

# **TrilliumSeries**Adiabatic Cooler - TRF

**RIGGING & ASSEMBLY INSTRUCTIONS** 



The TrilliumSeries™ adiabatic cooler should be rigged and assembled as outlined in this instruction manual.

Only qualified personnel should undertake the rigging and assembly of the equipment covered by this manual. This manual should be thoroughly reviewed prior to the actualrigging and assembly of the equipment to ensure proper procedures are followed and that all necessary equipment is available. Proper care, procedures, and tools must be used in handling, lifting, installing, operating, maintaining, and repairing this equipment to prevent personal injury and/or property damage.



Be sure to have a copy of the submittal package available for reference, since it includes submittal drawings and other equipment details. If you need additional information about this unit, contact your local <u>BAC Representative</u>, whose name and telephone number are on a label adjacent to the access door. The model number and serial number of the unit are also located in this area.



### RIGGING & ASSEMBLY INSTRUCTIONS

### Contents

1. Warnings and Cautions	4
Safety Precautions	4
Equipment Precautions	5
2. Rigging	6
Pre-Rigging Checks	6
Unit Weights	
Anchoring	
Layout Guidelines	8
Model Specific Rigging Drawings	9
Prolonged Outdoor Storage	10
Storage Preparation	10
Motor Storage Recommendations	10
Preparation After Prolonged Storage	11
3. Installation	12
Piping Guidelines	12
Water Connection	12
Installation of Leaving Fluid Temperature Sensor	13
Flange Coil Connections	14
Threaded Coil Connections	14
Plain Pipe Stub Coil Connections Nitrogen Charge Removal	14
Wiring and Electrical Information	14
Electrical Power Quality	14
Power Connections	
Control Connections	15
Unit Operation	15
4 Rigging Drawings	16

### 1. Warnings and Cautions

### **Safety Precautions**

- DANGER: This unit contains rotating equipment that can cause severe personal injury or death upon contact. Never remove or step on a fan guard grill, subject the fan guard grill to load, or place any objects on the fan guard grill. Employ safeguards (including the use of protective enclosures where necessary) to prevent public access to equipment.
- DANGER: Failure to use designated lifting points can result in a dropped load and cause severe injury, death, and/or property damage. Lifts must be performed by qualified riggers following these Rigging & Assembly Instructions and generally accepted lifting practices. The use of supplemental safety slings may also be required, as determined by the qualified contractor for rigging.
- DANGER: Performing work on an energized unit poses a risk of electrocution, which can cause severe personal injury, death, and/or property damage. Do not perform any service on or near the unit without first ensuring the unit is de-energized and all lockout / tagout procedures have been followed. Wait five minutes after disconnecting the voltage at all poles before opening the fan and motor assembly.
- WARNING: Failing to properly anchor the unit before operation poses a risk of severe injury, death and/or property damage.
- WARNING: Do not use the top horizontal surface of the unit as a walking surface or a working platform. Doing so poses a risk of falling through the surface, resulting in personal injury and/or equipment damage.
- WARNING: Attachment point shown in Figure 2 IS FOR FACTORY USE ONLY. A heavy load can fall and cause severe injury, possible death, and property damage. Only use the lift points designated in Rigging & Assembly Instructions.
- WARNING: The pre-cooler pads are made of flammable material and should be removed when performing hot work on or near the unit.

### **Equipment Precautions**



- Before a lift is undertaken, open the unit's access hatch(es) and check to ensure no water, snow, ice, or debris has collected in the sump or elsewhere in the unit. Such accumulations will substantially add to the equipment's lifting weight.
- BAC units are typically installed immediately after shipment, and many operate year-round.
   However, if the unit is to be stored for a prolonged period before installation or remain in an unused state for a prolonged period after installation, certain precautions should be observed. Refer to Prolonged Outdoor Storage details in Section 2.
- Do not use steam, high-pressure water, or high-pressure air to clean the unit or any component to prevent equipment damage.
- Field piping must not be supported by the unit inlet or outlet connections to prevent equipment damage.
- The installer must ensure a proper air purging of the system prior to operation. Entrained air can restrict the capacity of the cooler, resulting in higher process temperatures.
- All connections including those installed by others must be leak-free and tested accordingly.
- To prevent possible contamination of the make-up water supply, install a backflow prevention method in accordance with applicable local and national codes.
- To prevent excessive degradation do not attempt to remove the pre-cooler pads while wet.
- When connecting power to the unit, do not penetrate the control panel. Doing so may allow moisture to enter the panel. All cable and conduit should be supported separately from the unit.
- Do not penetrate the unit for supports or other connections.

### 2. Rigging

Adequate precautions appropriate for the installation and location of these units should be taken to safeguard the equipment and the premises from damage, and the public from possible injury. The procedures listed in this manual must be thoroughly reviewed prior to rigging and assembly. Read all warnings, cautions and notes.

### **Pre-Rigging Checks**

BAC TrilliumSeries<sup>™</sup> adiabatic coolers are factory assembled to ensure uniform quality with minimum field assembly. For each unit, only one lift is required. For the dimensions and weights of a specific unit or section, refer to the submittal drawings.

When the unit is delivered to the jobsite, it should be checked thoroughly to ensure all required items have been received and are free of any shipping damage prior to signing the bill of lading.

DANGER: Failure to use designated lifting points can result in a dropped load and cause severe injury, death, and/or property damage. Lifts must be performed by qualified riggers following these Rigging & Assembly Instructions and generally accepted lifting practices. The use of supplemental safety slings may also be required, as determined by the qualified contractor for rigging.

**WARNING**: Do not use the top horizontal surface of the unit as a walking surface or a working platform. Doing so poses a risk of falling through the surface, resulting in personal injury and/or equipment damage.

### The following parts should be inspected (if applicable to the unit's configuration):

☐ Adiabatic pre-cooler pads	☐ Interior surfaces
☐ Control panel	☐ Sump components
☐ Coil surfaces	☐ Water connection piping
☐ EC fan module(s)	☐ Water distribution system
☐ Exterior surfaces	
☐ Fan guard(s)	
☐ Leaving fluid temperature	

For TrilliumSeries™ Adiabatic Coolers that are shipped already charged with nitrogen, verify that the coil has maintained a pressure of 15 psi (1 bar) by measuring the pressure with a pressure gauge on the Schrader valve prior to installation.

The leaving fluid temperature sensor is shipped loose and stored inside the electrical cabinet for installation on site.

### **Unit Weights**

Before rigging a unit, verify the weight of each section with the unit submittal drawing. In the event of extended lifts or where hazards exist, the lifting devices should be used in conjunction with safety slings placed under the unit.



**NOTE:** Before an actual lift is undertaken, open the access hatch and check to ensure no water, snow, ice, or debris has collected in the sump or elsewhere in the unit. Such accumulations will substantially add to the equipment's lifting weight.

### **Anchoring**

7/8" diameter holes are provided in the bottom flanges of the unit for bolting the unit to the support beams. Refer to the suggested support drawing included in the unit submittal package for location and quantity of the mounting holes. The unit must be level within 1/16" per foot in both length and width directions for proper operation. Supporting steelwork and anchor bolts are not provided by BAC and must be furnished by others. BAC recommends 3/4" diameter, SAE J429 Grade 5, ASTM A325 Type 1 or equivalent anchor bolts. Beams should be selected in accordance with accepted structural engineering practices. Supporting steel must be greater than or equal to the length of the unit's base, and the unit may not be point supported. Each beam should be designed, at a minimum, for 65% of the total unit operating weight applied as a uniformly distributed load. If vibration isolators (provided by others) are to be used, the units shall be installed on steel support first and the vibration isolators should be mounted under the steel support. Refer to the vibration isolator manufacturer's guidelines before loading/unloading weight from the unit. When a unit is anchored directly to concrete on grade without steel supports, the support concrete must be flush and level at top. Any concrete surfaces for unit support and anchors must be in accordance with accepted structural practices. When units are anchored by anchor rods, 3/4" diameter ASTM F1554 Gr. 105 anchor rods or their equivalent are generally recommended.

**WARNING**: To prevent severe injury, death and/or property damage the unit must be properly anchored before operation begins.

### **Layout Guidelines**

TrilliumSeries™ adiabatic coolers require an adequate supply of fresh air to the coils. The axial fan(s) are not equipped to overcome external static pressure. When units are located adjacent to walls or within enclosures, care must be taken to ensure that the discharge does not recirculate back into the air intakes. Each unit must be located and positioned to prevent the introduction of discharge air into building ventilation systems, including the installed location and adjacent buildings. For detailed recommendations, see the Layout Guidelines available on BAC's public website.

### **Rigging Summary**

- 1. The equipment arrives on site by truck. A crane must always be used to unload the unit from the truck. Do not attempt to unload the unit using a forklift.
- 2. Spreader bars spanning the full width of the unit must be used between the lifting cables to prevent damage to the unit. Refer to **Table 1** and **Section 4. Rigging Drawings** for model number specific rigging dimensions.
- 3. For extended lifts or where hazards exist, it is recommended to use the lifting devices in conjunction with safety slings placed under the unit.
- 4. For each unit, only one lift is required. Multiple lifting ears located towards the bottom of the unit are provided as shown in **Figure 1.** Lifting ear holes are 1-3/4".

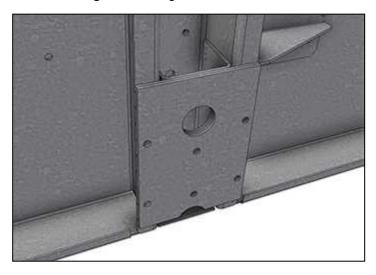


Figure 1. Lifting Ear

5. Do not lift equipment from upper attachment points shown in **Figure 2**. **THESE LIFT POINTS ARE FOR FACTORY USE ONLY.** Only use the lift points shown in the rigging drawings listed in **Table 1**.

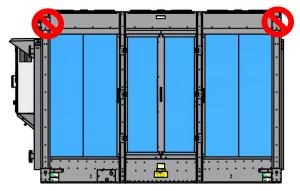


Figure 2. Incorrect Lifting Locations

- 6. Attach the lifting devices to the unit as per rigging methods below. Unload the unit from the truck.
- 7. Install the unit in its final position and anchor it to the support beams (supplied by others).

### **Model Specific Rigging Drawings**

Refer to **Table 1** for the rigging drawing applicable to your unit's model number. Refer to the appropriate rigging drawing for model number specific rigging dimensions.

Model Number	# of Fans	Rigging Drawing Page #			
TRF-1010N-C80GX17E	4	17			
TRF-1010N-C80FX17E	4	17			
TRF-1010N-C60FX17E	4	17			
TRF-1014N-C80GX26E	6	18			
TRF-1014N-C80FX26E	6	18			
TRF-1014N-C60FX26E	6	18			
TRF-1018N-C80GX34E	8	19			
TRF-1018N-C80FX34E	8	19			
TRF-1018N-C60FX34E	8	19			
TRF-1022N-C80GX43E	10	20			
TRF-1022N-C80FX43E	10	20			
TRF-1022N-C60FX43E	10	20			
TRF-1026N-C80GX51E	12	21			
TRF-1026N-C80FX51E	12	21			
TRF-1026N-C60FX51E	12	21			
TRF-1030N-C80GX60E	14	22			
TRF-1030N-C80FX60E	14	22			
TRF-1030N-C60FX60E	14	22			
TRF-1034N-C80GX68E	16	23			
TRF-1034N-C80FX68E	16	23			
TRF-1034N-C60FX68E	16	23			
TRF-1038N-C80GX77E	18	24			
TRF-1038N-C80FX77E	18	24			
TRF-1038N-C60FX77E	18	24			

Table 1: Rigging Drawing Page Numbers

### **Prolonged Outdoor Storage**

The TrilliumSeries™ adiabatic cooler is wrapped for shipment. If the unit is going to remain in outdoor storage for more than three months before installation, remove the stretch-wrap and tarp, and follow the storage recommendations below.



**NOTE:** BAC units are typically installed immediately after shipment, and many operate year-round. However, if the unit is to be stored for a prolonged period of time either before or after installation, certain precautions should be observed.

### **Storage Preparation**

- Ensure that the sump is fully drained. Ensure the sump drain valve remains open. Remove any leaves or debris that may have accumulated in the sump and water channels.
- Coils must be empty and closed off. For extended shutdown periods after start-up, coils should be charged with nitrogen at 15 psig in the field and capped by adding a welded cap. Upon start-up, the coil connections will require cutting.
- Insert desiccant bags into the control panel to absorb moisture. Seal the control panel for storage.
- Inspect the protective finish on the unit. Clean as required.



**NOTE:** Do not use steam, high-pressure water, or high-pressure air to clean any component.

#### **Motor Storage Recommendations**

TrilliumSeries™ adiabatic cooler motors are designed for storage at ambient temperatures of -40°F to 176°F (-40°C to 80°C). Prolonged periods of exposure above or below these temperature levels could degrade components of the motor and cause malfunction or premature failure. To protect the unit's motor:

- Care must also be taken to protect the motor from flooding or from harmful chemical vapors.
- The unit's or motor's storage area should be free from vibration. Excessive vibration can cause damage.
- Keep stored motor(s) dry and protected from weather.
- Rotate the fan once per month.

### **Preparation After Prolonged Storage**

Keep in mind that start-up procedures after long periods of storage are just as important as pre-shutdown procedures. Follow instructions in the  $TrilliumSeries^{TM}$  Adiabatic Cooler - TRF Operation & Maintenance Manual shipped with the unit and also available at BaltimoreAircoil.com. Be especially thorough with cleaning and inspection prior to start-up.



**NOTE:** Do not use steam, high-pressure water, or high-pressure air to clean any component.

### 3. Installation

### **Piping Guidelines**

When piping the unit, route the water pipes down or to the side so that there is a clear landing area in front of the unit for accessing the control panel and access hatch(es) in compliance with NEC regulations.



**NOTE**: Field piping must not be supported by the unit inlet or outlet connections.



**NOTE:** The installer must ensure a proper air purging of the system prior to operation. Entrained air can restrict the capacity of the cooler, resulting in higher process temperatures. All connections including those installed by others must be leak free and tested accordingly.

### Water Connection

Refer to **Figure 3** for typical water connection location and detail. The TrilliumSeries™ adiabatic cooler requires a water supply between 15 and 300 psi. See **Table 2** for nominal pipe size of water line connection based on the number of units installed. Refer to the unit submittal package for specific water line connection type, size, and location. To prevent possible contamination of the make-up water supply, install a backflow prevention method in accordance with applicable local and national codes.

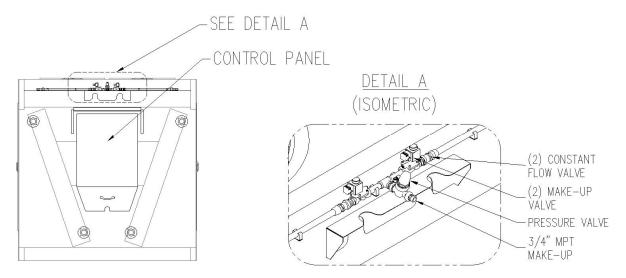


Figure 3. Water Connection Location & Detail

Number of Units	Nominal Pipe Size of Main Water Line (Inches)
1	1-1/2"
2	2"
3	2-1/2"
4	3"
5	3"
6	4"
7	4"
8	4"
9	4"
10	5"

Table 2. Water Connection Size for TRF Units

### **Installation of Leaving Fluid Temperature Sensor**

A leaving fluid temperature sensor is supplied on units configured as self-contained and is shipped inside the electrical panel together with a socket for installation in the return pipe. **Figure 4** and **Figure 5** show the dimensions of the socket. The socket is equipped with a PG7 - IP68 cable gland applied to the hexagonal end to secure the cable. The socket needs to be installed behind the manifold connecting the coil connections from both sides. The minimum distance between the manifold and the socket is advised to be +- 39-3/8" (1 m) in order to ensure the flow from both sides is well mixed and that the correct temperature is relayed to the PLC. Installation of the socket and sensor should follow good workmanship practices.

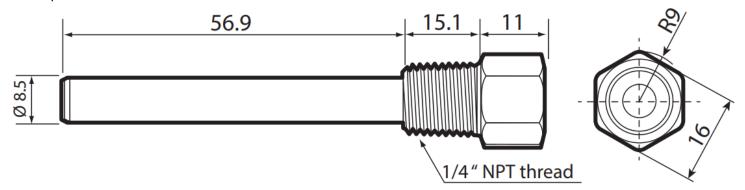


Figure 4. Leaving Fluid Temperature Sensor Socket (Metric)

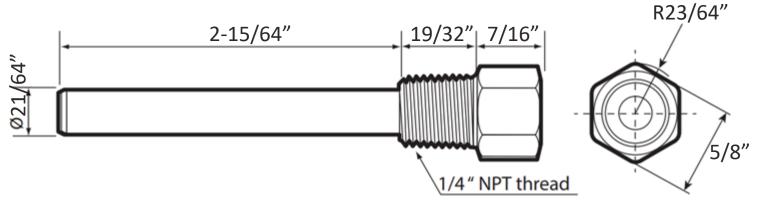


Figure 5. Leaving Fluid Temperature Sensor Socket (Converted to Imperial)

### **Flange Coil Connections**

Units configured with flange coil connections are supplied with class 150 floating flanges. Refer to unit submittal drawings for flange size. For shipment, sheet metal blanks are zip tied to floating flanges to secure flanges and to seal off the coil connection. Remove zip ties and sheet metal blank prior to installation. Install flanges according to ASTM B16.5.

### **Threaded Coil Connections**

Units configured with threaded coil connections are supplied with male pipe thread rated for 150 psi. Refer to unit submittal drawings for connection size.

### Plain Pipe Stub Coil Connections Nitrogen Charge Removal

To protect the inside coil surface from corrosion, coils supplied with a plain pipe stub coil connection are capped and charged with nitrogen from the factory. Plain pipe stub coil connections must be field cut and beveled before welding. Prior to cutting the pipe stub, relieve the pressure inside each coil using the factory installed Schrader valve.



**NOTE:** The pre-cooler pads are made of flammable material and should be removed when performing hot work on or near the unit. No actions that can generate sparks should be performed on or near the unit.



**NOTE:** To prevent excessive degradation do not attempt to remove the precooler pads while wet.

### **Wiring and Electrical Information**

### **Electrical Power Quality**

This unit requires clean electrical power to operate properly. Voltage and frequency should be within 10% of the designed voltage for the unit. Failure to provide this power may damage the unit. The controls wiring should be provided in a separate conduit from any power wiring. It is recommended to use shielded wire to avoid interference. Refer to the unit submittal package for wiring and electrical information.

#### **Power Connections**

Please ensure that the correct voltage is supplied to the unit. Check your unit's submittal to verify that the provided power matches your unit. The enclosure includes a pre-punched hole for the power supply connection. This hole will be plugged with a NEMA 4/IP66 rated plug. Remove the plug and be sure to use sealing methods that comply with NEMA standards. This will maintain the panel's NEMA 4 rating and prevent water ingression to the unit.

DANGER: Performing work on an energized unit poses a risk of electrocution, which can cause severe personal injury, death, and/or property damage. Do not perform any service on or near the unit without first ensuring the unit is de-energized and all lockout / tagout procedures have been followed. Wait five minutes after disconnecting the voltage at all poles before opening the fan and motor assembly.



**NOTE:** When connecting power to the unit, do not penetrate the control panel. Doing so may allow moisture to enter the panel. All cable and conduit should be supported separately from the unit. Do not penetrate the unit for supports or other connections.

#### **Control Connections**

The controls wiring should be provided in a separate conduit from any power wiring. Do not penetrate the control panel. Cord grips are provided in the bottom of the control panel for all possible connections. Cord grips are shipped plugged to seal the control panel during shipment. It is recommended to use shielded wire to avoid interference.

BAC offers the following options to control the TrilliumSeries™ adiabatic cooler. Check the submittal package for configuration settings and wiring diagrams.

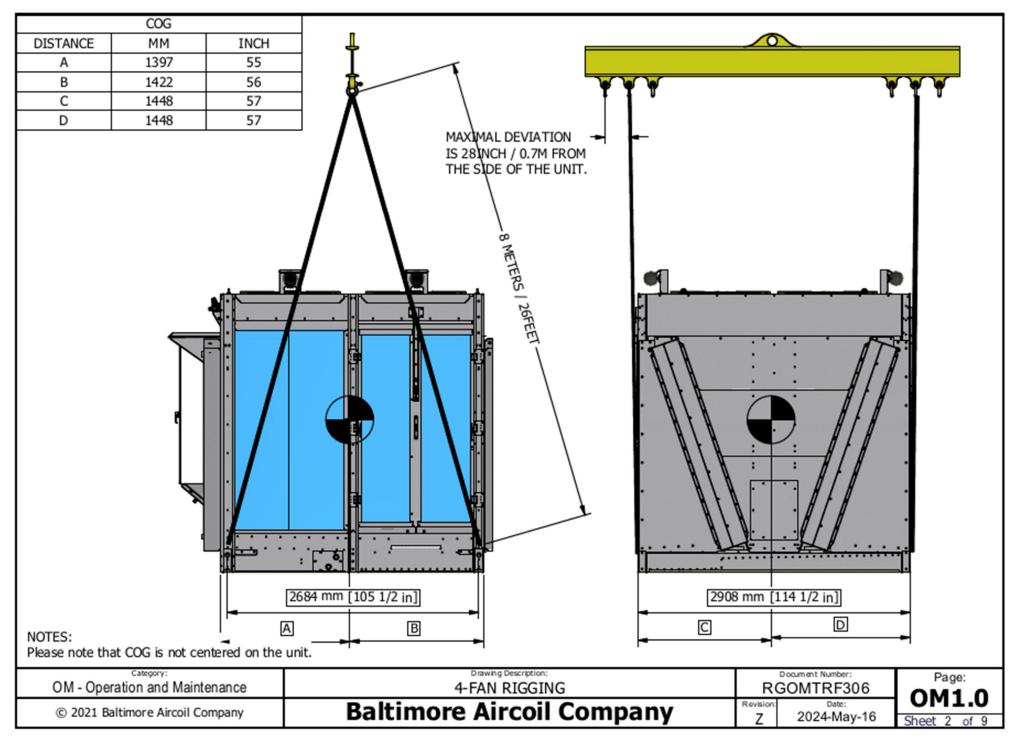
- **Self-contained unit (leaving fluid temperature control):** The leaving fluid temperature is monitored with a sensor installed in the leaving water piping. The sensor must be wired to terminals as shown in wiring diagrams included with submittal package.
- Communications via Modbus RS485, BACnet MS/TP or BACnet IP: For RS485 connection, BAC recommends the use of shielded twisted paired wire with a ground. The Modbus and BACnet connections do not have any device restrictions or proprietary protocols. Contact your building management system provider or controls integrator to verify that those systems will work with the TrilliumSeries™ adiabatic cooler communications protocols. Please see the *TrilliumSeries™* Adiabatic Cooler TRF Operation & Maintenance Manual shipped with the unit and available at BaltimoreAircoil.com for specific communication points map.
- Customer control via input signal (10-0VDC, 0-10VDC or 4-20mA): Use any of the following control signals, which can be set according to the Operation & Maintenance Manual:
  - o 10-0VDC analog signal where 10V is 0% fan speed and 0V is 100% fan speed
  - o 0-10VDC analog signal where 0V is 0% fan speed and 10V is 100% fan speed
  - o 4-20mA analog signal where 4mA is 0% fan speed and 20mA is 100% fan speed

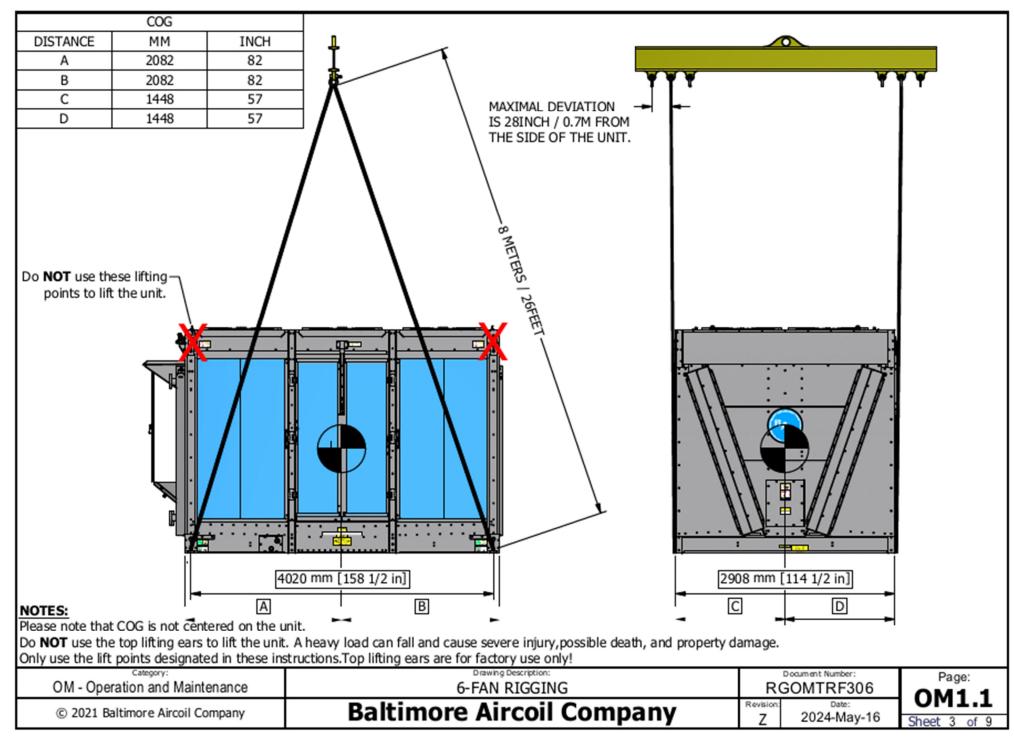
### **Unit Operation**

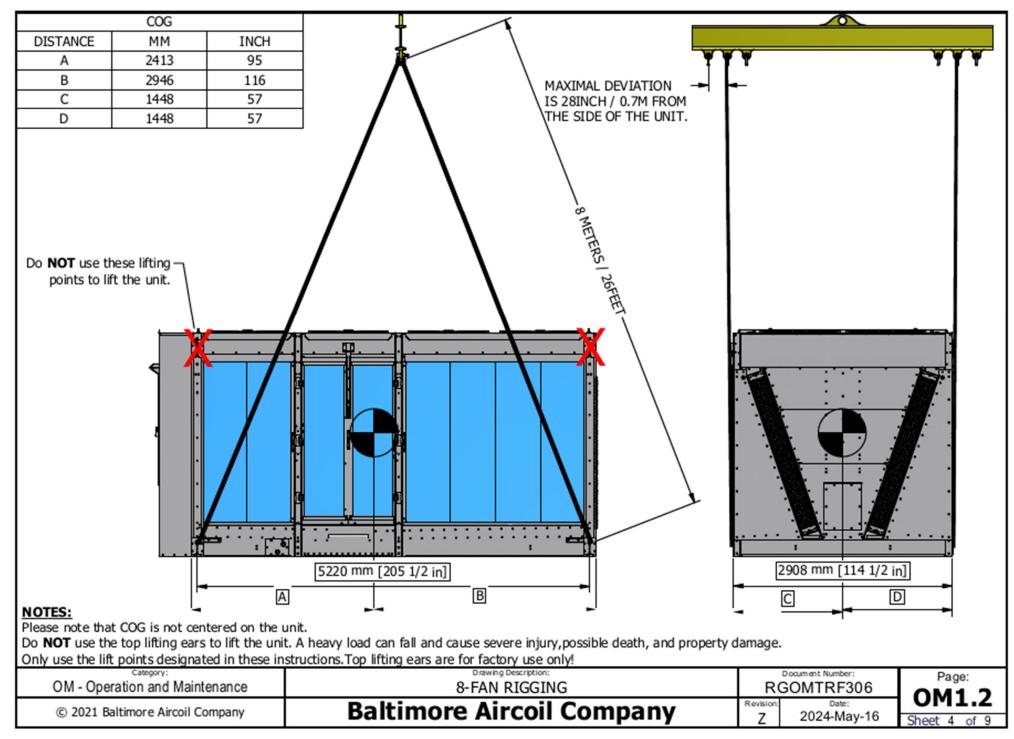
Prior to start-up and unit operation, refer to the *TrilliumSeries™ Adiabatic Cooler – TRF Operation & Maintenance Manual* shipped with the unit and also available at BaltimoreAircoil.com.

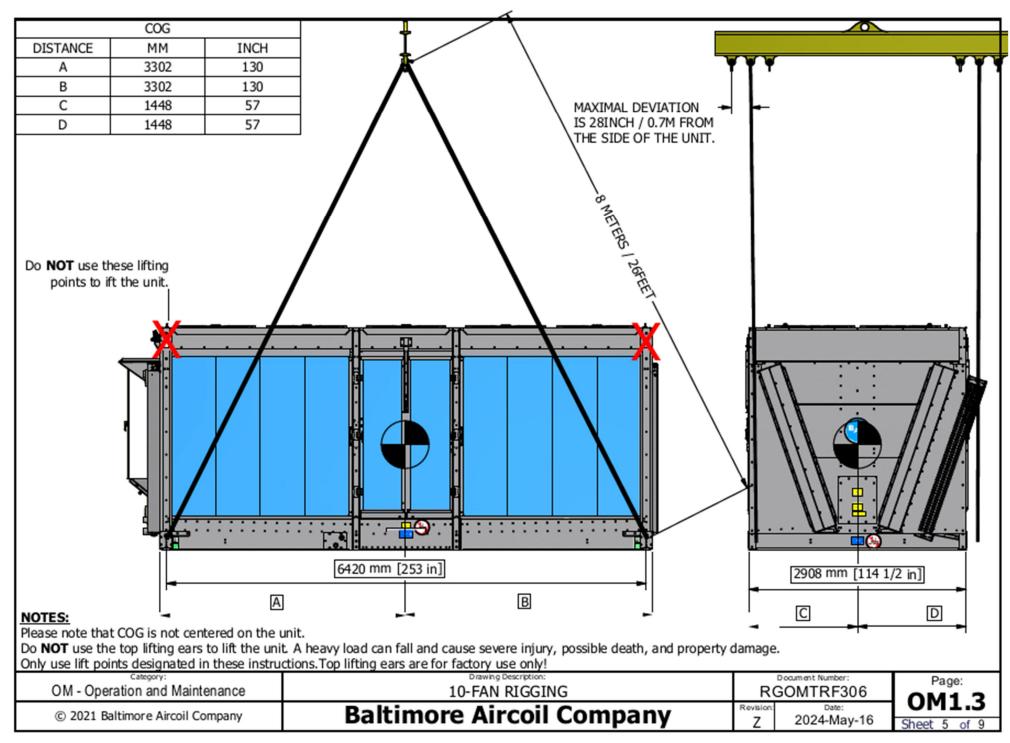
## 4. Rigging Drawings

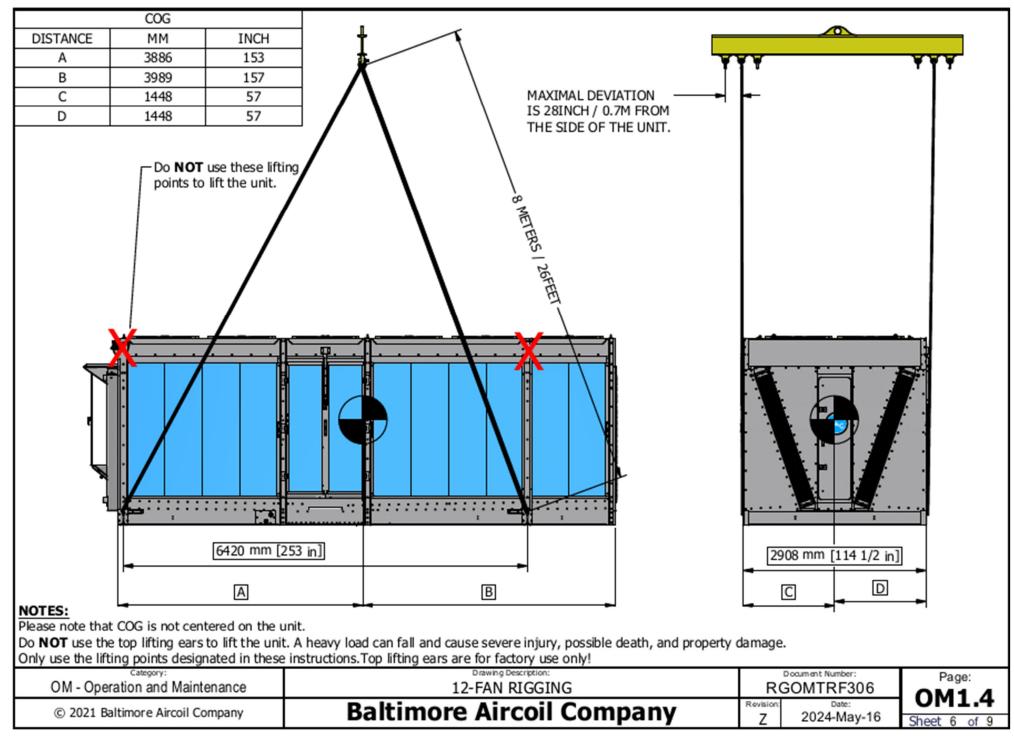
This page intentionally left blank

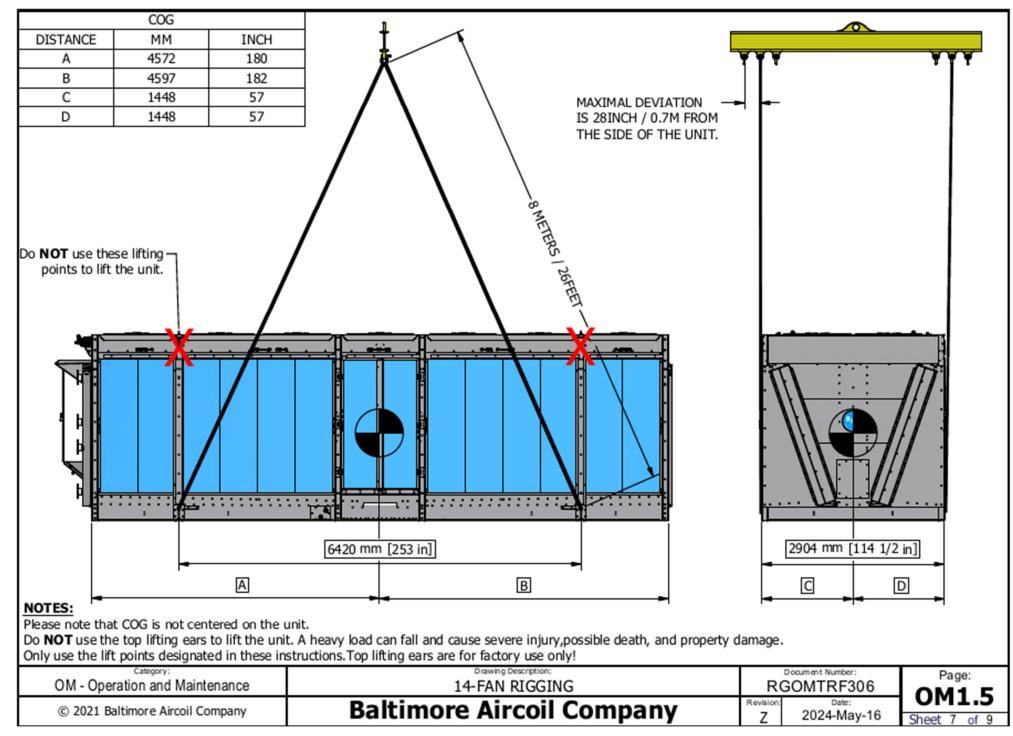


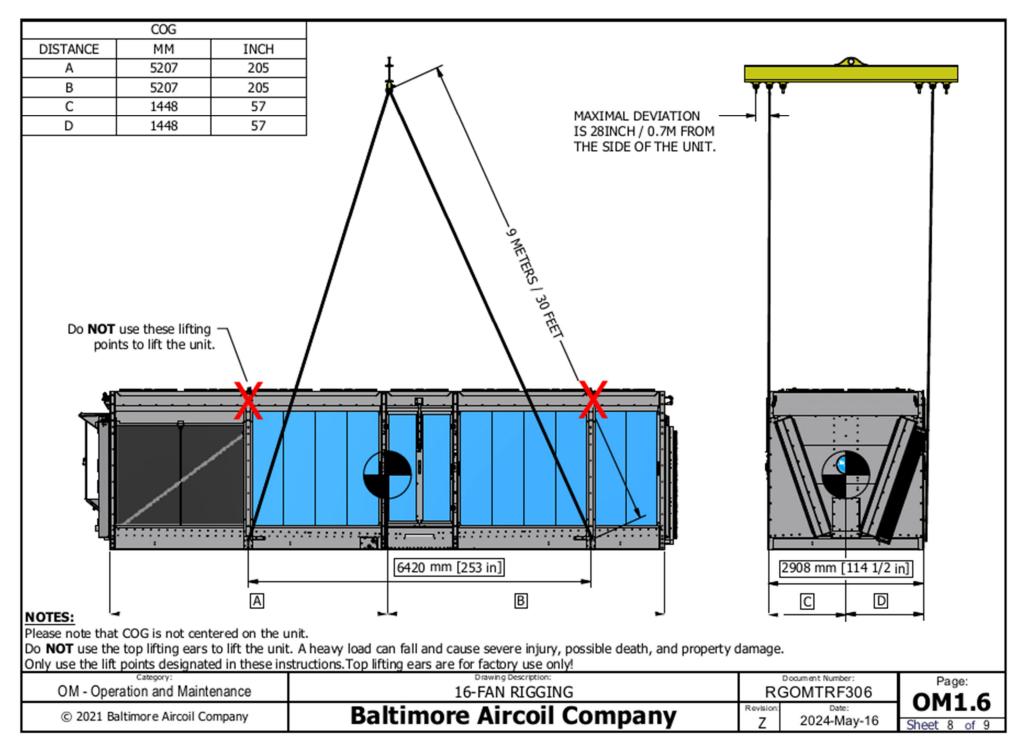


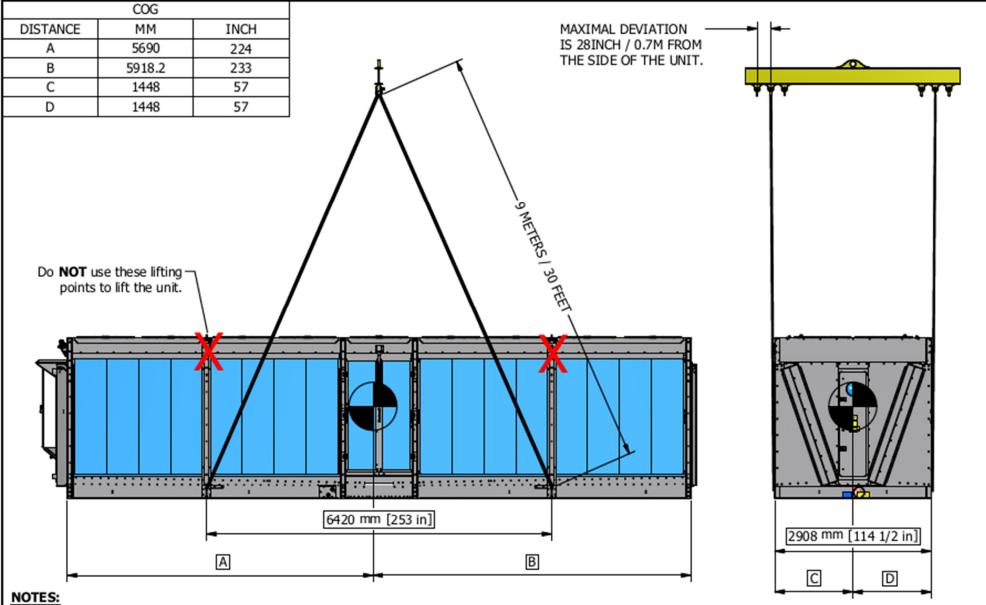












Please note that COG is not centered on the unit.

Do **NOT** use the top lifting ears to lift the unit. A heavy load can fall and cause severe injury, possible death, and property damage. Only use the lift points designated in these instructions. Top lifting points are for factory use only!

OM - Operation and Maintenance	Drawing Description: 18-FAN RIGGING	RGOMTRF306		Page: OM1.
© 2021 Baltimore Aircoil Company	Baltimore Aircoil Company	Revision:	Date: 2024-May-16	Sheet 9 of

### **TrilliumSeries** Adiabatic Cooler - TRF

### RIGGING & ASSEMBLY INSTRUCTIONS





baltimoreaircoil.com