AquaDry

# DEHUMIDIFIER

**MANUAL**

Installation • Operation • Maintenance

THIS PAGE IS INTENTIONALLY LEFT BLANK

# Table of Contents

# Reference and Contact Information

This manual provides basic information about the applicable equipment of various design, size, capacity etc.; therefore, some details covered in this manual may not be relevant to each piece of equipment. Respectively, some equipment-specific info may not be covered in this manual.

Refer to following, as needed:

- ✓ your equipment-specific ***submittal documentation*** – drawings, electrical diagrams, tech data etc.
- ✓ your equipment Main Label (see **Equipment Information** chapter for guidance)

This manual also provides guidance to the equipment installation, maintenance, service etc., however performance of these (and other, as required) tasks should be done in accordance with respective ***local and National Codes and Regulations***, proper field practice etc.

One of the key contributors to equipment longevity and proper and efficient operation is getting the equipment started up properly.

- Start Up of the equipment shall be conducted by qualified personnel and in accordance with manufacturer **Start Up Procedure.**

For all technical inquiries (including Start Up warranty etc.), as well as to obtain copy of this manual or other technical documentation - contact ***Dehumidified Air Services*** (see contact info below).

- If your enquiry is related to your specific equipment - provide ***Dehumidified Air Services*** with your equipment eight-digit Serial Number (refer to your equipment submittal documentation or main Label).

## Contact Us

DASV
5685 Rue Cypihot,
Saint-Laurent, QC H4S
Canada
**www.dehumidifiedairservices.com**

1-833-DAS-POOL (327-7665)

Schedule / Modify a Start-up:
Startups@DehumidifiedAirServices.com
Inquire about Warranty:
Warranty@DehumidifiedAirServices.com
Order Parts:
Parts@DehumidifiedAirServices.com
All Other Product Support:
Support@DehumidifiedAirServices.com

THIS PAGE IS INTENTIONALLY LEFT BLANK

# General Safety Information

Read following manual before attempting to install, operate or service the equipment!

## Warnings, Cautions, Notes

**FOR YOUR SAFETY: READ BEFORE PERFORMING ANY OPERATIONS, MAINTENANCE OR SERVICE TASKS!**

- Only qualified technicians should install, operate, maintain, service, repair or decommission mechanical equipment, including this appliance.
- Make sure to read this manual before performing any maintenance, service, repair or other related tasks to familiarize yourself with the equipment as well as with any potential hazards. Always exercise caution!

- This equipment is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

**Beware of electrical power and high electrical voltage!**

- Follow proper safety procedures – lockout, tagout, and other respective procedures.
- Failure to follow safety procedures can result in severe injury or death.

**Beware of moving parts and hot surfaces!**

- Make sure to stop all moving parts (fans, blowers, etc.) before accessing the equipment's internal space.
- Be aware of hot surfaces (hot refrigeration, space heating pipes, coils, heaters, etc.)

**Beware of specific hazards - high pressures, flammability and chemicals!**

- Dehumidifiers, equipped with compressors, contain refrigerant under high pressure; oil is also contained in the compressor and refrigeration circuit(s).
- A2L group refrigerant, used in compressor(s) circuit(s), is classified as mildly flammable!
- Be aware that refrigerant may not contain an odour.

The following warnings, cautions, and notes appear throughout this manual and referenced documentation whenever special care must be taken to avoid potential hazards that could result in equipment malfunction or damage, personal injury, or death.

**⚠ WARNING**
Indicates a potentially hazardous situation which could result in serious injury or death if handled improperly.

**⚠ CAUTION**
Indicates a potentially hazardous situation which could result in moderate injury or equipment damage if handled improperly.

**Note**
Indicates a situation that could result in equipment damage or improper/ineffective operation if handled improperly.

## General Operational Considerations

**⚠ WARNING!** **General Precaution**

- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odour.

**Attention: Warranty Conditions and Coverage.**

**NOTE.** The equipment is provided with comprehensive conditional warranty coverage. Any warranty work to be reimbursed must be approved by **Service & Customer Support Team** prior to work commencing. Installation, start up, maintenance etc. are not within warranty scope. Refer to the manufacturer standard warranty statement for more details on warranty conditions, scope and coverage.

**Attention: Equipment Proper Usage.**

**⚠ CAUTION!** Dehumidifier is **NOT** intended, and, therefore, **NOT** to be used, to condition (heat, cool, ventilate etc.) premise that is ***still under construction***. Such usage may cause equipment premature wear, poor performance and potential failure afterwards and will void the warranty!

## Personnel Performing Work Tasks Safety Considerations

Personnel, performing ANY work tasks on given equipment (installation, maintenance, service, repair etc.) must be qualified for such tasks – refer to **Work Tasks General Considerations and Training Requirements** chapter.

**⚠ WARNING!** Any work on the equipment (dehumidifier, outdoor condenser, fluid cooler, etc.) must be performed in accordance with respective manufacturer recommendations as well as submittal documentation, national and local Codes and Regulations, and appropriate field practices. Failure to do so could result in personal injury, equipment damage or malfunction, and will void equipment warranty.

**Attention: Maintenance Team**

**⚠ CAUTION!** To ensure equipment longevity and proper and efficient operation, the dehumidifier and its auxiliary systems and devices (outdoor condenser, fluid cooler, boiler package, etc.) should be maintained properly and regularly. Failure to do so could negatively affect premise comfort levels and people's health. It could also lead to equipment damage, malfunction, premature tear and ware and may void equipment warranty.

**Attention: Installing Contractors**

**⚠ CAUTION!** Dehumidifier, containing A2L (mildly flammable) group refrigerant, shall comply with minimum requirement for airflow and conditioned space area – refer to **Special Considerations for Equipment Containing A2L Refrigerant** clause in this manual!
Ensure that this is the case prior to installing the equipment!

# Special Considerations for Equipment Containing A2L Refrigerant

**Attention: Equipment Containing A2L Refrigerant**

⚠ **CAUTION!** Equipment contains A2L (mildly flammable) group refrigerant.
Such equipment placement shall satisfy respective requirements of local and National Codes and Regulations, such as **UL 60335/SCA B52/ASHRAE 15** and others, as applicable.
**Review following chapter in detail prior to placement of the equipment to ensure the requirements are met.**

To ensure that A2L-containing equipment is safe, multiple mitigation systems and approaches are used; that includes among others, specific relationship between refrigerant charge of the dehumidifier, and ventilation operation and size of space, conditioned by the dehumidifier.

## Dehumidifier Refrigerant Charge, Conditioned Space and Airflow Relationship

One of the mitigations means is to ensure that airflow, maintained by equipment, and conditioned space are adequately and mutually sized for proper venting and dilution of the air containing refrigerant (in case of the leak).

**Table 1** establishes relationship between refrigerant circuit charge (***Mc***), total conditioned space area (***TA min),*** and the equipment airflow, per respective model/option:

- The conditioned room space, served by the dehumidifier must have area not less then ***TA min***
  - To account for building's ground level altitude, ***TA min*** should be adjusted by adjustment factor (***AF***): multiply ***TA min*** value from ***Table 1*** by ***AF*** value from ***Table 2***.
- Total airflow, established by dehumidifier, must be not less then ***Q minTA.***
- ***Mc*** value shows (per UL 60335-2-40) system total refrigerant charge for dehumidifier compressor circuit.

**NOTE:** Refer to equipment submittal documentation and/or nameplate to verify the model and options:

- ***OAC option*** refers to optional Outdoor Air Condenser (whether dehumidifier is equipped with one or not)

Another mitigation mean is continuous dehumidifier's main blower operation, that ensures adequate venting of all the refrigerant (in the event of leak) from the dehumidifier; refer to the **Operation and Control** chapter of this manual for the details on the dehumidifier A2L mitigation via ventilation operation.

**Table 1.** Conditioned Space and Airflow Relationship

| **Model** | **AQ-003** | | **AQ-005** | | **AQ-007** | |
|---|---|---|---|---|---|---|
| ***OAC option*** | *yes* | *no* | *yes* | *no* | *yes* | *no* |
| ***Mc,*** kg | 12.2 | 5.0 | 15.2 | 5.4 | 17.1 | 5.9 |
| ***Q minTA,*** m3/h | 1241.3 | 505.7 | 1544.7 | 551.7 | 1737.8 | 597.6 |
| ***TA min,*** m2 | 37.6 | 15.3 | 46.8 | 16.7 | 52.7 | 18.1 |

**Table 2**. ***TA min*** adjustment factor for building site ground altitude.

| **H**alt, m | 0 | 200 | 400 | 600 | 800 | 1000 | 1200 | 1400 | 1600 |
|---|---|---|---|---|---|---|---|---|---|
| **AF** | 1.00 | 1.00 | 1.00 | 1.00 | 1.02 | 1.05 | 1.07 | 1.10 | 1.12 |
| **H**alt, m | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 | 3000 | 3200 | |
| **AF** | 1.15 | 1.18 | 1.1.21 | 1.25 | 1.28 | 1.32 | 1.36 | 1.40 | |

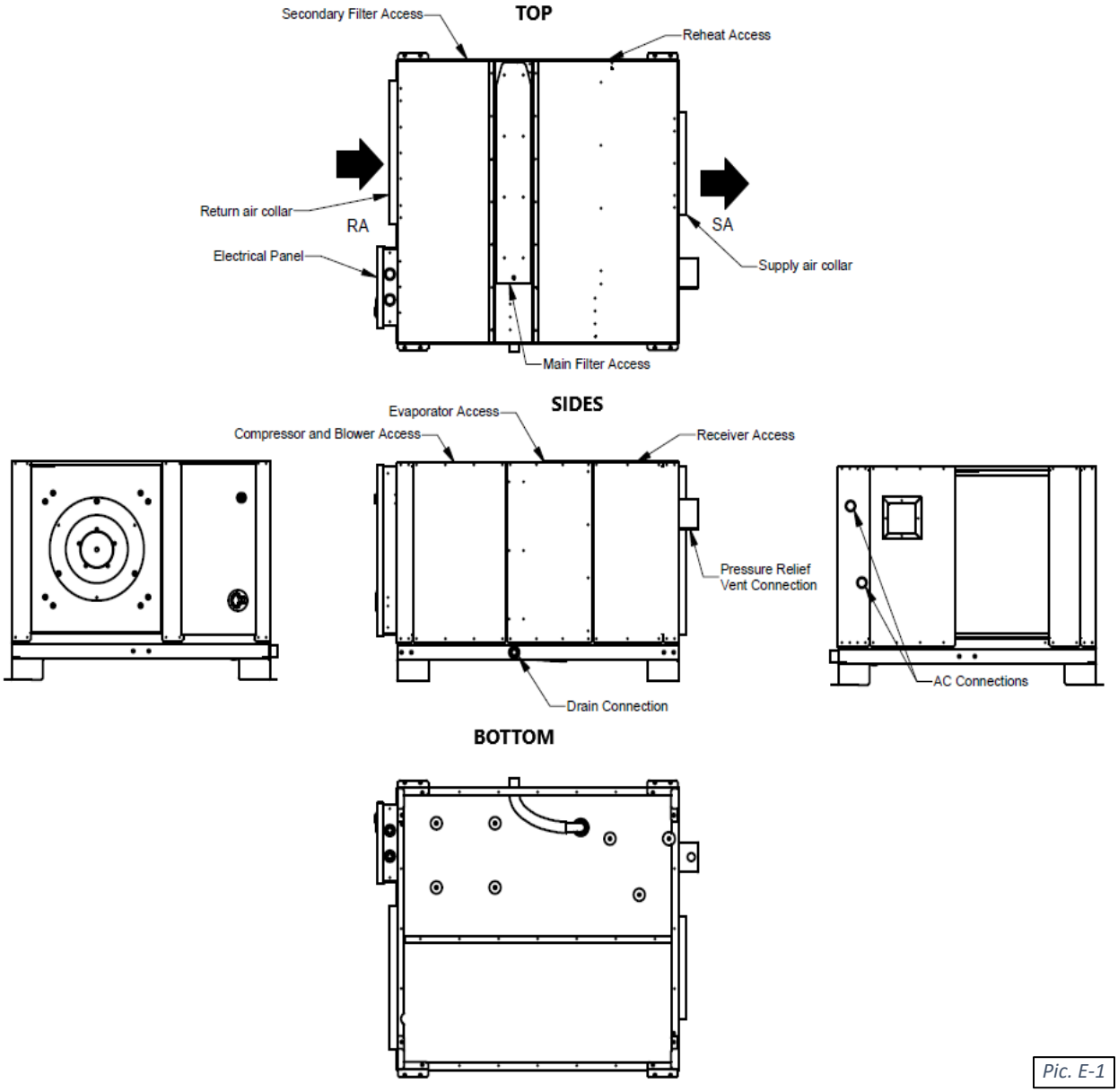
THIS PAGE IS INTENTIONALLY LEFT BLANK

# Equipment Information

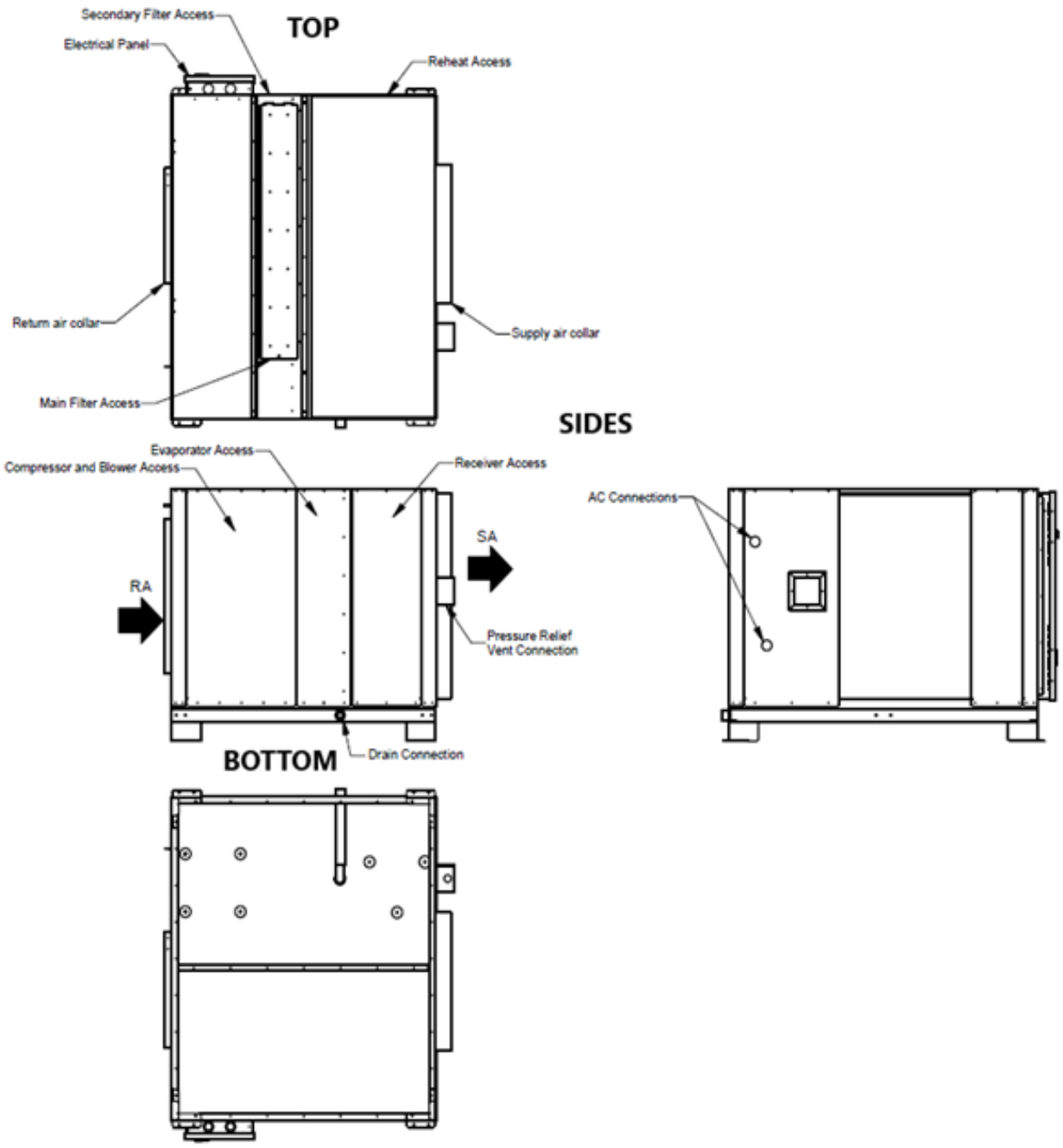
## Equipment General Views and Options

Current model of dehumidifier comes in two similarly built cabinets, which are shown on Pic. E-1 (model AQ-003) and Pic. E-2 (models AQ-005 and AQ-007).

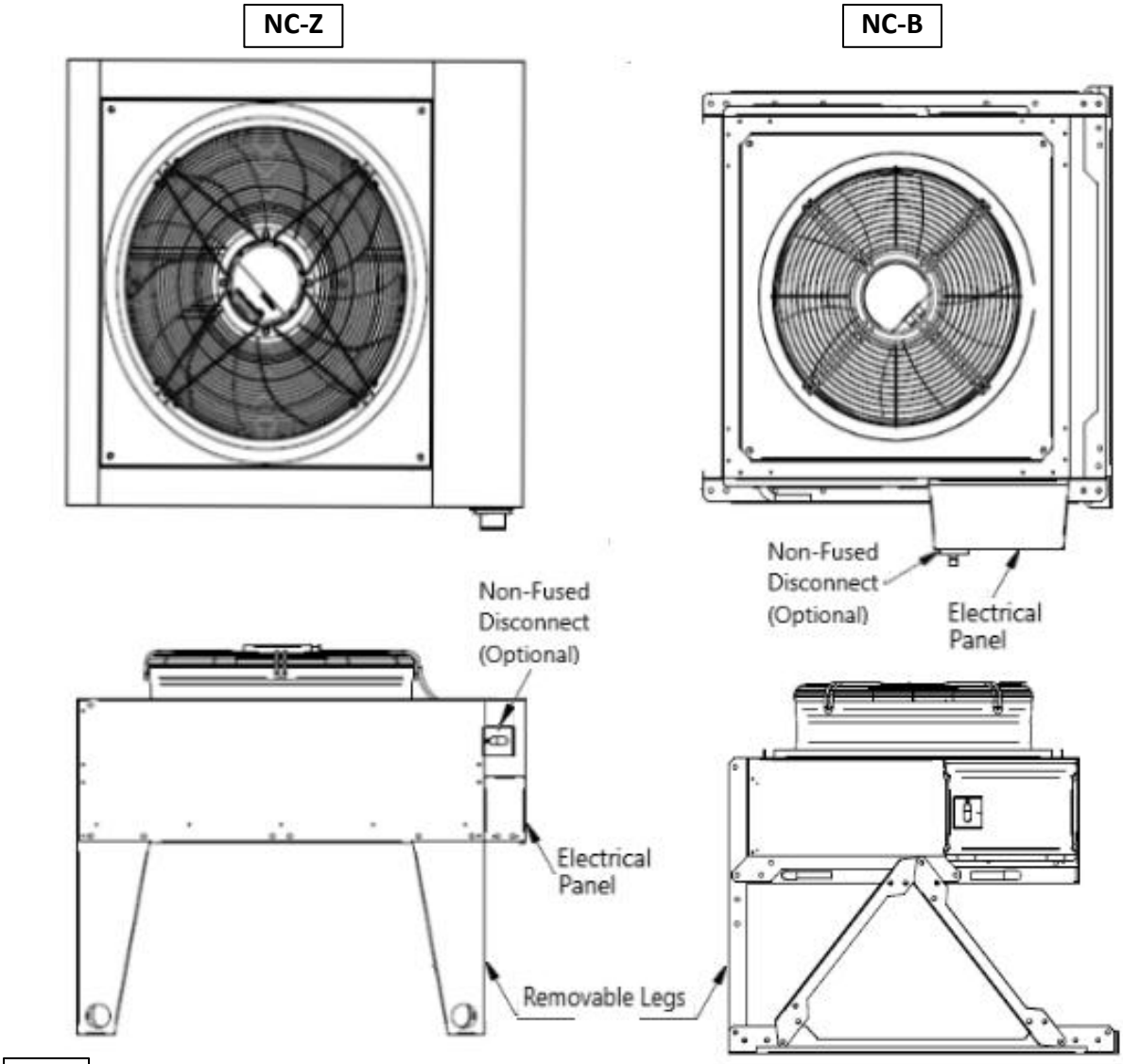
General views of optional Outdoor Air Condensers (NC-Z, suitable for models AQ-005 and AQ-007, and NC-B, suitable for model AQ-003) are shown on Pic. E-3.




*Pic. E-1*


TOP
Secondary Filter Access
Electrical Panel
Reheat Access
Return air collar
Supply air collar
Main Filter Access
SIDES
Evaporator Access
Compressor and Blower Access
Receiver Access
SA
RA
Pressure Relief
Vent Connection
Drain Connection
AC Connections
BOTTOM

*Pic. E-2*




*Pic. E-3*

### General Info

Current model of dehumidifier is designed to maintain the humidity of the conditioned space (pool room etc.). With basic option, heat acquired during dehumidification is passed to the conditioned space; however optional Outdoor Air Condenser is available to reject this heat outdoors.

- Indoor dehumidifier, equipped with single two-staged compressor.
- Airflow arrangement - ducted, horizontal return air (RA) and supply air (SA) duct connections.
- Optional **Outdoor Air Condenser** (OAC).
  - Additional ***ventilation systems/devices*** (outdoor fresh air, exhaust air etc.) are not part of given equipment.
  - ***Space Heater*** is not a part of given equipment, and, as/if required, should be installed separately.

⚠ **CAUTION.** Remote/separately installed space heater (if installed) shall NOT be installed in such a way to supply heated air into dehumidifier inlet air connection!

## Technical Data

Detailed information about specific equipment is presented in submittal documentation as well as in equipment Main Label and accompanied documentation (wiring diagrams etc. – see below).

- Equipment dimensions and clearances are provided in submittal documentation/drawings – refer as needed.

***General technical info***, pertinent to all models of given dehumidifiers, is provided below:

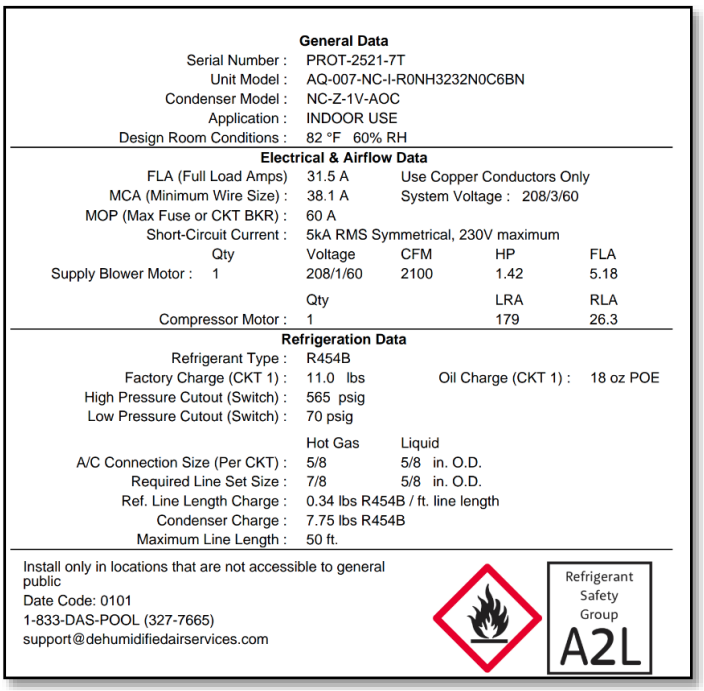
| | | |
|---|---|---|
| **Air Data** | ESP Min | 0" wc |
| | ESP Max | 1" wc |
| | Leaving Air Temperature, Max | 120 F |
| | Entering Air Temperature, Min – Max * | 65 F – 90 F |
| | Entering Air Humidity, Min - Max* | 40% - 65% |
| **Fuses Data**<br>For amperage rating of specific fuse – refer to Wiring Diagram provided with the equipment | Class | J, CC |
| | Type | Time-delay |
| | V (rated) | 600 VAC, 300 VDC |

*'* - It is critical to both, dehumidifier's longevity and efficiency, to have entering air characteristics (temperature and humidity) within design parameters (see main Label info below). Subjecting dehumidifier to loads outside of design parameters could lead to unsatisfactory performance and premature wear and/or failure of the equipment.*

***Equipment-specific technical information*** for individual dehumidifier is provided in the following methods:

***Main Label*** (example is shown on Pic. E-4)***:*** the manufacturer tag attached to the front of the dehumidifier includes the dehumidifier's most critical data:

- ✓ General data including:
  - Serial number
  - Equipment model (nomenclature)
  - Design room conditions (air temperature and humidity)
- ✓ Operational data, including:
  - Réfrigération (réfrigérant type, charge, etc.)
  - Electrical/airflow (dehumidifier voltage, CFM, etc.)
  - Other applicable data.



**General Data**

Serial Number : PROT-2521-7T
Unit Model : AQ-007-NC-I-R0NH3232N0C6BN
Condenser Model : NC-Z-1V-AOC
Application : INDOOR USE
Design Room Conditions : 82 °F 60% RH

**Electrical & Airflow Data**

FLA (Full Load Amps) 31.5 A — Use Copper Conductors Only
MCA (Minimum Wire Size) : 38.1 A — System Voltage : 208/3/60
MOP (Max Fuse or CKT BKR) : 60 A
Short-Circuit Current : 5kA RMS Symmetrical, 230V maximum

| | Qty | Voltage | CFM | HP | FLA |
|---|---|---|---|---|---|
| Supply Blower Motor : | 1 | 208/1/60 | 2100 | 1.42 | 5.18 |

| | Qty | LRA | RLA |
|---|---|---|---|
| Compressor Motor : | 1 | 179 | 26.3 |

**Refrigeration Data**

Refrigerant Type : R454B
Factory Charge (CKT 1) : 11.0 lbs — Oil Charge (CKT 1) : 18 oz POE
High Pressure Cutout (Switch) : 565 psig
Low Pressure Cutout (Switch) : 70 psig

| | Hot Gas | Liquid |
|---|---|---|
| A/C Connection Size (Per CKT) : | 5/8 | 5/8 in. O.D. |
| Required Line Set Size : | 7/8 | 5/8 in. O.D. |

Ref. Line Length Charge : 0.34 lbs R454B / ft. line length
Condenser Charge : 7.75 lbs R454B
Maximum Line Length : 50 ft.

Install only in locations that are not accessible to general public
Date Code: 0101
1-833-DAS-POOL (327-7665)
support@dehumidifiedairservices.com

Refrigerant Safety Group A2L

*Pic. E-4*

***Labels and Stickers***: attached when applicable to the exterior and interior of the equipment to show:

- ✓ External systems connections location/direction (refrigerant circuits, condensate etc.)
- ✓ Air filter locations, quantity, and size.
- ✓ Additional Info (warning, caution stickers, etc.)

**Note:** The main label shown above is just an example.

**Wiring Diagrams:** attached to the interior side of the equipment, depict dehumidifier control and power wiring.

# Operation and Control

## Sequence of Operation

- ✓ Once dehumidifier is powered up, main blower starts and runs constantly, establishing the required airflow through the dehumidifier and the conditioned space.
  - ➢ Air continuously flows across the evaporator and reheat coils, allowing for heat transfer ***when/if*** respective ***coil is ACTIVE*** (refrigerant flows through it): air is cooled and dehumidified in *active* evaporator coil, and heated – in *active* reheat coil.
- ✓ Room thermostat, located inside the conditioned space, compares air temperature and humidity to their desired values (***set points***) and issues respective calls - ***DEHUM, COOL*** or ***HEAT*** - to dehumidify, cool or heat the conditioned space air, respectively.
  - ➢ Note that DEHUM call could be in place simultaneously with COOL or HEAT calls, whereas COOL and HEAT calls could NOT be in place simultaneously.

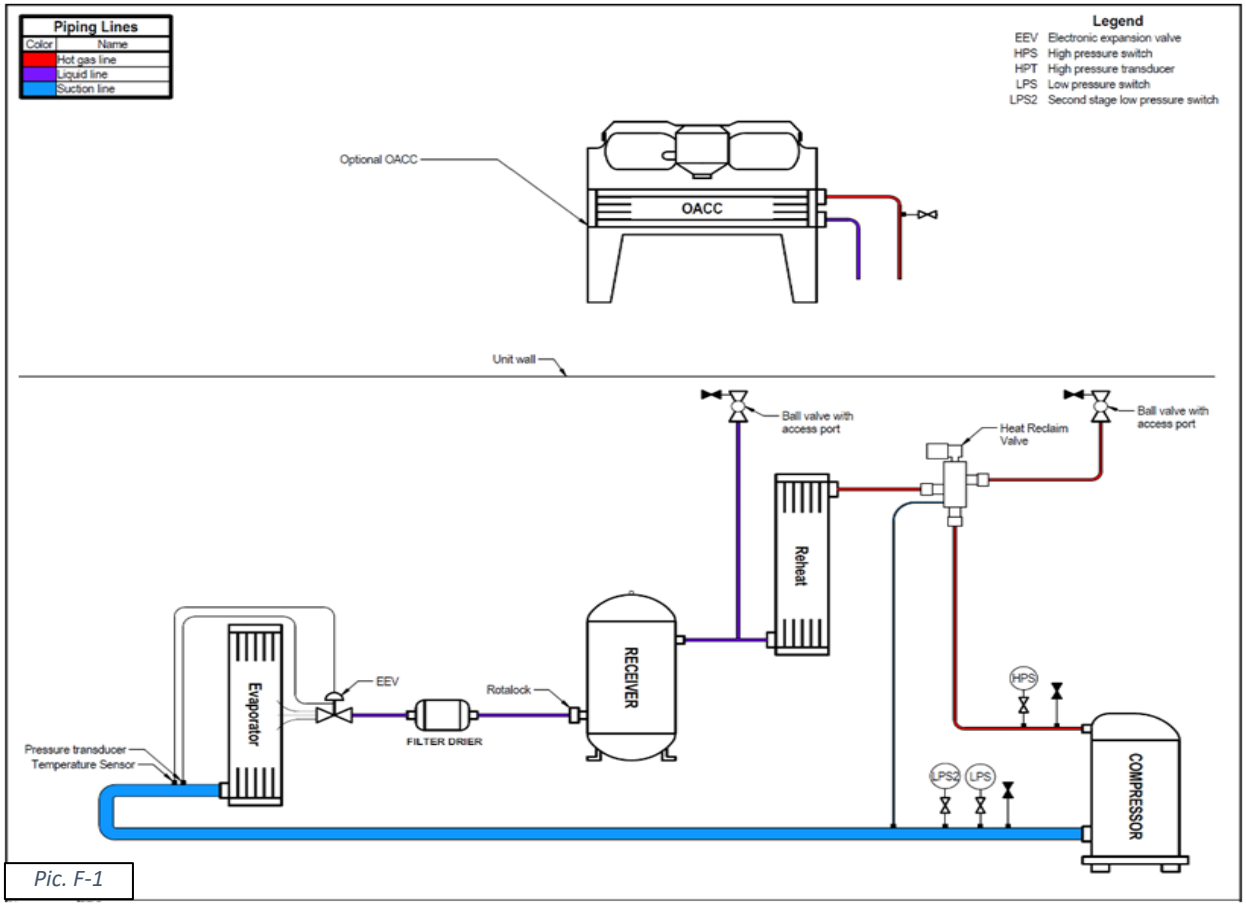
### Set Points

Set Points are the desired values of the space control parameters – room air temperature and humidity – that the thermostat is set to maintain; refer to the dehumidifier's main label for the design value of control parameters.

- ➢ To maintain desired comfort level, and at the same time, to ensure the dehumidifier's most economical operation, it is recommended to maintain the room ***air warmer than pool water by*** couple degrees:

**Room Air T = Pool Water T + 2˚F**

***Pic.F-1*** shows a piping diagram of the Dehumidifier compressor circuit, as well as optional Outdoor Air Condenser.




*Pic. F-1*

## Dehumidifier (Basic Package) Operation

*Note, that dehumidifier basic package (one **not** equipped with optional Outdoor Air Condenser - OAC) will warm the air while dehumidifying (COOL option is not available).*

- ✓ Thermostat calls for ***DEHUM*** (space humidity is higher than its set point):
  - ➢ ***Compressor Sequence*** starts:
    - Expansion valve engages, allowing for refrigerant flow.
    - After pre-set time delay (allowing proper expansion valve opening), compressor starts.
    - Evaporator becomes *active*, cooling and dehumidifying the air.
  - ➢ Heat Reclaim Valve stays disengaged, diverting refrigerant into Reheat Coil, making it *active* (so air, passing Reheat Coil is warmed up).
- ✓ ***DEHUM*** call is satisfied (space humidity is lower than its set point):
  - ➢ Compressor stops.
    - Thermostat built-in delay timer starts to prevent compressor short cycling.

## Dehumidifier Operation with Optional Outdoor Air Condenser

- ✓ Thermostat calls for ***DEHUM*** (space humidity is higher than its set point) and/or ***COOL*** (space air temperature is higher than its set point):
  - ➢ ***Compressor Sequence*** starts (see above)
  - ➢ If no ***COOL*** call issued (***DEHUM*** only):
    - Heat Reclaim Valve stays disengaged, diverting refrigerant into Reheat Coil, making it *active* (so air, passing Reheat Coil, is warmed up)
  - ➢ If ***COOL*** call is issued (***COOL*** only or ***COOL*** and ***DEHUM***):
    - Heat Reclaim Valve engages, diverting refrigerant into OAC (rejecting heat to outdoors); Reheat Coil becomes *inactive* (so air, passing it, is NOT warmed up).
    - OAC fan got enable signal from dehumidifier and starts.
- ✓ Both, ***COOL*** and ***DEHUM,*** calls are satisfied (space humidity and temperature are lower than their set points):
  - ➢ Compressor disengages.
    - Thermostat built-in delay timer starts to prevent compressor short cycling.
  - ➢ If OAC fan was active (COOL call was in place) – it stops once COOL call is satisfied (and enable signal is removed).

## A2L Refrigerant Leak Mitigation

Dehumidifier, that contains A2L (mildly flammable) refrigerant (like R454B), employ additional mechanisms (devices and/or control algorithm) to ensure the safety during unlikely event of refrigerant leak.

Danger of explosion of A2L refrigerant would occur if its concentration in the air would be above certain level. Special safety mechanism is embedded at the design and selection of the dehumidifier for respective premise:

- ➢ Dehumidifier design and components' layout is such that all refrigerant containing components within dehumidifier are also with the airflow: if refrigerant leak to occur within the dehumidifier it would be within the main airflow.
- ➢ Dehumidifier's main blower is running constantly (automatically venting the dehumidifier); fan's capacity is selected in such a way that it will create enough of the airflow to vent all the air (with leaked in refrigerant) into conditioned space at concentration much lower than the dangerous one.
  - o Dehumidifier safety system (see below) includes air flow sensor – if dehumidifier airflow drops below required min level, control thermostat is powered down, which presents visual indication of abnormal operation (to draws maintenance attention to it), as well as stopping compressor.
- ➢ The dehumidifier refrigerant charge and size (area, volume etc.) of conditioned space are matched in such a way that conditioned space would allow for dilution of leaked refrigerant to the point (concentration) that does not present danger.

### Heating

Note, that dehumidifier itself does not include a space heater, however, dehumidifier thermostat typically would have means to control said heater – see **Controls** below.

- If separate space heater is installed and set to be controlled by dehumidifier's thermostat – heater will engage on thermostat's calls for ***HEAT***.

## Controls

Dehumidifier (as well as optional Outdoor Air Condenser) is provided with the **wiring diagram**, depicting power and control wiring diagrams – refer to these documents as needed.

### Thermostat Operation and Compressor Capacity Control

Dehumidifier operation is controlled by the room thermostat.

- ✓ General set points values are typically pre-set – adjust them as required.
- ✓ Thermostat typically comes pre-programmed for standard operation. For case-specific thermostat's settings and configurations – refer to thermostat's manual and other accompanying documentation.
- ✓ Refer to **Dehumidifier Installation** chapter for proper placement, installation and wiring of the thermostat.

Thermostat, used for dehumidifier control, is typically capable of controlling two stages of cooling and one stage of dehumidification:

- ✓ COOL call (described above in **Sequence of Operation**) could engage one or both cooling stages:
  - If/when "max/high cooling" is needed (space temperature is significantly higher than set point) – Stage 2 Cooling is engaged. As a result, compressor engages in full capacity ("high stage")
  - If/when "low cooling" is needed (space temperature is higher, but close to set point) – Stage 1 Cooling is engaged. As a result, compressor engages only in partial capacity ("low stage"). This is done to maximize the efficiency of the equipment operation.
- ✓ DEHUM call engages compressor in full capacity ("high stage"), to ensure most effective moisture removal.
  - Note, that if both, COOL and DEHUM, calls are in place, compressor engages in full capacity.

Benefits of two-staged compressor are also utilized if/when dehumidifier load (space temperature and/or humidity) becomes low:

- ✓ When/if compressor suction pressure drops below pre-set value of low-stage pressure switch, it switches to partial capacity ("low stage"), thus reducing the possibility of freezing the evaporator coil.

⚠ **CAUTION** Dehumidifier shall NOT be used to maintain space temperature and humidity lower than design values! Operating dehumidifier at the low load, could lead to equipment damage and void warranty!

### Dehumidifier's Safety

Dehumidifier is equipped series of safety devices:

- ✓ Compressor ***High Pressure Switch*** and ***Low Pressure Switch*** ensure compressor protection.
- ✓ ***Voltage Monitor*** prevents the equipment from operating if power supply is inadequate.
- ✓ ***Air Flow Sensor*** monitors fan operation to ensure that the airflow is above minimum required value.

All these safeties are interlocked with the room thermostat, to ensure *higher visibility of abnormal situation*: open contact on any of these safeties (indicating abnormal situation – low airflow, abnormal compressor pressures or low airflow) would result in:

- compressor stoppage and
- powering down of the thermostat, thus bringing attention of maintenance personnel/customer to abnormal situation!

**⚠ WARNING! A2L Refrigerant Leak Mitigation!**

Room Thermostat (controlling dehumidifier) that appears NOT POWERED (screen not lit etc.) may indicate that airflow through the dehumidifier is lower than required for a proper A2L refrigerant leak mitigation! Investigation shall be conducted! Follow respective safety requirements!

### Outdoor Air Condenser Control

OAC receives an enable signal from dehumidifier to engage its fan on COOL call.
Internal OAC control may vary based on the specifics of installed OAC - refer to submittal documentation as well as documentation, accompanying OAC

- ✓ Refer to **Outdoor Air Condenser Installation** chapter for proper placement, installation and wiring of the OAC.

### Space Heater Control

Thermostat, used for dehumidifier control, is typically capable of controlling one or two stages of heating; for more details – refer to the space heater manufacturer documentations, thermostat manual and other related documentation (field wiring diagram etc.).

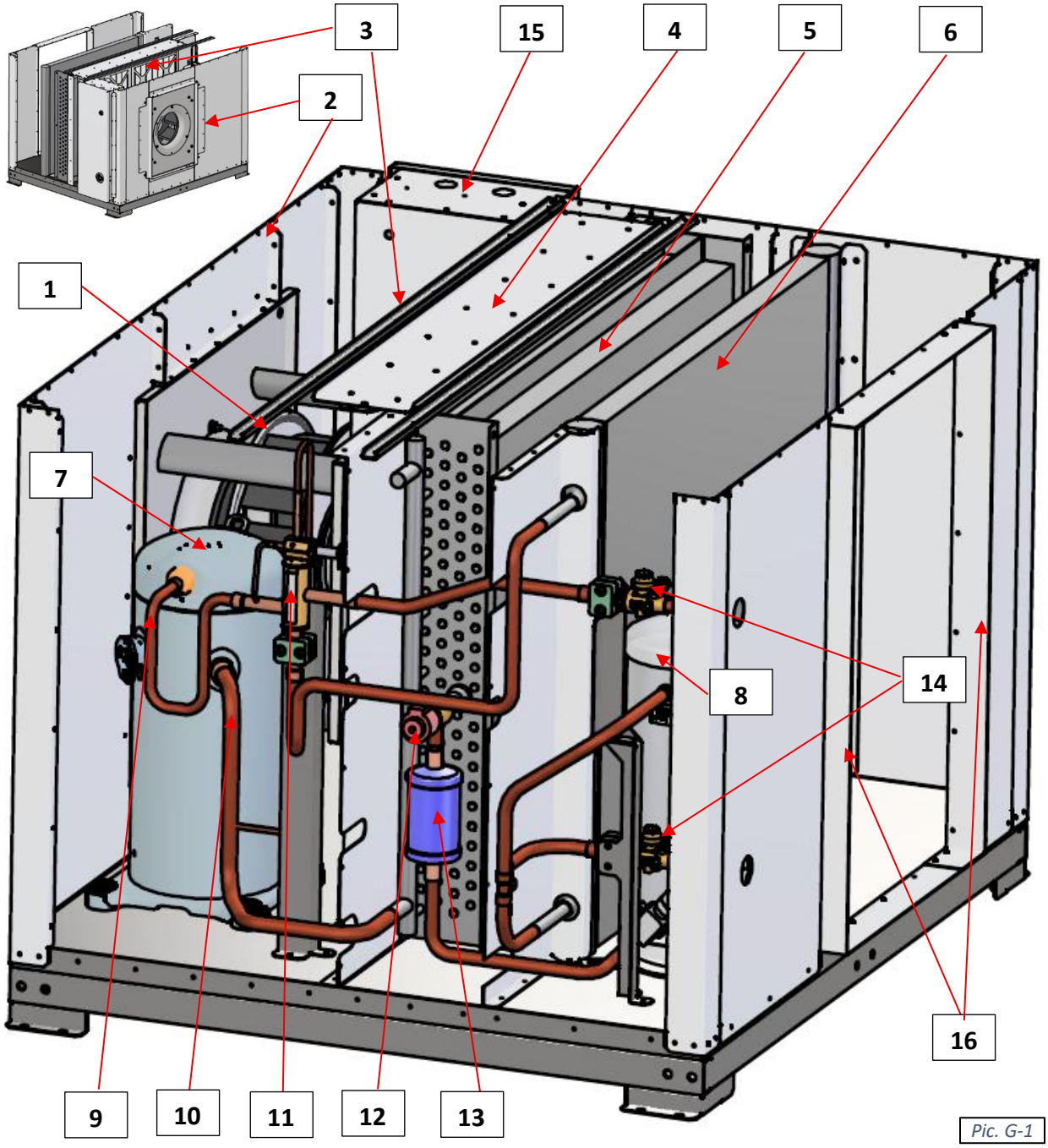
- ✓ It is recommended to have airflow switch interlocked with space heater to ensure heater is not engaging in event of fan stoppage (absence of airflow).

# Layout and Components

The general layout, components' location and main components are similar for all given dehumidifiers, however exact location of some components could vary from model to model – refer to submittal documentation for your specific equipment.

## Dehumidifier Layout and Main Components

Dehumidifier layout and main components are shown on Pic. G-1.

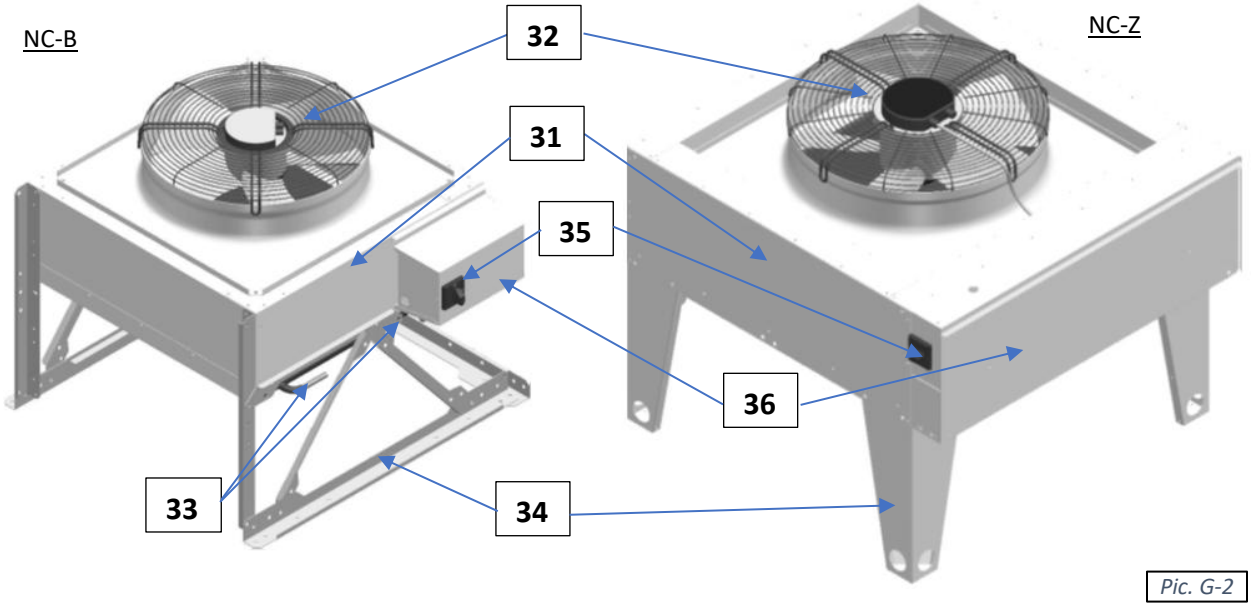



*Pic. G-1*

- **Main Blower** (1) is located between the air inlet (2) to the dehumidifier and the **Main Filter** (3).
    - **Main Filter** could be accessed through the **filter access panel** (4) or side wall panel (on opposite side)
    - Dehumidifier air inlet side, as well as air supply side (16) are fitted with duct collars to accommodate duct installation.
    - Air Flow Sensor is typically located near Main Blower – its exact location may vary based on the dehumidifier model.
- Refrigeration coils - **Evaporator** (5) and **Reheat** (internal condenser) (6) - are located directly downstream of the **Main Filter**
- All refrigeration main components - **Compressor** (7), **Receiver** (8) and other components are in the airstream, accommodating equipment venting in lieu of A2L mitigation.
    - Compressor **safety and control devices** (pressure switches, EEV sensors) are mounted on **discharge** (9) and **suction** (10) lines near **compressor** connections.
    - **Heat Reclaim** (HR) valve (11) controls the direction of refrigerant flow (to reheat coil or optional OAC coil).
    - **Electronic Expansion** (EEV) valve (12) and **filter-dryer** (13) are located next to evaporator.
    - Dehumidifier is equipped with **ball valves** (14), as a readily available connection to (optional) OAC.
- **Main Electric Panel** (15) contains one of dehumidifier safety device (Voltage Monitor), power and control (thermostat connection) terminals, control transformer, EEV control board and other electrical components.

## Outdoor Air Condenser Layout and Main Components

Layout and main components of optional OACs are shown on Pic.G-2 below.




*Pic. G-2*

- Condenser **coil** (where heat from refrigerant is rejected to the outdoor air) is mounted within metal air box (31), upstream (before) the **fan** (32), that pulls the air through the coil to absorb the heat.
    - Condenser **piping connections** (33) are identified as HG (Hot Gas) and LQ (Liquid) respectively.
        - in NC-Z model, piping connections are concealed by the **electric panel** cover.
    - Depending on the type and placement (vertical/horizontal), OAC could be provided with different set of **legs/supports** (34); support/legs on-site assembly/installation is typically required – refer to the **Outdoor Air Condenser Installation** chapter.
- Electric power is brought to **disconnect** (35) (if OAC is equipped with one) or to power terminals within the **electrical box/panel** (36), that also contains OAC power and control apparatuses.

# Work Tasks General Considerations and Training Requirements

Whether performing routine, day-to-day maintenance or one-off (commissioning, repair etc.) work tasks, one must recognize potential hazards, associated with the task to be performed, equipment and its installation specifics, as well as be properly trained and qualified to perform such tasks.

⚠ **WARNING!** Any work (installation, start up, service, maintenance, repair, etc.) on the equipment must be performed by respectively trained and qualified individuals!

**NOTE!** Info in this sub-chapter is applicable to **ALL individuals**, performing **ALL tasks**: ***maintenance, service, repair, commissioning/start-up and decommissioning*** etc.

## Personnel Training and Qualification

Personnel, performing ANY work tasks (installation, maintenance, service, repair etc.) must be qualified for such tasks, which includes (but not limited to) training and possessing knowledge of respective tasks and procedures.

Since the dehumidifier (equipped with compressor(s)) contains class A2L (mildly flammable) refrigerant, following knowledge is critical to have for **ALL PERSONNEL** performing **ANY OF THE TASKS**:

- Information and understanding of the explosion and ignition potential of FLAMMABLE REFRIGERANTS
- Information about POTENTIAL IGNITION SOURCES,
- Information about the ventilation of the equipment, its compartments and the room it's installed in, and its effect on the safety (of the surroundings, carried out work tasks etc.)
- Information about refrigerant detectors (principle of functioning, interaction with the equipment, specific procedures related to refrigerant detectors – how to check, replace, repair and disable it etc.)
- Information and understanding of the concept of sealed components and enclosures.
- Information about correct work procedures for specific tasks, related to **MAINTENANCE, SERVICE, REPAIR, COMMISSIONING and DECOMMISSIONING.** These tasks include (but not limited to):
    - Commissioning – verify/check that:
        - conditioned space area is sufficient per refrigerant charge of the appliance.
        - Leak test is performed and is satisfactory
        - Appliance safeties are ok.
        - Other relevant safety and installation requirements are met
    - Maintenance-related (also – refer to separate chapter "Basic Maintenance"):
        - Verify that sufficient ventilation/airflow is in place
        - Be aware of the equipment operation/malfunction possible relation to its charge
        - As/if needed, perform proper capacitor discharge not to cause any sparks
        - As/if needed replace sealed or intrinsically safe components
        - Check appliance safeties
    - Repair/Service/Decommissioning-related – in addition to listed above for MAINTENACE:
        - As/if required – perform brazing and other auxiliary tasks (recovery, pressure testing, vacuuming, purging etc.) following best field practices, accounting for flammability of the refrigerant. Refer as needed to separate chapter "Service, Repair and Decommissioning"
        - If safety of decommissioned and to-be-removed equipment is affected by presence of the refrigerant in it – remove refrigerant prior.

In addition to qualifications outlined above, for personnel, performing some INSTALLATION, SERVICE, REPAIR and DECOMMISSIONING tasks (related to install, repair and/or disposal of mechanical and refrigeration equipment, ductwork, piping, electrical), formal training in respective field and/or trade licensing may be required, issued by local or national authorities.

## Considerations for any Work, Performed on the Equipment

When performing any work task on the equipment, it is critical to recognise hazards associated with equipment in general, as well as task specific hazards.

### General Potential Hazards Associated with Equipment

⚠ **WARNING!** Dehumidifier, equipped with compressor(s) contain A2L (mildly flammable) refrigerant!

- ***Moving mechanical parts***, components under ***high pressures*** and ***surfaces with high temperatures***. Before accessing the equipment and/or performing any equipment maintenance work, make sure that all moving parts are stopped, surfaces are cool, and it is safe to perform required task.
- ***Electrical power.*** Before performing any maintenance, disconnect all electrical power, including remote disconnect, and discharge all energy storing devices before servicing. Follow proper lockout procedures to ensure that power cannot be accidentally restored. Failure to follow provided safety warnings and labels could result in serious injury or death.
- ***A2L refrigerant***. Equipment contain A2L (***mildly flammable***) refrigerant.
    - Beware of possibility of leak and refrigerant concentration with potential to cause *explosion/fire*:
        - Ensure there is no open flames or other potential ignition sources!
        - Ensure there is sufficient ventilation!
    - Dehumidifier is equipped with safety mechanisms to mitigate the potential effects of the refrigerant leak; these mechanisms (*ventilation* etc.) rely on the equipment being powered, and respectively, these mechanisms are not active when equipment is powered down – beware of it!

### General Considerations Associated with Equipment Installation, Location and Connection

- Location, placement:
    - Equipment, containing A2L refrigerant, must comply with requirements, shown in **Table 1 and 2** (see **General Safety Information** chapter for **Special Considerations for Equipment Containing A2L Refrigerant**)!
    - Equipment must NOT be accessible to general public.
    - Equipment, installed on the elevated surfaces must have means, as applicable, to prevent personnel (maintenance, service, repair etc.) working on/with equipment, from falling – refer to respective Codes and Regulations.
    - Mechanical room, where dehumidifier is installed, and dehumidifier installation must comply with requirement **CSA B52/ASHRAE 15** for **MACHINERY ROOMS**. Requirements include, but not limited to, following (refer to respective Code):
        - Machinery room shall be of a tight construction and not accessible to general public.
        - Machinery room with equipment that contains A2L refrigerant shall:
            - be mechanically vented outdoors
            - be equipped with refrigerant detection system
            - have NO flame-producing devices or hot surfaces permanently installed in the room
- Parts and components – general:
    - Sealed electrical components shall be replaced instead of repaired.
    - Intrinsically safe components shall be replaced instead of repaired.
- Ductwork:
    - Ductwork connections (between duct in the conditioned space and the dehumidifier) must be of tight construction. Ducts passing through a machinery room shall be of tight construction and shall have no openings

  - Dehumidifier contains A2L refrigerant and relies on full ventilation via ductwork as means to mitigate potential leak and accumulation of refrigerant beyond dangerous concentration - any auxiliary devices that have a potential to become an ignition source are NOT permitted to be installed within ductwork.
- Piping:
  - Refrigeration piping (material, routing, installation), connecting dehumidifier and outdoor condenser shall comply with national and local Codes and Regulations, such as **CSA B52/ASHRAE 15** (and other as applicable) as well as proper field practises applicable to respective work tasks (piping, brazing, pressure/leak test, evacuation, charging, recovery etc.).
  - Piping shall be protected from physical damage in operation and service.
- Power:
  - Ensure that cabling/wiring are not subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. Account for the effects of aging or continual vibration (from equipment components, such as compressor, fan etc.)

## Maintenance Tasks

The only tasks performed should be the ones individual is qualified and trained for:

- When it is necessary to work with live electrical components, have a licensed electrician or other qualified professional perform the required task.
- Some maintenance tasks may involve usage of power tools, chemicals, etc. Refer to such tools and materials data (manuals, MSDS, etc.). Personnel performing such maintenance tasks should be:
  - Properly trained to handle such tools and materials safely
  - Equipped with proper personal protective equipment

## Installation, Service, Repair, Commissioning and Decommissioning Tasks

In some instances, more intrusive/specific work tasks (apart from routine maintenance) required. Apart from standard best field practices and Codes and regulations, applicable to respective tasks, it is critical to consider some equipment and its installation-specific details.

It is essential for any personnel carrying out any work on this equipment to be familiar with the equipment, its operation and details.

### General Considerations and Checks

⚠ **WARNING!** Any work (service, repair, decommissioning etc.) on the equipment must be performed by respectively trained and qualified individuals!

⚠ **WARNING!** Dehumidifier contains A2L (mildly flammable) refrigerant!

Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapour being present while the work is being performed.

- **General Area Check (where equipment is installed and/or work to be performed):**
- Prior to beginning work on systems, perform safety checks to ensure that the risk of ignition is minimised.
  - All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out.
  - Work in confined spaces shall be avoided.

- *Fire extinguishing equipment.* If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available (like a dry powder or $CO_2$ fire extinguisher).

- **Ventilation Check.** Ensure that the area is in the open or that it is adequately ventilated before breaking into the refrigeration system or conducting any hot work (brazing etc.). A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse released refrigerant (if any) and preferably expel it externally into the atmosphere.
- **Presence of Refrigerant in Atmosphere Check.** The area shall be checked with an appropriate refrigerant detector prior to and during work, to be aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i. e. non-sparking, adequately sealed or intrinsically safe. Refer to sub-chapter "Pressure/Leak Test. Leak Detection" below
- **Ignition Sources Check**
  - No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion.
  - All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the work site, where/when refrigerant can possibly be released to the surrounding space.
  - Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be displayed.
- **Electrical Devices Check.**
  - Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. Initial safety checks shall include:
    - that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking.
    - that no live electrical components and wiring are exposed while charging, recovering or purging the system.
    - that there is continuity of earth bonding
  - If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with.
    - If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment, so all parties are advised.
  - Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance.
- **Refrigerating Equipment and Piping Check**
  - The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS:
    - the actual REFRIGERANT CHARGE is in accordance with the conditioned space and room size within which the refrigerant containing parts are installed (see table1 and 2)
    - the ventilation machinery and outlets are operating adequately and are not obstructed.
    - marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.
    - *refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.*
    - *All field refrigerant joints shall be accessible for inspection prior to being covered or enclosed*

### Refrigeration Work Tasks

When/if required, service or repair work on refrigeration piping and equipment, that contain A2L (mildly flammable) refrigerant must be conducted in safe manner, following specific recommendations of respective Codes and Regulations as well as best field/trade practices.

### Pressure/Leak Testing. Leak Detection.

Refrigeration piping circuit must be leak-free to ensure problem-free operation of the equipment, comply with environmental and safety requirements. Following tasks to ensure that must be performed at different stages of piping.

After completion of respective work (installation, repair, replacement etc.), the pipework shall be **PRESSURE TESTED** with an inert gas and then vacuum tested prior to refrigerant charging.

- Pressure-test circuit/equipment – refer to the dehumidifier main label for operating pressure level.
  - The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system, cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.
  - Use only dry nitrogen for pressure testing!
  - Ensure that dehumidifier valves are in proper position (open/closed – as required by particular task) to allow for proper propagation of test gas and/or isolate proper segment, if any, of the equipment/piping.

Once circuit successfully charged (after performing all needed steps, like brazing, vacuuming and charging – see below), all field refrigerant joints indoors shall be **TIGHTNESS/LEAK TESTED**.

- Test must be performed with device/method with sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure. No leak shall be detected.

### A2L Refrigerant Leak Detection Methods.

⚠**WARNING!** It is prohibited to use potential sources of ignition to search for refrigerant or for detection of refrigerant leaks! A halide torch (or any other detector using a naked flame) shall not be used.

Acceptable (for A2L refrigerant) leak detection methods include:

- "Bubble" method (special leak-detection soap could be used, that forms bubble at the leak point). It is not recommended to use chlorine-containing liquids for this purpose.
- Electronic Leak Detection (by using ELD – Electronic leak Detector). Ensure the following:
  - ELD is not a potential source of ignition and is suitable for refrigerant used – refer to ELD manufacturer data
  - ELD is properly and regularly calibrated:
    - Calibration must be done in refrigerant-free area
    - Leak detection equipment shall be set at a percentage of the *LFL* of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.

### Evacuation and Charging

Perform evacuation (vacuuming) before charging system/its portion with the refrigerant:

- Verify/check evacuation and charging tools (vacuum pump, hoses etc.) for following:
  - compatibility with refrigerant used in the system
  - not being used with other refrigerants/oils to prevent cross-contamination
  - all tools in good order; hoses are not overly long (to minimize amount of refrigerant in them)
- Evacuate the system – ensure that vacuum of ***250 microns*** (min) is achieved and held for ***30 min***. Follow best field/trade practice.
  - Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.
  - Ensure that evacuation devices and tools (vacuum pump, hoses etc.) are compatible.
- Charge the system with proper amount of proper refrigerant.

- Refer to equipment (dehumidifier, OAC etc.) main label for ***refrigerant type*** and ***charge***. Ensure proper amount is added.
    - *Total system charge consists of **unit charge** (refrigerant, contained initially in the dehumidifier circuit itself), and **field charge** (refrigerant, contained in Outdoor Air Condenser Coil and a line set).*
        - ***Unit charge** is shown on the equipment main label.*
        - *To determine the **field charge**, calculate the **line set charge** by multiplying its length by the charge-per-foot amount show on the main label, and then add to it **OAC charge** amount, shown on the main label as well.*
- Charge with liquid refrigerant ONLY!
    - Ensure that charging cylinder(s) kept in an appropriate position.
    - Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant. Label the system when charging is complete (if not already)

### A2L Refrigerant Recovery and Removal

In some cases (to make a repair of for any other purposes) refrigerant removal (recovery) is required. If system must be emptied of the refrigerant, refrigerant should not be vented to atmosphere but properly removed! Conventional best recovery procedures and practices should be used with consideration of the flammability of the refrigerant.

- Before attempting the procedure, ensure that:
    - system is isolated electrically.
    - area is well ventilated
    - mechanical handling equipment is available, if required, for handling refrigerant cylinders.
    - all personal protective equipment is available and being used correctly.
    - the recovery process is supervised at all times by a competent person.
    - recovery equipment and cylinders conform to the appropriate standards. Verify following as well:
        - compatibility with refrigerant used in the system
        - hoses, recovery machine, cylinders were not being used with other refrigerants/oils to prevent cross-contamination
        - all tools in good order - cylinders are equipped with shut-off and pressure relief valve in good order, hoses with leak-free disconnects etc.
        - proper/correct number and type of cylinders available - of sufficient type for recovery and sufficient size/capacity to contain all recovered refrigerant
    - ***NOTE**: if refrigerant and/or oil is suspected to be faulty/not-acceptable (acidic etc.) or if recovery is done for decommissioning purposes, an oil and refrigerant sample shall be taken prior to the task being carried out in case analysis is required prior to re-use of recovered refrigerant*
- Remove refrigerant from the system following local and national Codes and Regulations as well as best field practices, including, but not limited to, following:
    - Pump down refrigerant system, if possible (to facilitate recovery process)
    - Make sure that cylinder is situated on the scales before recovery takes place
    - Start the recovery machine and operate in accordance with instructions.
    - Do not overfill cylinders (no more than 80 % volume liquid charge).
    - Do not exceed the maximum working pressure of the cylinder, even temporarily.
    - When the cylinders have been filled correctly and the process completed, make sure that the cylinders
    - and the equipment are removed from site promptly and all isolation valves on the equipment are closed
    - off.
- Once refrigerant is safely and completely recovered, evacuate (vacuum) the system and then break the vacuum by purging the system with dry nitrogen (or other suitable inert gas – no oxygen or air should be used).

- Ensure that the outlet for the vacuum pump is away from any potential ignition sources, and that proper ventilation is in place.
- Although not mandatory, it is recommended to repeat last step (evacuate and purge the system).

- Open the system for intended purpose.
  - if repair work involves open flame (brazing etc.)- continuously purge with inert gas
  - If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.
- If refrigerant recovery is performed for decommissioning purposes or faulty (contaminated, acidic etc.), recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

THIS PAGE IS INTENTIONALLY LEFT BLANK

# Delivery and Storage.

## Receiving Checklist

Each piece of equipment is tested and inspected before it ships from the factory; however, the equipment may suffer damage in transit.

It is highly recommended to thoroughly check for both visible and concealed damage upon the equipment arrival and before signing the receiving papers:

- ✓ Visually inspect exterior of the equipment for damages (scratches, dents, missing elements, etc.)
- ✓ Verify the proper operation of latches and hinges on all access doors
- ✓ Inspect all coils for damage to the fin surface coating, headers or coil connections
- ✓ Manually rotate the fan wheel to ensure free movement of the shaft, bearings, and drive
- ✓ Inspect the fan housings for any foreign objects
- ✓ Inspect and test all piping for possible shipping damage
- ✓ Check the tightness of bolts on the compressor, receiver, fan and coils' support

### Shock and Tilt Watch Check

Equipment is typically shipped from the factory with **Shock and Tilt Watches** (see Pic. I-1), attached to the packaging to indicate if equipment been handled inadequately during shipping (hit, tilted etc.).

If any either Tilt or Shock Watch indicate warning sign (indicator spot is **RED** on Shock Watch, indicator ball shows excessive tilt) – follow the instructions adjacent to the Shock and Tilt Watches:

- ➢ Do not refuse the shipment
- ➢ Make notation of the damage indicators (red spot on Shock Watch, degree of tilt etc.) on delivery receipt and inspect for damages.
- ➢ If damage is discovered, leave item in its original state and packaging, and request immediate inspection from carrier within 5 days of delivery.


*Pic. I-1*

## Shipping Damage Handling

Default manufacturer shipping method is “freight on board” (FOB), meaning that the equipment belongs to the customer as soon as the delivery truck leaves the factory.

**Note:** Manufacturer is not responsible for any shipping damage. Should the equipment arrive damaged, follow the instructions below to resolve the situation. Delivery cannot be refused on the basis of shipping damage.

### Shipping Damage Handling Instructions:

- ✓ Note the damage in detail on the freight bill and bill of lading.
- ✓ Take clear photographs of the damaged components, areas, and portions of the equipment.
- ✓ Obtain a claim form from the carrier, fill it out, and return it promptly. Report all claims of shipping damage to the carrier immediately and coordinate a carrier inspection if necessary.
- ✓ Contact Customer Support Team (see **Contact Us** clause) to notify of the noted damage.
    - Have the equipment serial number (8-digit) on hand to provide to Customer Support Team. The serial number can be found on the equipment’s main label or bill of lading.
    - Note: it is the receiver's responsibility to provide reasonable evidence that damage was not incurred after delivery.
    - Do not attempt to repair the equipment without consulting with Customer Support Team.

## Storage

- Protection from the elements is required for any equipment that will be stored on a job site or holding area before installation.
- All factory-applied shipping protection should be removed before the equipment is put into storage. Shipping protection material is provided by the factory for shipping only – it is not a suitable protection for short or long-term storage.
- For long-term storage, a controlled indoor environment is highly recommended.
    - If long-term storage is required, warranty aspect should be considered - refer to the **Warranty** chapter for more details regarding standard warranty terms and conditions. Contact manufacturer if needed.

⚠ **WARNING!** The appliance shall be stored in a room without continuously operating ignition sources (open flames, an operating gas appliance or an operating electric heater).

# Dehumidifier Installation

## Equipment Placement and Mechanical Installation

⚠**WARNING!** All work must be done by qualified personnel in accordance with local and national Codes, Standards and Regulations as well as respective submittal documentation and manufacturer recommendations.

As well, refer to **Work Tasks General Considerations and Training Requirements** chapter for guidance on training and work tasks safety.

⚠**CAUTION!** Obtain all necessary documentation (manufacturer documentation, submittal documentation, drawings, etc.) and familiarise yourself with it before performing installation or any other related tasks.

### Lifting and Rigging

⚠ **WARNING!** If equipment placement or delivery requires specialized lifting or rigging devices (crane, hoist etc.) – exercise caution and use proper lifting techniques and procedures!
Lifting and rigging must be done by trained professionals in accordance with proper lifting techniques and safety procedures. Proper lifting machinery and tools and safety equipment (PPE) must be used.
Improper lifting may cause equipment damage, serious injury, or death. Manufacturer is not responsible for the improper use of lifting equipment.

### Placement of the Equipment

Equipment (dehumidifier, outdoor condenser, fluid cooler, etc.) should be installed in accordance with respective local Codes and Regulations as well as applicable submittal documentation and proper field practices.

**Attention: Installing Contractors**

⚠ **CAUTION!** Dehumidifier, containing A2L (mildly flammable) group refrigerant, shall comply with minimum requirement for airflow and conditioned space area – refer to **Special Considerations for Equipment Containing A2L Refrigerant** clause in this manual!
Ensure that this is the case prior to installing the equipment!

**NOTE.** Installation of the equipment, that contains refrigerant, must comply with requirements of **CSA B52/ASHRAE 15** and other applicable local and national Codes and Regulations

- ✓ **Equipment installation base.** Equipment must be installed on a firm, levelled surface, properly affixed to said base, with provision for vibration absorption.
  - Acceptable (but not limited) type of base for equipment installation is concrete pad, support frame, suspension frame etc.
  - Acceptable (but not limited) means of affixing the equipment to the base are anchoring/fastening with bolts or screws.

**NOTE.** Equipment installation base as well as proper means of affixing equipment to it, shall be designed and provided by qualified party, accounting for various aspects (type and material of base, equipment weight etc.). DAS does neither design, provide nor responsible for equipment installation base.

- ✓ **Service and operational clearances** to the equipment must be always maintained.
  - Access to ALL doors, filter racks, access ports and covers must not be restricted. Some installations may require catwalks (over ducts, pipes, etc.) or other means of access to otherwise restricted side of the equipment.
- ✓ Clearances (service, to combustible etc.) that must be maintained are typically provided in submittal documentation package – refer to one for your dehumidifier. Some general guidelines are:
  - ***Clearance to combustible*** – min **12"**
  - ***Dehumidifier (***clearance from the doors, panels, access block-offs of the equipment (where access to internal or external components is provided)) - min ***36",*** otherwise – min **30"**

## General Requirements for Mechanical Rooms

⚠ **WARNING!** The equipment itself and mechanical room shall be NOT accessible to general public!

- ✓ No chemicals allowed to be stored in the same mechanical room.
  - other stored materials must not block access to the equipment for service and maintenance.
- ✓ Recommended levels for mechanical room air temperature is between 60F and 90F, and relative humidity - less than 65%.
- ✓ Mechanical room must have operational floor drain.
- ✓ ***Ceiling-suspended*** installation: support dehumidifier from (underneath) the base; refer to submittal documentation for dehumidifier weight distribution for proper selection and positioning of support.

### Requirement for Rooms with Equipment, Containing A2L Refrigerant

Mechanical room, where dehumidifier is installed, and dehumidifier installation must comply with requirement **CSA B52/ASHRAE 15** for **MACHINERY ROOMS**. Requirements include, but not limited to, following:

- ✓ Machinery room shall be of a tight construction and not accessible to general public.
- ✓ Machinery room with equipment that contains A2L refrigerant shall:
  - be mechanically vented outdoors
  - be equipped with refrigerant detection system
  - have NO flame-producing devices or hot surfaces permanently installed in the room
- ✓ Ducts passing through a machinery room shall be of tight construction and shall have no openings

For specific details on the requirements for machinery room, refer to **CSA B52/ASHRAE 15** respectively.

# Ductwork Connection

## Special Considerations for Ducted Dehumidifiers with A2L Refrigerant

- ✓ Ductwork connections (between duct in the conditioned space and the dehumidifier) must be of tight construction.
- ✓ Dehumidifier contains A2L refrigerant and relies on full ventilation via ductwork as means to mitigate potential leak and accumulation of refrigerant beyond dangerous concentration.
  - Any auxiliary devices that have a potential to become an ignition source are NOT permitted to be installed within ductwork. Consult the manufacturer prior to installing auxiliary device within the ductwork to ensure it's acceptable to do so.
  - Conditioned space area (***TAmin***) and dehumidifier refrigerant charge (***Mc***) relationship must comply with requirements, presented in **Tables 1 and 2 (**see **General Safety Information** chapter**)**. If zoning dampers are used, then the *conditioned area of the smallest zone* shall comply with this requirement (area of the smallest zone must be not less then ***TAmin***).

## Ductwork Layout and Connection Considerations

Though ductwork layout is outside of scope of dehumidifier installation and duct connection to it, it is crucial to have proper ductwork layout for proper air distribution throughout the premise and proper dehumidifier operation. Proper ductwork layout encompasses, among others, the following:

- ✓ Supply air must be directed/properly distributed to:
  - exterior windows and doors, skylights, etc.
  - breathing zone at the deck level and water surface.
  - remainder of the room to ensure there are no stagnant areas.
- ✓ Return duct grille must be located where it will optimize the entire airflow pattern (central/equidistant location of return grille, multiple return grilles if needed, etc.).
- ✓ Air short-circuiting must be prevented – no supply air diffusers near the return.
- ✓ Ensure grilles, diffusers and registers are delivering proper throw distance and CFM.
- ✓ Where/if applicable, establish direct exhaust of humid/chemical laden air from the source (locate exhaust grille above/close to spa, whirlpool, etc.).
- ✓ *Duct sock installation:* sock must be levelled (hangers are at the same heights), stretched and not sagging.

### Duct Connection – General Considerations

- ✓ All duct connections should be done in accordance with local and national standards.
  - Proper duct turns and transitions (sizing, distance, angles, turn vanes, etc.) should be used to minimize air friction losses and turbulence and to ensure the highest fan efficiency.
  - Flexible connectors (canvas collars, etc.) should be used to prevent (reduce) vibration and sound propagation.
- ✓ Ductwork should not interfere with other devices/systems operation and accessibility:
  - fasteners (screws, etc.) attaching ducts to the damper (if any), are not interfering with damper linkage, actuator(s) wiring and mounting brackets etc.
  - fasteners (screws etc.) are not interfering/penetrating any internal wiring, piping etc. possibly located behind the surface(s) ductwork is attached to – verify visually before installation and after.
  - If any, damper actuator(s), filter racks, etc. are accessible/not blocked by the installed ductwork.

## Outdoor Air Intake Consideration

For outdoor air brought into return air duct, to ensure equipment proper operation, following must be done:

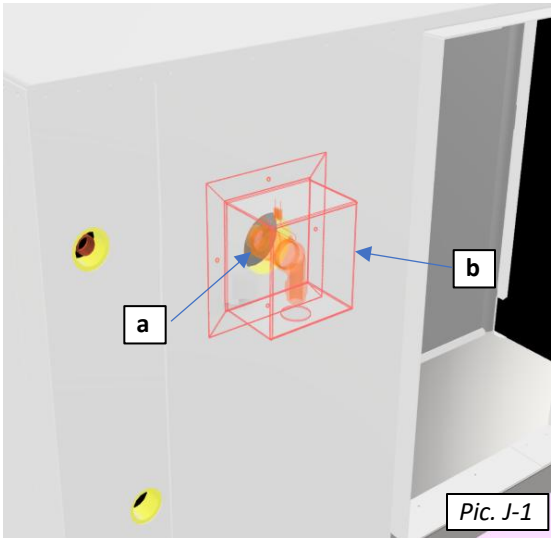
- ✓ Amount of outdoor air should not exceed 25% of the total airflow of the dehumidifier.
- ✓ Outdoor air should be at least 50F, before it's introduced into return duct/dehumidifier return air opening.

# Piping Connection

## PRV (Pressure Relief Valve) Venting

PRV, typically installed at the receiver, is used to prevent a pressure build-up within refrigeration system above safe level; if such event occurs, PRV would open and relieve the pressure (refrigerant).
To vent the relieved refrigerant outside, venting line should be connected to the PRV treaded connection (**a**) (see Pic. J-1):

- ✓ PRV is typically covered with protective metal cover (**b**), located near the supply air opening. Cover has pre-punched hole for venting line. If/as needed, enlarge existing hole or punch new one as needed.
- ✓ Install rubber grommet in the hole to protect vent pipe from metal edges.
- ✓ Consult and follow respective local and National Codes (like CSA B52/ASHRAE15 and any other applicable ones) when piping the venting pipe (selecting the pipe material, sizing, connection to PRV, termination etc.



*Pic. J-1*

## Condensate Drain and P-Trap

Each dehumidifier is equipped with a drain pan to collect and remove moisture, condensed during dehumidification. Drain pan must be fitted with a P-Trap and condensate line, which shall be directed to an external drain to ensure proper drainage.

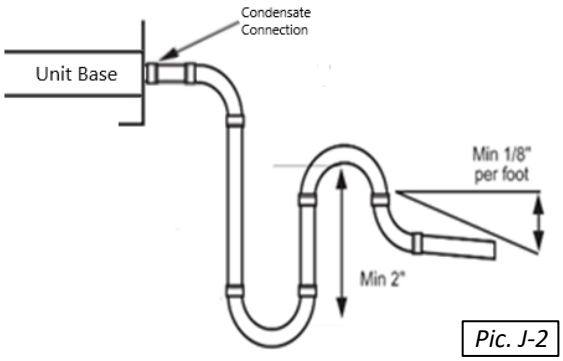
- Utilize proper piping materials, bonding and piping methods (support, routing etc.), suitable for condensate removal.
- If gravity disposal of condensate is not possible, use a condensate pump.
- If the drain line passes through an unconditioned/not-heated space, heat tracing is required to prevent the condensate in the drain from freezing.

Dehumidifier is typically provided with horizontal condensate termination (at the dehumidifier base); refer to submittal documentation for condensate drain connection exact location and size.

### P-trap Installation

- Make sure that drain connection has a P-trap!
- Make sure that there is only one P-trap installed (do not double-trap).
    - If soft piping material is used (braided hose, etc.) - ensure the drain line is not sagging (this may create “double-trapping effect” and prevent condensate from proper drainage).
- Pitch the condensate drain line minimum of 1/8” per linear foot and support the pipe with code-approved hangers at least every 5 feet (see Pic. J-2).

**Condensate Drain and P-trap Installation**



*Pic. J-2*

# Electrical Connection

⚠**WARNING!** All work must be done by qualified/licenced personnel in accordance with local and national Codes, Standards and Regulations as well as proper field practices, respective submittal documentation and manufacturer recommendations.

⚠ **CAUTION!** When connecting the electrical power supply and/or control wiring, refer to equipment submittal documentation, wiring diagrams and equipment labels and stickers to identify proper electrical/connection panels, access points, connection terminals etc.
Refer to equipment submittal documentation and main label for needed electrical data of individual components and equipment overall (voltage, phasing, amperage, MOP, MCA etc.)

⚠ **CAUTION!** Use **copper** conductors only. Equipment electrical and control terminals are not designed to accept other types of conductors. Use of aluminium or other wiring may result in galvanic corrosion and/or overheating that may cause equipment malfunction and/or failure and would void the warranty.

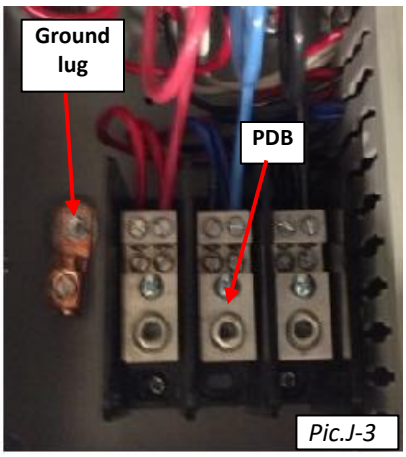
- ✓ For details on electrical connection of optional Outdoor Air Condenser – refer to respective chapter of this manual.

## Electrical Connection General Considerations

- Select power supply wire gauge and, as/when needed, external power apparatuses (disconnects, breakers, etc.) according to equipment electric data (MCA, MOP, etc.), provided on the main label, as well as respective local and national Codes and Regulations.
  - Disconnecting means must be incorporated into site wiring in accordance with any national and local Codes or ordinances that may apply.
- Equipment is accompanied with their respective wiring diagrams, depicting equipment internal wiring and terminals for external connection (power supply, control terminals, etc.) – refer as needed.
- Ensure that cabling/wiring will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. Account for the effects of aging or continual vibration (from equipment components, such as compressor, fan etc.)
- Properly seal all penetrations made/used in the equipment cabinet outer walls. Failure to due so may result in water/humid air infiltration that could lead to equipment malfunction or damage.
- Ensure that all metal shards and filings are swept to avoid possible corrosion or damage to electrical components. Ensure that wires are properly protected/isolated from the equipment cabinet sharp edges, hot surfaces, etc.

## Equipment Main Power Connection

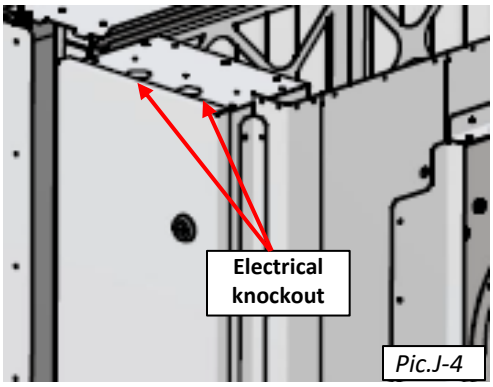
- Connect main ('high") power to PDB (power distribution block, see Pic. J-3), located in the **electric panel** – refer to equipment labels and manual for panel and PDB location reference.
  - If equipment has a built-in ***disconnect***, power must be brought to it – disconnect would be factory-wired to the PDB or devices directly.
- Verify that proper voltage and number of wires (single -phase Vs three-phase) are connected to the equipment – refer to the main label and submittal documentation
  - Connect power lines to PDB and ground wire to ground lug respectively



*Pic.J-3*

### Knockout for Power and Control Wiring Connection Location

- Use knockout hole(s) in the dehumidifier electric panel (see pic. J-4) to bring power directly to dehumidifier.
  - Same knockouts are available at the bottom of the panel to accommodate specific site requirements.
  - Multiple knockouts are available – to accommodate power and control cables separately/independently.
- Refer to equipment documentation (main label, submittal etc.) and respective local and National Codes and Regulations to determine cable and knockout sizing.



*Pic.J-4*

## Field Control Wiring – External Systems and Devices

Dehumidifier is controlled by the room thermostat, typically provided with the dehumidifier.

- ✓ Following guidelines refer to the basic package – dehumidifier without Outdoor Air Condenser (OAC). OAC control wiring is covered in **Outdoor Air Condenser Installation** chapter – refer as needed.

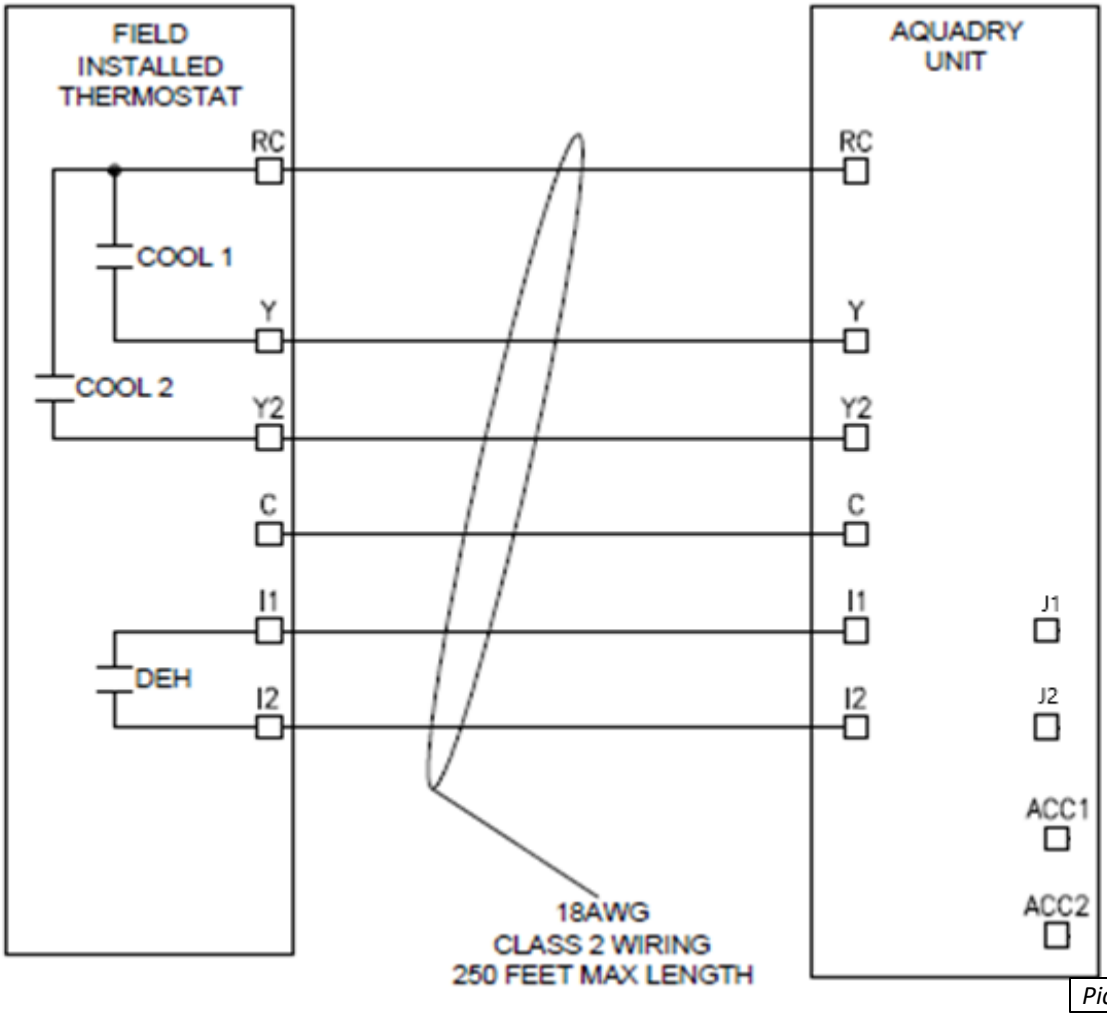
### Room Thermostat

- ✓ **Note:** basic instructions regarding the thermostat location and installation are provided below; for detailed information about specific thermostat navigation, programming and set up – refer to ***thermostat manual*** and other accompanying documentation.

**Thermostat basic location and mounting guidelines:**

- thermostat should be installed in a location most representative of the space average temperature and humidity.
- thermostat should be installed on the interior wall, approximately 5 feet above floor and at least 18" from outside wall.
- following should be avoided:
  - Behind doors, near outside doors, in corners or other dead air spaces.
  - In direct sunlight, near lighting fixtures, in the flow of a supply register or other direct heat sources
  - In a wall with concealed pipes or ductwork
  - In areas with high humidity emission (next to spa, whirlpool etc.)
  - In areas subject to splashing pool water

Typical thermostat field wiring is shown on Pic. J-5.




*Pic. J-5*

- ✓ **Fan operation**. Note that dehumidifier fan is NOT controlled by thermostat. Fan operation is intended to be continuous and uninterrupted.
- ✓ **RC/RH jumper**. Some thermostats come with terminals RC and RH connected via jumper. If your system has remote space heater controlled by the same thermostat as the dehumidifier, this jumper may need to be removed – refer to the **Space Heater** clause below and Space Heater manufacturer documentation.
- ✓ **J1/J2 terminals**. Dehumidifier default factory wiring has terminals J1 and J2 NOT connected – make sure this is the case if your dehumidifier is NOT equipped with Outdoor Air Condenser.

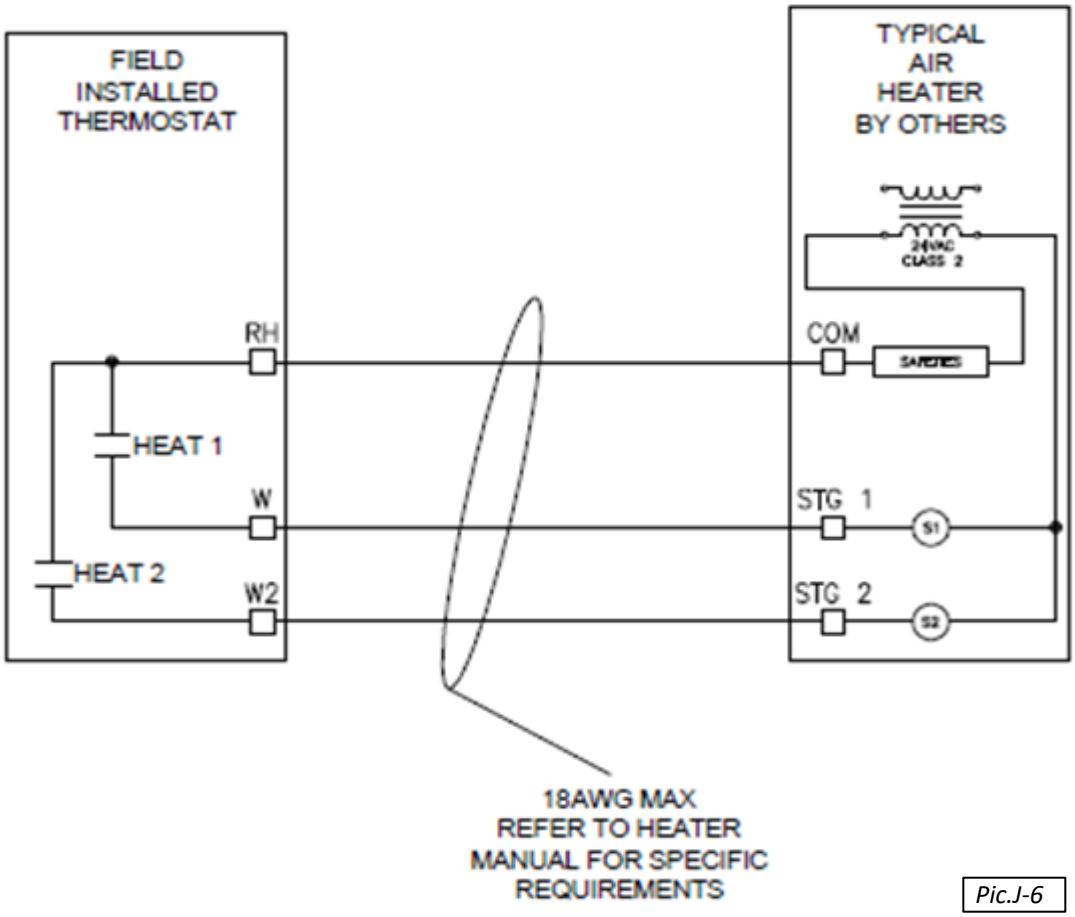
### Remote Space Heater

Space heater is not typically provided as a part of the dehumidifier, and its installation is outside current manual scope, however, some general control wiring guidelines are provided below for typical space heater (single – or two-stage one):

- ✓ For efficient operation of overall mechanical system and air temperature proper maintenance, it is recommended for the space heater to be controlled by the dehumidifier thermostat.

Typical control wiring of space heater is shown on Pic. J-6.

- If installed Space Heater has its own 24VAC power source (as shown on the diagram below) and it's to be controlled from the same thermostat as dehumidifier - make sure that jumper between thermostat's terminals **RC** and **RH** is REMOVED.
- It is highly recommended to have air-proving safety switch as a part of space heater control (especially – electric heater) – to ensure that the heater is disengaged/de-activated in absence of airflow.
- Refer to respective space heater manufacturer documentation for control wiring and other aspects of heater operation.




*Pic.J-6*

# Outdoor Air Condenser Installation

This chapter covers the details of installation of the Outdoor Air Condenser and applicable only to the systems equipped with one.

## Equipment Placement and Mechanical Installation

⚠**WARNING!** All work must be done by qualified personnel in accordance with local and national Codes, Standards and Regulations as well as respective submittal documentation and manufacturer recommendations.

As well, refer to **Work Tasks General Considerations and Training Requirements** chapter for guidance on training and work tasks safety.

⚠**CAUTION!** Obtain all necessary documentation (manufacturer documentation, submittal documentation, drawings, etc.) and familiarise yourself with it before performing installation or any other related tasks.

### Lifting and Rigging

⚠ **WARNING!** If equipment placement or delivery requires specialized lifting or rigging devices (crane, hoist etc.) – exercise caution and use proper lifting techniques and procedures!
Lifting and rigging must be done by trained professionals in accordance with proper lifting techniques and safety procedures. Proper lifting machinery and tools and safety equipment (PPE) must be used.
Improper lifting may cause equipment damage, serious injury, or death. Manufacturer is not responsible for the improper use of lifting equipment.

### Placement of the Equipment

Equipment (dehumidifier, outdoor condenser, fluid cooler, etc.) should be installed in accordance with respective local Codes and Regulations as well as applicable submittal documentation and proper field practices.

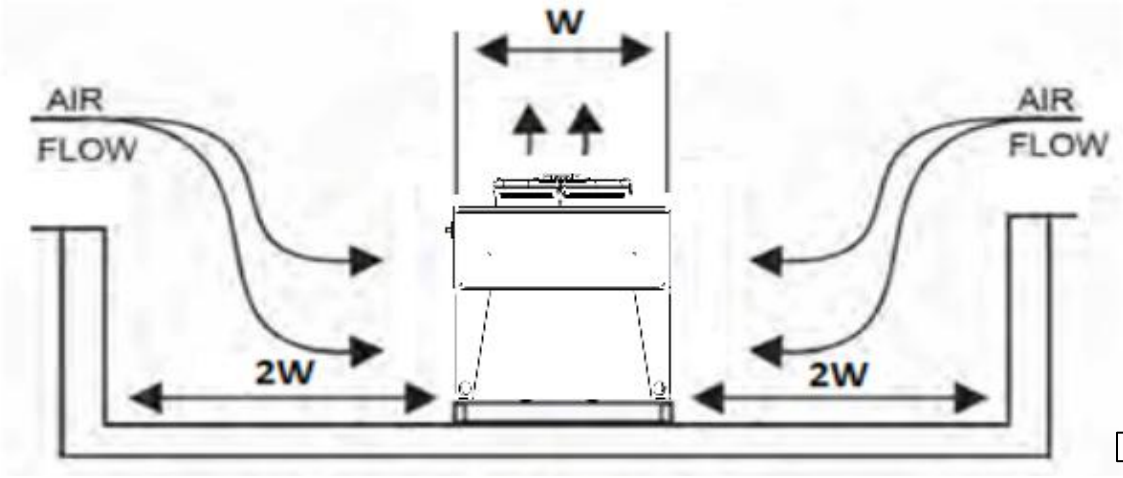
**NOTE.** Installation of the equipment, that contains refrigerant, must comply with requirements of **CSA B52/ASHRAE 15** and other applicable local and national Codes and Regulations

- ✓ **Equipment installation base.** Equipment must be installed on a firm, levelled surface, properly affixed to said base, with provision for vibration absorption.
  - Acceptable (but not limited) types of bases for equipment installation are concrete pad, support frame, suspension frame etc.
  - Acceptable (but not limited) means of affixing the equipment to the base are anchoring/fastening with bolts or screws.

**NOTE.** Equipment installation base as well as proper means of affixing equipment to it, shall be designed and provided by qualified party, accounting for various aspects (type and material of base, equipment weight etc.). DAS does neither design, provide nor responsible for equipment installation base.

- ✓ **Distance to the served equipment (dehumidifier).** Outdoor Air Condenser (OAC) is typically used as optional condenser for a dehumidifier (or another air-conditioning or refrigeration equipment) and is connected to said equipment via the line set. The length of the line set is limited, typically, to 50’ one-way – refer to your OAC main label and submittal documentation for specific max distance.
  - Line set length **shall NOT exceed said max distance,** otherwise would lead to system malfunction and failure!

- ✓ **Service and operational clearances** to the equipment must be always maintained.
  - Access to ALL panels, covers etc. must not be restricted.
  - Clearances (operational, service, to combustible etc.) must be maintained are typically provided in submittal documentation package – refer to one for your dehumidifier. Some general guidelines are:
    - ***Clearance to combustible*** – min **12"**
    - ***Operational typical clearances*** are 36" all around and 96" above; refer to submittal documentation for exact values.
  - ***Equipment installed in a pit*** (surrounded on all four sides by walls, structures etc. – see Pic. L-1) shall be avoided as much as possible. If such installation can not be avoided:
    - the *min. clearances* must be increased to *double width of the equipment* all around.
    - *surrounding structures' height* must *not exceed the height of the equipment*.




*Pic. L-1*

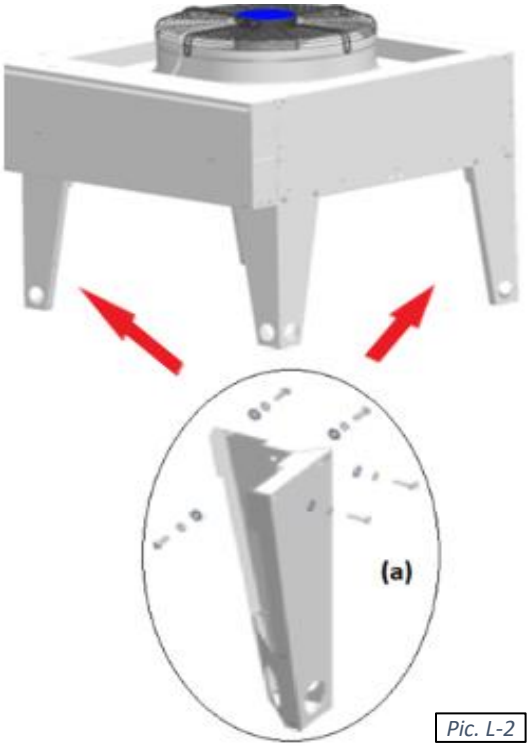
## Mounting Support Field Assembly

Provided Outdoor Air Condensers can be installed in vertical (OAC mounted on the horizontal surface - ground, roof etc.) or horizontal (OAC mounted on the vertical surface – wall etc.) airflow configuration and may require field assembly of respective mounting support.

### Vertical airflow configuration.

OAC model **NC-Z** assembly for vertical airflow configuration is shown on Pic. L-2:

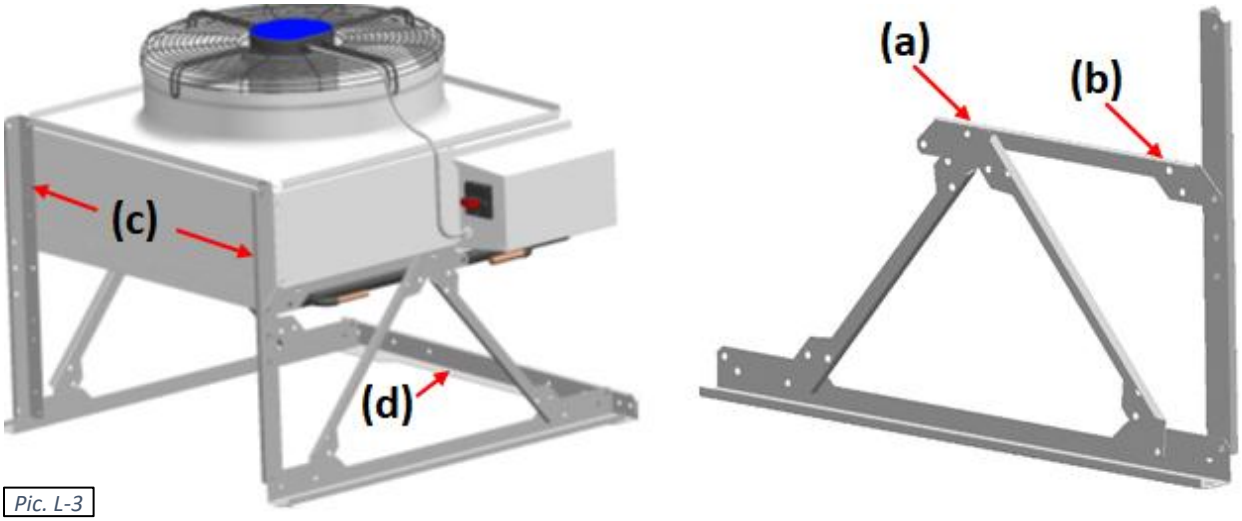
- ✓ Uncrate/unwrap the OAC and mounting kit (legs, fasteners etc.).
- ✓ Install the four provided legs **(a)** onto the OAC (leg is to be placed inside in the corner)
- ✓ Align all four holes in each leg and OAC corner and attach legs with provided bolts, washers (legs have factory-installed nut-certs); tighten all bolts.
- ✓ Ensure that the OAC is levelled and firm; affix the legs to the surface (concrete slab, etc.); anchors/fasteners for surface mounting are NOT included.




*Pic. L-2*

OAC model **NC-B** assembly for vertical airflow configuration is shown on Pic. L-3:

- ✓ Uncrate/unwrap the OAC and mounting kit (legs, fasteners etc.).
- ✓ Assemble left and right mount legs as shown with provided bolts, nuts, and washers (*except for joint point **(a)** – it must be bolted to the OAC!)*
- ✓ Align holes **(a)** and **(b)** in the mount legs with the holes in the OAC and attach them with provided bolts, nuts and washers.
- ✓ Attach rear support braces to the OAC with provided self-tapping screws **(c)**
- ✓ Install the optional front cross piece **(d)** between left and right leg with provided bolts, nuts and washers.
- ✓ Ensure that the assembly is straight, square and sturdy; tighten all bolts.
- ✓ Ensure that the OAC is levelled and firm; affix mount legs footings to the surface (concrete slab, etc.); anchors/fasteners for surface mounting are NOT included.

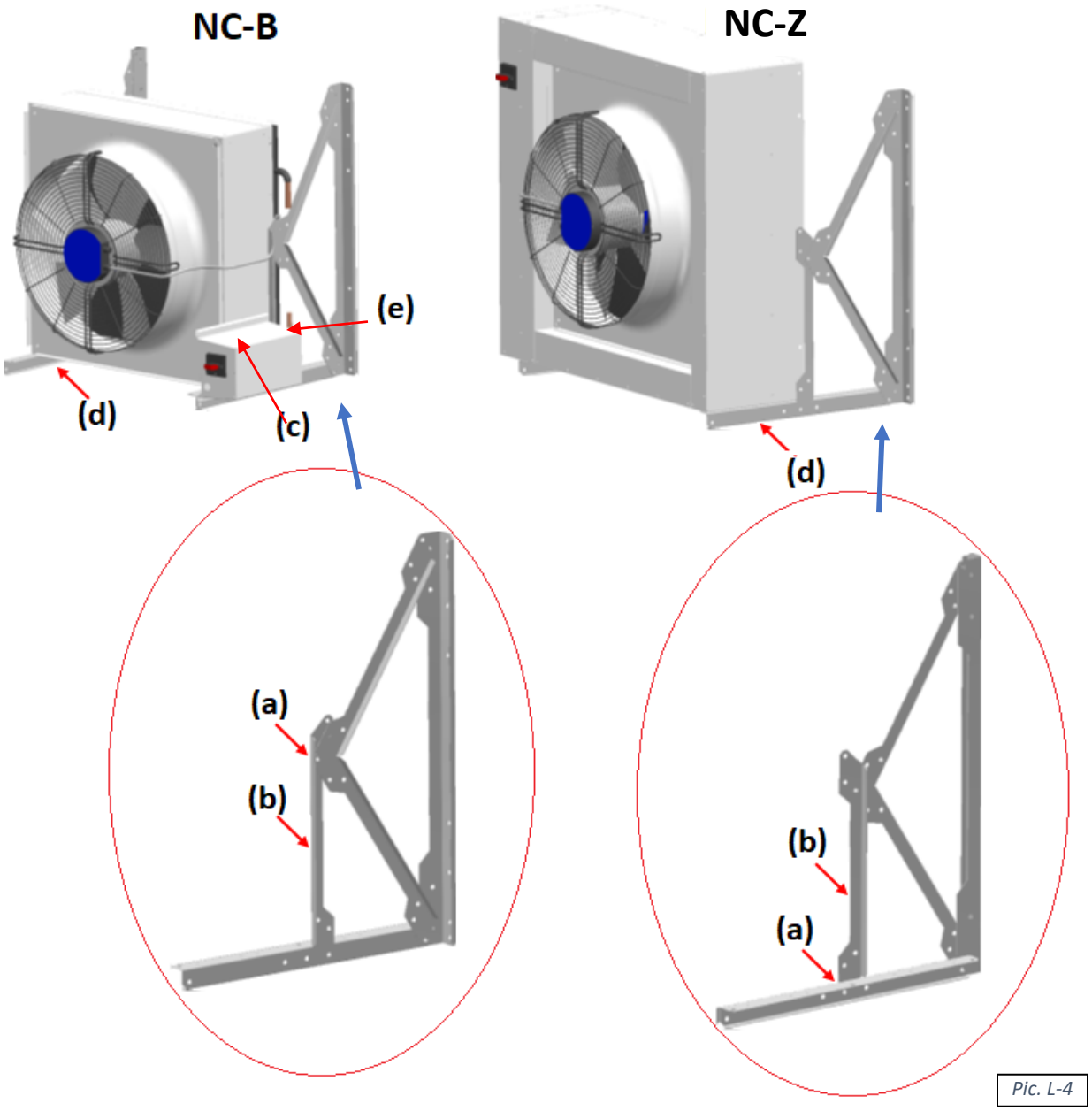



*Pic. L-3*

### Horizontal airflow configuration.

Both OAC models, **NC-Z** and **NC-B**, use same set of support for horizontal airflow configuration; assembly is shown on Pic. L-4 (note that support assembly and placement are slightly different for two models):

- ✓ Uncrate/unwrap the OAC and mounting kit (legs, fasteners etc.).
- ✓ Assemble left and right mount legs as shown with provided bolts, nuts, and washers (*except for joint point **(a)** – it must be bolted to the OAC!)*
  - Note that the cross-piece **(b)**, that is to be attached to the OAC, is mounted differently for NC-Z and NC-B.
- ✓ Before final assembly of equipment and mount legs, ensure following:
  - For model **NC-B**: electric box is positioned as shown – horizontal, with drip protection bend **(c)** at the top.
  - For all models: refrigerant connections are on the side AND *liquid line* connection (smaller of two - refer to OAC labels) is the *bottom one*, **(e).**
- ✓ Align respective holes in cross-piece **(b)** and the holes in the OAC and attach them with provided bolts, nuts, and washers.
- ✓ Attach rear support braces to the OAC with provided self-tapping screws **(d)**
- ✓ Ensure that the assembly is straight, square, and sturdy; tighten all bolts.
- ✓ Ensure that the OAC is levelled and firm; affix mount legs footings to the surface (wall, etc.); anchors/fasteners for surface mounting are NOT included.




*Pic. L-4*

## Refrigeration Piping

⚠ **WARNING!** Any work (installation, start up, service, maintenance, repair, etc.) on the equipment must be performed by respectively trained and qualified individuals!
Refer to "**Work Tasks -General Considerations and Training Requirements**" chapter for guidance on piping and refrigeration work.

**Note:** Refrigeration piping (material, routing, installation), connecting dehumidifier and outdoor air condenser shall comply with national and local Codes and Regulations, such as **CSA B52/ASHRAE 15** (and other, as applicable) as well as submittal and other manufacturer documentation and proper field practises.

## General Piping Consideration

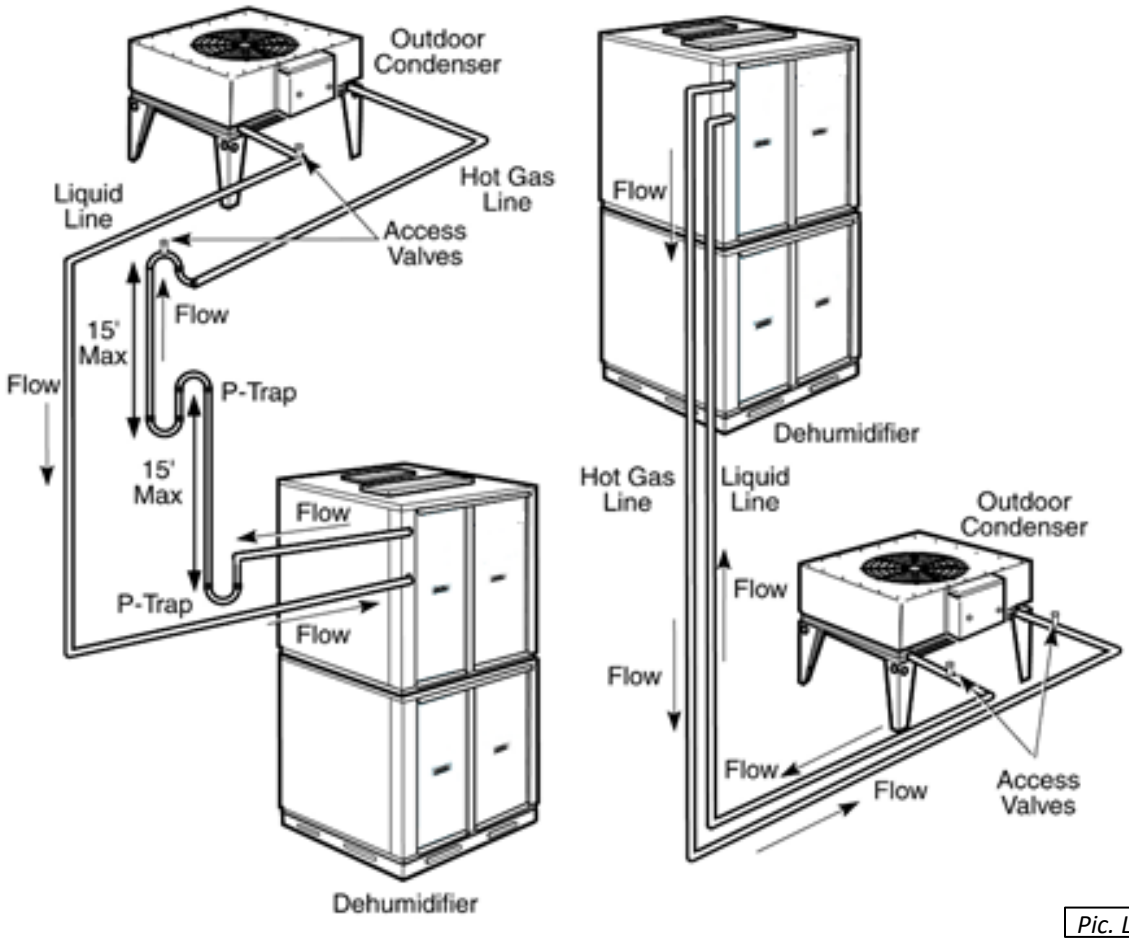
**NOTE!** Ensure that the area is in the open or that it is adequately ventilated before breaking into the refrigeration system or conducting any hot work (brazing etc.). A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse released refrigerant (if any) and preferably expel it externally into the atmosphere.

- ✓ Piping shall be protected from physical damage in operation and service.
- ✓ All field refrigerant joints shall be accessible for inspection prior to being covered or enclosed.
- ✓ Ensure proper piping support and bracing is in place – condenser and dehumidifier pipe terminations do not provide structural support for pipe line set.
- ✓ Proper piping practices (cleaning, sanding, reaming, wet ragging during brazing, etc.), tools (pipe cutters, torches, etc.) and bonding methods, respective to pipe and fittings material must be followed/used.
    - Exercise caution while brazing hot gas line to the hot gas connection – wet rag/protect pressure transducer installed at the HG connection from overheating.
    - Refrigeration piping/tubing must be brazed using respective brazing equipment and materials (flux, Sil-Fos® 5 brazing rod/wire or better etc.)
    - Where needed, only refrigerant-approved lubricant/sealant in threaded connections should be used.
    - Purge the air from the line set and condenser with nitrogen prior to brazing to avoid soot built-up inside the lines – soot/debris may potentially plug refrigeration circuit devices and cause failure.
- ✓ Identify correct system pipe terminations on condenser and dehumidifier (typically labeled as "HG/hot gas" and "LQ/liquid"). Connect similarly labeled terminations (HG to HG, LQ to LQ).
- ✓ If the condenser is installed ***above*** the dehumidifier, install an ***oil trap*** at the start of and at every **15'** of vertical lift in the hot gas line as shown on Pic. L-5.
- ✓ Pitch the ***horizontal*** lines a min ½" every 5' in the direction of flow.
- ✓ Keep the hot gas and liquid lines a min of 2" apart to prevent heat transfer. Insulate the hot gas line where a person may come in contact with the line and be in danger of burning themselves.
- ✓ ***CAUTION!*** The dehumidifier typically is shipped pre-charged with refrigerant. Before cutting dehumidifier' pipe stubs off to connect line set - ensure that dehumidifier isolating hot gas and liquid ball valves are closed.
    - Isolating ball valves typically have access ports that could be used for nitrogen purging, pressure testing, evacuating and charging. Check access ports for any pressure in the pipe stubs before cutting.
    - Add access port(s) to the line set or at the condenser, if needed.

*Note that the piping schematics shown on Pic. L-5 are example only - the design, provision, and installation of actual condenser line set is not manufacturer responsibility and is to be done by a third party.*

### Line Set Selection and Sizing

- Refer to equipment main labels for line set sizing (both, ***max line set length*** and pipes' ***diameters***):
    - note that line set ***pipe diameters*** may differ from respective piping connections size at the dehumidifier and condenser – refer to the equipment's main label.
    - one-way line set length (liquid OR hot gas line length) *must not exceed* ***max line set length***, indicated on the main label (typically – 50'). Excessive line set length could result in equipment malfunction and premature failure. Do **NOT** increase lines diameters (oversizing line set) to compensate for excessive line set length – consult the factory first.
- The outdoor air condenser, in general, can be located above, below or at the same level as the dehumidifier, however some limitation may apply:
    - *Consult the factory if the condenser is to be located **10'** or more **below** the dehumidifier.*
- Standard recommended pipe and fitting materials are refrigeration grade copper piping/tubing – refer to material applicability according to given application (refrigerant type, max working pressure, etc.).




*Pic. L-5*

## Other Refrigeration Work Tasks - Pressure Testing, Vacuuming and Charging

Refrigeration work tasks (Pressure/Leak Testing, Vacuuming, Charging etc.) must be performed according to the respective field practices, as well as requirements/steps, outlined in **"Work Tasks – General Considerations and Training Requirements"** – refer as needed/applicable.

### Dehumidifier Connection – Ball Valves Usage

Dehumidifier is equipped with isolating ball valves to facilitate Outdoor Air Condenser connection and (as needed) to isolate OAC from dehumidifier (to perform required work tasks).

- Ensure that dehumidifier isolating ball valves stay close during pressure test and evacuation.
- Once proper refrigerant amount ("field charge") is added to the line set and condenser – open dehumidifier isolating ball valves to allow for refrigerant flow.
- Use ball valve access port(s) on the line set for charging (if/as needed, install additional ports on the line set).

# Electrical Connection

⚠**WARNING!** All work must be done by qualified/licenced personnel in accordance with local and national Codes, Standards and Regulations as well as proper field practices, respective submittal documentation and manufacturer recommendations.

⚠ **CAUTION!** When connecting the electrical power supply and/or control wiring, refer to equipment submittal documentation, wiring diagrams and equipment labels and stickers to identify proper electrical/connection panels, access points, connection terminals etc.
Refer to equipment submittal documentation and main label for needed electrical data of individual components and equipment overall (voltage, phasing, amperage, MOP, MCA etc.)

⚠ **CAUTION!** Use **copper** conductors only. Equipment electrical and control terminals are not designed to accept other types of conductors. Use of aluminium or other wiring may result in galvanic corrosion and/or overheating that may cause equipment malfunction and/or failure and would void the warranty.

## Electrical Connection General Considerations

- Select power supply wire gauge and, as/when needed, external power apparatuses (disconnects, breakers, etc.) according to equipment electric data (MCA, MOP, etc.), provided on the main label, as well as respective local and national Codes and Regulations.
    - Disconnecting means must be incorporated into site wiring in accordance with any national and local Codes or ordinances that may apply.
- Equipment is accompanied with its respective wiring diagrams, depicting equipment internal wiring and terminals for external connection (power supply, control terminals, etc.) – refer as needed.
- Ensure that cabling/wiring will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. Account for the effects of aging or continual vibration.
- Properly seal all penetrations made/used in the equipment cabinet outer walls. Failure to due so may result in water/humid air infiltration that could lead to equipment malfunction or damage.
- Ensure that all metal shards and filings are swept to avoid possible corrosion or damage to electrical components. Ensure that wires are properly protected/isolated from the equipment cabinet sharp edges, hot surfaces, etc.

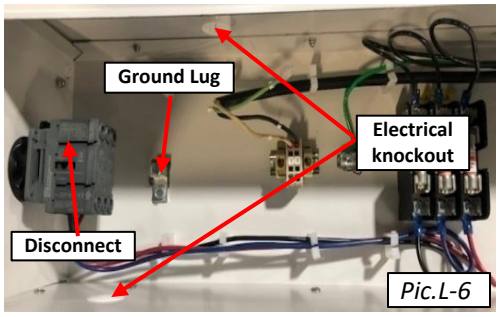
## Equipment Main Power Connection

Outdoor Air Condenser is typically provided with **built-in disconnect** (see Pic. L-6):

- Connect power to disconnect, located in the **electric panel**
- Verify that proper voltage and number of wires (single -phase Vs three-phase) are connected to the equipment – refer to the main label and submittal documentation.
    - Connect power lines to disconnect and ground wire to ground lug respectively.

**Knockout holes** are provided in the OAC electrical panel:

- Knockout location - side, top or bottom – may vary per model.
- Multiple knockouts are typically provided to accommodate power and control cables separately/independently.
- Refer to equipment documentation (main label, submittal etc.) and respective local and National Codes and Regulations to determine cable and knockout sizing.



*Pic.L-6*

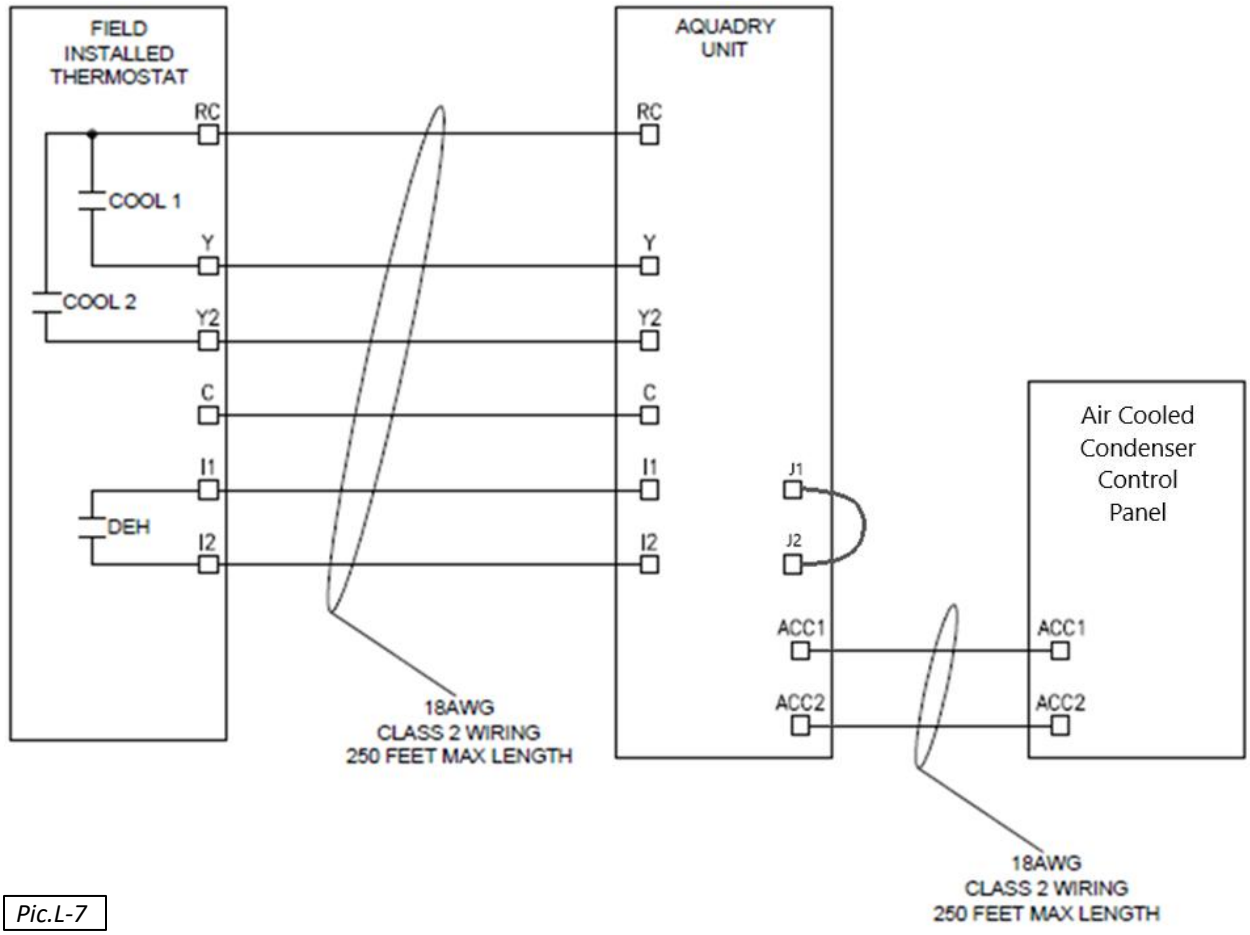
## Field Control Wiring

- Install control wires between OAC and dehumidifier
- Use copper gauge 18 multi-strand conductors.
- Ensure proper wire insulation/protection selection (exposure to cold weather, UV light, etc.)
- Refer to Wiring Diagrams of respective dehumidifier and OAC, as well as Field Wiring Diagram for needed number of conductors and terminals (at dehumidifier and OAC respectively).

Dehumidifier issues enabled signal to control OAC operation; internal control schematic of each OAC could vary based on specific OAC details – refer to submittal documentation as well as documents, accompanying OAC.

Typical Field Wiring diagram is shown on the Pic. L-7.

- **J1/J2 jumper**: install J1/J2 jumper to enable OAC operation.




*Pic.L-7*

Note, that field control wiring, shown above, depicts generic control set up, applicable for any outdoor condenser that uses “enable/disable” (on/off) control.
Depending on the internal control arrangement of provided outdoor condenser, some additional control wiring (and other steps) might be required – refer to the documentation accompanying your equipment as well as submittal documentation.

# Maintenance

Although dehumidifier is built for minimal service downtime, periodic preventative maintenance is required to ensure maximum reliability, safety, and operating efficiency.

⚠ **WARNING!** To ensure equipment longevity and proper and efficient operation, the dehumidifier and its auxiliary systems and devices (outdoor condenser, fluid cooler, boiler package, etc.) **must** be **maintained** properly and regularly. It is recommended to create a **facility-specific Routine Maintenance Program**.
Failure to maintain the equipment properly and regularly could result in personal injury, equipment damage or malfunction and will void the equipment warranty.

⚠ **WARNING!** Individuals performing Maintenance tasks on the equipment shall be properly trained and equipped to conduct respective tasks - review and follow details in chapter **Work Tasks General Considerations and Training Requirements** chapter to ensure safety while performing said tasks!

## Maintenance Key Points

Here are some basic/key maintenance considerations, pertinent to all dehumidifiers and their auxiliary systems:

- *Dehumidifier in mechanical room.* **No chemicals** should be stored **in the same mechanical room** where the dehumidifier is installed. Chemical fumes/off gas can cause premature deterioration of the equipment.
    - Store chemicals in a separate, well-ventilated room.
- *Access to the Equipment.* Ensure that the **equipment is accessible** (minimum clearances are maintained): approaches to the dehumidifier are not restricted/limited with materials in mechanical room.
- *"MUST DO" maintenance task.* Although all other maintenance tasks are as important, these two maintenance tasks are the most common and most helpful*:*
    - Maintain **clean air filter(s)**. Make sure to replace dirty filters regularly.
    - Maintain **clean air-side coils** (especially Outdoor Air Condenser). Make sure to clean coils regularly.
- *Pool Water Chemistry*. Incorrect pool water chemistry (improper pH level or high concentration of chlorine, sea salt or other corrosive additives etc.) can result in equipment premature wear or malfunction (let alone poor air quality in the pool and potential health issues) and will void the equipment warranty. Refer to pool water quality standards; contact factory as needed.

## Routine Maintenance Program

Creating facility-specific routine maintenance program and following it is vital to equipment longevity and efficient operation.
The suggested general maintenance operations and their frequency/intervals, listed in the **Table Q-1** below, can be used to create such a program. For more detailed maintenance recommendations related to specific components, refer to the respective component manufacturer's manual.

**Table Q-1.** Recommended Maintenance Tasks and Intervals

| Interval | Maintenance Task |
|---|---|
| Weekly | Observe the equipment for any changes in running conditions and unusual noise |
| Quarterly | Clean or replace air filters if clogged or dirty |
| | Verify that all set-points are correctly programmed as specified by the facility operator |
| Semi-Annually | Inspect and clean the drain pan(s) |
| | Tighten electrical connections, if required |
| | Inspect all airside coils (outdoor condenser, fluid cooler, dehumidifier coils – evaporator, etc.) for dirt, cobweb build-up, etc.; clean as needed |
| | Check that the P-trap is primed (filled with water). It is good practice to pour some water into the drain pan to ensure that the P-trap is primed and operational |
| | Inspect the equipment's cabinet for corrosion. If any damage is found, clean and repaint the affected surface with a rust-resistant primer |
| Annually | Clean the fan wheel(s) |
| | Inspect electrical components, wiring and insulation |
| | Rotate the fan wheel(s) and check for obstructions and rubbing |
| | Check gasket condition on all doors to ensure an airtight seal |
| | Check bolts on compressors, motor mounts, dehumidifier bases and coils and tighten if required |
| | Verify that the airflow around the remote condenser is unobstructed |

## Specific Components Maintenance

Actual maintenance plan may vary from installation to installation, yet there are several key components from maintenance perspective.

If needed, contact respective component manufacturer for additional maintenance information.

**Filters**

- Ensure air filters are clean. Dirty air filters will negatively affect dehumidifier performance and lifetime
- Frequency of filters replacement will vary based on air quality, dehumidifier usage, facility type, etc. Make sure to replace filters regularly
- Replace with filters of equivalent size and rating – refer to dehumidifier details (compartment stickers, etc.)

**Insulation**

Inspect dehumidifier insulation, exposed to airstream for microbial growth (i.e., mold). If there is evidence of microbial growth on the interior insulation, the insulation should be removed and replaced prior to operating the dehumidifier.

**Air-Side Coils**

- **Warning: Hazardous chemicals!** Cleaning agents can be highly acidic or alkaline. Handle all chemicals carefully and use appropriate personal protective equipment (PPE). Refer to the cleaning agent manufacturer's Materials Safety Data Sheet (MSDS) for safety and handling information. Failure to follow all safety instructions could result in serious injury or death.
- **Warning: Hazardous pressures!** Coils containing refrigerant under pressure must not be cleaned using a solution over 150 ºF. Failure to follow these safety precautions could result in coil bursting, which could result in serious injury or death.

**To clean the coil**

- Disconnect all electrical power to the equipment
- Use a soft brush to remove loose debris from the coil
- Mix a high-quality coil cleaning detergent with water according to the manufacturer's instructions
- Clean coil according to suggested instructions
- Thoroughly rinse both sides of the coil and the drain pan with, clean water
- Straighten any coil fins that have been bent during the cleaning process
- Confirm the drain line is clear
- Replace all panels and parts and restore electrical power to the equipment

THIS PAGE IS INTENTIONALLY LEFT BLANK

# Troubleshooting

Although **AquaDry** equipment is designed and built to operate trouble-free, equipment/system malfunction could still occur, requiring investigation and addressing the issue.

⚠**WARNING!** All work must be done by qualified personnel in accordance with local and national Codes, Standards and Regulations as well as respective submittal documentation and manufacturer recommendations.

As well, refer to "**Work Tasks -General Considerations and Training Requirements"** chapter for guidance on training and work tasks safety.

⚠**CAUTION!** Obtain all necessary documentation (manufacturer documentation, submittal documentation, drawings, etc.) and familiarise yourself with it before attempting to troubleshoot, service or repair the equipment.

Use the Troubleshooting Guide below to identify the issue, its probable cause and corrective action.
Note that Troubleshooting Guide:

- lists just the most common issues and may not cover all possible scenarios or issues.
- covers potential issues with the ***provided equipment*** (dehumidifier, OAC, thermostat, controllers etc.) operation overall; it does not address said equipment ***components*** (compressor, fans, controllers, valves etc.) ***internal*** works, design or failures issues – refer to the respective component manufacturer documentation.
- does NOT cover ***external systems and devices*** (space heaters, ductwork etc.), associated with the equipment provided.
- does NOT cover potential ***issues with the served space*** (pool room etc.) level of comfort and room condition (room is too warm/too cold, condensation on windows, foul odor etc.).

Contact ***Dehumidified Air Services*** (see contact info in "**Reference and Contact Information"** chapter) before replacing any components or entire equipment, or for any other questions (technical support, warranty, parts etc.).

## Troubleshooting Guide

| Symptom | Possible Reason | Troubleshooting Steps |
|---|---|---|
| Fan does not run | No power to dehumidifier<br>Fan fuses are blown<br>Fan speed resistors (if any) are faulty (shorted/open) | Check the dehumidifier power supply – braker (if tripped), fuses, disconnect (if turned off), wiring.<br>Check and replace (as needed) fan fuses<br>Check and replace (as needed) resistors – refer to dehumidifier wiring diagram. |
| Fan runs but produces no/low airflow | High air pressure drop across the dehumidifier and ductwork<br>Dehumidifier filters are clogged<br>Fan speed resistors (if any) are faulty | Check the ductwork (supply and return) for obstruction and sizing (if ductwork is undersized).<br>Check dehumidifier air filter, replace if heavily loaded.<br>Check and replace (as needed) resistors – refer to dehumidifier wiring diagram. |
| Dehumidifier does not drain properly | Drain line blocked<br>Unit not levelled<br>P-trap is not installed or installed incorrectly | Check the drain line for blockages and for a continuous downward slope.<br>Verify that the unit is levelled.<br>Check that the p-trap is installed correctly and primed. |

| Symptom | Possible Reason | Troubleshooting Steps |
|---|---|---|
| Dehumidifier significantly overheats the room | *Dehumidifier WITHOUT OAC*: normal operation<br>*Dehumidifier WITH OAC*: set points are incorrect | No action needed – dehumidification operation results in dry and heated<br>Adjust/lower Cooling Set Point to desired level |
| Compressor does not run while DEHUM call in place | Compressor relay(s) and/or contactor open/not engaged<br>Compressor capacitor is faulty<br>No power to compressor | Check RD relay (for being powered, closed etc.)<br>Check short-cycling relay (for being faulty, settings value etc.)<br>Check compressor contactor (for being engaged, supplying power to the compressor etc.)<br>Check and replace (as needed) compressor capacitor<br>Check and replace (as needed) compressor fuses |
| Compressor does not run while COOL call in place | Jumper J1/J2 is not installed<br>Compressor relay(s) and/or contactor open/not engaged<br>Compressor capacitor is faulty<br>No power to compressor<br>Incorrect thermostat settings (*for dehumidifier WITHOUT OAC only!)* | Check and install AC optional jumper – refer to wiring diagram<br>Check RC relay (for being powered, closed etc.)<br>Check short-cycling relay (for being faulty, settings value etc.)<br>Check compressor contactor (for being engaged, supplying power to the compressor etc.)<br>Check and replace (as needed) compressor capacitor<br>Check and replace (as needed) compressor fuses<br>For dehumidifier without OAC - COOL call could not be executed (refer to thermostat set up) |
| Compressor operation is intermittent (frequent start/stop)<br>AND/OR<br>Thermostat is not powered (screen is not lit) | No power to thermostat (from the dehumidifier)<br>Dehumidifier Voltage Monitor fault contact is open<br>Dehumidifier compressor switch (High Pressure - HP or Low Pressure -LP) is open<br>Air Flow Switch is open | Check power supply to dehumidifier itself<br>Check and replace (as needed) control thermostat fuses<br>Check 24VAC wiring to thermostat (RC and C)<br>Check supplied main power for being proper (voltage, phasing etc.)<br>Check Voltage Monitor for displayed fault (if any)<br>See "***Compressor Switches Trip***" symptom<br>Check Air Flow Switch operation/setting, replace as needed<br>See "***Fan runs but produces no/low airflow***" and ***"Fan does not run"*** symptom |
| Compressor Switches Trip – LP switch is open | Low refrigerant charge<br>Low/inadequate main fan airflow<br>Low load (room air temperature or humidity)<br>Restrictive/malfunctioning Expansion Valve | Verify refrigerant level - check receiver sight glasses<br>Check amount of field-added refrigerant during OAC installation<br>Check system for leak<br>See "***Fan runs but produces no/low airflow***" symptom<br>Check set points – they should not be lower than the design value!<br>Verify Expansion valve operation |
| Compressor Switches Trip – HP switch is open | Overcharged system<br>Restrictive/malfunctioning HR valve<br>OAC Fan operation is inadequate (fan is off, speed is inadequate etc.)<br>OAC airflow is restrictive | Verify refrigerant level - check receiver sight glasses<br>Check amount of field-added refrigerant during OAC installation<br>Verify HR Valve operation<br>See ***"OAC Fan does not run while COOL call in place"*** symptom<br>Check OAC coil, clean as required<br>Check OAC installation, clearances |

| Symptom | Possible Reason | Troubleshooting Steps |
|---|---|---|
| No call for Compressor (DEHUM or COOL call is not in place) while controlled parameter (room air temperature or humidity) is higher than its set point | Incorrect/different from expected set point<br>Controlled parameter (air temperature or humidity) is within a deadband of the set point<br>Compressor Min Off Timer has not lapsed yet<br>Incorrect thermostat setting<br>Faulty thermostat | Check the set point(s), adjust as needed<br>Check deadband settings; wait until controlled parameter value appears outside of the deadband and verify operation<br>Check the Compressor Min off Time settings; wait for timer to laps and verify operation<br>Check thermostat settings – refer to thermostat documentation Annex A of this manual<br>Check thermostat – refer to thermostat manual |
| OAC Fan does not run while COOL call in place | No power to OAC<br>OAC Fan fuses are blown<br>No enable signal to OAC Fan<br>OAC internal controller (if any) issue<br>OAC Fan internal failure | Check the OAC power supply – braker (if tripped), disconnect (if turned off), wiring.<br>Check and replace (as needed) fan fuses<br>Check for 24V on ACC1 and ACC2 terminals – refer to OAC and dehumidifier wiring diagrams<br>Check OAC controller (power, settings etc.) if applicable – refer to OAC documentation<br>Check OAC fan – refer to OAC fan documentation |

THIS PAGE IS INTENTIONALLY LEFT BLANK

# Warranty

## General Policy

All AquaDry service and warranty work is managed exclusively by Dehumidified Air Services (DASV). All warranties apply to the original equipment owner and are not transferable. All warranty inquiries should be made directly to Dehumidified Air Services prior to the completion of repairs.

AquaDry warrants as set forth and for the time periods shown below that AquaDry will provide a new or rebuilt part to replace a factory installed part which has failed because of defect in workmanship or material. AquaDry warrants as set forth and for the time periods shown below that AquaDry will provide a labor authorization for the repair or replacement of a factory installed part which has failed because of defect in workmanship or material.

**NOTE: Every request related to a warranty of any nature as described below must be officially documented with and authorized in advance by DASV to qualify for warranty coverage.** Visit www.Dehumidifiedairservices.com and select the Warranty tab to register your dehumidifier warranty and for the latest instructions to file a warranty claim.

Dehumidified Air Services:
Website: www.Dehumidifiedairservices.com
Phone: 1-833-DAS-POOL (1-833-327-7665)
Email: Warranty@DehumidifiedAirServices.com

## Warranty Void Unless Registered

All Warranties are void unless an authorized startup is completed and reported to Dehumidified Air Services (DASV) within 2 weeks of the original equipment startup date. The startup report must be approved by DASV for a Warranty Certificate to be issued. **Warranties are only registered after a Warranty Certificate has been issued.** To complete the equipment warranty registration, it is required to provide both the installation location and the equipment owner's information.

All standard parts warranties, extended parts warranties and labor warranties shall begin on the date of equipment startup, or 6 months from the date of equipment shipment, whichever occurs first. **An approved startup report is required for warranty registration.** The completed startup report must be submitted to Warranty@dehumidifiedairservices.com within 2 weeks of the original startup date for approval and warranty registration.

## 90-day Comprehensive Labor Warranty

Following warranty registration, during the first 90-days following the original date of equipment startup, not to exceed 9-months from the date of shipment, DASV will authorize a labor allocation for the repair of any factory defects in workmanship or materials covered by AquaDry manufacturer warranty.

DASV may elect at their sole discretion, for a DASV technician, or authorized service provider of their choosing to complete a warranty repair in lieu of authorizing a labor allocation. Shipping of warranty parts and RMA return shipping is covered under the 90-day Comprehensive Labor Warranty.

## Two-Year Parts Warranty

If any factory installed part supplied by AquaDry fails because of a defect in workmanship or material prior to the completion of the 24th month from date of completion of the warranty activation, AquaDry will provide a new or rebuilt
part FCA factory. No labor reimbursement will be made for expenses incurred in replacing the part except as set in the *90-day Comprehensive Labor Warranty.*

AquaDry reserves the right to have the defective part returned to the factory in order to determine the warranty applicability. Parts shipping and handling costs (to and from the factory) are not covered outside of the 90-day Comprehensive Labor Warranty.

AquaDry reserves the right to have the defective part returned to the factory in order to determine the warranty applicability. Parts shipping and handling costs (to and from the factory) are not covered outside of the 90-day Comprehensive Labor Warranty.

### Replacement Part Warranty

If a replacement part provided by AquaDry under this warranty fails due to a material defect prior to the end of the Two-Year Parts Warranty (or the end of the extended warranty period if applicable), AquaDry will provide a new or rebuilt part FCA factory

AquaDry reserves the right to have the defective part returned to the factory in order to determine the warranty applicability. Parts shipping and handling costs (to and from the factory) are not covered outside of the 90-day Comprehensive Labor Warranty.

### Applicability

This warranty is applicable only to products that are purchased and installed in the United States and Canada. This warranty is NOT applicable to:

1. Products that have become defective or damaged as a result of non-DASV or unauthorized service work, poor maintenance, faulty electrical supply, act of God, or any other circumstances outside of the specified care, maintenance or operation of the equipment including:
    - Components that have been relocated from their original placement during manufacturing.
    - Any portion of the system not supplied by AquaDry.
    - Components on which the model and/or serial number plates have been removed or defaced.
    - Components which have become defective or damaged as a result of unauthorized opening of the refrigeration circuit, improper wiring, electrical supply characteristics, poor maintenance, accidents, transportation, misuse, abuse, fire, flood, alteration and/or misapplication of the product.
    - Products not installed, operated, and maintained as per the AquaDry Operating and Maintenance Manual.
    - Products operating in mechanical rooms that house chemicals (i.e. chlorine, bromine, salt, water treatment chemicals).
    - Products on which payment is in default.

2. Parts that wear out due to normal usage, such as air filters, contactors, relays and fuses are not covered by this warranty.

**NOTE:** Refrigerant or glycol lost during the 90-day Comprehensive Labor Warranty due to defect in factory provided material or workmanship will be reimbursed in accordance to the current wholesale market price of the refrigerant or glycol at the time of repair and upon discretion of DASV's Customer Support team. AquaDry will not be responsible for refrigerant or glycol lost from the system due to improperly installed contractor piping to the remote outdoor air-cooled condenser, fluid cooler or other external piping systems. When connected to an external fluid system (heating loop, condenser loop, etc.), AquaDry will not be responsible for fluid lost from the external piping system.

## Limitations

1. DASV is a Manufacturer Service organization, not a first-response or urgent response local service company. As such, we highly recommend that equipment owners have a relationship with their own qualified first response service organization or one recommended by DASV.

DASV hours of operation are from 8:00 AM to 5:00 PM Eastern, Monday through Friday unless otherwise agreed to under a separate agreement.

Parts replacement can be subject to availability. We highly recommend for mission-critical applications that owners purchase and maintain a local stock of critical components in case immediate replacement is required. If for any reason one of those components are replaced under applicable warranty conditions, AquaDry will provide a new or rebuilt part FCA factory for any component used under the terms of Warranty.

**NOTE:** AquaDry expressly disclaims any liability for parts replacement delays due to parts unavailability or shipping delays.

2. This warranty is given in lieu of all other warranties. Anything in the warranty notwithstanding, any implied warranties of fitness for particular purpose and merchantability shall be limited to the duration of the warranties described above. AquaDry expressly disclaims and excludes any liability for consequential or incidental damage for breach of any express or implied warranty.

Where a jurisdiction does not allow limitations or exclusions in a warranty, the foregoing limitations and exclusions shall not apply to the extent of the legislation, however, in such case the balance of the above warranty shall remain in full force and effect.

This warranty gives specific legal rights. Other rights may vary according to local legislation.

## Force Majeure

AquaDry will not be liable for delay or failure to provide warranty parts or service due to government restrictions or restraints, war, strikes, material shortages, acts of God or other causes beyond AquaDry control.

THIS PAGE IS INTENTIONALLY LEFT BLANK