2000A for this use.
3. Use a DDC control system to control the ERV based on a room occupancy schedule.
4. Tie the operation of the ERV into the light switch. The lights in a room are usually on only when occupied.
5. Use a manual timer that the occupants turn to energize the ERV for a specific number of hours.
6. Use a programmable mechanical timer to energize the ERV and indoor blower during occupied periods of the day.
7. Use Bard Part No. 8403-056 CO₂ controller for “on-demand” ventilation.

CONTROL WIRING

The QWSERV comes wired in the low voltage control circuit from the factory.

With the “X” Remote Thermostat Option, it is default wired into the “A” terminal, which drives the vent to operate only during occupied periods when using a Bard 8403-060 or CS9B Series thermostats. If you prefer for the QWSERV to operate anytime the blower is operational, you will need to install a jumper wire from “G” to “A”. If you prefer to use Bard 8403-067 CO₂ controller to make the ventilation “on-demand”, there is a connection adjacent to the thermostat connections in the unit upper right-hand corner, and is marked to match CO₂ controller connections. Furthermore, disconnect and tape off the wire as shown in Figure 4 and you will need to field set the CO₂ sensor jumpers per Figure 5.

With the “D” Door Mounted Thermostat Option, the thermostat is already connected and programmed to operate the QWSERV only during occupied periods.

With the “H” Door Mounted Thermostat and CO₂ controller, the unit is ready to go with “on-demand” ventilation as controlled by the CO₂ controller.

VENTILATION AIRFLOW

The ERV is equipped with a 3-speed motor to provide the capability of adjusting the ventilation rates to the requirements of the specific application by simply changing motor speeds.

**TABLE 1
VENTILATION AIR (CFM)**

| CFM | High Speed (Black) | Medium Speed (Blue) | Low Speed (Red) |
|-----|--------------------|---------------------|-----------------|
| | 450 | 375 | 300 |

The ERV units are wired from the factory on medium intake and low exhaust speeds. The ERV is equipped with independently controlled 3-speed motor to provide the capability of adjusting the ventilation rates to the requirements of the specific application and to be able to provide positive pressure in the structure. This is accomplished by setting the intake blower on a higher speed than the exhaust blower.

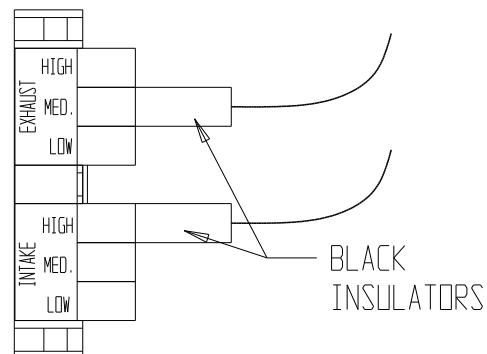
WARNING

Open disconnect to shut all power OFF before doing this. Failure to do so could result in injury or death due to electrical shock.

Moving the speed taps located in the control panel can change the blower speed of the intake and exhaust. See Figure 1.

**FIGURE 1
BLOWER SPEED ADJUSTMENT**

- TO ADJUST INTAKE AND EXHAUST BLOWER SPEEDS
1. DISCONNECT POWER TO UNIT
 2. REMOVE ERV CONTROL PANEL COVER
 3. MOVE BLACK INSULATOR TO DESIRED SPEED ON TERMINAL CONNECTOR



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MIS-2120

PERFORMANCE AND APPLICATION DATA

**TABLE 2
SUMMER COOLING PERFORMANCE
(INDOOR DESIGN CONDITIONS 75°DB/62°WB)**

| Ambient O.D. | DB/WB | F | VENTILATION RATE 450 CFM 65% EFFICIENCY | | | | | VENTILATION RATE 375 CFM 66% EFFICIENCY | | | | | VENTILATION RATE 300 CFM 67% EFFICIENCY | | | | | | | |
|-----------------|-------|---|--------------------------------------------|-------|-------|-------|------|--------------------------------------------|-------|-------|-------|-------|--------------------------------------------|-------|-------|------|-------|-------|------|-------|
| | | | VLT | VLS | VLL | HRT | HRS | HRL | VLT | VLS | VLL | HRT | HRS | HRL | VLT | VLS | VLL | HRT | HRS | HRL |
| 105 | 75 | | 21465 | 14580 | 6884 | 13952 | 9477 | 4475 | 17887 | 12150 | 5737 | 11805 | 8018 | 3786 | 14310 | 9720 | 4590 | 9587 | 6512 | 3075 |
| | 70 | | 14580 | 14580 | 0 | 9477 | 9477 | 0 | 12150 | 12150 | 0 | 8018 | 8018 | 0 | 9720 | 9720 | 0 | 6512 | 6512 | 0 |
| | 65 | | 14580 | 14580 | 0 | 9477 | 9477 | 0 | 12150 | 12150 | 0 | 8018 | 8018 | 0 | 9720 | 9720 | 0 | 6512 | 6512 | 0 |
| 100 | 80 | | 31590 | 12150 | 19440 | 20533 | 7897 | 12635 | 26325 | 10125 | 16200 | 17374 | 6682 | 10692 | 21060 | 8100 | 12960 | 14110 | 5427 | 8683 |
| | 75 | | 21465 | 12150 | 9314 | 13952 | 7897 | 6054 | 17887 | 10125 | 7762 | 11805 | 6682 | 5123 | 14310 | 8100 | 6210 | 9587 | 5427 | 4160 |
| | 70 | | 12352 | 12150 | 202 | 8029 | 7897 | 131 | 10293 | 10125 | 168 | 6793 | 6682 | 111 | 8235 | 8100 | 135 | 5517 | 5427 | 90 |
| | 65 | | 12150 | 12150 | 0 | 7897 | 7897 | 0 | 10125 | 10125 | 0 | 6682 | 6682 | 0 | 8100 | 8100 | 0 | 5427 | 5427 | 0 |
| | 60 | | 12150 | 12150 | 0 | 7897 | 7897 | 0 | 10125 | 10125 | 0 | 6682 | 6682 | 0 | 8100 | 8100 | 0 | 5427 | 5427 | 0 |
| 95 | 80 | | 31590 | 9720 | 21870 | 20533 | 6318 | 14215 | 26325 | 8100 | 18225 | 17374 | 5345 | 12028 | 21060 | 6480 | 14580 | 14110 | 4341 | 9768 |
| | 75 | | 21465 | 9720 | 11744 | 13952 | 6318 | 7634 | 17887 | 8100 | 9787 | 11805 | 5345 | 6459 | 14310 | 6480 | 7830 | 9587 | 4341 | 5246 |
| | 70 | | 12352 | 9720 | 2632 | 8029 | 6318 | 1711 | 10293 | 8100 | 2193 | 6793 | 5345 | 1447 | 8235 | 6480 | 1755 | 5517 | 4341 | 1175 |
| | 65 | | 9720 | 9720 | 0 | 6318 | 6318 | 0 | 8100 | 8100 | 0 | 5345 | 5345 | 0 | 6480 | 6480 | 0 | 4341 | 4341 | 0 |
| | 60 | | 9720 | 9720 | 0 | 6318 | 6318 | 0 | 8100 | 8100 | 0 | 5345 | 5345 | 0 | 6480 | 6480 | 0 | 4341 | 4341 | 0 |
| 90 | 80 | | 31590 | 7290 | 24300 | 20533 | 4738 | 15794 | 26325 | 6075 | 20250 | 17374 | 4009 | 13365 | 21060 | 4860 | 16200 | 14110 | 3256 | 10854 |
| | 75 | | 21465 | 7290 | 14175 | 13952 | 4738 | 9213 | 17887 | 6075 | 11812 | 11805 | 4009 | 7796 | 14310 | 4860 | 9450 | 9587 | 3256 | 6331 |
| | 70 | | 12352 | 7290 | 5062 | 8029 | 4738 | 3290 | 10293 | 6075 | 4218 | 6793 | 4009 | 2784 | 8235 | 4860 | 3375 | 5517 | 3256 | 2261 |
| | 65 | | 7290 | 7290 | 0 | 4738 | 4738 | 0 | 6075 | 6075 | 0 | 4009 | 4009 | 0 | 4860 | 4860 | 0 | 3256 | 3256 | 0 |
| | 60 | | 7290 | 7290 | 0 | 4738 | 4738 | 0 | 6075 | 6075 | 0 | 4009 | 4009 | 0 | 4860 | 4860 | 0 | 3256 | 3256 | 0 |
| 85 | 80 | | 31590 | 4860 | 26730 | 20533 | 3159 | 17374 | 26325 | 4050 | 22275 | 17374 | 2672 | 14701 | 21060 | 3240 | 17820 | 14110 | 2170 | 11939 |
| | 75 | | 21465 | 4860 | 16605 | 13952 | 3159 | 10793 | 17887 | 4050 | 13837 | 11805 | 2672 | 9132 | 14310 | 3240 | 11070 | 9587 | 2170 | 7416 |
| | 70 | | 12352 | 4860 | 7492 | 8029 | 3159 | 4870 | 10293 | 4050 | 6243 | 6793 | 2672 | 4120 | 8235 | 3240 | 4995 | 5517 | 2170 | 3346 |
| | 65 | | 4860 | 4860 | 0 | 3159 | 3159 | 0 | 4050 | 4050 | 0 | 2672 | 2672 | 0 | 3240 | 3240 | 0 | 2170 | 2170 | 0 |
| | 60 | | 4860 | 4860 | 0 | 3159 | 3159 | 0 | 4050 | 4050 | 0 | 2672 | 2672 | 0 | 3240 | 3240 | 0 | 2170 | 2170 | 0 |
| 80 | 75 | | 21465 | 2430 | 19035 | 13952 | 1579 | 12372 | 17887 | 2025 | 15862 | 11805 | 1336 | 10469 | 14310 | 1620 | 12690 | 9587 | 1085 | 8502 |
| | 70 | | 12352 | 2430 | 9922 | 8029 | 1579 | 6449 | 10293 | 2025 | 8268 | 6793 | 1336 | 5457 | 8235 | 1620 | 6615 | 5517 | 1085 | 4432 |
| | 65 | | 4252 | 2430 | 1822 | 2764 | 1579 | 1184 | 3543 | 2025 | 1518 | 2338 | 1336 | 1002 | 2835 | 1620 | 1215 | 1899 | 1085 | 814 |
| | 60 | | 2430 | 2430 | 0 | 1579 | 1579 | 0 | 2025 | 2025 | 0 | 1336 | 1336 | 0 | 1620 | 1620 | 0 | 1085 | 1085 | 0 |
| 75 | 70 | | 12352 | 0 | 12352 | 8029 | 0 | 8029 | 10293 | 0 | 10293 | 6793 | 0 | 6793 | 8235 | 0 | 8235 | 5517 | 0 | 5517 |
| | 65 | | 4252 | 0 | 4252 | 2764 | 0 | 2764 | 3543 | 0 | 3543 | 2338 | 0 | 2338 | 2835 | 0 | 2835 | 1899 | 0 | 1899 |
| | 60 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

LEGEND

| | |
|-----------------------------------|--------------------------------|
| VLT = Ventilation Load – Total | HRT = Heat Recovery – Total |
| VLS = Ventilation Load – Sensible | HRS = Heat Recovery – Sensible |
| VLL = Ventilation Load – Latent | HRL = Heat Recovery – Latent |

TABLE 3
WINTER HEATING PERFORMANCE — (INDOOR DESIGN CONDITIONS 70°F DB)

| Ambient O.D. | VENTILATION RATE | | | | | | | | |
|-----------------|---------------------------|-------|------|---------------------------|-------|------|---------------------------|-------|------|
| | 450 CFM 80% EFFICIENCY | | | 375 CFM 81% EFFICIENCY | | | 300 CFM 82% EFFICIENCY | | |
| DB/°F | VLT | HRS | VLS | VLT | HRS | VLS | VLT | HRS | VLS |
| 65 | 2430 | 1944 | 486 | 2025 | 1640 | 385 | 1620 | 1328 | 292 |
| 60 | 4860 | 3888 | 972 | 4050 | 3280 | 770 | 3240 | 2656 | 583 |
| 55 | 7290 | 5832 | 1458 | 6075 | 4920 | 1154 | 4860 | 3985 | 875 |
| 50 | 9720 | 7776 | 1944 | 8100 | 6561 | 1539 | 6480 | 5313 | 1166 |
| 45 | 12150 | 9720 | 2430 | 10125 | 8201 | 1924 | 8100 | 6642 | 1458 |
| 40 | 14580 | 11664 | 2916 | 12150 | 9841 | 2309 | 9720 | 7970 | 1750 |
| 35 | 17010 | 13608 | 3402 | 14175 | 11481 | 2693 | 11340 | 9298 | 2041 |
| 30 | 19440 | 15552 | 3888 | 16200 | 13122 | 3078 | 12960 | 10627 | 2333 |
| 25 | 21870 | 17496 | 4374 | 18225 | 14762 | 3463 | 14580 | 11955 | 2624 |
| 20 | 24300 | 19440 | 4860 | 20250 | 16402 | 3848 | 16200 | 13284 | 2916 |
| 15 | 26730 | 21384 | 5346 | 22275 | 18042 | 4232 | 17820 | 14612 | 3208 |
| 10 | 29160 | 23328 | 5832 | 24300 | 19683 | 4617 | 19440 | 15941 | 3499 |
| 5 | 31590 | 25272 | 6318 | 26325 | 21323 | 5002 | 21060 | 17269 | 3791 |
| 0 | 34020 | 27216 | 6804 | 28350 | 22964 | 5387 | 22680 | 18598 | 4082 |
| -5 | 36450 | 29160 | 7290 | 30375 | 24604 | 5771 | 24300 | 19926 | 4374 |
| -10 | 38880 | 31104 | 7776 | 32400 | 26244 | 6156 | 25920 | 21254 | 4666 |

NOTE: Sensible performance only is shown for winter application.

LEGEND

VLT = Ventilation Load – Total

HRS = Heat Recovery – Sensible

VLS = Ventilation Load – Sensible

ENERGY RECOVERY VENTILATOR MAINTENANCE

GENERAL INFORMATION

The ability to clean exposed surfaces within air moving systems is an important design consideration for the maintenance of system performance and air quality. The need for periodic cleaning will be a function of operating schedule, climate, and contaminants in the indoor air being exhausted and in the outdoor air being supplied to the building. All components exposed to the airstream, including energy recovery wheels, may require cleaning in most applications.

Rotary counterflow heat exchangers (heat wheels) with laminar airflow are “self-cleaning” with respect to dry particles. Smaller particles pass through; larger particles land on the surface and are blow clear as the flow direction is reversed. For this reason the primary need for cleaning is to remove films of oil based aerosols that have condensed on energy transfer surfaces. Buildup of material over time may eventually reduce airflow. Most importantly, in the case of desiccant coated (enthalpy) wheels, such films can close off micron sized pores at the surface of the desiccant material, reducing the efficiency with which the desiccant can absorb and exude moisture.

FREQUENCY

In a reasonably clean indoor environment such as a school, office building, or home, experience shows that reductions of airflow or loss of sensible (temperature) effectiveness may not occur for ten or more years. However, experience also shows that measurable changes in latent energy (water vapor) transfer can occur in shorter periods of time in commercial, institutional and residential applications experiencing moderate occupant smoking or with cooking facilities. In applications experiencing unusually high levels of occupant smoking, such as smoking lounges, nightclubs, bars and restaurants, washing of energy transfer surfaces, as frequently as every six months, may be necessary to maintain latent transfer efficiency. Similar washing cycles may also be appropriate for industrial applications involving the ventilation of high levels of smoke or oil based aerosols such as those found in welding or machining operations, for example. In these applications, latent efficiency losses of as much as 40% or more may develop over a period of one to three years.

CLEANABILITY AND PERFORMANCE

In order to maintain energy recovery ventilation systems, energy transfer surfaces must be accessible for washing to remove oils, grease, tars and dirt that can impede performance or generate odors. Washing of the desiccant surfaces is required to remove contaminate buildups that can reduce adsorption of water molecules. The continued ability of an enthalpy wheel to transfer latent energy depends upon the permanence of the bond between the desiccant and the energy transfer surfaces.

Bard wheels feature silica gel desiccant permanently bonded to the heat exchange surface without adhesives; the desiccant will not be lost in the washing process. Proper cleaning of the Bard energy recovery wheel will restore latent effectiveness to near original performance.

MAINTENANCE PROCEDURES

NOTE: Local conditions can vary and affect the required time between routine maintenance procedures, therefore all sites (or specific units at a site) may not have the same schedule to maintain acceptable performance. The following timetables are recommended and can be altered based on local experience.

QUARTERLY MAINTENANCE

1. Inspect mist eliminator/prefilter and clean if necessary. This filter is located in the wall sleeve and can be accessed by either removing the exterior louver grille, the vent package from inside the unit, or by disconnecting the unit from the wall brackets, and rolling the unit away from the sleeve on its integral wheel system. The filter is an aluminum mesh filter and can be cleaned with water and any detergent not harmful to aluminum.
2. Inspect the comfort air filter and clean or replace as necessary. This filter is located behind the front-hinged service door.
3. Inspect energy recovery ventilator for proper wheel rotation and dirt buildup. This can be done in conjunction with Item 2 above. Energize the energy recovery ventilator after inspecting the filter and observe for proper rotation and/or dirt buildup.
4. Recommended energy recovery wheel cleaning procedures follow: Disconnect all power to the unit. Open the front-hinged service door to the unit.
5. Remove the front cassette retaining panel from the front of the ERV. Unplug the amp connectors to the cassette drive motor. Slide energy recovery cassette out of the ventilator.
6. Use a shop vacuum with brush attachment to clean both sides of the energy recovery wheels.

7. Reverse shop vacuum to use as a blower and blow out any residual dry debris from the wheel.

NOTE: Discoloration and staining of the wheel does not affect its performance. Only excessive buildup of foreign material needs to be removed.

8. If any belt chirping or squealing noise is present, apply a small amount of LPS-1 or equivalent dry film lubricant to the belt.

ANNUAL MAINTENANCE

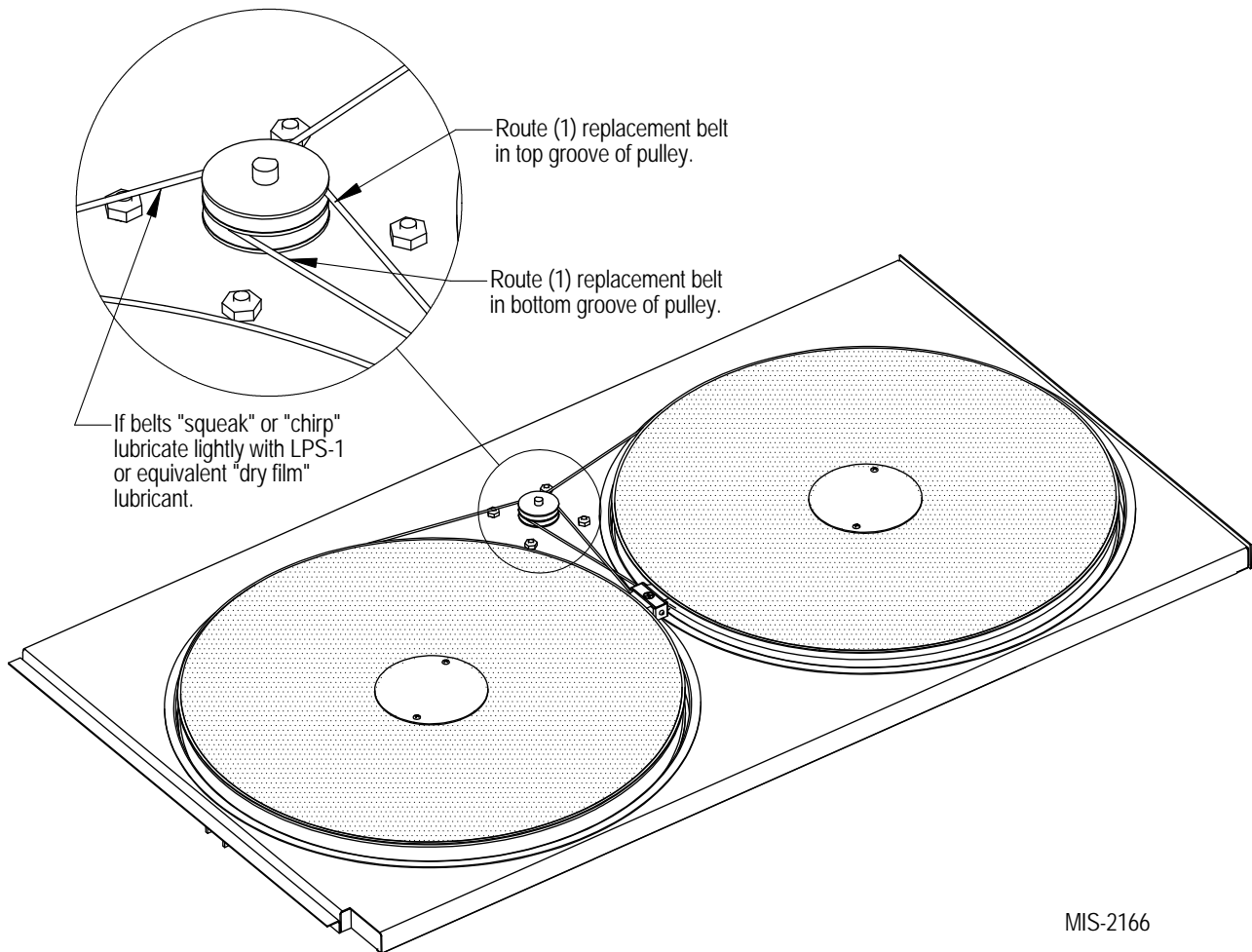
1. Inspect and conduct the same procedures as outlined under Quarterly Maintenance.
2. To maintain peak latent (moisture) removal capacity, it is recommended that the energy recovery wheels be sprayed with a diluted nonacid based evaporator coil cleaner or alkaline detergent solution such as 409.

NOTE: Do not use acid based cleaners, aromatic solvents, temperatures in excess of 170°F or steam. Damage to the wheel may result.

Do not disassemble and immerse the entire heat wheel in a soaking solution, as bearing and other damage may result.

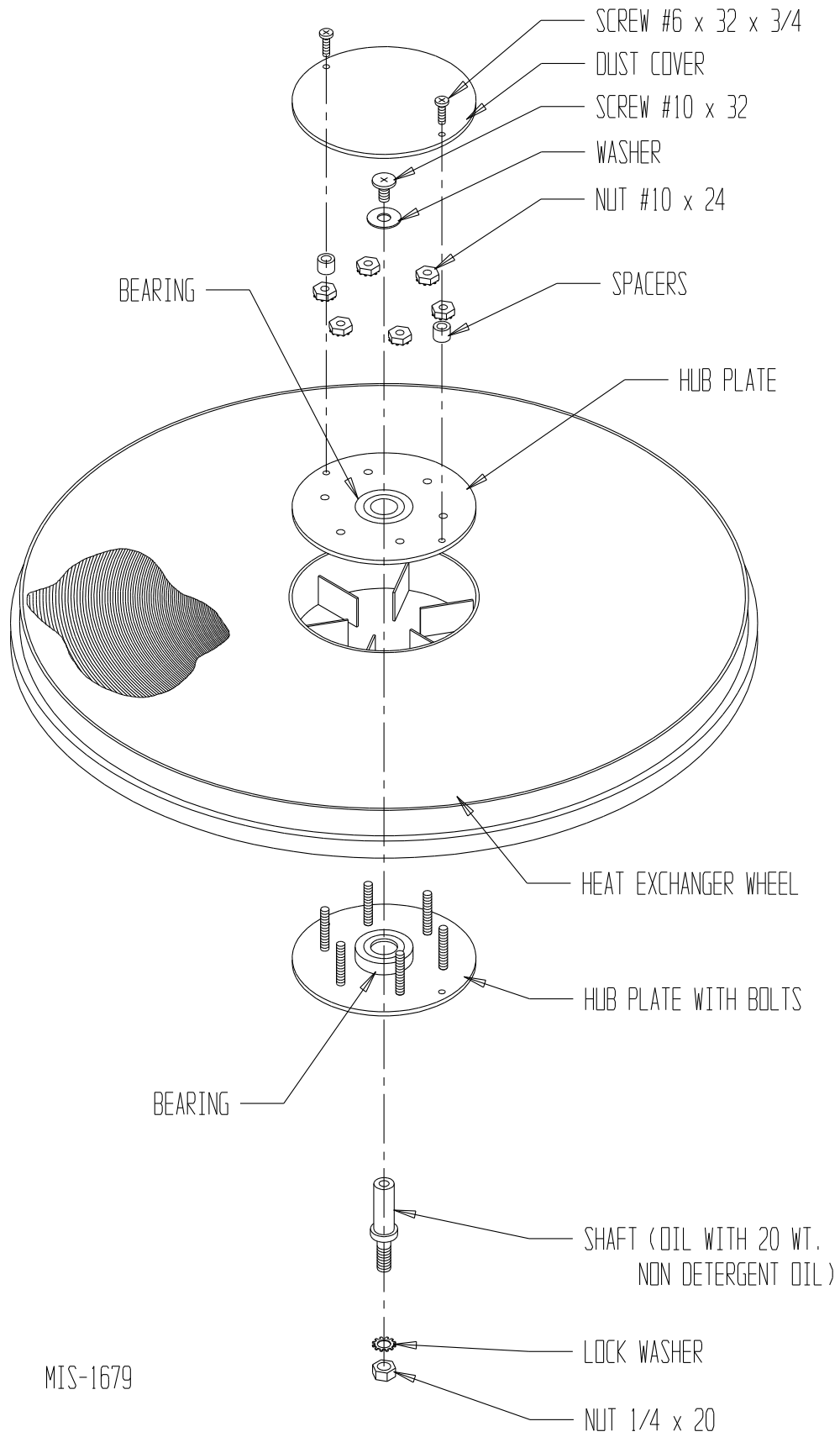
3. Rinse wheel thoroughly after application of the cleaning solution, and allow to drain before reinstalling.
4. No re-lubrication is required to heat wheel bearings of the drive motor, or to the intake and exhaust blower motors.
5. If any belt chirping or squealing noise is present, apply a small amount of LPS-1 or equivalent dry film lubricant to the belt.

FIGURE 2 BELT REPLACEMENT INSTRUCTIONS



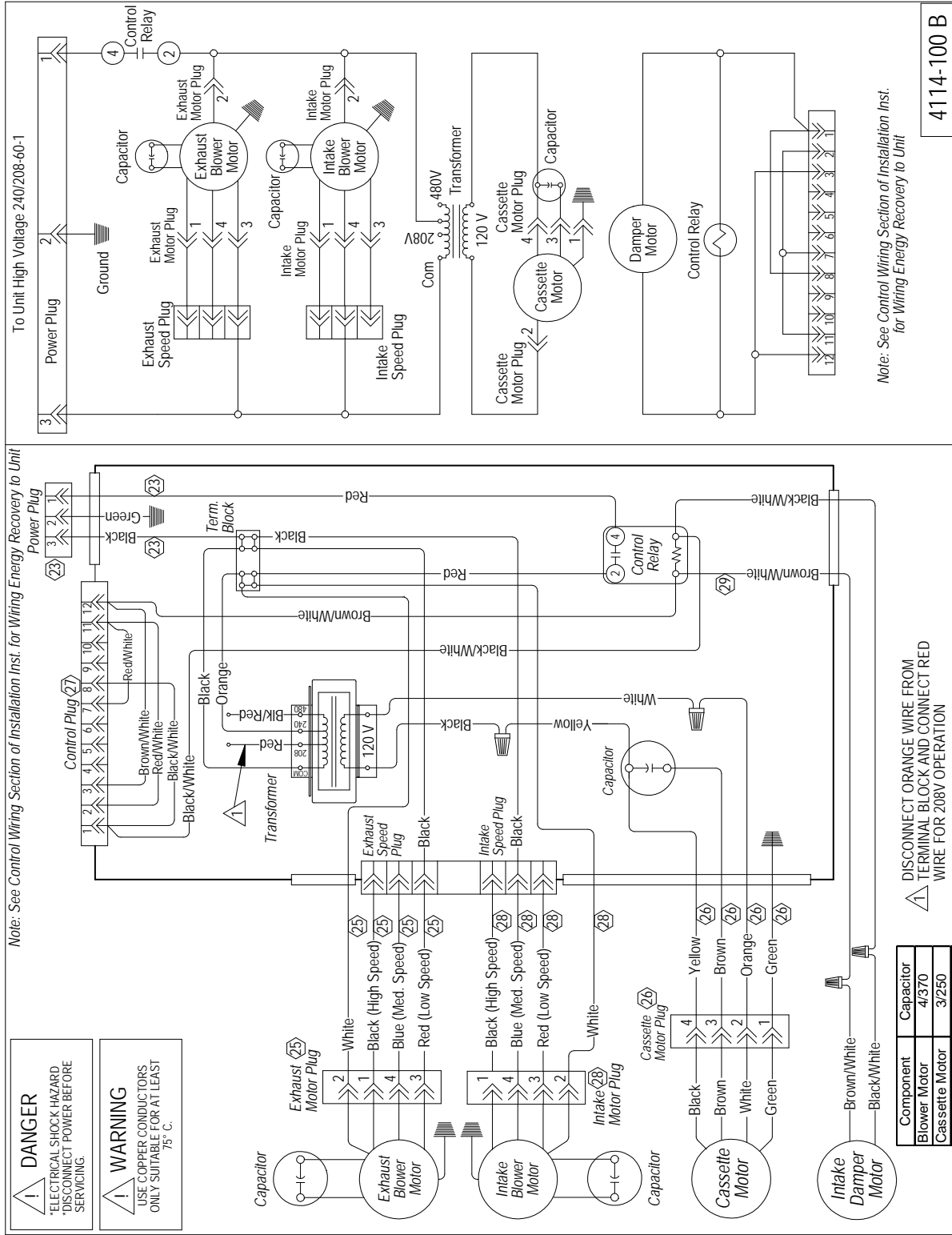
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FIGURE 3
HUB ASSEMBLY WITH BALL BEARINGS



MIS-1679

WIRING DIAGRAM FOR 920-0074 QWSERV



4114-100 B

FIGURE 4
DISCONNECT & TAPE OFF WIRE

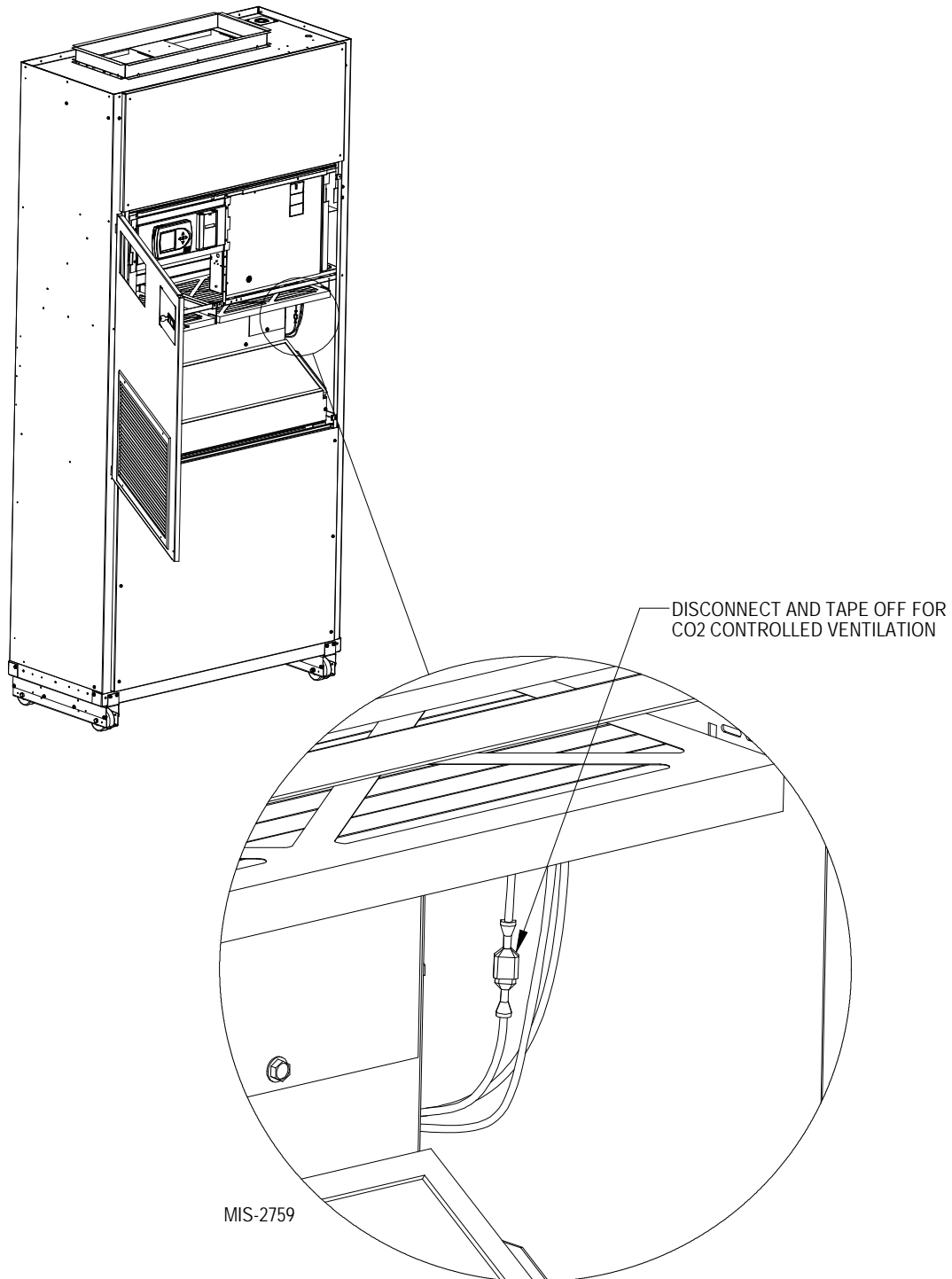
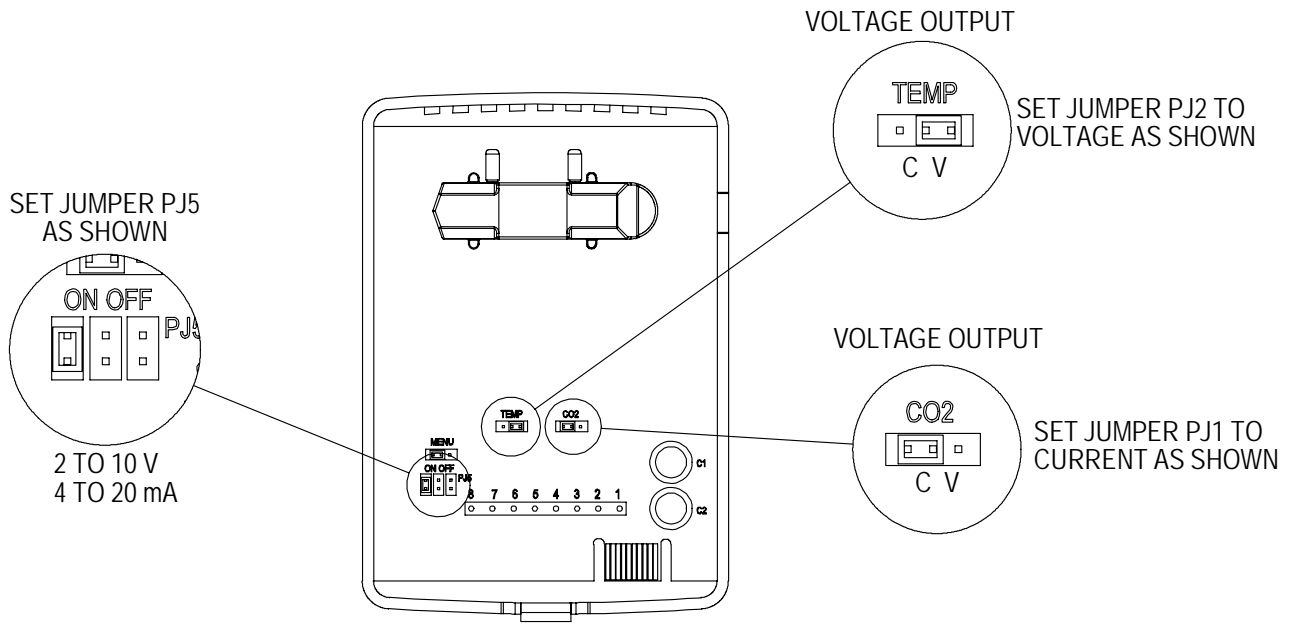


FIGURE 5
CONFIGURING 8403-067 CO₂ CONTROL



MIS-3175