



Desiccant Dehumidification Equipment

MANUAL

HCUB RENTAL

Model Number
HCUB60304-HMXC

Rev 00

Reviewed _____
Date _____

Contacts:

Munters Service / Start-up Scheduling
888-349-4335

Munters Corporation
Commercial Dehumidification Division
16900 Jordan
Selma, TX 78154
(210) 651-5018



OPERATING AND MAINTENANCE MANUAL

MODEL: DRYCOOL RENTAL HCUb SERIES

Section 1 Operating and Maintenance

- | | |
|---|-----------|
| a) Operating and Maintenance Instructions | OM0008-09 |
|---|-----------|

Section 2 Technical Data

- | | |
|---|-------------------|
| a) Flow Diagram | 2-1 |
| b) Equipment Data | 2-2 |
| c) DX Coil Performance | 2-3 |
| d) Refrigeration Flow Diagram | 7650-61 - 7650-62 |
| e) General Arrangement Drawing HCUb6000 | S71127-004 |
| g) Operations Guide | 2-4 |
| h) Touch Screen Navigation | 2-5 |

Section 3 Wiring

- | | |
|----------------------------------|---------|
| a) Wiring Diagram HCUb6000, 460V | 5800-67 |
|----------------------------------|---------|

Section 4 Blowers

- a) Supply Blower Curve – HCUb6000
- b) Reactivation Blower Curve – HCUb6000

Section 5 Spares

- | | |
|------------------------------|-----|
| a) Spare Parts List HCUb6000 | 5-1 |
|------------------------------|-----|

Section 1

INSTALLATION, OPERATION & MAINTENANCE

Warranty Safety Installation Operation Maintenance



**Munters HCUb
Rental Plus
May 2017**

Table of Contents

1.	Introduction	2
1.1.	Equipment Warranty	2
1.2.	Desiccant Dehumidifier Operating Principle	5
1.3.	Cooling Operating Principle	7
1.4.	Filter Principle.....	7
2.	Safety	8
3.	Installation	9
3.1.	Pre-Installation Requirements.....	9
3.2.	Pre Checks and Inspection before Installation	9
3.3.	Positioning the Unit.....	10
3.4.	Installation Requirement Checklist.....	10
3.5.	Connecting Air Supply Duct	12
3.6.	Connecting Condensation Drain	13
3.7.	Connecting Electrical Service	13
4.	Operating Instructions.....	14
4.1.	Controls	14
4.2.	Setting Up Control System.....	14
4.3.	Starting the Unit.....	14
4.4.	Modes of Operation	14
4.5.	Using Microprocessor	17
5.	Maintenance	18
5.1.	Overview	18
5.2.	Quick Check	18
5.3.	Recommended Maintenance Schedule.....	18
5.4.	Inspecting Ductwork	19
5.5.	Replacing Air Filters and Cleaning Reactivation Coil.....	20
5.6.	Inspecting Seals	20
5.7.	Inspecting Fans	20
5.8.	Inspecting Wheel Drive Motor and Belt	23
5.9.	Inspecting Roller Wheels	23
5.10.	Removing and Replacing Desiccant Wheel, Drive Belt and Seals.....	23
5.11.	Inspecting Desiccant Wheel.....	24
5.12.	Cleaning Desiccant Wheel.....	24
5.13.	Electronic Controls.....	25
5.14.	Inspecting Drain Pan and Drain	27
6.	Troubleshooting.....	28
6.1.	Troubleshooting.....	28
7.	Appendix A: VFD Parameter Settings	30
7.1.	To Program J1000 and V1000 drives.....	30
8.	Appendix B: Sequence of Operation	33
8.1.	Inputs	33
8.2.	Outputs.....	33
8.3.	Alarms	34
9.	Appendix C: Using VFD	36

1. Introduction

This manual includes installation, operation, and troubleshooting instructions for the DryCool HCUB-Plus Air Cooled model. The goal of the manual is to provide the necessary information for the user to understand the unit's construction and function, and to serve as a guide during installation, operation, maintenance and basic fault finding that generally can be carried out before contacting Munters Technical Support. The contents of this manual include suggested best working practices and procedures.

The HCUB-Plus is designed to provide an economical way to bring makeup or recirculated air into the space and control space temperature and humidity. The HCUB-Plus uses a cooling coil to cool and dehumidify the air. The air is saturated with moisture as it leaves the cooling coil. The air then passes through a desiccant wheel converting the latent heat (moisture) into sensible heat. This raises the air temperature to a room-neutral temperature condition and at the same time lowers the dew point. This prevents overcooling the space at off-design conditions. The desiccant wheel is reactivated by recycling waste heat from the condenser coil.

The HCUB-Plus has two compressors. They are two independently circuited refrigeration systems. The condenser rejected heat is used for reactivation. Air is drawn through coils and then through desiccant wheel by the reactivation fan. The reactivation fan is modulated by a VFD to maintain a constant discharge pressure during dehumidification. The remaining rejected heat is handled by the conventional condenser fans also controlled by VFD.

The HCUB-Plus can be controlled directly by a thermostat/de-humidistat or manual switches. These can be used to give signals to turn on the supply fan, dehumidification and stages of cooling. The microprocessor monitors and protects the HCUB-Plus internal functions and protections.

The HCUB-Plus can provide years of trouble-free service if you follow the recommendations listed in this manual. We strongly recommended that you read this entire manual. The manual describes how to get the best performance and service from your unit.

For questions concerning this manual, or concerning the dehumidifier, call the Munters Technical Service Department at (800) 229-8557 to speak with one of the Service Operation Technicians.

1.1. Equipment Warranty

WARRANTY FOR MUNTERS DEHUMIDIFICATION EQUIPMENT, SYSTEMS AND PARTS

Munters warrants that the Products (other than services and labor) shall be free from defects in workmanship and materials for the lesser of (i) fifteen (15) months from the date of shipment of the Product by Munters; or

(ii) twelve (12) months from the date such Product become operational (collectively, the “Warranty”). For purposes of standard terms and conditions of sale, including for the purpose of defining and describing Purchaser’s remedy as provided below in this section, the term “Products” shall not include related services or labor. Any extended warranties or warranties for services or labor shall be subject to Munters’ “Additional Terms and Conditions – Service Plans,” which shall be provided by Munters to Purchaser if applicable.

The Warranty applies only to Products that are properly installed, maintained and operated under normal conditions with competent supervision in accordance with the instruction manual, good maintenance practice and Munters recommendations, if any, made by Munters in writing. Without limiting the foregoing, the Warranty shall be void, and Munters shall have no liability for, in the case of any Products that: (a) have been disassembled, repaired or tampered with in any way, except when such work has been done with Munters’ prior written approval, (b) have been damaged by use or operation in excess of any maximum pressures, temperatures or rated capacities as specified by Munters in writing, (c) have been damaged by corrosion, or have degradation in performance as a result of dirt, dust, or other foreign material, or (d) are considered consumable.

Munters’ obligation, and Purchaser’s sole and exclusive remedy, under the Warranty is limited to repair or replacement at Munters’ facility, at Munters’ option, of any Products (or parts thereof) determined to be defective in workmanship or material during the applicable warranty period. The Warranty is a parts only warranty, and except as may be provided in “Additional Terms and Conditions – Service Plans,” if these Additional Terms are applicable, the Purchaser’s remedy under the Warranty does not include services or labor. The warranty period shall not be extended by the performance of warranty repairs or replacements.

The Warranty shall be voided if payment is not made in accordance with the terms as set forth by Munters and conditions of sale.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, AT LAW OR IN EQUITY, WITH RESPECT TO THE PRODUCTS, ANY RELATED SERVICES OR LABOR OR THEIR CHARACTERISTICS, QUALITY OR PERFORMANCE, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHTS OF THIRD PARTIES, AND ANY AND ALL SUCH WARRANTIES AND REPRESENTATIONS ARE HEREBY DISCLAIMED. No agent, representative, or dealer, or any other person or entity, is authorized to give on Munters’ behalf any representation or warranty as to Product(s) or to assume for Munters any liability pertinent to Product(s) under any circumstances.

DISCLAIMER OF DAMAGES AND LIMITATION OF LIABILITY

IN NO EVENT SHALL MUNTERS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND ARISING FROM THE USE OF OR FAILURE TO USE THE PRODUCT(S), WHETHER IN CONTRACT, WARRANTY, TORT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, INCLUDING BUT NOT LIMITED TO LOSS OF PROFITS OR REVENUE, LOSS OF USE OF PRODUCTS, DELAYS, OR CLAIMS OF CUSTOMERS OF PURCHASER OR OTHER THIRD PARTIES FOR SUCH OR OTHER DAMAGES. MUNTERS’ LIABILITY ON ALL CLAIMS, WHETHER IN CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY, OR OTHERWISE FOR ANY LOSS OR DAMAGE ARISING OUT OF, OR CONNECTED WITH AN ORDER, OR FROM THE DESIGN OR MANUFACTURE OF PRODUCTS, SHALL IN NO CASE EXCEED THE PURCHASE PRICE.

This warranty covers replacement and repairs or adjustments made at the Munters’ factory only. If the services of a Munters Service Technician are required at the site where the equipment or part is installed, or at any other location other than Munters’ factory, buyer will be responsible for the cost thereof and a purchase order shall be issued to Munters. The warranty period will not be extended by the performance of warranty repairs or replacements.

WARRANTY FOR MUNTERS Desiccant WHEELS

Munters warrants its HoneyCombe® desiccant wheels to be free from structural defects in workmanship and materials for a period of five years commencing thirty* (30) days from the date of shipment by Munters. (*For specified customers the original startup report date establishes the date which will be used to calculate a prorated replacement cost.)

The foregoing warranty does not apply to any equipment or part:

- Damage caused by misuse or any improper maintenance or contamination of the Desiccant wheel media, or

- Damage caused by other component malfunction or operation of the equipment beyond the specified conditions, or
- Damage caused by use or operation of such product in excess of any maximum pressures, temperatures, or rated capacities as specified in Munters' quotation, schedules or drawings, or
- Units that have not been installed, maintained or operated under normal conditions with competent supervision in accordance with the equipment instruction manual, good maintenance practice, and Munters' recommendations; or
- Units that have been disassembled, repaired or tampered with in any way, except when such work has been done (by an authorized service representative) in accordance with Munters' service guidelines.

This warranty covers replacements and repairs or adjustments made at the Munters' factory only. If the services of a Munters Service Technician are required at the site where the equipment or part is installed, or at any other location other than Munters' factory, buyer will be responsible for the cost thereof and a purchase order shall be issued to Munters. The warranty period will not be extended by the performance of warranty repairs or replacements.

CLAIM PROCEDURES

If any defect appears in the equipment during the applicable warranty period:

- Buyer shall notify Munters of the defect in writing, including in such written notice the model, serial number and part number of such equipment or defective part thereof, and a description of the nature of the defect.
- After receipt of such information and a purchase order, Munters will ship a replacement, F.O.B. Munters factory, and will invoice the buyer therefore, and for shipping charges, if applicable.
- Upon receipt of written **Returned Materials Authorization** from Munters, buyer shall return the defective equipment or part to Munters with shipping charges prepaid.
- Upon receipt of the equipment or part by Munters, the cause of the failure will be analyzed. If equipment or part is found to be defective in workmanship or material, a credit will be issued for the cost of the replacement or repair of said equipment or part plus ground freight costs. Any special shipping requests such as "Next Day Air" will be the customer's responsibility and will be sent "freight collect".

Munters assumes no responsibility for any incidental or consequential damage to structures (including, but not limited to, any ductwork, roofing materials, outbuilding or piping) or any other equipment caused by any defective equipment or part or the removal or replacement thereof.

This warranty does not include delivery of materials to the job site or rigging, scaffolding, lifts or labors necessary to install replacement equipment or parts. Buyer is responsible for removal of previously supplied or installed materials. The warranty period will not be extended by the performance of warranty repairs or replacements.

EXCLUSIVE REMEDY

Munters' obligation, and buyer's sole and exclusive remedy under this warranty, is limited to parts repair, exchange or replacement, at Munters' option, of any equipment determined to be defective in workmanship or material during the applicable warranty period.

This warranty is exclusive and in lieu of all other warranties, expressed or implied, including, without limitation, any warranty of merchantability or fitness for a particular purpose. Without limiting the generality of the foregoing, Munters disclaims and buyer hereby waives any other claim against Munters.

This includes (whether arising by operation of law or otherwise), including any claim or liability for special, indirect or consequential damages of any kind relating to or arising out of the equipment or any part thereof, or the buyer's use thereof.

Munters neither assumes nor authorizes any person to assume for it any other liability in connection with the manufacture, sale, delivery, installation and operation of the equipment or any part thereof except as aforesaid.

This warranty is not transferable and does not cover normal wear and tear or damage caused by improper use. Warranty is also voided if purchaser modifies desiccant wheel or original equipment in any way.

NONCONFORMITY AND DEFECTS

Munters shall not be responsible for any nonconformity or defect in or failure of a Product that: (a) is created after such Product is delivered by Munters, including any nonconformity, defect or damage resulting from shipment or handling by the common carrier or from Purchaser's handling, maintenance or storage of such Product; (b) results from materials, specifications or designs provided by Purchaser; or (c) results from modifications to such Product by Purchaser or others.

1.2. Desiccant Dehumidifier Operating Principle

- **Figure 1** shows how HCUB-Plus removes moisture from the air. The “Heart” of this system is the Desiccant wheel. The wheel has a series of air passages or channels arranged in a honeycomb pattern. Air can be forced through these channels in either direction.
- Passages inside wheel are impregnated or synthesized with a desiccant material. When desiccant contacts damp air, it soaks up moisture. When desiccant is heated, it releases moisture. HCU operates with two separate air streams. Supply air stream is air supplied to space being conditioned. Reactivation air stream is part of condenser air stream and is used to remove heat from condenser coil and reactivate (dry out) desiccant wheel. Supply air is pulled from outdoors into HCUB-Plus unit. This air is first drawn through DX cooling coil that cools and removes moisture from air through condensation. Air is then drawn through desiccant wheel. Desiccant picks up additional moisture in air. At this point, moisture has been removed from outdoor air and stored in Desiccant wheel. Once it has been dried, supply air is ducted into the conditioned space.
- Next is removing this moisture from wheel. Desiccant will release moisture when heated. Hot air can hold a large amount of moisture. When hot air reaches desiccant, and moisture is released, we say desiccant is “reactivated”.

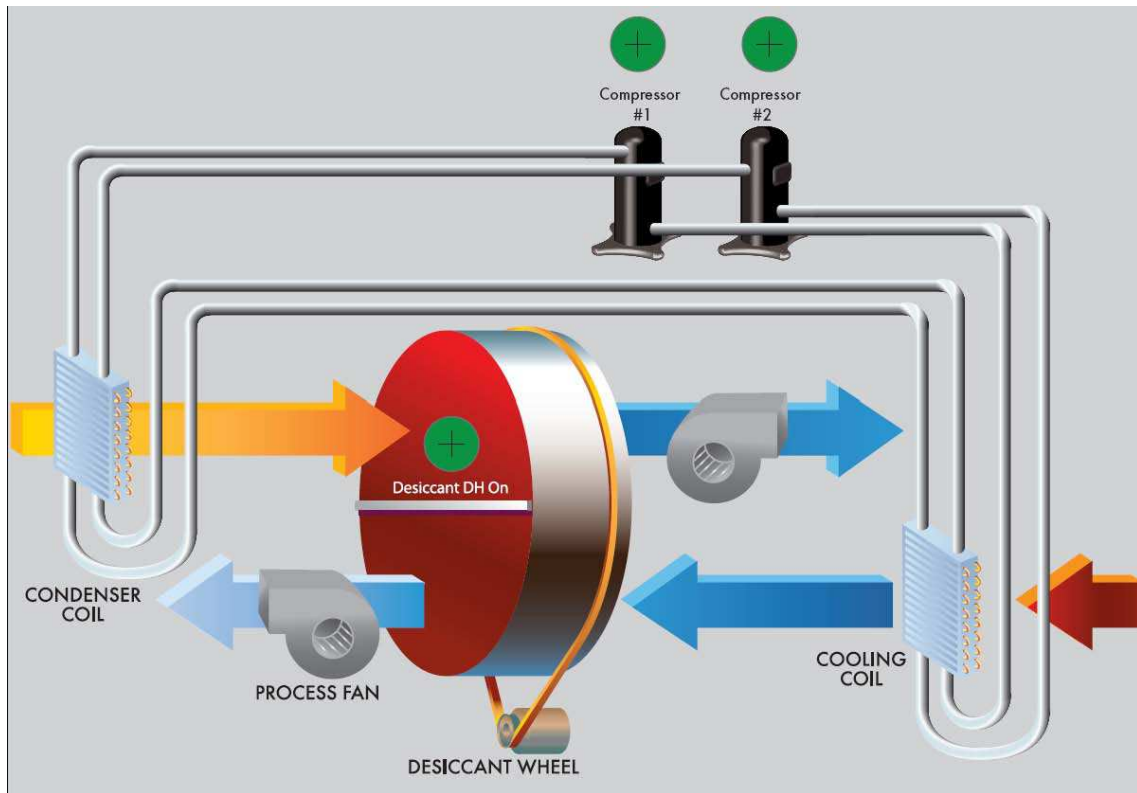


Figure 1: Dehumidifier Operating Principle

- In the HCUB-Plus, a stream of ambient air is taken from outdoors through reactivation/condenser coil. This heated condenser air is recycled for reactivation heat. It is then pulled through desiccant wheel. Desiccant releases moisture into heated air stream, where it is vented outside again. This is the reactivation process which is a continuous process as desiccant wheel rotates.
- The honeycomb material is nonmetallic and does not react to bacteria. Desiccant material is made of silica gel, and depends on “adsorption” principle. As moisture collects, each particle of gel can bond with a large number of water molecules. This process can be reversed by adding heat. As desiccant is heated, it releases water to air.
- Several other parts must be added to make a working unit. HCUB-Plus has two seals, mounted on wheel plates on each side of desiccant wheel. These seals separate two streams of air – moist air from evaporator and heated air from condenser. Notice that two air streams move through HCUB-Plus in opposite directions (“counter flow”). Wheel is turned by drive motor and belt. Belt tension adjusts automatically.
- Supply air is pulled through the wheel by fan. A filter is included to keep dirt from the evaporator air and plugging wheel. On reactivation side of system, ambient air is pulled through the wheel by a second fan. Just upstream of wheel, this ambient air passes through condenser coil. Heat from this coil provides energy needed to “reactivate” desiccant.
- Heated air from the first circuit is used to dry desiccant wheel and is used to provide additional cooling and/or dehumidification when necessary. Air is drawn through the condenser coil with the reactivation fan. This fan is controlled by a variable frequency drive (VFD) to maintain a constant head pressure and therefore constant condensing coil leaving air temperature. Not all of the air from the condensing coil is needed for reactivation of the wheel, so a portion of the air is exhausted through the condenser fan.
- See **Appendix B: Sequence of Operation** for a detailed description of operation of HCUB-Plus.

1.3. Cooling Operating Principle

1.3.1. DX – Direct Expansion of Refrigerant

Electro-Mechanical compressor stages are used to compress the refrigerant. The hot, compressed refrigerant circulates through a heat exchanger (condensing coil) to remove the heat created in the compression process. At this stage the refrigerant is in liquid form. The pressurized liquid refrigerant is allowed to expand, at a controlled rate, returning to a vapor. The vapor flows into another heat exchanger (evaporator coil), located in the main air stream. The thermal energy in the air stream is absorbed by the evaporator coil, resulting in a reduced air stream temperature.

If the surface temperature of the evaporator coil is below the dew point temperature of the entering air stream, moisture will condensate out of the air, and collect on the coil surface. The leaving air stream will be cooler and dryer as a result of this process.

1.4. Filter Principle

A typical Munters dehumidification system includes several filters. Each filter is designed to remove particles or contaminants from the air stream. An operating dehumidification system handles large volumes of air. Even in a relatively clean environment a unit operating without filters would quickly collect large amounts of dust and contaminants. If this dust was allowed to collect in the Desiccant wheel, the small passages in the wheel would become plugged, and the wheel would lose its ability to dehumidify. The heating or cooling coils in the unit would also become coated with dust, reducing their ability to condition the air stream.

The filters used in the dehumidification system are specified by their “efficiency” and “arrestance” ratings. “Efficiency” indicates the size of the particles which can be removed by the filter. (The filter efficiency ratings are based on ASHRAE standard 52-76.)

The “arrestance” ratings indicate the percentage of particles of the rated size which the filter will remove. In general, the higher the efficiency and arrestance ratings of a filter, the smaller the particles it will trap and hold.

2. Safety

The contents of this manual include suggested best working practices and procedures. These are issued for guidance only and they do not take precedence over the individual responsibility and/or local safety regulations.




During installation and operation of this unit it is always each individual's responsibility to consider:

- Their own and others personal safety.
- The safety of the unit through correct use of the equipment in accordance with the descriptions and instructions provided in this manual and local/state safety guidelines.




Munters is concerned about the safety of all who use or services the HCub-Plus unit. There are parts inside the HCub-Plus that can be dangerous if an untrained person tries to service the unit. Throughout this manual, we have pointed out hazards that may occur in the use of the HCub-Plus. We have also listed the precautions necessary to avoid these problems.

It is recommended that the user be informed about the use of safety symbols used in this manual by reading the following information. The relevant safety information will be listed in each chapter or section.

This manual uses three different types of **warning** messages to alert you of possible hazardous conditions:

 DANGER	Immediate hazard that <u>will</u> result in severe personal injury and even death.
 WARNING	Hazard or unsafe practice that <u>may</u> result in severe personal injury or death.
 CAUTION	Hazard or unsafe practice that <u>could</u> result in minor personal injury or property damage.

Be aware of the following **warnings** while servicing the unit.

 DANGER	The HCub-Plus is wired for 208 - 460 Volts. This unit can produce ample voltage and current to cause severe burns, serious injury or death. Always TURN OFF and Lock-Out all electrical power before servicing inside unit. Only trained electricians should service the electrical components of this unit.
 WARNING	The HCub-Plus includes three or four fans (supply, reactivation and condenser fans). Keep hands away from fan blades at all times while unit is on. DO NOT service unit until fans have completely stopped. The desiccant wheel used in HCub-Plus unit is extremely heavy. Block desiccant wheel, when inside unit is propped up, to prevent accidental movement and/or injury to personnel.
 CAUTION	The HCub-Plus is designed for outdoor use. However, unit is not waterproof or weatherproof unless all access panels are secured and all doors are closed. DO NOT operate unit unless all access panels and doors are in place and secured.

3. Installation

3.1. Pre-Installation Requirements

Please note the following items related to this unit and its installation must be completed prior to scheduling the factory technician for startup.

- All wiring (Power and Control), electrical components, control devices, and electrical service should be completed in accordance with **NFPA 70, NEC** (National Fire Protection Association, National Electrical Code). Wiring and components must also comply with all State and Local Code requirements along with installation plans and unit specifications.
- All heating, venting, cooling, refrigeration, heat producing appliances, plumbing and piping should be installed per **UMC, ASHRAE** (Uniform Mechanical Code, American Society Heating, Refrigeration and Air Conditioning Engineers) requirements for building and energy efficiency. All components must also comply with all State and Local Code requirements along with installation plans and unit specifications.
- All air supply, ducting and connections must be completed per **UMC, AMCA, and SMACNA** (Uniform Mechanical Code, Air Movement and Control Association - International Inc., Sheet Metal and Air Conditioning Contractors National Association) specifications. All components must also comply with all State and Local Code requirements along with installation plans and specifications.

3.2. Pre Checks and Inspection before Installation

The unit must be lifted by crane using **all** lifting points located on top of unit. The crane must be capable of lifting weight shown on General Arrangement drawing. Failure to do so will damage the unit and void warranty. See **Figure 2** and **Appendix D: General Arrangement** for specific unit dimensions and weight.

For proper mounting, review all drawings; dimensions, ducting, submittal package, notes on orientation and positioning and confirm this information before installing unit(s).

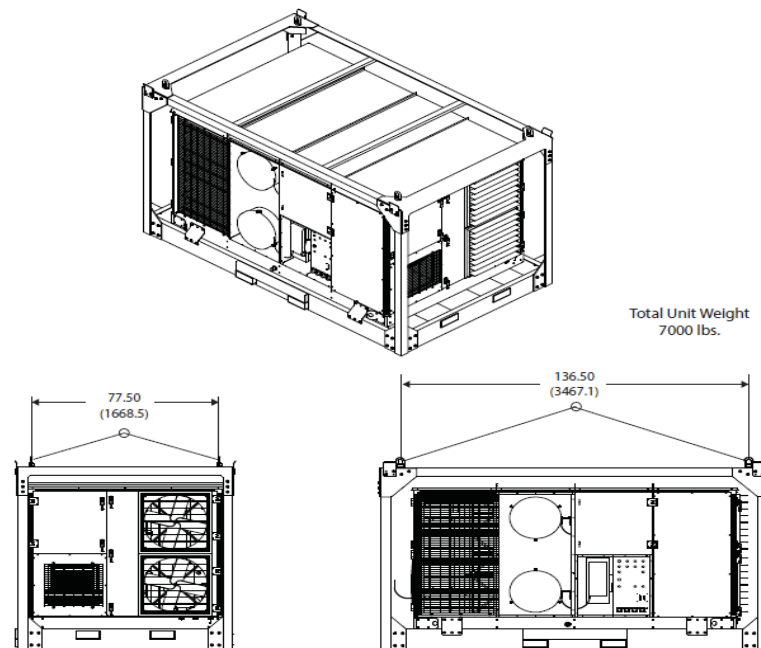


Figure 2: Lifting to prevent unit damage

Upon unit arrival, inspect immediately for signs of shipping damage. If you do notice any damage, report it to the shipping company and to Munters immediately.

1. Check all items in the shipment carefully against the bill of lading. Be sure all of the listed items have been received. Please check as some parts may have been shipped inside the unit.

2. Check outside of unit. Open damper for the reactivation blower. Try to turn blower by hand (be sure to use Lock-Out/Tag-Out procedures). It should turn easily. Do the same with the process blower. (This blower may be mounted in a plenum behind a panel.)
3. Remove the access covers on front of unit to check the following items:
 - Desiccant wheel is in position and evenly supported on four rollers.
 - Remove shipping strap from around wheel.
 - Check seals around both faces of Desiccant wheel for any obvious signs of damage.
 - Check wheel drive belt is in place and both belt and rollers are free of grease.
 - Remove drive belt for wheel from drive pulley. Try to turn Desiccant wheel by hand. Wheel should turn with some resistance and in one direction more easily than the other. Replace drive belt on drive pulley.
 - Check that reactivation filter is in place.
 - During shipment, each blower motor frame is held against the mounting springs by a set of bolts. Be sure these bolts have been removed before operating unit.
4. Check the electrical panels and controls:
 - Check for any signs of damage.
 - Check the tightness of all electrical connections. Carefully check the power wiring terminals.
 - Be sure all control relays are firmly seated in their sockets.
5. Please refer to Technical Service Department (800-229-8557) if you have additional questions.

3.3. Positioning the Unit

It is important that the intended installation site meets the location and space requirements for the unit in order to achieve the best possible performance and trouble-free operation.

- The Appendix shows the dimensional drawings for the HCUB-Plus units. Allow specified clearances around the unit on all sides for maintenance access. Units should have free access to all access panels and doors.
- Care must be taken to install unit in a location that will not allow exposure to contaminated air such as a loading dock or oily kitchen exhaust as this could cause damage to the unit and desiccant wheel.

3.4. Installation Requirement Checklist

Check all items in this listing to insure proper installation prior to unit startup.

1. Check and install all Electrical service.
 - Most units have a single point electrical hookup and a control panel with an integral non-fused disconnect. An electrical service must be provided to accommodate the unit MCA (Minimum Circuit Capacity). It must be suitably protected against short circuit and ground fault by a suitable means using the MOP (Maximum Overcurrent Protection) stated on the nameplate.

- Electrical service enters the unit via camlocks directly provided on unit electrical control panel.
 - If a Remote Terminal Control is to be included with this unit, be sure all mounting, panel position, wiring, thermostats, humidistat's etc., are properly installed using the electrical schematics that are part of the submittal package. All connections must be completely installed for the unit to operate correctly.
2. Check and install all Duct connections.
 - Duct connections for supply and return air are made to the sides of the unit. Duct connections must always be made to the flanges sticking out of the unit, never to the sheet metal on the unit housing. Flexible duct connectors should be installed between the unit duct outlet and the duct. Fans are sized to accommodate 4" total external static pressure (supply + return) from the duct system unless otherwise specified.
 - On supply discharge ductwork, allow several duct diameters of a single duct run prior to branching of the ductwork into multiple runs to ensure even airflow and temperature/humidity distribution. Details on ducting standards can be found in **SMACNA** publication "HVAC Systems – Duct Design" and Chapter 18 of **2008 ASHRAE HVAC Systems and Equipment Handbook**.
 - Most units have cooling, heating and dehumidification functions controlled by sensors located in the conditioned space. As the controlled condition reaches the "on" set point, the required function will energize. Wide variations in discharge temperatures can occur. During cooling mode, the discharge temperature may be between 55F and 65F. During dehumidification temperature may range from 65F to 85F. Makeup air units may have even greater variations. Discharge registers in the conditioned space should be carefully located to prevent cold or hot air from blowing directly on people and causing uncomfortable conditions.
 3. Check and install all Control Wiring.
 4. Check piping for refrigeration circuit.
 5. Install approved "P" trap on cooling and drain pan. Please see **Section 3.6**.
 6. Install all thermostats; humidistat's etc.
 7. Check and unlock reactivation outlet cover on end of unit. The cover is held down by a screw on shorter units that must be removed. On taller units, the cover is held down by a cord inside the reactivation blower housing. Loosen the blower access cover to release cord (cord will be visible, sticking out of over). Remove the cord and retighten blower access cover. See **Figures 3 and 4** for Operating and Shipping Positions of cord/straps over louvers and damper.

Operating Positions



Straps on Eyelets for storage

Blast Damper raised and secured on retaining latch

Figure 3: Damper and Cords/Straps - Operating Position

Shipping Positions



Straps installed over louver to secure for shipment

Blast Damper lowered to protect unit interior

Figure 4: Damper and Cords/Straps - Shipping Position

3.5. Connecting Air Supply Duct

1. Air duct connections must be completed according to U.M.C., A.M.C.A., S.M.A.C.N.A., and/or state and local code requirements. Refer to the plans and specifications supplied with the unit.

2. This unit requires a duct from the supply air outlet to the conditioned space. Duct should be sized appropriately and insulated.

3.6. Connecting Condensation Drain

1. The unit includes a condensation drain located on the base of the unit on the opposite side of electrical control panel. An integrated P-trap is furnished underneath the unit base.

3.7. Connecting Electrical Service

1. Check for any signs of damage.
2. Ensure all electrical connections are tight. Carefully inspect power wiring terminals.
3. Ensure all control relays are firmly seated in their sockets.
4. Electrical service and control wiring must comply with NEC and/or state and local code requirements.
5. The HCUB-Plus is designed to operate on three-phase AC at 208-230/3/60, 460/3/60 as specified. Be sure line voltage matches the voltage required by unit.



HCUB-Plus is wired for 208 - 575 Volts. This unit can produce enough voltage and current to cause serious burns or death to service personnel. Always turn off electrical power before servicing inside the unit. Follow standard Lock-Out/Tag-Out procedures. Only licensed technicians should service unit.



Be sure unit is connected to a power source with correct line voltage. Wire to unit must be copper. Line voltage that is too high can cause a SHOCK hazard and damage unit. Correct line voltage is listed on nameplate.

6. Bring in main power cable from a fused disconnect or circuit breaker directly to the camlocks provided on the control panel. Fuse must be a time delay type. Unit FLA, MCA, and MOP are shown on the Equipment Data Sheet.
7. Properly connect main grounding lug on control panel of HCUB-Plus to the main earth ground.
8. Before operating HCUB-Plus, ensure electrical phasing is correct. With any given combination of wiring connections for L1, L2 and L3, there is a 50% chance that the unit's fans (not controlled by VFD's) and compressors will be turning backwards. To check, turn on power to unit momentarily and check for correct rotation of condenser fans and compressors are generating a pressure differential. Fans controlled by VFD's will have correct rotation even when the unit is phase backwards. Scroll compressors will not generate a pressure differential and make a very loud noise when phased backwards. **WARNING: RUNNING SCROLL COMPRESSORS BACKWARDS FOR EXTENDED PERIODS OF TIME WILL RESULT IN COMPRESSOR FAILURE WHICH IS NOT COVERED BY THE EQUIPMENT WARRANTY.** It is important the HCUB-Plus is wired correctly.

4. Operating Instructions

4.1. Controls

Unit is factory set to operate when commands are received from the thermostat/humidistat or manual switches. HCUB-Plus has an internal PLC (Programmable Logic Controller) **microprocessor** to supervise and control all internal functions and protections. If you do not understand a part of this manual, or have a question please call the Munters Technical Service Department at (800) 229-8557.

4.1.1. Dehumidification (DH)

On HCUB-Plus models in DH mode, the microprocessor initiates first stage dehumidification. Compressor A energizes along with desiccant wheel and reactivation fan. If after specified delay time (10 minute default), DH demand still exists, compressor B will initiate.

4.1.2. Condensing Section

Compressor A and B have an air cooled condenser coil that provides reactivation heat for desiccant wheel. Air from the outside air inlet is drawn through reactivation coil and through desiccant wheel by reactivation fan. Speed of this fan is controlled by a VFD to maintain a designed discharge pressure. If needed, the two condenser fans can be activated and also controlled by a VFD to assist the heat dissipation.

4.1.3. Cooling

Upon call for stage 1 cooling from the thermostat or manual switches, Compressor A starts. Upon call for stage 2 cooling, Compressor B starts. There is a defined stage delay between the two compressors if they are called simultaneously.

4.2. Setting up Control System

4.2.1. HCUB-Plus Rental Setup

Unit must be configured according to instructions.

- **PLEASE NOTE:** The microprocessor parameters for this unit have been set from the factory. The **laminated** control parameter sheet should be located (taped) inside the electrical panel. If the document is missing or you need additional information, please contact the Munters Service Department at (800) 229-8557.
- **NOTE:** Any changes made to the settings must be recorded on this sheet for future reference.
- Power up microprocessor.
- Default passcode is 1234.
- For detail information on how to access, setup and adjust unit operation mode or parameters, please refer to Appendix D – BACKview 6 navigation instructions.

4.3. Starting the Unit

- Turn disconnect switch to 'ON' position.

4.4. Modes of Operation

4.4.1. Unit Operation – Thermostat / De-humidistat

- Turn Control Mode Switch (6S) to “Thermostat / De-humidistat” position.
- Unit should start when run command is received (Fan On) from the stat.
- Adjust the supply fan speed control potentiometer between Min and Max to desired airflow.
- Supply fan airflow can be looked up in the chart below based on the air pressure drop across the desiccant wheel.

Estimated Supply Airflow (CFM)	Measured Air Pressure Drop across DH wheel (inch H2O)
3000	0.50-0.60
4000	0.70-0.80
5000	0.90-1.10
6000	1.10-1.20

Table 1: Supply Airflow vs DH Wheel APD

- Upon call for stage 1 Cooling, Compressor A starts.
- Upon call for stage 2 Cooling, Compressor B starts.
- Upon call for DH, Compressor A, Compressor B and DH wheel will start.

4.4.2. Unit Operation – Manual

- Turn Control Mode Switch (6S) to “MANUAL” position.
- Turn on “Supply Fan” switch to start fan.
- Adjust the supply fan speed control potentiometer between Min and Max to desired airflow.
- Turn on “Cool 1” to start Compressor A.
- Turn on “Cool 2” to start Compressor B.
- Turn on “DH” to start Compressor A, Compressor B and DH wheel for dehumidification. It is not necessary to turn on “Cool 1” or “Cool 2” for DH.

4.4.3. Unit Operation – Return Air Sensor (factory installed)

- First make sure the return air ducts are connected, butterfly dampers are open and outside air damper is closed.
- Turn Control Mode Switch (6S) to “OFF” position.
- Turn Control Mode Switch (5S) to “RETURN AIR SENSOR” position.
- Setup the return air temperature and humidity control set points in unit PLC located inside the control cabinet.
- Refer to unit O&M manual for details on how to setup unit PLC.
- Unit should start to run the proper functions decided by PLC.

4.4.4. Unit Operation – BMS

- Make sure BMS communication cable is properly connected.
- Turn Control Mode Switch (6S) to “OFF” position.
- Turn Control Mode Switch (5S) to “BMS” position.
- Unit should start to run the proper functions decided by BMS.
- Refer to unit O&M manual for details on how to setup unit PLC with BMS communication.



Figure 5: Control Panel with Lights and Disconnect

(Green Panel Lights come on/signal as Cool 1, Cool 2 operate, DH operates and Condenser Fan)

4.4.5. Compressor Protection

Microprocessor has several features to protect compressors and prevent DX coil from freezing.

NOTE

Modifying some factory set points will void warranty.

- Compressors have minimum run times and minimum off times to prevent too many starts per hour. These times should “not” be adjusted as altering these set points can void equipment warranty. Minimum run time insures that oil is returned to compressor after being pumped out upon compressor start. Minimum run time is 3 minutes and minimum off time is 5 minutes. Minimum run time is overridden by a high discharge pressure event.
- When in cooling or DH mode: suction pressure on each compressor is monitored by microprocessor. If suction pressure is < 90 psi, compressor will not start. If suction pressure drops below 90 psi after compressor is running, it will de-energize immediately provided minimum on time has elapsed (3 minutes). If both compressors are running and their suction pressures drop below 90 psi, compressor B will de-energize immediately provided minimum on time has elapsed, and if compressor A suction pressure doesn't rise above 90 psi, it will de-energize after defined time delay. Compressor B will not energize until compressor A suction pressure rises above 128 psi, if the call for compressor B still exists. Compressor A will restart if its suction pressure rises to 90 psi after minimum off time of 5 minutes.
- If the suction pressure of compressor A is below 128 psi, compressor B will not start even after the stage on delay.
- If the ambient temperature is below 45F, all compressor operation will be locked out.

4.4.6. Faults

The HCub-Plus will perform shutdown and retry functions due to fault conditions that follow. However, a unit general fault or a “out of phase” alarm will be indicated on the unit control panel. All other faults will be shown on the microprocessor display.

4.4.7. Operational Alarms Description

Internal processes are monitored for proper sequencing of events and values that are within established upper or lower limits. Operational alarms are an indication of sequence failure and/or invalid values. Any latching alarm can be reset by utilizing the "Alarm Reset" function through Programmable Logic Controller (PLC). For additional corrective actions please see Troubleshooting Section, **Table 24**.

	Alarm Description	Corrective Action
1	React Fan Lockout (cycle power to reset)	Cycle main power to reset lockout.
2	React Fan Fault	Check motor overload or VFD fault relay
3	Supply Fan Fail Lockout	Cycle main power to reset lockout.
4	Supply Fan Failure	Check motor overload or VFD fault relay
5	Unit Locked out (cycle power to restart)	Cycle main power to reset lockout.
6	Ambient Temp Sensor Fail	Check sensor power and connections
7	Ambient RH Sensor Fail	Check sensor power and connections
8	Leaving Temp Sensor Fail	Check sensor power and connections
9	Compressor A Discharge Sensor Failure	Check sensor power and connections
10	Wheel Rotation Switch Fault	Check wheel switch wiring and operation
11	Wheel Motor Fault	Check wheel motor overload and wiring
12	Compressor A High Pressure Lockout (cycle power to reset)	Cycle main power to reset lockout.

13	Compressor A High Pressure Fault	Verify head pressure and condensing fan operation
14	Compressor A Low Suction Pressure Fault	Verify suction pressure and DX coil temperature
15	Compressor A Low Suction Lockout (cycle power to reset)	Cycle main power to reset lockout.
16	Compressor A Low Pressure Sensor Failure	Check sensor power and connections
17	Compressor B High Pressure Lockout (cycle power to reset)	Cycle main power to reset lockout.
18	Compressor B High Pressure Fault	Verify head pressure and condensing fan operation
19	Compressor B Low Suction Pressure Fault	Verify suction pressure and DX coil temperature
20	Compressor B Low Suction Lockout (cycle power to reset)	Cycle main power to reset lockout.
21	Compressor B Low Pressure Sensor Failure	Check sensor power and connections

Table 2: Operational Alarms Description

4.5. Using Microprocessor

Microprocessor has a keypad and display to allow operator to view status of various functions and set parameters. Keypad and display are located on microprocessor inside control panel. **NOTE:** Modification of set points without consulting factory could void warranty.



CAUTION

There is high voltage inside control panel. Do not touch anything but keypad on display. Failure to heed this precaution may cause injury to personnel and/or damage to equipment.

4.5.1. Navigation of Microprocessor

Refer to Section 2 for detail information.

5. Maintenance

5.1. Overview

This section includes suggested maintenance requirements for unit. This information is offered as a guide, but your system may require more frequent maintenance. For example, if your unit is used in a very dusty atmosphere, you should replace air filters more often. Use these suggested schedules as a starting point, and modify them to suit your installation.

Munters dehumidifiers are designed to be very rugged and reliable. However, you should not skip maintenance. Poor maintenance can result in poor performance, increased downtime and additional operating costs and potentially void equipment warranty.

Munters strongly recommends that you follow a comprehensive maintenance program. This program should include not only dehumidifier, but any support systems involved in the dehumidification system.

At some installations, downtime can be very expensive. To avoid possible downtime it is important to maintain an on-site inventory of spare parts. A list of recommended spare parts is included in Appendix D.

As the unit operates, make routine checks of these three basic functions:

- The process air flow and reactivation air flow should be checked to ensure they remain at design levels. If the air flow changes, this can change the operation of the unit. A change in air flow may call for maintenance or troubleshooting. If the application changes, which will result in different air flows, contact the Technical Service Department at Munters.
- Visually check and replace dirty filters as necessary.
- Check unit for alarms.

5.2. Quick Check

As the unit operates, make routine checks of these two basic functions:

- The supply air fan should be running whenever the HCU is getting power, the “MAX FLOW” or “MAX DRY” switch is in the “On” position (HCU 4000, HCU 6000, and HCU 8000 only), and the controller is calling for “FAN” to be on.
- Turn on power to the unit and allow it to operate normally for about 30 minutes. (This will allow time for the temperatures inside the unit to stabilize.) You should run this test at a time of day when the HCU needs to run dehumidification. Using a simple probe thermometer, check the temperatures leaving (LAT) the cooling coil, desiccant wheel, and condenser coil. The cooling coil LAT should be 15 to 30°F cooler than ambient. The wheel LAT should be 10 to 15°F warmer than the coil LAT. The condenser coil LAT should be at least 112°F.

5.3. Recommended Maintenance Schedule

The following table lists recommended maintenance schedules. For detailed instructions on each procedure, see sections that follow.

5.3.1. Annual Maintenance Schedule

Check This	Location	Monthly	Annually	Every 2 Years
Inspect Ductwork	Supply Air Outlet (See Section 5.4)	✓		
Replace Air Filters	As Labeled (See Section 5.5)	✓		
Check Fans	Supply Fans Bearings and Belts (See Section 5.7)	✓		
Inspect Seals Around Desiccant Wheel	Both faces of Desiccant Wheel (See Section 5.6)		✓	
Check Fans	Reactivation, Supply and Condenser Fan (See Section 5.7)		✓	
Inspect Wheel Drive Motor	Cassette Access Panel or Door (See Section 5.8)		✓	
Inspect Roller Wheels	Cassette Access Panel or Door (See Section 5.9)		✓	
Inspect Electronic Controls	Control Panel (See Section 5.13)		✓	
Inspect Drain Pan	DX Coil Access Door or Panel (See Section 5.14)	✓		
Grease Reactivation Fan with Lithium Grease (Shell Alvania or eq.)	(See Section 5.7)			✓
Grease Supply Fan with Lithium Grease (Shell Alvania or eq.)	(See Section 5.7)			✓

Table 3: Annual Maintenance Schedule

Note: The frequency of all maintenance activities should be adjusted as required per the area of installation. Dirty or dusty environments may require more frequent scheduling of maintenance.

5.4. Inspecting Ductwork

1. Check supply air drop box to insure that louvers are open.
2. Be sure air inlets are not blocked at these points.
 - Makeup air inlet
 - Condenser air inlet

5.5. Replacing Air Filters and Cleaning Reactivation Coil

This unit has disposable air filters at intakes for makeup air and reactivation air. It is important to replace filters when dirty. If a filter becomes dirty, efficiency of unit will drop off, and desiccant wheel may be damaged.

Open filter access doors. Unit will turn off/de-energize automatically when these doors are opened, but will restart after doors are all closed. Slide old filters out and replace with proper size 2" thick 30% efficient pleated disposable air filters. See equipment data sheets in appendix for exact sizes.

5.6. Inspecting Seals

1. Seals are positioned against each face of Desiccant wheel. One seal is mounted on each side of wheel. Standard high-pressure seal has an outer layer of durable coating with a black supporting material. Seals should provide many years of service under normal conditions.
2. Turn off/de-energize unit and open doors and/or access panels to gain access to desiccant wheel.
3. Check clearance between each seal and face of wheel. Slide a business card or a feeler gauge of 0.030" between face of wheel and seal face. Check entire seal area on both sides of wheel. At each point, you should feel a moderate drag or resistance as you slide card or feeler.

If at any point on seal you feel little or no resistance, replace seals with new ones. See **Section 5.10**.

If you feel little or no drag on one side and excessive drag on other side, check rollers that support wheel. Look for wear on roller bushings. See **Section 5.9**.

4. If Desiccant wheel has been removed, you can inspect surface of each seal. (See wheel removal procedure in **Section 5.10**.) On face of seal (portion that comes in contact with Desiccant wheel) is a black durable coating which is a Teflon[®] material, with a black supporting material. Inspect outer surface of each seal for signs of excessive wear. If black portion of a seal is visible through black, seal should be replaced. If white is visible through black, seal is serviceable.
5. If a seal is torn, you can make a temporary repair by using silicone caulking (such as GE RTV[®]). Bond torn section back together. Avoid getting silicone on outer or wearing portion of seal. This can cause excess drag. Plan to replace damaged seal as soon as possible.

5.7. Inspecting Fans

1. Turn off/de-energize unit disconnect before you check fans.



KEEP YOUR HANDS AWAY FROM FANS WHILE UNIT IS TURNED ON. TURN OFF POWER, USING DISCONNECT OR CIRCUIT BREAKER, BEFORE YOU INSPECT FANS.

2. **Supply fan.** This fan should spin easily. Bearings should not make noise. Belts should have proper tension and not show any signs of fraying. Belt tension should allow 1/2" of play with a force exerted with one finger half way between pulleys. (**NOTE:** Please see **Section 5.7.1** Tensioning V-Belt Drives). There should be no free play when you try to move motor shaft side-to-side. A motor with stiff or gritty bearings must be replaced. Motor should be greased every other year using a lithium-based grease such as Shell

Alvania R3 or equivalent as follows. With unit turned off/de-energized, wipe off grease fitting and apply small amount of grease. Close door and run unit for a few minutes. Turn off/de-energize unit again and allow fan to stop. Apply a small additional amount of grease. Applying too much grease can result in grease getting inside motor housing through inner seal and causing premature motor failure. Applying not enough grease can result in bearing overheating and premature motor failure also. Fan bearings should be greased every other year in a manner same as motor.

3. **Reactivation fan.** This fan can be accessed for inspection by opening door on right side of unit (when viewed from outside air-intake end of unit) close to fan. You can reach in and turn fan blade by hand. The fan blade should spin easily. Bearings should not make noise and there should be no free play when you try to move motor shaft side-to-side. A motor with stiff or gritty bearings must be replaced. Motor should be greased every other year using a lithium-based grease such as Shell Alvania R3 or equivalent as follows. With unit turned off/de-energized, wipe off grease fitting and apply small amount of grease. Close door and run unit for a few minutes. Turn off/de-energize unit again and allow fan to stop. Apply a small additional amount of grease. Applying too much grease can result in grease getting inside motor housing through inner seal and causing premature motor failure. Applying not enough grease can result in bearing overheating and premature motor failure also. Fan bearings should be greased every other year in a manner same as motor.
4. **Condenser fan(s).** Condenser fans are propeller-type and are located on the end of the unit. Condenser fan should spin easily and not contact fan guard. Condenser fan is permanently lubricated.

5.7.1. Tensioning V-Belt Drives

One of the most important factors in successful operation of a V-belt drive is proper belt-tensioning. To achieve long, trouble free service, belt tension must be sufficient to overcome slipping under maximum peak load. The amount of peak load will vary depending upon the character of the unit drive system. To increase total tension, increase the center distance. Be sure the sheaves are properly installed and aligned. If the belt slips, it is too loose and tension can be added by increasing the center distance. Never apply dressing as this will damage the belt and cause early failure.

General Method – Rules of Tensioning.

Ideal tension is the lowest tension at which the belt will not slip under peak load conditions. Tension should be checked frequently during the first 24 hours of operation and periodically thereafter or as recommended.

5.7.1.1. How to Use – V-Belt Tension Gauge



CAUTION

Before performing any maintenance or tensioning on belt drives be sure to turn off equipment using Lock-Out/Tag-Out procedures.

1. Place a matched set of belt(s) over the sheave grooves. Take up the slack until the belt(s) appear fairly taut.
2. With the drives stopped, measure the belt span of your drive. **See Figure 8.** Set the rubber O-ring on the body of the tension gauge at the dimension equal to $1/64^{\text{th}}$ inch for every inch of span length. For example, the deflection for a 32 inch span is $1/64^{\text{th}}$ inch x 32, $1/2$ inch.

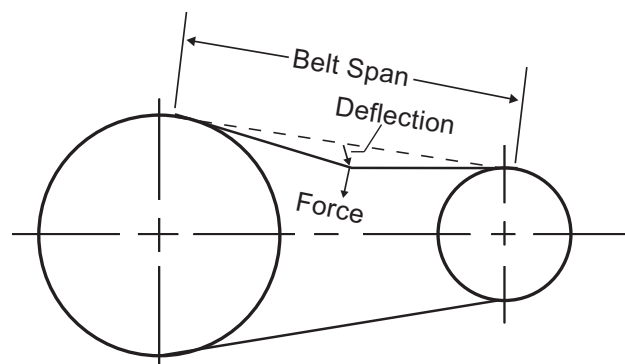
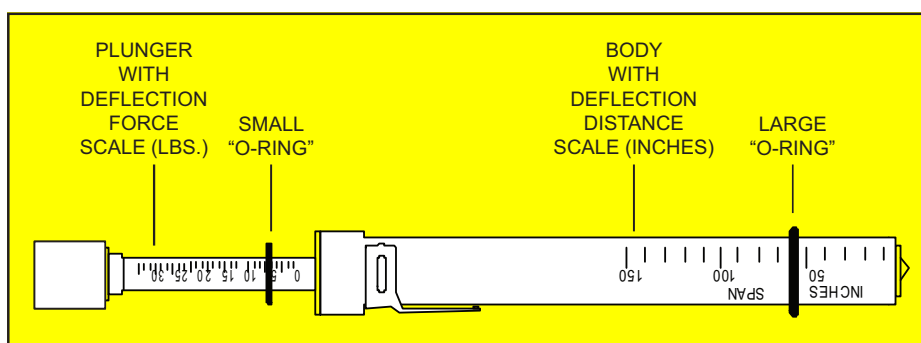


Figure 8: Proper V-Belt Tensioning

3. Set the O-ring on the plunger at 0 against the body of the tension gauge.
4. With the tension gauge perpendicular to the span, apply a force on one belt in the center of the span. Deflect the belt by applying enough force until bottom of the large O-ring is even with the top of the next belt, or the bottom of a straight edge laid across the top of other belt(s) on the drive. Release pressure and read the force applied from the bottom of the small O-ring on the deflection force scale. **See Figure 8.**



Please Note: When new belts are installed on a drive, the tension will drop rapidly during the first few hours. Thus, for new belts, tighten to the initial installation deflection force shown in the tables/chart. Check tension frequently during the first 24 hours of operation. Subsequent retensioning should fall between the minimum and maximum forces shown in tables.

5. Compare the force required in step 4 with the ranges in the tables listed. Tighten or loosen belts to bring them into the recommended range.

Note: The proper tension for V-belt drives is the lowest tension at which the belt(s) won't slip under peak conditions.

5.7.2. Recommended Deflection Force (Lbs.) for V-Belts

V-Belt Cross Section	Small Sheave Diameter Range (inches)	Initial Installation	Retensioning Maximum	Retensioning Minimum
A	3.0 - 3.4	3.3	2.9	2.2
	3.6 - 4.2	3.5	3.1	2.4
	4.6 - 6.0	3.7	3.3	2.5
B	4.6 - 5.4	6.0	5.1	4.0
	5.6 - 7.4	6.3	5.5	4.2
	8.6 - 9.4	6.6	5.7	4.4
C	7.0 - 8.5	13.2	11.5	8.8
	9.0 - 12.0	13.9	12.1	9.3
	13.0 - 16.0	14.6	12.6	9.7
D	12.0 - 15.5	26.5	22.9	17.6
	16.0 - 18.0	27.8	24.3	18.7
	22.0 - 27.0	29.1	25.6	19.6
E	17.7 - 23.6	39.7	34.4	26.5
	23.7 - 31.5	41.7	36.2	27.8
	31.6 - 39.3	43.7	37.9	29.1

V-Belt Cross Section	Small Sheave Diameter Range (inches)	Initial Installation	Retensioning Maximum	Retensioning Minimum
AX	2.1 - 3.4	4.4	3.7	2.9
	3.6 - 4.2	4.6	4.0	3.1
	4.6 - 6.0	4.9	4.2	3.3
BX	3.7 - 5.4	7.7	6.6	5.1
	5.6 - 7.4	8.2	7.1	5.5
	8.6 - 9.4	8.6	7.5	5.7
CX	5.8 - 8.5	17.2	15.0	11.5
	9.0 - 12.0	18.1	15.7	12.1
	13.0 - 16.0	19.0	16.5	12.8
3V	2.65 - 3.35	5.5	4.8	3.9
	3.65 - 4.12	6.4	5.7	4.4
	4.50 - 5.60	7.5	6.6	5.1
	6.00 - 10.60	8.6	7.5	5.7
5V	7.10 - 8.50	19.2	16.7	13.0
	9.00 - 11.80	23.3	20.3	15.6
	12.50 - 16.00	27.3	23.8	18.5
8V	12.50 - 16.00	50.9	44.3	34.4
	17.00 - 20.00	57.1	49.8	38.6
	21.20 - 24.80	61.3	53.3	41.4
3VX	2.20 - 3.35	5.5	4.8	3.9
	3.65 - 4.12	6.4	5.7	4.4
	4.50 - 5.60	7.5	6.6	5.0
	6.00 - 10.60	8.6	7.5	5.7
5VX	4.40 - 8.50	19.2	16.7	13.0
	9.00 - 11.80	23.3	20.3	15.6
	12.50 - 16.00	27.3	23.8	18.5

Table 4: Recommended Deflection Force (Lbs.) for V-Belts Description

5.8. Inspecting Wheel Drive Motor and Belt

1. Drive motor is located inside cassette.
2. Check belt for signs of stiffness or cracking. Replace it if necessary. See Section 5.9.

5.9. Inspecting Roller Wheels

- Desiccant wheel is supported on four rollers.
- Each pair of rollers is supported by a shaft that sits in a support bracket. Each roller should have a small side-to-side play on shaft.
- Should rollers become worn, excessive play may develop. This can cause uneven support of wheel. Inspect rollers and check for signs of wear. Replace all rollers if any appear excessively worn.
- Roller assemblies have nylon bushings that **do not** require lubrication and should never be lubricated.

5.10. Removing and Replacing Desiccant Wheel, Drive Belt and Seals

It is important to work carefully when removing and replacing wheel. Desiccant section in center of wheel can be damaged if handled roughly. You will need normal hand tools to replace wheel. Wheel is heavy and will require assistance.

- Turn off unit. Turn off/de-energize power supply to unit and Lock-Out so power cannot be returned by mistake.
- The desiccant wheel is removed from the condenser air/react air outlet side of the unit. Lift drive motor and disengage belt. Remove the drive motor from path of desiccant wheel. Lift wheel slightly to remove tension off roller. Support wheel, remove support roller and shaft. Carefully roll wheel out of cassette
- Inspect seals. If seals are worn or damaged, they should be replaced.



WARNING

The wheel can weigh as much as 550 lbs. If it is allowed to roll forward suddenly, you may be injured.

NOTE

Please Note: If seal replacement or repair is required, and because specifications per unit are unique, contact Technical Service Department at (800) 229-8557 for repair or replacement.

3. To replace wheel, reverse steps listed above. When rolling wheel back into cassette, be very careful to avoid snagging seal on wheel.

5.11. Inspecting Desiccant Wheel

Desiccant wheel contains a lightweight framework that supports desiccant chemical. Honeycomb pattern includes many small air passages or “flutes” which run parallel through wheel. Passages are designed to allow air flow across desiccant with the least amount of resistance. Near the seam in the wheel housing there is engraved text. This is informational text only and provides the wheel serial number, date of manufacture and the manufacturing process used if needed for replacement.

Wheels generally do not foul or plug unless one or more air streams has not been properly filtered. Plugging is most likely to occur when units must operate in very dusty environments. If wheel becomes blocked, this will increase pressure drop across wheel for both evaporator and reactivation air streams. To check for moisture damage and plugging, follow this procedure.

- Turn off/de-energize dehumidifier. Turn off and Lock-Out power to unit to prevent restarting by mistake.
- Remove wheel as described in **Section 5.10**.
- Check faces of wheel and ends of flutes for signs of damage. This may indicate a problem with alignment of wheel. This occurs if support rollers become worn. Small isolated areas of damage are usually caused by rough handling of wheel. If area of damage is less than 10% of total wheel, no action is required. However, if damaged area is greater and equipment performance has deteriorated, wheel should be replaced.
- To check for plugging, use a 60 watt minimum “drop light”. Hold light on far side of wheel, facing wheel. Check sighting through flutes of wheel to see if plugged. You should be able to see light clearly. Scan entire area of wheel for dark areas and plugs. You should be able to see light at all points on wheel.

5.12. Cleaning Desiccant Wheel

1. Remove Desiccant wheel by following procedure listed in **Section 5.10**.
2. Vacuum both faces of wheel. Use a “wet/dry” vacuum with “dusting brush” attachment and a soft bristle brush.
3. Vacuuming alone may not remove blockage. Increase force of air by applying stream of low-pressure compressed air to side of wheel while you vacuum. Do this carefully so you do not damage wheel. Use dry, oil-free compressed air not more than 30 PSIG. Do not allow air jet closer than 12" to face of wheel. Use compressed air with vacuum to clear blockage.



CAUTION

Do not use high-pressure air to clean wheel. Do not hold air jet near surface of wheel. Honeycomb structure inside wheel may be damaged.

Only use this procedure to clean Desiccant wheel. Do not wash wheel with any solvent. You may damage wheel, and make replacement necessary.

4. After cleaning, recheck wheel using droplight. If blockage has been removed, re-install wheel. If blockage is still extensive, wheel may be cleaned carefully with water. A small amount of liquid dish washing detergent may be incorporated as a degreaser if oils are suspected in wheel. Never use a cleaner that contains ammonia, as this will damage wheel. Care should be taken to support wheel face while performing this function. Be sure to blow out any excess water that may have accumulated on wheel face before restarting. Desiccant wheel should be dried out soon after washing process to minimize stresses placed on wheel structure by substantial water weight increase.

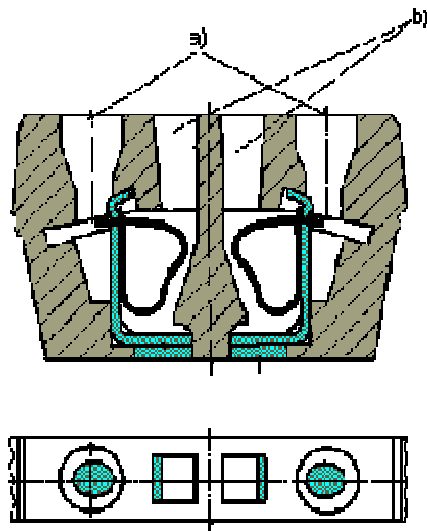
5.13. Electronic Controls

- There is a fused disconnect below the control panel. This will disconnect power to unit.
- Make a general check for possible problems – frayed wires, loose relays, overheated parts, loose terminal connections, etc. **Please see Note below:** Checking Loose Wiring/Relays.
- There are one or more Variable Frequency Drives (VFDs) in the control panel. These are labeled “2 VFD”, “3VFD and “4 VFD”. The reactivation fan (2 VFD) modulates from 50% output (30Hz) to 100% output (60HZ) to maintain a constant discharge pressure on refrigeration circuit A. Supply fan VFD on standard unit is controlled by digital inputs to control fan at one of two speeds. A higher speed when in DH mode and a lower speed when not in DH. When the discharge pressure exceeds set point and the reactivation fan is at 100%, the condenser fan (3 VFD) starts and modulates to maintain set point discharge pressure. Some units have 4 VFD to set the speed of the supply fan. (To adjust the air volume, **See Section 4.8**). If any VFD is replaced, program parameters must be set as shown in the Appendix A. Note: the non-bolded parameters are preset from the VFD factory. The **bold** parameters are set at Munters per appendices.
- There is a microprocessor inside the control panel. The microprocessor is solid state and very reliable. If it should need replacement, turn off/de-energize all power to unit. Unplug each modular wire harness plug from top and bottom of microprocessor. Microprocessor mounts on a standard DIN rail. Using small screwdriver, lift latching devices and remove unit from DIN rail. Snap new microprocessor onto DIN rail and plug wire harnesses in. Turn on power and look at display. Model number must show HCUB-Plus and refrigerant R410a. It must also have program version 3.XX. If it does not, consult factory. Controller must be configured as required in SETUP.

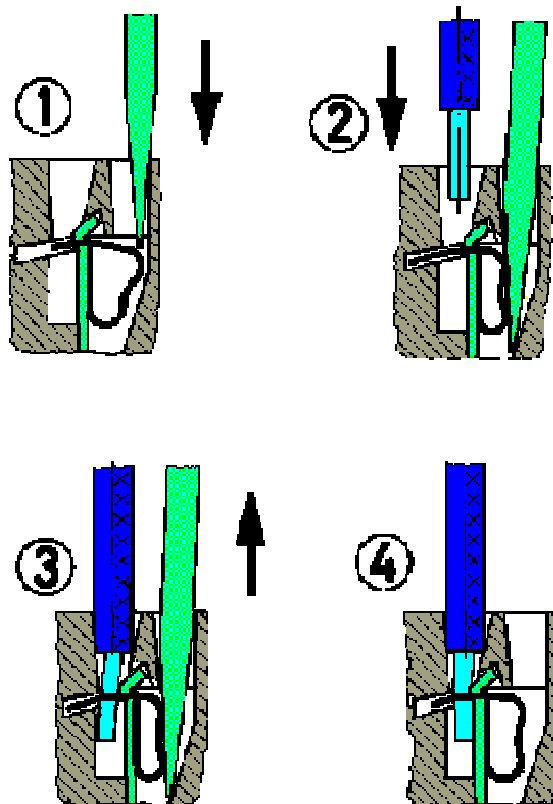
NOTE: Checking Loose Wiring/Relays on Terminal Block Connections

This method requires very little preparation of the wire and no special tools, only a screwdriver, leading to a high degree of mechanical security with the following highlights.

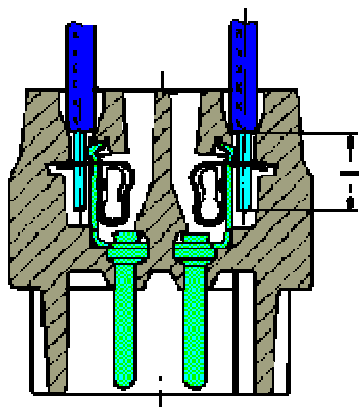
- For all stranded and solid wires with a cross section 0.14 to 2.5 mm².
- Ease of termination. Conductor and screwdriver are in same plane.
- No special preparation of stripped conductor.
- The larger the conductor, the higher the clamping force.
- Testing is possible in the screwdriver aperture.
- The termination is vibration-proof.
- Guaranteed constant low resistance connection of the cage-clamp terminal.
- The cage-clamp system is internationally approved. VDE, SEV, CSA, UL, ÖVE, SEMKO, LCIE (France), Germanischer Lloyd, DET Norske Veritas.



- a) One conductor per termination, 18 and larger gage wires, may take two.
 b) Slot for screwdriver



Screwdriver width: 3.5 x 0.5 mm



Inserts	max. wire gauge		Stripping length
	(mm ²)	AWG	l (mm)
Han® ES, Han® HvES	0,14-2,5	26-14	7... 9
Han® ESS	0,14-2,5	26-14	9...1

5.14. Inspecting Drain Pan and Drain

Evaporator coil can cause water to condense out of incoming air. Normally, this water is collected in a drain pan under evaporator coil. Water is then drained away through a P-trap and drain line. There should be no water standing in drain pan. If water has collected there, drain line may be blocked and needs to be cleaned to unclog. If water is being blown off coil, one of following problems may exist:

1. Supply air volume is greater than maximum allowed and water is blowing off coil.
2. Drain trap is missing, dry, damaged or improperly designed allowing air to be drawn through drain pipe and spraying water out drain pan.

6. Troubleshooting

The HCUB-Plus has state-of-the-art design, with a sophisticated control system using a microprocessor with solid-state electronics. These units have proven to be very reliable in a wide variety of installations with features that facilitate troubleshooting when a problem occurs.

6.1. Troubleshooting

The HCUB-Plus has a sophisticated control system that uses a microprocessor to control internal functions of the unit along with variable frequency drives (VFDs) on reactivation and supply fans. If either detects a problem, it will go into an alarm mode. The first step in troubleshooting a unit is to look for an alarm code on microprocessor and each VFD.

If VFD goes into fault mode, it sends a signal to microprocessor by closing fault output contacts on VFD that go to digital inputs on microprocessor. The microprocessor will shut down the unit for 2 minutes to allow all fans to come to a complete stop. The microprocessor will then send a reset signal to all VFD's and start the unit. If a VFD trips again, unit will turn off/de-energize for 30 minutes, reset VFDs, and restart unit. Microprocessor will retry four times (each try after a 30 minute delay) in case of repeated VFD trips. After fourth try, unit will lock out.

Do not turn off power until microprocessor and VFDs are checked for alarms and alarm codes noted. If an alarm is present on microprocessor, see "Using Microprocessor" below. If an alarm is present on a VFD, go to **Appendix A: Variable Frequency Drives** to applicable VFD model and check section for cause and solutions.

Next step is to refer to **Table 5: Common Faults** for all models of Yaskawa VFD **Using Microprocessor**: HCUB-Plus microprocessor is equipped with keypad display. Whenever microprocessor detects a fault, alarm button will illuminate red. See Section 4.4.8 and 4.5 for viewing faults via display and detailed microprocessor operating instructions.

Variable Frequency Drives (VFD): VFDs are used to control fan motor speeds on reactivation and condenser fans (condenser fan only on the HCUB-Plus 1000). They replace motor contactors and overload relays and provide a soft start for motor. If VFD detects a problem such as high amperage, low voltage, etc., it shuts motor down to protect it and indicates a fault condition. Fault indications are shown in **Tables 5 and 6**. VFD settings are shown in **Appendix A** for reactivation fan (2 M) and condenser fan (3 M). Programming settings should be changed only with factory authorization.

6.1.1. Supply Fan VFD

The supply fan speed is optionally controlled by means of a VFD. This eliminates the need for fan belts and pulleys or other manual adjustments to control supply airflow. The VFD allows the motor to run at two different speeds. On some units when dehumidification is not required, a bypass damper opens to allow filtered makeup air to bypass the desiccant wheel. By eliminating that pressure drop, the supply can run at a lower speed to save energy. If the unit is equipped with this feature, the speed of the supply fan must be adjusted under each condition.

6.1.2. Condenser and Reactivation Fan VFD's

The condenser and reactivation fan speeds are each controlled by a VFD. These VFDs modulate the motor speeds to maintain the desired discharge pressure on the compressor. During cooling-only mode, the target discharge pressure is 340 psig. During dehumidification mode, the target discharge pressure is 444 psig to provide sufficient reactivation heat. The reactivation VFD will operate first until it can no longer maintain the desired discharge pressure. Then the condenser fan VFD (2 VFD) will energize.

One of two different Yaskawa VFDs may be used according to the particular unit: J1000 or V1000.

VFD Display	Problem	Possible cause
oL1	Motor overload	Motor amps > FLA setting (E2-01) but < drive amp capacity Acceleration time (C1-01) too short
oL2	Drive overload	Motor amps > drive capacity
ou	Overvoltage	Deceleration time (C1-02) too short High surge of input voltage
oC	Overcurrent	Motor amps > FLA setting (E2-01)
PF	Phase Loss	Blown VFD supply fuse or unit input phase loss
Uu	Undervoltage	Low voltage into unit

Table 5: Common Faults for all models of Yaskawa VFD

6.1.3. General Troubleshooting

General	Possible Causes
Unit will not run	Microprocessor has an alarm (alarm button is illuminated red). Go to Appendix E for a description of all alarms. If there is no alarm light, check power to unit for correct voltage on all three phases and proper phasing. Phase protection relay will prevent unit running if phasing is incorrect.
Refrigeration Circuits	
Compressor trips on HIGH DISCHARGE alarm	Check Condenser and Reactivation Fan VFDs for trip. Check condenser coil for blockage. Ambient temperature may be excessive (above 110°F).
Compressor trips on LOW DIFF	Compressor may be running backward (Low discharge pressure, high suction pressure). Airflow switch is not adjusted properly and is shutting off compressors. Manual reset high discharge switch is tripped.
Compressor trips on Low Suction Pressure Compressor cycles on Low Suction pressure	Refrigeration circuit may be low on refrigerant Refrigerant circuit may be low on refrigerant. Ambient temperature may be too low for continuous compressor operation.
Variable Frequency Drives (VFD)	
VFD trips	Voltage spike may have occurred. VFD parameter settings may be incorrect. See Appendix A for parameter settings, fault codes, and possible solutions for each fault.
Microprocessor/Controller	
Display is blank	Check 24V power to terminals 19 and 20. Remove and reapply power to 19 and 20. If all else fails, re-upload program.
Alarm light is on	Refer to Appendix E for alarm descriptions.
Microprocessor is not receiving any analog sensor inputs	There may be a problem with wiring causing a short-circuit on 24Vdc line;
Desiccant Wheel	
Pressure drop is incorrect on process side	Supply fan speed may need adjustment (See Section 4.8 and 4.9). Filter may be dirty or wheel might be clogged. (See Sections 5.5 and 5.11.)

Table 6: General Troubleshooting

6.1.4. Alarm Troubleshooting and Verification

See section 4.4.5 Operational Alarms Description.

7. Appendix A: VFD Parameter Settings

7.1. To Program J1000 and V1000 drives

NOTE

Drive must be stopped to program.

There are hundreds of programming parameters in the J1000 and V1000 VFDs., however all except ones listed in the Non-default Parameters Table remain at default value. The method to check and set parameters is to first globally reset all parameters to default values and then change those listed in **Tables 8, 9, 10 and 11.**

1. Press "ESC" key until left-most part of Drive's display shows "F". "DRV" LED will also be lit.
2. Press "DOWN" arrow once to display "PAR" then Press "ENTER" key.
3. Using "UP/DOWN/RIGHT" ARROWS, select A1-01 and set to 2.
4. Select A1-03 and set to 2220 to reset all parameters to default values (use "RIGHT" ARROW key to scroll to each digit of parameter value). Parameters will reset to default and A1-03 will return to 0.
5. Using "UP/DOWN/RIGHT" ARROWS, scroll to and set required value then press "ENTER" key to store value for each of the parameters in applicable table above.
6. Once ALL parameters are set, go back to A1-01 and set A1-01 = 0 to lockout from tampering.

#	User	Parameter Description
A1-01	2 then 0	"Accessible" Parameters: 0=Operation Only; 2=(Advanced Level)
b1-04	1	"Reverse Control": 0=(Enabled); 1=Disabled
b1-07	1	"Local/Remote Run": 0=(Cycle Ext Run); 1=Accept Ext Run
b1-08	1	"Run Cmd" Accepted: 0=(Only in Operation menu); 1=All menus; 2=>>>
b1-17	1	"Run Cmd at Power-up": 0=(Cycle Ext Run); 1=Accept Ext Run
C1-01	15	"Acceleration Time #1": Default=10 seconds (range=0.0 - 6000.0)
C1-02	100	"Deceleration Time #1": Default=10 seconds (range=0.0 - 6000.0)
d2-02	50	"Freq Ref Lower Limit": Default=0% (range=0.0 - 110% of E1-04)
E2-01	FLA	"Motor Rated Current": Set per motor's FLA w/o exceeding Drive Amps
L1-01	2	"Motor Overload Protection": 0=Disabled; 1= (Standard Mtr); 2=Blower Cooled
L1-13	0	"Continuous Electrothermal Operation": 0=Disabled; 1=(Enabled)
L2-01	2	"Momentary Power Loss": 0=(Disabled); 1=L2-02; 2=Power restored
L5-01	5	"Number of Auto Restarts": Default=0 (range=0 -- 10)
O2-02	0	"Stop Key" function: 0=Disabled when in Remote Ctrl; 1=(Enabled)

Table 8: J1000 Reactivation Fan Non-default Parameters

#	User	Parameter Description
A1-01	2 then 0	"Accessible" Parameters: 0=Operation Only; 2=(Advanced Level)

#	User	Parameter Description
b1-04	1	"Reverse Control": 0=(Enabled); 1=Disabled
b1-07	1	"Local/Remote Run": 0=(Cycle Ext Run); 1=Accept Ext Run
b1-08	1	"Run Cmd" Accepted: 0=(Only in Operation menu); 1=All menus; 2=>>
b1-17	1	"Run Cmd at Power-up": 0=(Cycle Ext Run); 1=Accept Ext Run
C1-01	15	"Acceleration Time #1": Default=10 seconds (range=0.0 - 6000.0)
C1-02	100	"Deceleration Time #1": Default=10 seconds (range=0.0 - 6000.0)
d2-02	25	"Freq Ref Lower Limit": Default=0% (range=0.0 - 110% of E1-04)
E2-01	FLA	"Motor Rated Current": Set per motor's FLA w/o exceeding Drive Amps
L1-01	2	"Motor Overload Protection": 0=Disabled; 1= (Standard Mtr); 2=Blower Cooled
L1-13	0	"Continuous Electrothermal Operation": 0=Disabled; 1=(Enabled)
L2-01	2	"Momentary Power Loss": 0=(Disabled); 1=L2-02; 2=Power restored
L5-01	5	"Number of Auto Restarts": Default=0 (range=0 -- 10)
O2-02	0	"Stop Key" function: 0=Disabled when in Remote Ctrl; 1=(Enabled)

Table 9: J1000 Condenser Fan Non-default Parameters

#	User	Parameter Description
A1-01	2 then 0	"Accessible" Parameters: 0=Operation Only; 2=(Advanced Level)
b1-04	1	"Reverse Control": 0=(Enabled); 1=Disabled
b1-07	1	"Local/Remote Run": 0=(Cycle Ext Run); 1=Accept Ext Run
b1-08	1	"Run Cmd" Accepted: 0=(Only in Operation menu); 1=All menus; 2=>>
b1-17	1	"Run Cmd at Power-up": 0=(Cycle Ext Run); 1=Accept Ext Run
C1-01	15	"Acceleration Time #1": Default=10 seconds (range=0.0 - 6000.0)
C1-02	100	"Deceleration Time #1": Default=10 seconds (range=0.0 - 6000.0)
d2-02	50	"Freq Ref Lower Limit": Default=0% (range=0.0 - 110% of E1-04)
E1-03	7	"V/F" Pattern": Default=F for Custom (15 possible fixed V/F)
E2-01	FLA	"Motor Rated Current": Set per motor's FLA w/o exceeding Drive Amps
L1-01	2	"Motor Overload Protection": 0=Disabled; 1= (Standard Mtr); 2=Blower Cooled
L1-13	0	"Continuous Electrothermal Operation": 0=Disabled; 1=(Enabled)
L2-01	2	"Momentary Power Loss": 0=(Disabled); 1=L2-02; 2=Power restored
L5-01	5	"Number of Auto Restarts": Default=0 (range=0 -- 10)
O2-02	0	"Stop Key" function: 0=Disabled when in Remote Ctrl; 1=(Enabled)

Table 10: V1000 Reactivation Fan Non-default Parameters

#	User	Parameter Description
A1-01	2 then 0	"Accessible" Parameters: 0=Operation Only; 2=(Advanced Level)
b1-01	1	"Frequency Reference Selection 1" 0=Operator - Digital preset speed d1-01

#	User	Parameter Description
b1-04	1	"Reverse Control": 0=(Enabled); 1=Disabled
b1-07	1	"Local/Remote Run": 0=(Cycle Ext Run); 1=Accept Ext Run
b1-08	1	"Run Cmd" Accepted: 0=(Only in Operation menu); 1=All menus; 2=>>
b1-17	1	"Run Cmd at Power-up": 0=(Cycle Ext Run); 1=Accept Ext Run
C1-01	30	"Acceleration Time #1": Default=10 seconds (range=0.0 - 6000.0)
C1-02	60	"Deceleration Time #1": Default=10 seconds (range=0.0 - 6000.0)
d1-01	45	Frequency Reference 1
d1-02	60	Frequency Reference 2
d2-02	50	"Freq Ref Lower Limit": Default=0% (range=0.0 - 110% of E1-04)
E1-03	7	"V/F" Pattern": Default=F for Custom (15 possible fixed V/F)
E2-01	FLA	"Motor Rated Current": Set per motor's FLA w/o exceeding Drive Amps
L1-01	2	"Motor Overload Protection": 0=Disabled; 1= (Standard Mtr); 2=Blower Cooled
L1-13	0	"Continuous Electrothermal Operation": 0=Disabled; 1=(Enabled)
L2-01	2	"Momentary Power Loss": 0=(Disabled); 1=L2-02; 2=Power restored
L5-01	5	"Number of Auto Restarts": Default=0 (range=0 -- 10)
O2-02	0	"Stop Key" function: 0=Disabled when in Remote Ctrl; 1=(Enabled)

Table 11: V1000 Supply Fan Non-default Parameters

8. Appendix B: Sequence of Operation

NOTE

The sequence below is only for the HCub-Plus program.

8.1. Inputs

- Supply Fan
- Cooling Stage 1
- Cooling Stage 2
- Dehumidification

8.2. Outputs

8.2.1. Fan

Supply fan runs continuously when input for fan or DH or manual switch for fan is ON.

8.2.2. Outside Air Damper

HCub-Plus only has manual outside air damper. Depending on the application, the user can set the damper open for outside air operation or close it and connect the return air flex ducts for circulated air operation.

8.2.3. Cooling Stage 1

When call for cooling stage 1 is ON, Compressor A runs and head pressure is maintained at 340 psig for economical operation. If ambient temperature is below 45F, Compressor A will not start.

8.2.4. Cooling Stage 2

When call for cooling stage 2 is ON, Compressor B runs and head pressure is maintained at 340 psig for economical operation. If ambient temperature is below 45F, Compressor B will not start. If the compressor A suction pressure is below 128 psi, Compressor B will not start unless the compressor A or compressor A suction pressure transducer is in fault condition. In addition, there is a compressor stage on delay between compressor A and B startup.

8.2.5. Dehumidification (DH)

Supply fan should run when DH is ON. Desiccant wheel rotates at approximately 8 revolutions per hour. Compressor A runs if the ambient temperature allows and head pressure is maintained at 444 psig.

If after a settable compressor stage on delay (default 10 minutes) the call for DH is still present, compressor B energizes to provide additional dehumidification if the ambient temperature allows and the suction pressure of compressor A is at least 128 psi. When the call for DH is removed, compressor B shuts off after minimum run time and compressor A continues to run for a settable compressor stage off delay (default 10 minutes) and then shuts off if the call for DH does not continue.

8.2.6. Compressor Pump Down

When the call for compressor operation occurs, its liquid line solenoid valve should be energized 5 second after the compressor starts. When the call for compressor operations drops, its liquid line solenoid valve should be de-energized first and the compressor should continue to run until its suction pressure drops to 70 psi.

8.2.7. General Alarm Output

This alarm will activate if any fault occurs that causes all or part of the unit to cease operation.

8.3. Alarms

1. Available ALARMS on main menu allows all ALARMS to be viewed.
2. ALARM LOG on main menu allows alarm history to be viewed. Press the Enter key to view the history. Any alarms will appear in order with the latest alarm first. Pressing the up arrow key indexes to the second latest alarm and so forth.
3. If any compressor discharge pressure reaches 570 psi, that compressor will shut down for a delay period of 10 minutes. During this delay, the display will read:
 - CRITICAL ALARM
 - High Discharge Pressure
 - Restarting in _ _ _ s (countdown)

After 10 minutes, the unit will restart automatically. If it shuts down a second time, it will repeat this sequence. After the third shutdown, the unit will lock out, the alarm light will illuminate. The display will read:

- Unit locked out
 - High Discharge Lockout
 - Cycle power to reset
4. If any compressor suction pressure drops to 50 psi while the ambient is above 45F , that compressor will shut down and lock out, the alarm will appear. (Low Suction Pressure Lockout). During this delay, the display will read:
 - CRITICAL ALARM
 - Compressor lost charge Lockout
 5. If the difference between compressor discharge pressure and Suction pressure is not at least 50 psi after 30 seconds, that compressor will shut down. During this delay, the display will read:
 - CRITICAL ALARM
 - Low Pressure Diff
 - Cycle power to reset
 6. If the unit experiences a desiccant wheel motor trip, the unit will continue to run. During this delay, the display will read:
 - ALARM
 - Wheel Motor Trip
 7. If the unit receives a fault signal from the supply fan Airflow Switch (AFS), the unit will shut down for 30 minutes. During this delay, the display will read:
 - CRITICAL ALARM
 - Supply fan Airflow fault

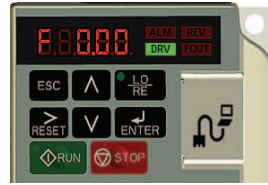
After the third shutdown, the unit will lock out, the alarm light will illuminate. The display will read:

- Unit locked out
8. If the unit experiences a discharge sensor failure (non-fatal alarm), the unit will continue to run, the alarm light will illuminate. The reactivation and condenser fans will default to full RPM. The display will read:
 - Unit running
 - Discharge Sensor Fail.

- If the unit experiences a suction sensor failure (non-fatal alarm), the unit will continue to run, the alarm light will illuminate. The reactivation and condenser fans will default to full RPM. The display will read:
 - Unit running
 - Suction Sensor Fail.
9. Unit will continue to run (non-fatal alarm), illuminate the alarm light with the following alarm(s) present:
- Sensor failure post cool temperature
 - Sensor failure outside temperature
 - Sensor failure outside humidity
 - Sensor failure leaving temperature
- The display will show:
- Unit Running
 - Sensor fail
10. If there is an outside humidity sensor failure, all cooling, DH, and heating functions will continue to function.
11. If there is an outside temperature sensor failure.
- The unit supply fan will not shut down because of low ambient temperature.
 - Compressors and related functions will be allowed to run when called for.
 - OUTSIDE TEMPERATURE, OUTSIDE GRAINS, and SUPPLY HEAT overrides will not bring cooling, DH, or heating functions on.

9. Appendix C: Using VFD

J1000/V1000 Digital Operator power-up state. →



Press **↓** two times until the digital operator shows the parameter menu (PAr) the press **ENTER** .



Select Parameter Menu

Press **→** to select the digit you would like to change. Next use **↑** and **↓** to select the parameter group, sub-group or number.



Select Parameter

Modify the parameter value using **↑** and **↓** and press **ENTER** to save the new value.



Change Parameter Value

Figure 9: J1000/V1000 VFD Access and Change Parameter Value

Press **↑** until the FOUT LED turns on. The display now shows the actual drive output frequency in Hz.



Output Frequency

Pressing **↑** again will show the motor output current. The "A" behind the value means "Amps".

Please refer to the product technical manual on how to access other monitors.

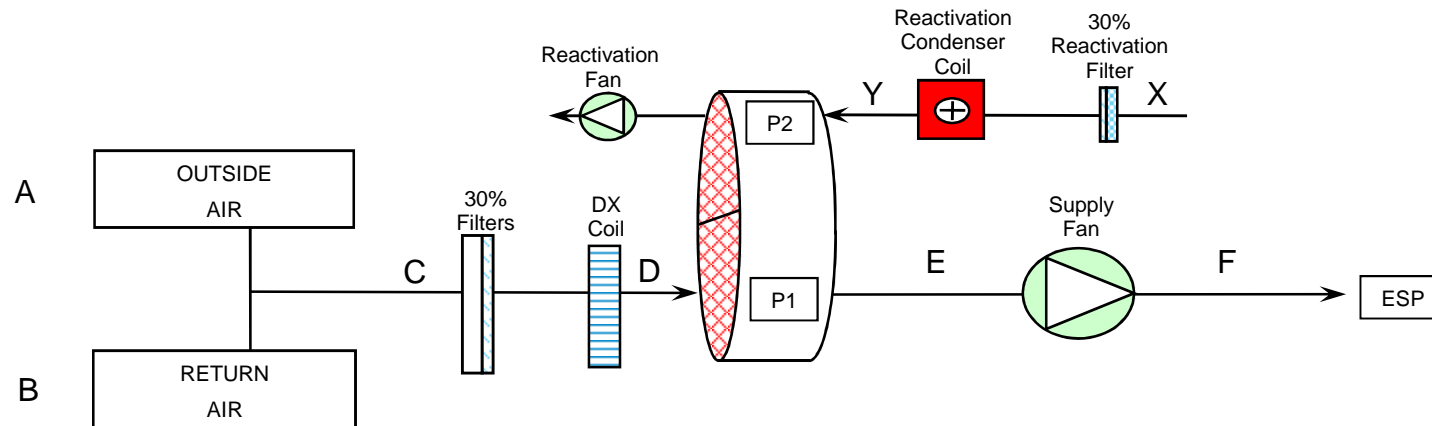


Motor Current

Figure 10: Monitor VFD Motor Frequency and Motor Current

Section 2

Munters Corporation - Dehumidification Division
Flow Data Sheet – Rental Units
HCUb6000 Series



Note: pressures across the wheel will vary (+/- 0.2" wc) depending on the inlet conditions

HCUb6000	A	B	C	D	E	F	X	Y
Airflow - SCFM	6,000	0	6,000	6,000	6,000	6,000	6,000	6,000
Temp (°F)	80	0	80	50	68	72	80	115
Moisture (gr/lb)	92	0	92	54	40	40	92	92

Static Pressure (in. W.C.)	P1	P2	ESP
HCUb6000	1.21	1.40	3.00

EQUIPMENT DATA SHEET	
MANUFACTURER	MUNTERS DRYCOOL
MODEL NUMBER	HCUb6000
DESIGN DATA	
SUPPLY AIRFLOW (SCFM)	6,000
MAKE UP AIR VOLUME (SCFM)	6,000
SUPPLY FAN	
SIZE	16" x 107%
TYPE/CLASS	BAF / III
AIR VOLUME (SCFM)	6,000
TOTAL STATIC PRESSURE (WG")	5.86
EXTERNAL STATIC PRESSURE (WG")	3.00
FAN RPM	3550
MOTOR HP	10
REACTIVATION FAN	
SIZE	18-18
TYPE/CLASS	FC / III
AIR VOLUME (SCFM)	0-6000
TOTAL STATIC PRESSURE (WG")	2.48
FAN RPM	881
MOTOR HP	5
DESICCANT WHEEL	
PRESSURE DROP PROCESS (WG")	1.21
PRESSURE DROP REACTIVATION (WG")	1.40
MOISTURE REMOVAL (LB/HR)	201
COOLING COIL	
REFRIGERANT TYPE	R-410A
TOTAL CAPACITY	30 TONS
COIL CIRCUITS	1
ROWS / FPI	6 / 12
FACE AREA (SQ. FT)	15.9
CONDITIONED AIR (SCFM)	6,000
COIL P (WG")	0.60
CONDENSER	
COMPRESSORS / HP	2 / 15
STAGES OF CAPACITY	2
COIL FACE AREA	42
ROWS / FPI	3 / 13
CONDENSER FAN HP	2
CONDENSER FAN RPM	1140
FILTERS	
TYPE	2" / 30% PLEATED
REACTIVATION FILTER (QTY) SIZE	(6) 16" X 20" X 2"
SUPPLY FILTER (QTY) SIZE	(6) 20" X 20" X 2"
ELECTRICAL	
SYSTEM VOLTAGE (V/P/H)	460V / 3 / 60
CONTROL CIRCUIT VOLTAGE	120 V
SUPPLY MOTOR AMPS	11.7
REACTIVATION MOTOR AMPS	6.5
COMPRESSOR A1 AMPS	26.9
COMPRESSOR A2 AMPS	26.9
CONDENSING FAN AMPS	8
CONTROL TRANSFORMER AMPS	2.2
UNIT FLA	82.2
UNIT MCA	88.9
UNIT MOP	110

Customer:
Contact:
Telephone:
Cell:
Fax:
Job:
Quote #:

Date: 1/17/2018
From:
Company:
Return Tel:
Return Fax:

Construction

Item: DHCUB6K00C
Coils Per Bank: 1
Tube OD IN: 3/8
Style: EJ
Fins Per Inch: 12
Rows: 6
Fin Surface: C
Fin Height (IN): 56.00
Finned Length (IN): 40.00
Tubing Mat. (IN): 0.012 Copper Rifled
Fin Mat. (IN): 0.0060 Aluminum
Circuiting: -42
Face Area (SQ FT): 15.56

Air Side

Air Flow (Sft³/min) 6000.0
Altitude FT: 0.00
Ent. Air DB/WB °F: 80.00 / 70.00
Lvg. Air DB/WB °F: 50.00 / 50.00
Total / Sensible MBH: 0.00 / 0.00
Max Air PD "H2O: 0.00

Refrigerant Side

Refrigerant: 410A
Super Heat °F: 10.00
Saturated Suction Temp °F: 44.50
Liquid Temp °F: 105.0

OUTPUT DATA			OPTIONS	
Model Number:		3EJ1206C	Casing Material:	Galvanized
FPI Rows Surf:		12 06 C	Casing Type:	Flanged
Circuiting:		Interlaced	Hand:	Left
Air Velocity:	(Sft/min)	385.7	Connection Material:	Copper
Total Capacity:	MBH	370.1	ByPass Kit Quantity:	0
Sens. Capacity:	MBH	194.7	ByPass Kit Size:	0
Lvg. Air DB:	°F	49.95	Label Kit:	No
Lvg. Air WB:	°F	49.95	Coating: None	
Standard APD	"H2O	0.70	Mounting Holes:	No
Code 18/19:		7042/15	Drain Headers:	No
Code 18/19_2:		N/A	Boxed Headers:	No
Suction Conn.:	IN	(2) 1.625		
Distributor Conn 1:	IN	(2) 0.875		
Distributor Conn 2:	IN	N/A		
Refr. PD:	lbf/in ²	3.98		
Refr. Velocity:	ft/min	1244.2		
Internal Volume:	in ³	1545.6		
Weight:	lbm	234.1		
Notes:		CJMU		

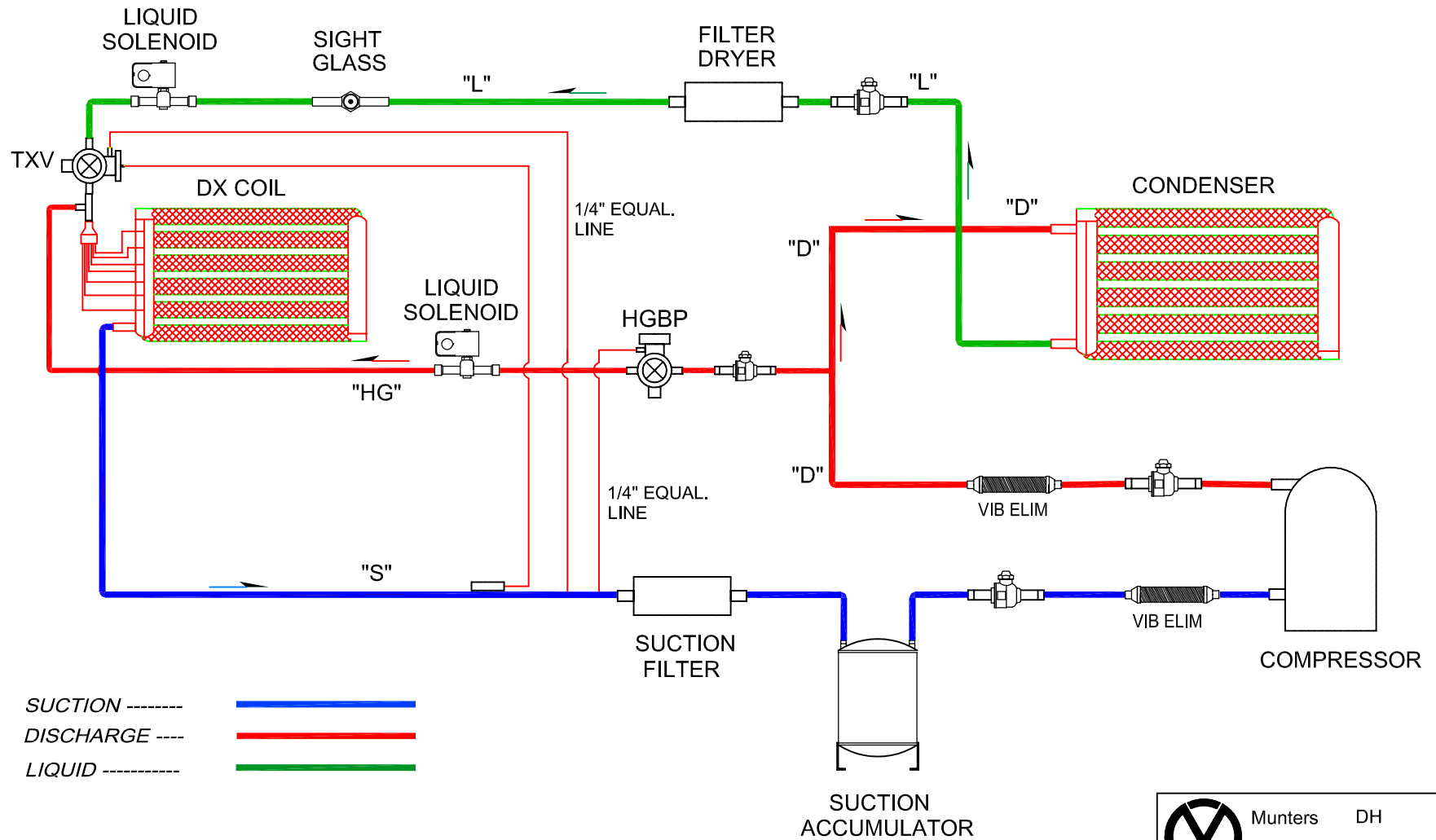
Notes:


C) Coil is NOT certified by AHRI.
J) Coil Will Be Supplied With Multiple Distributors.

M) Coil rating valid for Heatcraft coils only.
U) User-entered circuiting. Check circuiting for dropped tubes or opposite-end connections

"A" CIRCUIT

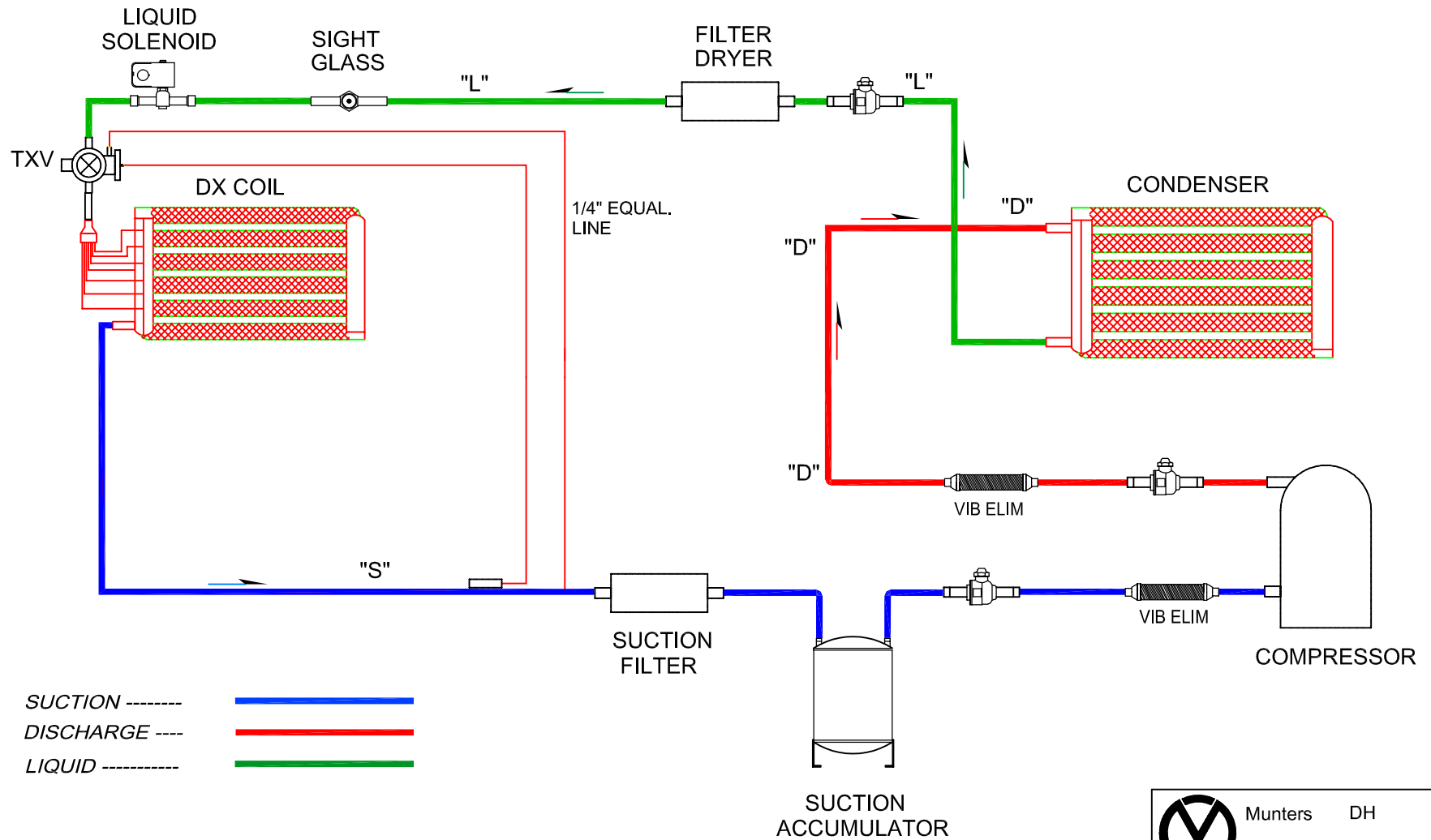
REFRIGERATION CIRCUIT PIPING DIAGRAM




 Munters DH [®] A DIVISION OF MUNTERS			
		REFRIGERATION PIPING DIAGRAM	
DRAWN AS 01/15/17			
PART NUMBER 7650-61	REV. 00	SHEET 1 OF 1	

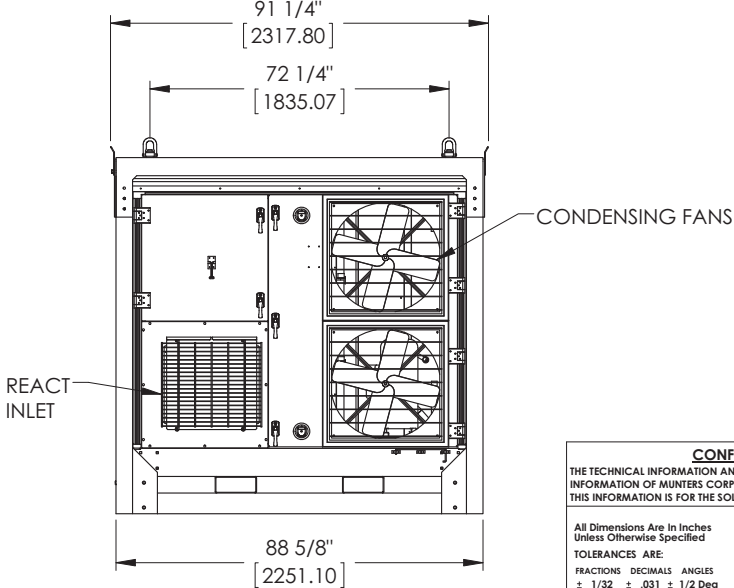
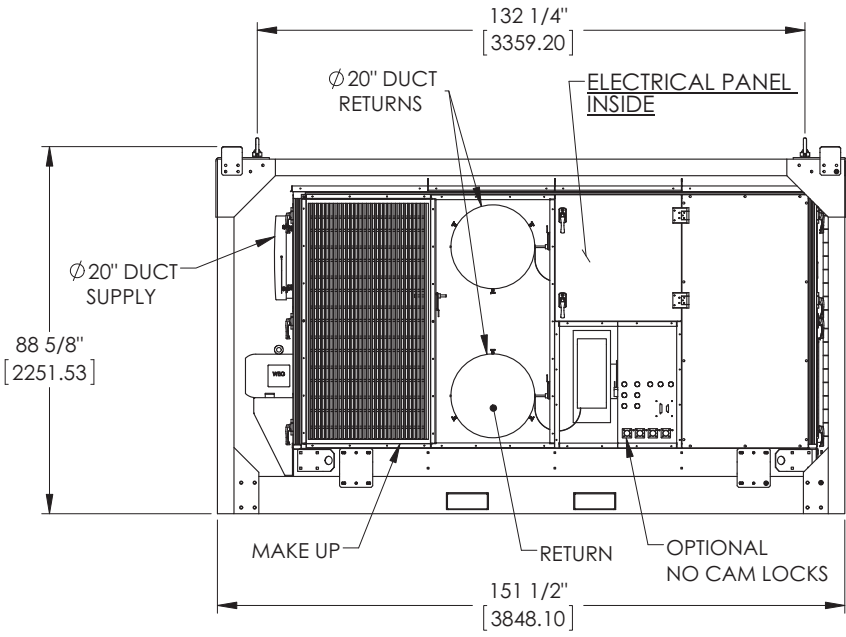
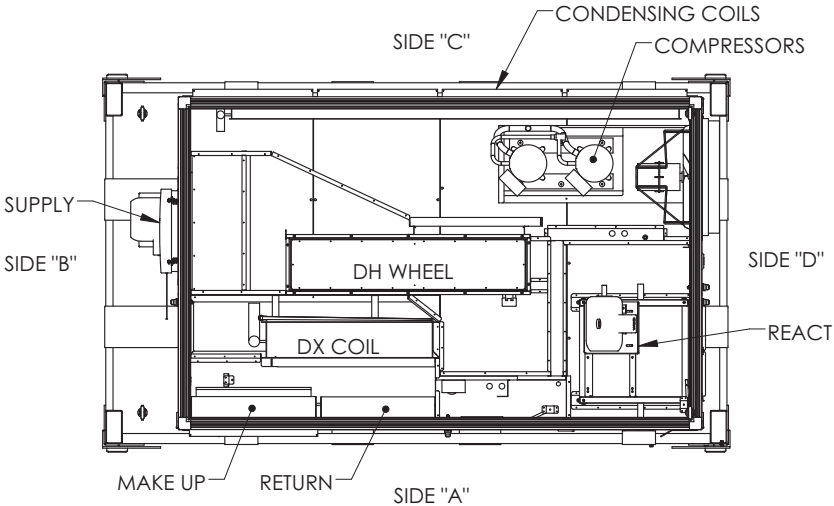
"B" CIRCUIT

REFRIGERATION CIRCUIT PIPING DIAGRAM



 Munters DH [®] A DIVISION OF MUNTERS			
		REFRIGERATION PIPING DIAGRAM	
DRAWN AS 06/22/17			
PART NUMBER 7650-62	REV. 00	SHEET 1 OF 1	

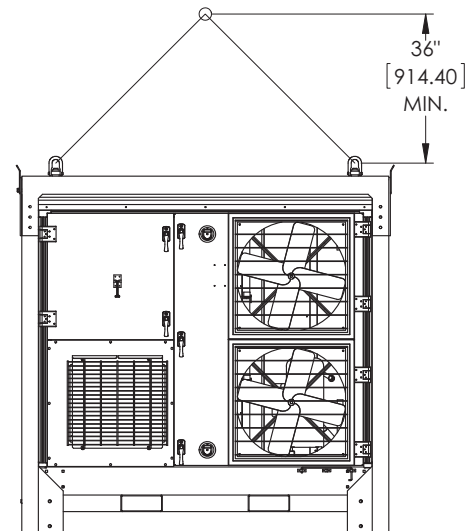
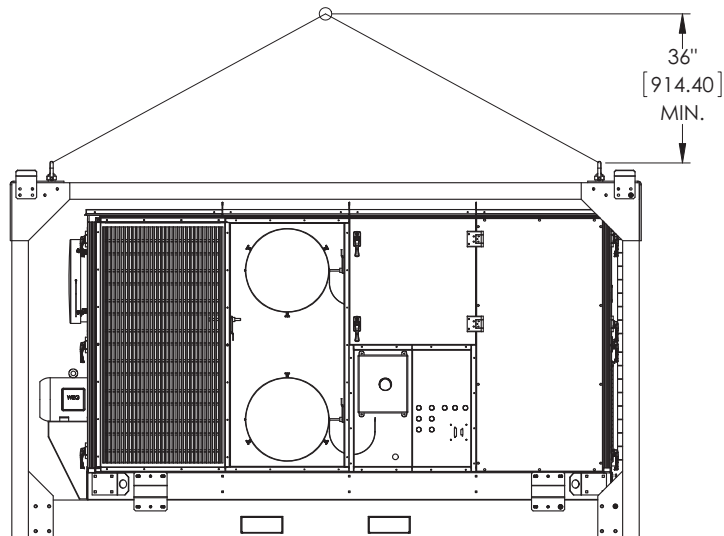
REV.	DESCRIPTION	BY	DATE	CHKD	DATE	E.C.O.
...



UNIT WEIGHT = 7000 LB [15400 kg] +/- 10%

CONFIDENTIALITY STATEMENT				
THE TECHNICAL INFORMATION AND DESIGN DATA DISCLOSED HEREIN CONSTITUTE PROPRIETARY INFORMATION OF MUNTERS CORPORATION AND ARE TO BE MAINTAINED IN STRICT CONFIDENCE. THIS INFORMATION IS FOR THE SOLE USE OF OUR CUSTOMERS AND END USERS OF OUR EQUIPMENT.				
All Dimensions Are In Inches Unless Otherwise Specified				
TOLERANCES ARE:		DRAWING DESCRIPTION:		
FRACTIONS	DECIMALS	ANGLES	HCUB-6000-RENTAL, NEW DESIGN	
± 1/32	± .031	± 1/2 Deg	SPEC:	
Designed by:	Ck by:	Appr by:	SOFTWARE:	
AO	XX	XX	SOLIDWORKS	
Date:	Date:	Date:	SHEET: 1 of 2	PART NUMBER:
7-20-15	----	---		S71127-004
				SIZE B

CAUTION ATTENTION RIGGER



APPROVED

By Alex Ortiz at 1:49 pm, Aug 03, 2015


NOTES:
LIFT ONLY USING TOP LIFTING RINGS.
CRANE AND RIGGING MUST BE CAPABLE
OF HANDLING 7000 LBS $\pm 10\%$ LOAD.
UNIT MUST BE RIGGED USING ALL 4
LIFTING RINGS.
UNIT MUST REMAIN LEVEL DURING LIFT.

UNIT WEIGHT = 7000 LB [15400 kg] $\pm 10\%$

REV.	DESCRIPTION	BY	DATE	CHKD	DATE	E.C.O.
...

CONFIDENTIALITY STATEMENT

THE TECHNICAL INFORMATION AND DESIGN DATA DISCLOSED HEREIN CONSTITUTE PROPRIETARY INFORMATION OF MUNTERS CORPORATION AND ARE TO BE MAINTAINED IN STRICT CONFIDENCE. THIS INFORMATION IS FOR THE SOLE USE OF OUR CUSTOMERS AND END USERS OF OUR EQUIPMENT.

All Dimensions Are In Inches Unless Otherwise Specified			
TOLERANCES ARE: FRACTIONS DECIMALS ANGLES $\pm 1/32 \pm .031 \pm 1/2$ Deg		DRAWING DESCRIPTION: HCUB-6000-RENTAL, NEW DESIGN	
Designed by: AO	Ck by: XX	Appr by: XX	SPEC:
Date: 7-20-15	Date: ----	Date: ---	SHEET: 2 of 2
		PART NUMBER: S71127-004	SIZE B

MUNTERS HCUB RENTAL PLUS OPERATION GUIDE

Pre-Checks

- All exterior and interior areas for visible damage.
- Shipping straps (if any) should be removed from wheel, seals, rollers, pulleys and filters in place.
- Tightness of all electrical connections and power terminals.
- All electrical service provided to accommodate unit MCA (Minimum Circuit Amps) and suitable ground fault MOP (Maximum Over-current Protection) in place for service.

Outside Air Damper

- Open or close the damper depending on application.

Return Air Duct

- Connect to return air duct as needed per application. If not used, close the butterfly dampers and open the outside air damper.

Supply Air Duct

- Connect and secure supply air ducts with duct clamps.

Connect Thermostat / De-Humidistat (if applicable)

- Thermostat / De-humidistat mounted in the conditioned space. It has a fan control (On/Off/Auto), two stages of cooling and one stage of DH.
- Connect the terminals to the HCub rental unit control panel as per table below:

Thermostat / De-Humidistat	HCub Rental Control Panel
24 VAC Power (R)	Terminal R
Common (B)	Terminal B
Fan (G)	Terminal G
Cooling Stage 1 (Y)	Terminal Y
Cooling Stage 2 (Y2)	Terminal Y2
De-Humidistat (BR)	Terminal BR

Connect BMS cable (if applicable)

- BMS communication cable should connect directly to unit PLC main board I/O Flex 6126 Port 2a.

Connect Fire Alarm Relay

- If there is a fire alarm system available from the conditioned space, connect the 24VDC fire alarm from the building to the terminal F1 and F2 on the unit control panel. Otherwise, set the fire alarm toggle switch at default position "Off".

Starting the Unit

- Turn disconnect switch to "ON" position.

Unit Operation – Thermostat / De-humidistat

- Turn Control Mode Switch (6S) to "Thermostat / De-humidistat" position.
- Unit should start when run command is received (Fan On) from the stat.
- Adjust the supply fan speed control potentiometer between Min and Max to desired airflow.
- Supply fan airflow can be looked up in the chart below based on the air pressure drop across the desiccant wheel.

Estimated Supply Airflow (CFM)	Measured Air Pressure Drop across DH wheel (inch H2O)
3000	0.50-0.60
4000	0.70-0.80
5000	0.90-1.10
6000	1.10-1.20

- Upon call for stage 1 Cooling, Compressor A starts.
- Upon call for stage 2 Cooling, Compressor B starts.
- Upon call for DH, Compressor A, Compressor B and DH wheel will start.

Unit Operation – Manual

- Turn Control Mode Switch "MANUAL –OFF-TSTAT" to "MANUAL" position.
- Turn on "Unit Run" switch to start the supply fan.
- Adjust the supply fan speed control potentiometer between Min and Max to desired airflow.
- Turn on "Cool 1" to start Compressor A.
- Turn on "Cool 2" to start Compressor B.
- Turn on "DH" to start Compressor A, Compressor B and DH wheel for dehumidification. It is not necessary to turn on "Cool 1" or "Cool 2" for DH.

Unit Operation – Return Air Sensor (factory installed)

- First make sure the return air ducts are connected, butterfly dampers are open and outside air damper is closed.
- Turn Control Mode Switch "MANUAL –OFF-TSTAT" to "OFF" position.
- Turn Control Mode Switch "BMS-OFF-SENSOR" to "SENSOR" position.
- Setup the return air temperature and humidity control set points in unit PLC located inside the control cabinet.
- Refer to unit O&M manual for details on how to setup unit PLC.
- Unit should start to run the proper functions decided by PLC.

Unit Operation – BMS

- Make sure BMS communication cable is properly connected.
- Turn Control Mode Switch "MANUAL –OFF-TSTAT" to "OFF" position.
- Turn Control Mode Switch "BMS-OFF-SENSOR" to "BMS" position.
- Unit should start to run the proper functions decided by BMS.
- Refer to unit O&M manual for details on how to setup unit PLC with BMS communication.

Operation Details

- Supply fan should operate between 30hz (Min) and 60hz (Max) depending on the supply fan speed potentiometer setting.
- When DH is called, there will be a time delay between the starting of Compressor A and Compressor B.
- The condenser fan VFD modulates the speed to maintain the desired discharge pressure on the compressor. During cooling only mode, target discharge pressure is 340 psig, During DH mode, target discharge pressure is 444 psig.
- In any operation, the reactivation fan should start first and modulate the discharge pressure of the compressor until it can no longer able to, then the condenser fan VFD should energize.

Compressor Protection

- Unit PLC has several features to protect compressors and prevent DX coil from freezing.
- No compressor will energize when its suction pressure is below 90 psig.
- No compressors will energize when ambient temperature is below 45F.
- Compressor B will not energize when compressor A suction pressure is below 108 psig.
- Compressors have minimum run time (3 minutes) and minimum off time (5 minutes) delays. These delays should NOT be adjusted as altering them will void equipment warranty.

Navigation of Microprocessor (PLC)

- Refer to unit O&M manual for details.

Stopping the Unit

- **Turn both Control Mode Switches to "OFF" position, wait for unit to stop completely, then turn disconnect switch to "OFF" position.**

HCUB
Equipment Touch
Interface
Screen Navigation and
User Guide

EQUIPMENT TOUCH SCREEN INFORMATION



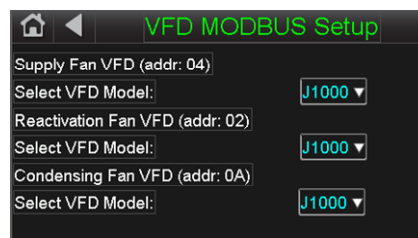
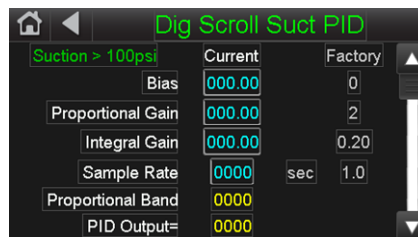
As seen in the example to the right, colors are used throughout the screens to help identify data that is read only and data that can be edited.

As shown above the data in **Blue** can be edited, the data in **Yellow** is read only.

The Scroll Bar on the right side of the screen indicates more information is available than can fit on the screen. Drag the bar button up or down or use the arrows at the top and bottom of the bar.

In other instances a choice is available in a pull down menu for items that can have "one of many" selection criteria. **J1000**

J1000
V1000
Z1000
A1000



Standby Screen

The Standby screen displays when the Equipment Touch has had no user activity for the time specified on the Inactivity Timeout screen. The Standby screen is not interactive, as soon as you touch the screen, the Home screen will display.



HOME SCREEN

The Home screen provides date, time of day, current unit status.

Information based on process feedback and control is also shown.

After logging in a link button to the main menu will appear on the screen

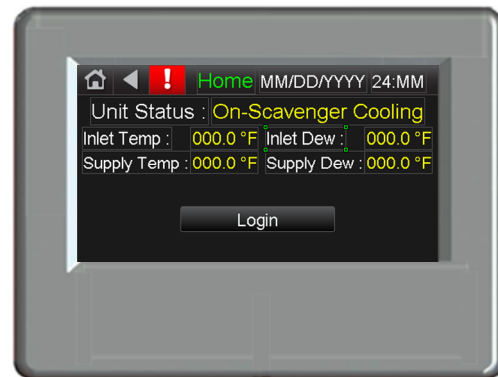
Press the Login button to gain access to other screens.

Passwords are:

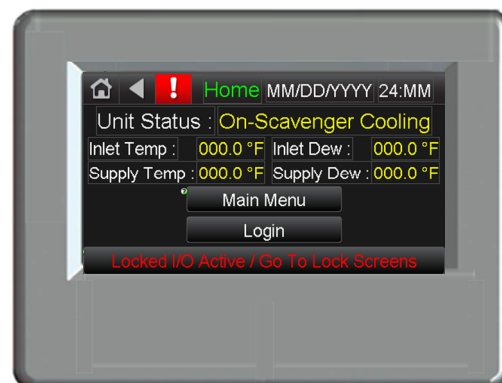
user for user access,

admin for administrator access

1234 for factory access



The main Menu screen is opened by pressing the Main Menu button on the Home screen after entering the login password



Login Screen

Enter alpha-numeric characters using the screen keypad



Use the Left Arrow, Right Arrow and circled X to select and delete characters entered in error



Displays if the screen you selected requires a password. Enter your password, then touch **Done**.

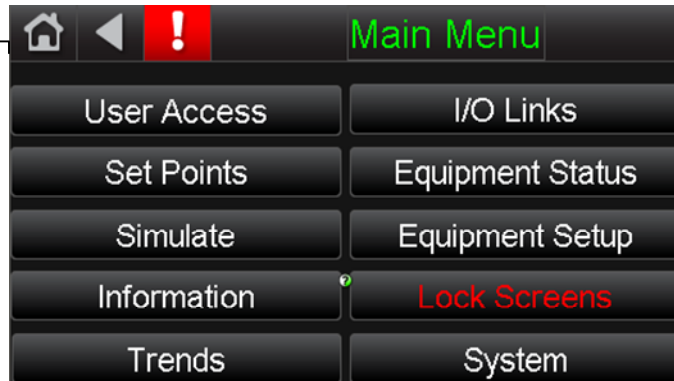
Each screen is programmed with one of the following password levels:

A screen requiring this password level...	Can be accessed by...
User	A user logged in with the User, Admin, or Factory password
Admin	A user logged in with the Admin or Factory password
Factory	A user logged in with the Factory password
No password	Anyone

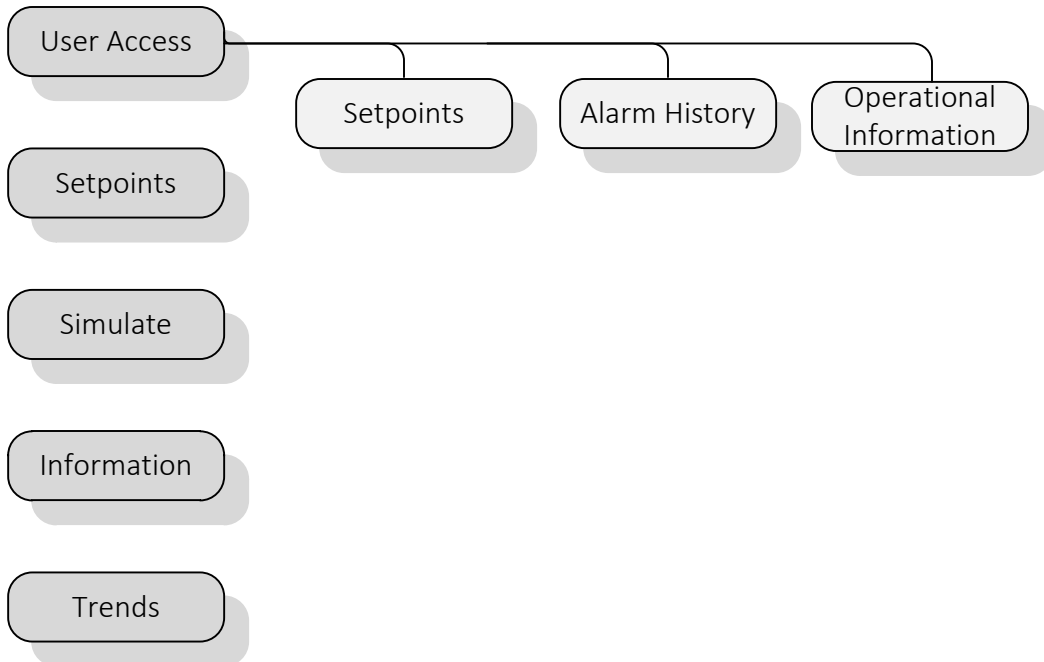
Main Menu

Header Links to Home Screen,
Previous Screen and Alarm Log

Press the desired Link Button to
open the associated screen



Main Menu Navigation Tree



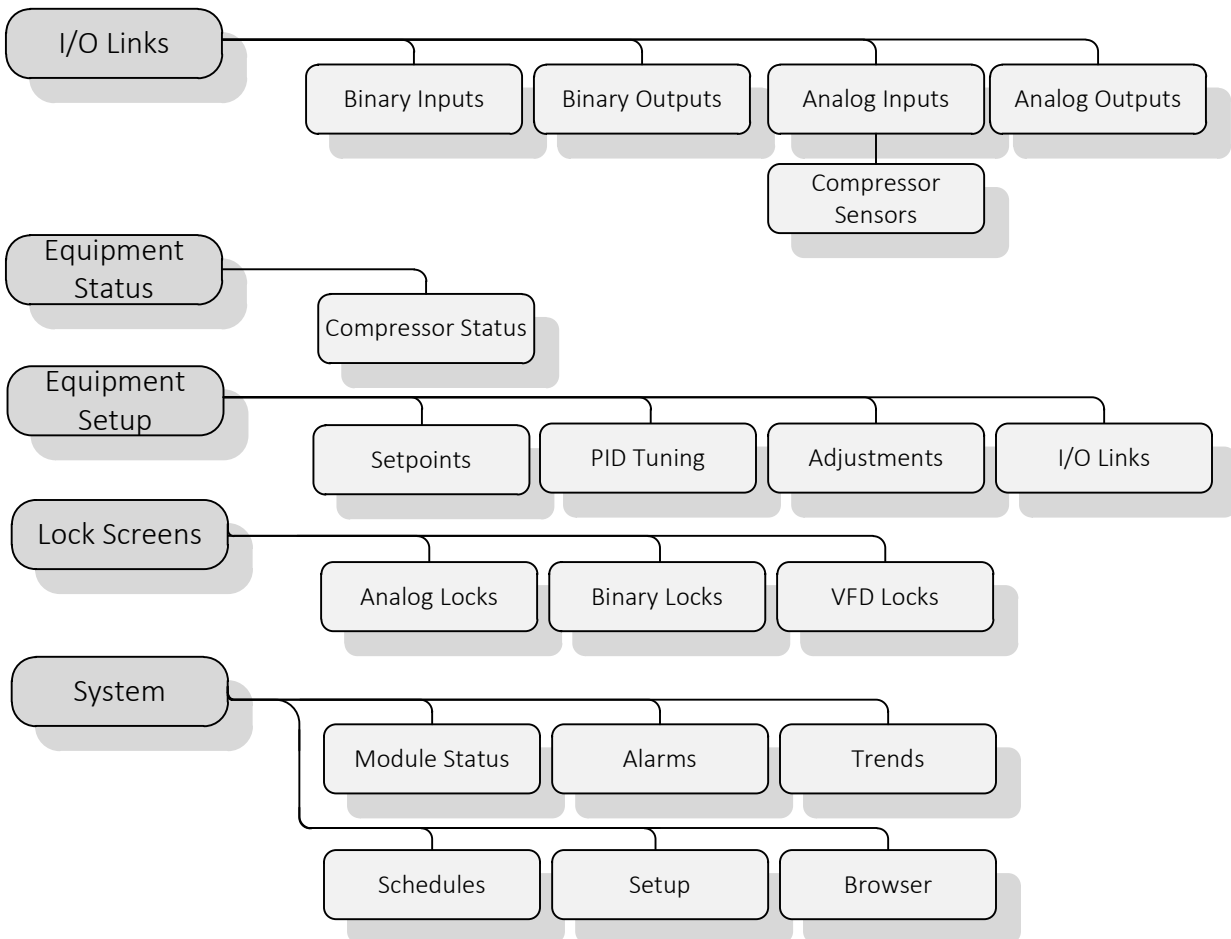
Main Menu cont'd

Header Links to Home Screen, Previous Screen and Alarm Log

Press the desired Link Button to open the associated screen



Main Menu Navigation Tree

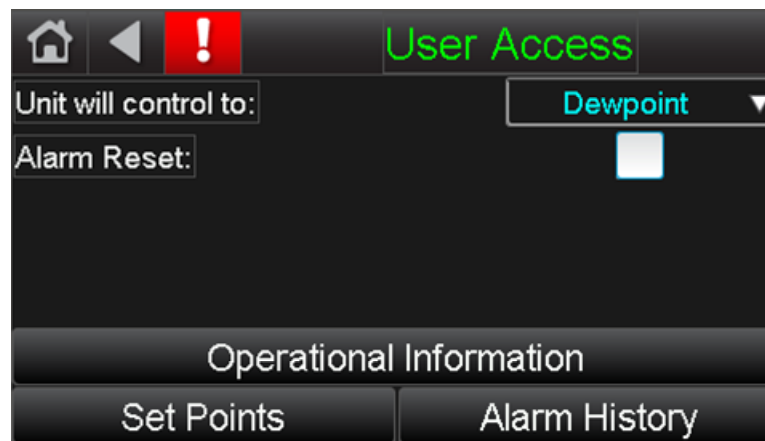


USER ACCESS

To go to the "USER ACCESS" screen, press the user Access link button on the Main Menu screen.
The User Access password (*user*) is required to open the screen.

Functions available to the user include:

- The Alarm Reset (Momentary function)
- Unit Enable (must be enabled for unit to start)
- VFD power reset



Screens may contain elements like the checkbox ☐ or pull down menu items Off ▼

Touching the checkbox will activate the function and place a checkmark in the box.
Touching the checkbox again will deactivate the function and erase the checkmark.
Touching a pull down item will reveal the selections for that item. Touching the desired item in the list will make that selection active.

SET POINTS

To the right, a full image of the screen contents are shown.

Process set points and dead bands (shown in blue) are available for adjustment.

Please note that not all equipment will have Occupied and UnOccupied mode, those setpoints will only show if the Munters unit has that option installed.

Also note that not all equipment will have a Room Sensor, if no Room Sensor is present, the setpoint will not show up on your touchscreen.

The default dead band of 2°F is recommended.
(The dead band may be adjusted if process testing shows a wider or narrower dead band will provide improved control.)

Always ensure the heating set points are below the cooling set points to prevent overlap.

Dehumidification and cooling processes will be initialized when the sensor reading is equal to the set point and will cease when the sensor reading is equal to the set point minus the dead band.

Optional Post cooling process (if shown) will operate to maintain the supply temperature at set point during dehumidification and cooling. The Upper Supply Cooling Set point is active when the room conditions are satisfied. The Lower Cooling Set point is active when the room is warmer than the current set point.

Heating process will be initialized when the sensor reading is equal to the set point and will cease when the sensor reading is equal to the set point plus the dead band. Heating process, while active, will operate to maintain the supply temperature at set point. The Lower Supply Heating Set point is active when the room conditions are satisfied. The Upper Heating Set point is active when the room is cooler than the current set point.

To the left, the Set Points screen is a convenient way to access at all the various process settings, grouped by process, on one screen.

The scrolling function is used to view off screen items. Use the UP /DOWN arrows or drag the bar up and down to scroll.

Extended Screen Image, shows off-screen items below the dashed line

Process Set Points	Setting
Dehumidification Process	
Dewpoint Setpoint	000.0 °F
Dewpoint Deadband	000.0 °F
Relative Humidity Setpoint	000.0 °F
Relative Humidity Deadband	000.0 °F
Cooling Process	
Cooling Setpoint	000.0 °F
Cooling Deadband	000.0 °F

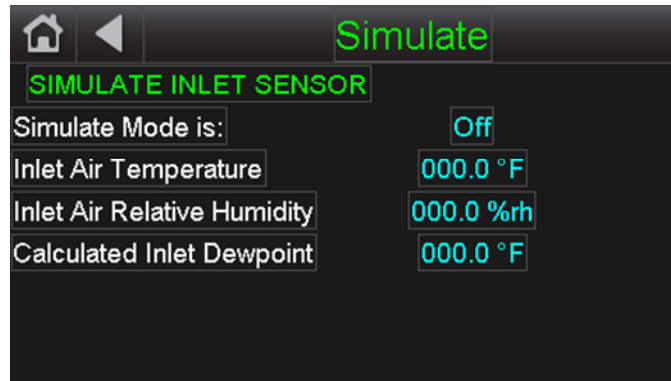
**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met, or has been activated through setup*

Simulate

The Simulate Screen allows the user to operate the unit in one of three modes...

Dehumidification, Heating or Cooling.

By selecting the desired process mode from the pull down menu, the required sensor values are overwritten to force the unit into a simulated process. The simulated sensor values will be updated after a short delay. The process will be allowed to operate for up to four hours. The remaining time will be displayed on the screen once the process starts. The user may choose to stop or change the simulation process at any time.



It is the responsibility of the user to realize the limitations of the unit when simulation mode is engaged. Ambient conditions can play a large roll in the ability of the equipment to properly function. Compressor operation will be limited in cold weather. Heater operation will be limited in hotter weather.

**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met, or has been activated through setup*

INFORMATION

*The scrolling function is used to view off screen items.
Use the UP /DOWN arrows or drag the bar up and
down to scroll.*

Extended Screen Image, shows off-screen items
below the dashed line

Unit Information:	
Manufacturer:	Munters Air-T
Project:	HCUb 6030 Rental
Program Version:	1.01
Hardware Configuration:	
Master Controller:	I/O Flex 6126
Expansion Modules:	I/O Flex 8160
Display:	Equipment Touch
Communication Protocol:	MODBUS
Contact:	
Munters Corporation	
16900 Jordan Road	
Selma, TX 78154	
1(800)229-8557	

Information related to the units manufacturing facility, project, design family, software version, PLC controller hardware, BMS Communication Protocol, and contact information are provided.

When calling for technical assistance please have the project information and program version handy.

**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met,
or has been activated through setup*

TRENDS

Select the analog/digital values by touching the appropriate check box. All checked items will appear on the trend graph screen.

Pressing next will open the trend scaling screen (no image available). The start date/time, the stop date/time and the Y-axis Min/Max scaling can be entered to focus on a specific time period or the default values can be retained.



The scrolling function is used to view off screen items. Use the UP / DOWN arrows or drag the bar up and down to scroll.

On the Trends Scaling screen (no image available) press the Display Trends button to show the selected trend graphs in the chosen timeline.



**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met, or has been activated through setup*

I/O Links

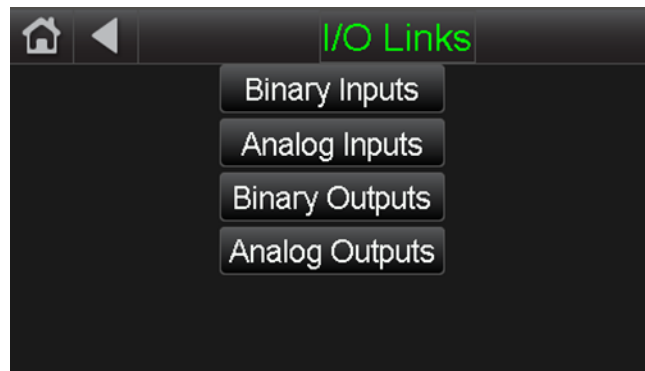
Navigate to the desired screen by pressing the associated link.

Binary Inputs: Hardwired Switches or device contacts

Binary Outputs: Devices requiring a contact closure for operation and VFDs commanded through MODBUS.

Analog Inputs: Sensor signals or equipment feedback signals

Analog Outputs: Modulating or steady voltage/milliamp signals to devices that can operate over a range of control and VFDs commanded through MODBUS.



**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met, or has been activated through setup*

Binary Inputs

To the right, a full image of the screen contents are shown.

BMS Fan/DH/Cool1/Cool2 Call: These indicate the status of the inputs received from the BMS, should the unit be connected to a BMS system for operation. These will only show when the BMS is chosen as the units mode of operation.

Manual / Thermostat Fan/Cool1/Cool2/DH Call: These indicate the status of the inputs received from either the Manual selector switches or from a Thermostat 24VAC input. These will be available when the unit is either in Manual mode or in Thermostat mode.

Fire Alarm Contact: This shows the status of the Fire Alarm contact, in either Fire or Bypass mode.

Supply Airflow Switch: A normally closed contact that confirms if Supply Air airflow has been made.

Supply Fan VFD Fault: A normally closed contact indicating a fault from the Supply Fan VFD.

Reactivation Fan VFD Fault: A normally closed contact indicating a fault from the Reactivation Fan VFD.

Condenser Fan VFD Fault: A normally closed contact indicating a fault from the Condenser Fan VFD.

DH Wheel Motor Overload: This is a normally open contact that indicates whether or not the DH Wheel Motor Overload has tripped.

DH Wheel Rotation Switch: Circuit will close as DH Wheel activates the normally open switch once per revolution.

BMS Control Select Switch: This indicates whether the BMS has been selected as the mode of operation for the unit.

Inlet Sensor Control Switch: This indicates whether Inlet Sensor has been selected as the mode of operation for the unit.

Binary Inputs: Hardwired Switches or device contacts

The scrolling function is used to view off screen items. Use the UP /DOWN arrows or drag the bar up and down to scroll.

Extended Screen Image, shows off-screen items below the dashed line

INPUT	Value
BMS Fan Call	Off
BMS DH Call	Off
BMS Cool 1 Call	Off
BMS Cool 2 Call	Off
Manual / Thermostat Fan Call	Off
Manual / Thermostat Cool 1 Call	Off
Manual / Thermostat Cool-2 Call	--- Off ---
Manual / Thermostat DH Call	Off
Fire Alarm Contact	Off - Alarm
Supply Airflow Switch	Off
Supply Fan VFD Fault	Off - Fault
Reactivation Fan VFD Fault	Off - Fault
Condenser Fan VFD Fault	Off - Fault
DH Wheel Motor Overload	Off - OK
DH Wheel Rotation Switch	Off
BMS Control Select Switch	Off
Inlet Sensor Control Switch	Off

**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met, or has been activated through setup*

Binary Outputs

Binary Outputs: Devices requiring a contact closure for operation and VFDs commanded through MODBUS.

The scrolling function is used to view off screen items. Use the UP /DOWN arrows or drag the bar up and down to scroll.

To the right, a full image of the screen contents are shown.

Supply Fan VFD: Displays the current output state of the Supply Fan VFD Enable.

Condenser Fan VFD: Displays the current output state of the Condenser Fan VFD Enable.

Reactivation Fan VFD: Displays the current output state of the Reactivation Fan VFD Enable.

DH Wheel: Displays the current output state of the DH Wheel Enable.

Compressor A: Enables compressor operation in circuit A
Compressor B: Enables compressor operation in circuit B

Compressor A/B Liquid Line Solenoid Valve: Displays the current output state of the Compressor A/B Liquid Line Solenoid Valve Enable.

DH Process Light: Indicates that the DH Process Light has been enabled.

VFD Reset: Indicates that the VFD Reset function has been enabled.

Alarm Output: In the event of any alarm this output Indicates a general alarm to the external automation system.

Extended Screen Image, shows off-screen items below the dashed line

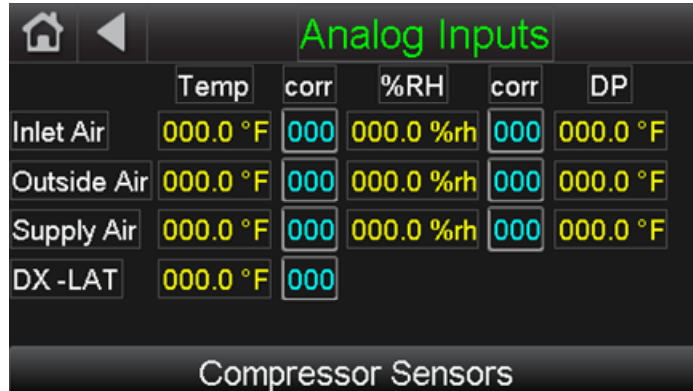
OUTPUT		Value
Supply Fan VFD		Off
Condenser Fan VFD		Off
Reactivation Fan VFD		Off
DH Wheel		Off
Compressor A		Off
Compressor B		Off
Compressor A Liquid Line Solenoid Valve	---	Off---
Compressor B Liquid Line Solenoid Valve		Off
DH Process Light		Off
VFD Reset		Off
Alarm Output		Off

**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met, or has been activated through setup*

Analog Inputs

Navigate to the desired screen by pressing the associated link.

Compressor Sensors: Suction pressure and Discharge pressure sensors for all compressor circuits



	Temp	corr	%RH	corr	DP
Inlet Air	000.0 °F	000	000.0 %rh	000	000.0 °F
Outside Air	000.0 °F	000	000.0 %rh	000	000.0 °F
Supply Air	000.0 °F	000	000.0 %rh	000	000.0 °F
DX -LAT	000.0 °F	000			

Compressor Sensors

Analog Inputs will accept many varieties of sensors and signal values.

- Thermistor sensors
- Voltage signals
- Milliamp signals
- RTDs

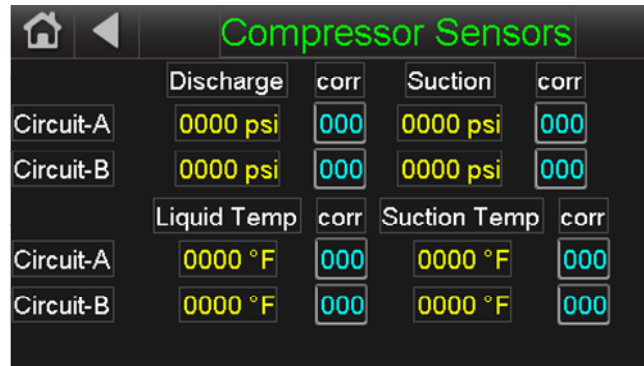
Each sensor type is internally programmed and scaled based on the manufacturer's data to produce the proper measurement reading.

Any sensor that has a reading outside its normal minimum or maximum value will create an alarm for that sensor. When the reading returns a value between the minimum and maximum the alarm is canceled.

**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met, or has been activated through setup*

Compressor Pressure Sensors

Each compressor circuits suction and discharge pressure values and the associated correction value are shown. The correction values are editable in the event a sensor has an error. Any correction value will be algebraically summed with the current pressure reading and will immediately be reflected in the reading and remain active until reset to 0.



	Discharge	corr	Suction	corr
Circuit-A	0000 psi	000	0000 psi	000
Circuit-B	0000 psi	000	0000 psi	000

	Liquid Temp	corr	Suction Temp	corr
Circuit-A	0000 °F	000	0000 °F	000
Circuit-B	0000 °F	000	0000 °F	000

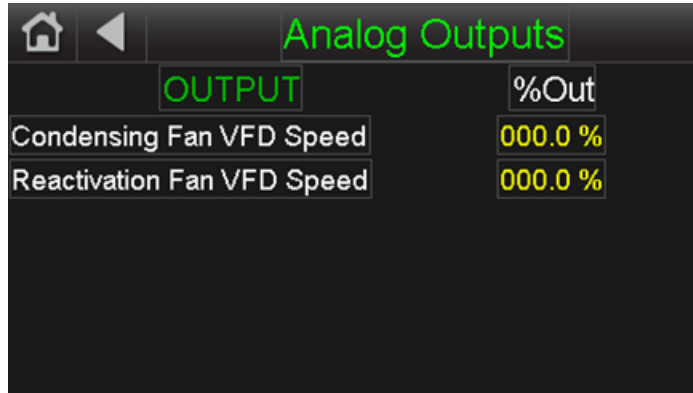
The range for all compressor pressure sensors is 0 to 650psi. The correction range is from -99 to 999.

**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met, or has been activated through setup*

Analog Outputs

Devices that operate over a range of positions or speeds require an analog signal. The %Out column indicates the current device operation within its range. The VDC column is a representation of the actual voltage present at the PLC terminals of the connected device.

Additional information is shown for devices controlled through a MODBUS connection. These are virtual values and are not present at any PLC terminal.



OUTPUT	%Out
Condensing Fan VFD Speed	000.0 %
Reactivation Fan VFD Speed	000.0 %

The scrolling function is used to view off screen items.

**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met, or has been activated through setup*

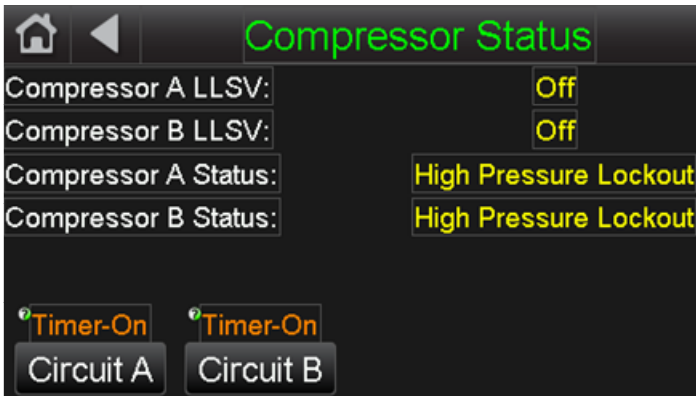
Equipment Status

INLET SENSOR MODE ACTIVE	
Inlet Air Temperature	000.0 °F
Inlet Air Relative Humidity	000.0 %rh
Inlet Air Calculated Dewpoint	000.0 °F
BMS CONTROL MODE ACTIVE	
BMS Fan Call	Off
BMS DH Call	Off
BMS Cool 1 Call	Off
BMS Cool 2 Call	Off
STANDARD INPUTS MODE ACTIVE	
Manual Toggle/Stat Fan Call	Off
Manual Toggle/Stat DH Call	Off
Manual Toggle/Stat Cool 1 Call	Off
Manual Toggle/Stat Cool 2 Call	Off
Supply Fan VFD Enable	Off
Condenser Fan VFD Enable	Off
Condenser Fan VFD Speed	000.0 %
Reactivation Fan VFD Enable	Off
Reactivation Fan VFD Speed	000.0 %
DH Wheel Enable	Off

This screen allows user to see the current operating status of the unit. Depending on which mode of operation the unit is operating in, this will determine what information is displayed on the screen.

**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met, or has been activated through setup*

Compressor Status



General status of each compressor, the lowest Evaporator Coil temperature sensor reading and if the circuit is in a delay period.

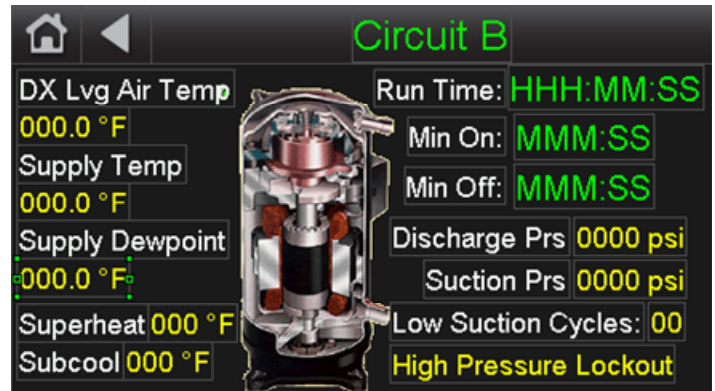
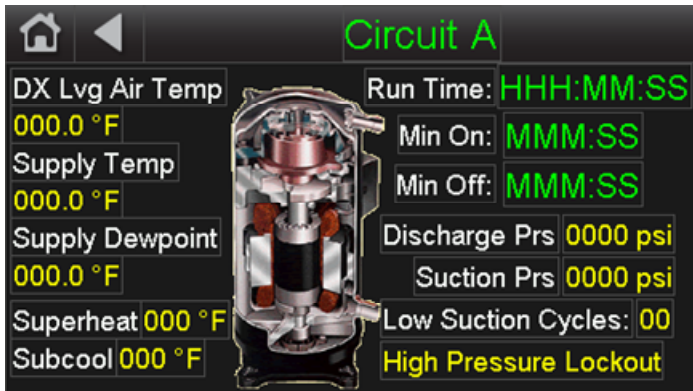
A Link to each compressor is located at the bottom of the screen.

The number of compressors can vary based on unit design. Compressors that are not in the unit design will be omitted from the screens.

The individual compressor circuit data shown are identical.

Data includes DX Coil leaving temperatures (top & bottom), Compressor run time since last start, Elapsed time for minimum run and minimum off times, suction and discharge pressures, Low suction cycles and compressor status.

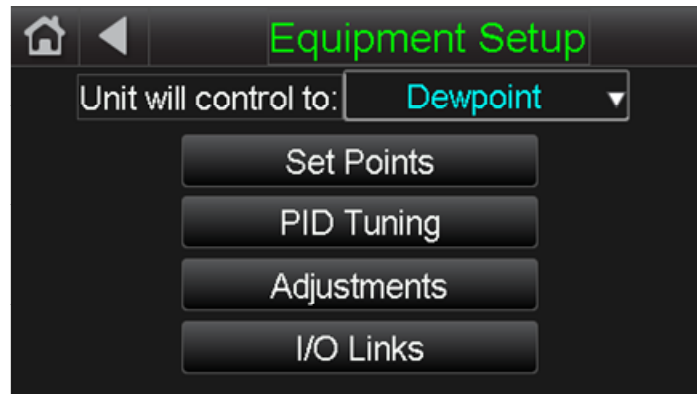
Compressor Status: (1=off, 2=On, 3=Low pressure cycle off, 4= Lost charge, 5=High discharge alarm, 6= High discharge lockout, 7= Differential lockout, 8= Ambient lockout)



**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met, or has been activated through setup*

Equipment Setup

Navigate to the desired screen by pressing the associated link.



Equipment Options should be reviewed to ensure the proper choices have been made to correspond to actual equipment design and function.

Process Setup should be performed by a trained factory representative or other trained personnel familiar with the operation and process requirements of this equipment. Errors in equipment setup may have negative effects on unit performance and may result in unwanted operation.

Archive Parameters is used to store settings once all the adjustments and settings have been made. *Use this command only when changes have been made that are required to be retained through a power cycle.* Archive function writes to permanent flash memory, which has a limited number of write cycles.

**NOTE: Some information on the screens may only be visible to the user if certain conditions have been met, or has been activated through setup*

Adjustments

Compressor Stage Delay:	00.0 min
Compressor LLSV Open Delay:	00 seconds
Circuit Pump Down Limit:	0000 psi
Minimum A Suction to call B:	0000 psi
Compressor Minimum Run Time:	0000 min
Compressor Minimum Off Time:	0000 min
Ambient Compressor Lockout:	0000 °F
DX Leaving Air Minimum:	0000 °F

Adjustments made on this screen affect certain operating parameters of the unit. These are normally set at the factory for optimal operation, however if adjustments are necessary, please ensure that they are done by a factory trained person as to not negatively affect operation of the unit.

Compressor Stage Delay – Adjusts the delay (in minutes) between the subsequent staging of additional refrigerant circuits.

Compressor LLSV Open Delay – Adjusts the delay (in seconds) between the opening of the Liquid Line Solenoid Valve and its associated Compressor.

Circuit Pump Down Limit – Adjusts the PSI in which the Compressor will pump-down to when it is cycled off.

Minimum A Suction to call B – This is the minimum PSI that Compressor A has to have in order for the unit to cycle on Compressor B for either DH or Cooling.

Compressor Minimum Run Time – Adjusts the time (in minutes) that any Compressor has to run if it is cycled on.

Compressor Minimum Off Time – Adjusts the time (in minutes) that any Compressor has to be off for after it is cycled off.

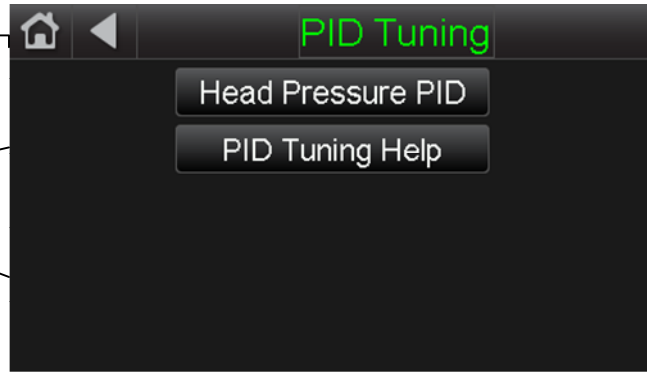
Ambient Compressor Lockout – Adjusts the minimum ambient temperature that the unit must be in for Compressor operation to be allowed. If the unit is in an environment that is below this setting, Compressor operation will not be allowed.

DX Leaving Air Minimum – Adjusts the lowest allowed DX leaving air temperature during normal operation.

PID Tuning

Header Links to Home Screen,
and Previous Screen

Press the desired Link Button to
open the associated screen



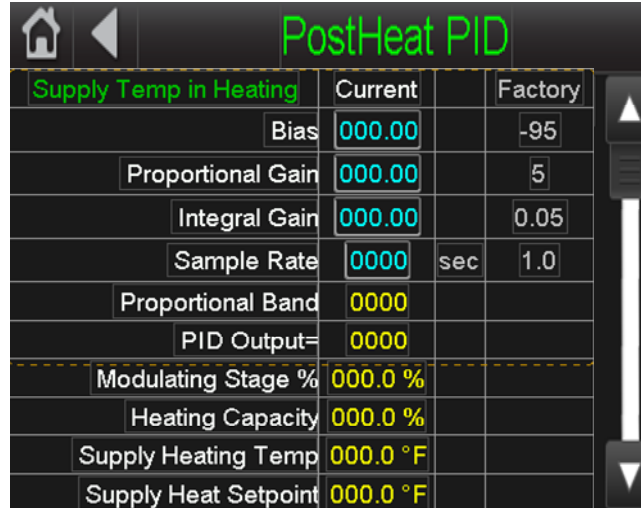
** NOTE: Only trained factory personnel should attempt changing PID loop parameters*

Head Pressure PID: Controls the ability of the Condenser and Reactivation Fan VFDs to maintain the proper head pressure across the Condenser coil.

PID Tuning Help: Additional information pertaining to the adjustment of the PID loops in the program for this unit.

PID Tuning Help

PID Tuning Help: Do not make any attempt to adjust PID loops for any of the processes unless you are sure what the result of the adjustments are going to do to the operation of the equipment. Incorrect adjustments can cause undesired operation of the equipment and/or processes.



	Current	Factory
Supply Temp in Heating		
Bias	000.00	-95
Proportional Gain	000.00	5
Integral Gain	000.00	0.05
Sample Rate	0000 sec	1.0
Proportional Band	0000	
PID Output=	0000	
Modulating Stage %	000.0 %	
Heating Capacity	000.0 %	
Supply Heating Temp	000.0 °F	
Supply Heat Setpoint	000.0 °F	

Proportional Gain

Adjusts the proportional band above and below the setpoint.

Bias

Algebraically shifts the proportional band up and down. This prevents premature or delayed application of the process.

Integral Gain

Provides error correction based on the total error of process setpoint minus process feedback.

Sample Rate

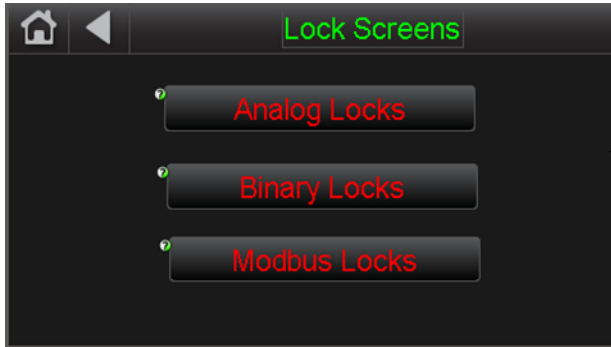
Adjust the output on a interval (in seconds) based on the error times Integral Gain

Proportional Band = $100/\text{Proportional Gain}$

PID Output = -100 to +100 based on the upper and lower limits of the proportional band (determined by proportional gain and bias settings).

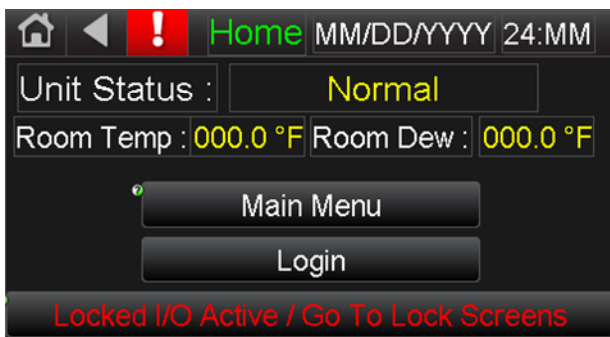
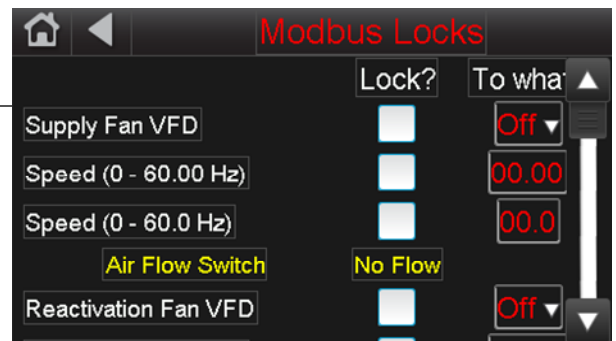
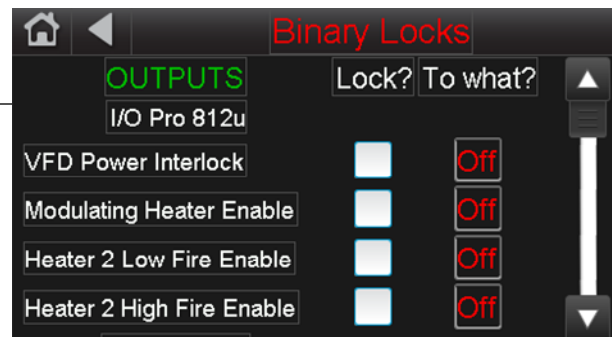
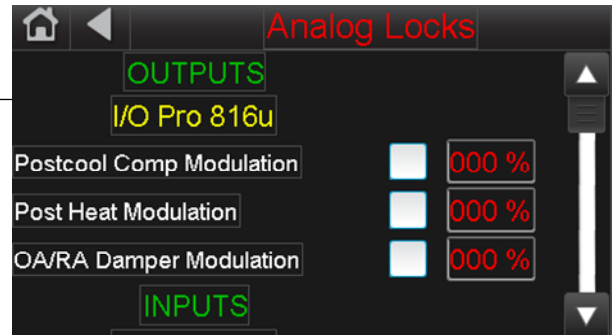
Other parameters shown on the PID Tuning pages: Any setpoints or readings that pertain to the process being adjusted will show up on the screen below the PID Output. They are there to assist in determining whether or not the adjustments made are having the desired effect on operation of the process or equipment.

LOCK SCREENS



Touching the checkbox will activate the lock and place a checkmark in the box.
 Touching the checkbox again will deactivate the lock and erase the checkmark.
 Touching an item in the "To What?" column will allow you to change the locked state value (ON/Off) or a numeric Value (000.0)
 Lock Value functions are only for testing and should never remain in the active state. Release all locks before leaving the site.

When any item in any screen is locked, a message will appear on the Home Screen (see below).
 Touching the Locked I/O button will take you to the Lock Screens.



System / Module Status

Screen name	Description
System	

Displays the BACnet device instance number, the controller's time, temperature read from the controller's prime variable, and zone color. Touch a button to jump to the **Module Status**, **Alarms**, **Trends**, **Schedules**, **Setup**, or **Browser** screen.

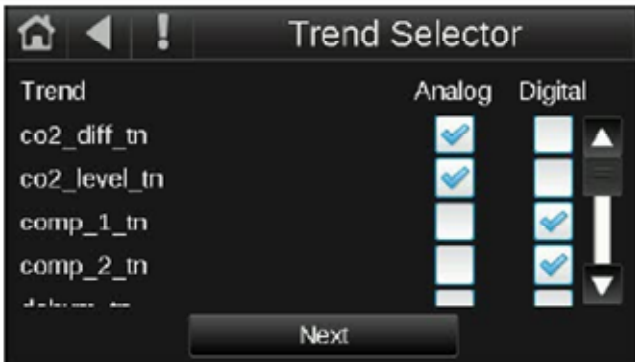
Module Status	
---------------	---

Touch a button to see one of the following sections of a Module Status report: **Device Data**, **Driver Data**, **Reset Counters**, **System Errors**, **Warnings**, **Information**, **Hardware**, **Database**, **Network**.

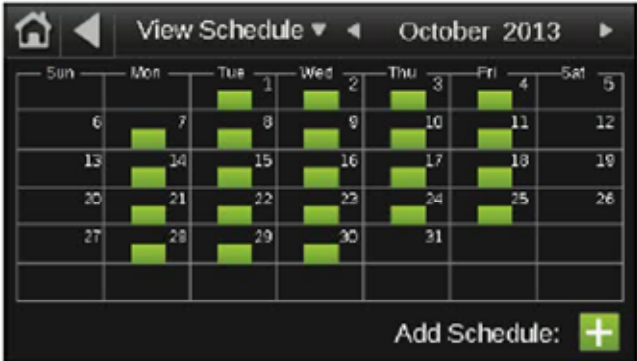

For example, the screens below show examples of the Driver Data and Reset Counters information.


--

Reset Counters / Alarms / Trend Selector

Screen name	Description
	 <p>The 'Reset Counters' screen displays a list of counters and their values:</p> <ul style="list-style-type: none">3 Power failures2 Brownouts44 Commanded boots0 System errors0 Watchdog timeouts
Alarms	 <p>Lets you view alarms from the controller. See Viewing alarms</p>
Trends	 <p>Lets you view trends for points that have trending enabled. See Viewing trends</p>

Schedules / Setup

Screen name	Description
Schedules	 <p>Lets you view, add, edit, or delete BACnet schedules in the controller. See Setting up schedule.</p>
Setup	 <p>Touch a button to jump to the Module Setup, Touchscreen Setup, or Login screen.</p>

Browser

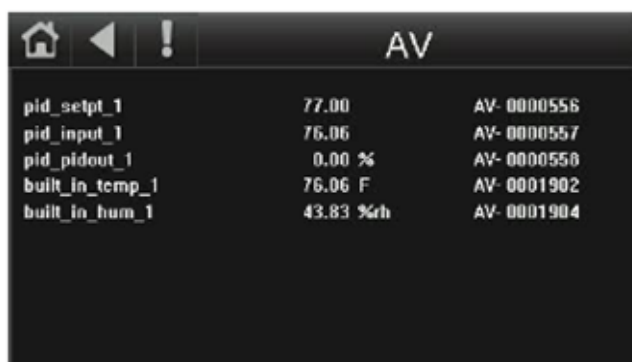
Screen name	Description
-------------	-------------

Browser

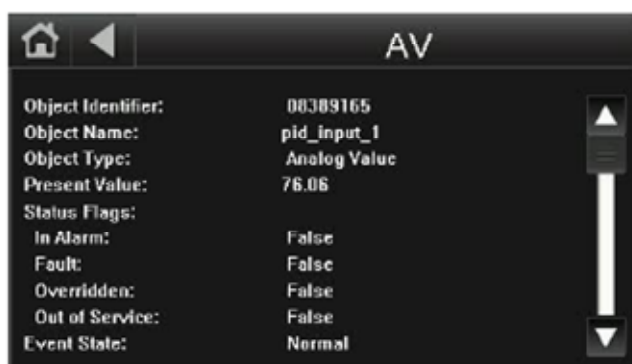


Touch a button to see that type of BACnet objects found in the controller. Each screen shows a list of network-visible BACnet objects with BACnet Object Name, Current Value, and BACnet Object Instance number.

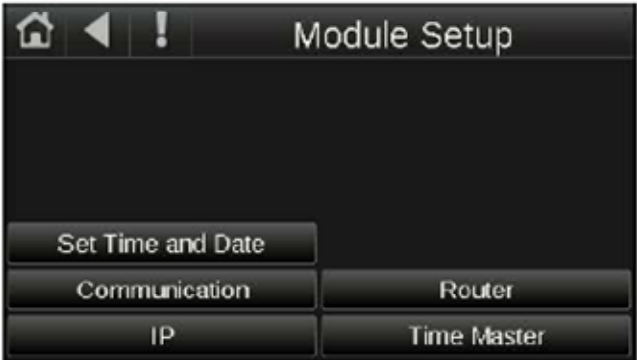
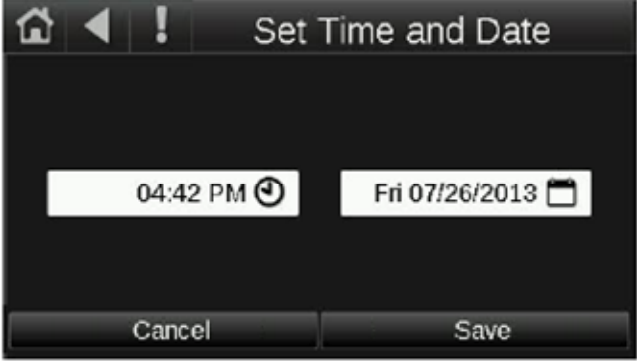
Below is an example of AV BACnet objects in a controller.



Touch an object in the above screen to see the details shown below.



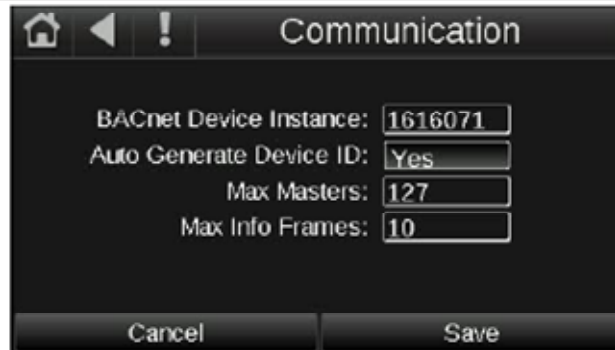
Module Setup / Time & date

Screen name	Description
Module Setup	 <p>Touch a button to jump to the Set Time and Date, Communication, Router, IP, or Time Master screen.</p> <p>NOTE A yellow value on a Module Setup screen indicates the value has been changed.</p>
Set Time and Date	 <p>Touch the time or date field to edit it.</p>

Communications / Router

Screen name	Description
-------------	-------------

communication



The 'Communication' screen features a dark background with a top navigation bar containing a home icon, a back arrow, and an exclamation mark. The title 'Communication' is centered at the top. Below the title, there are four input fields: 'BACnet Device Instance' with the value '1616071', 'Auto Generate Device ID' with the value 'Yes', 'Max Masters' with the value '127', and 'Max Info Frames' with the value '10'. At the bottom, there are two buttons: 'Cancel' and 'Save'.

Lets you edit the information below for the controller. Touch a field to tap in new information.

BACnet Device Instance number

Auto Generate Device ID—Enter No or Yes

You can edit the following fields that pertain to the controller's MS/TP network:

Max Masters - Set this to the highest MAC address (up to 127) on the MS/TP network. If you later add a device with a higher address, you must change this field to that new address.

Max Info Frames - Specifies the maximum number of information messages a controller may transmit before it must pass the token to the next controller.

CAUTION Increasing this number allows the controller to transmit more messages while it has the token, but it also increases the overall time it takes for the token to pass through the network.

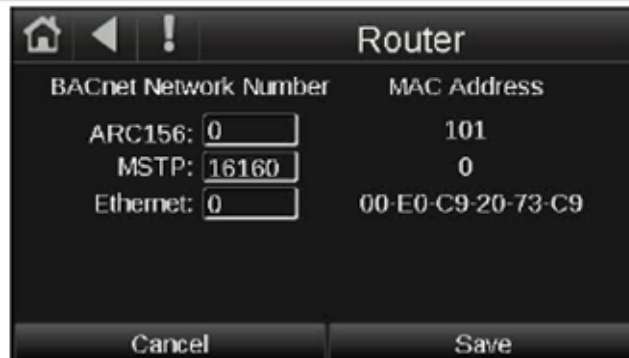
- For a router, set this value to a high number such as 200.
- In non-router controllers, use the following formula to calculate this value:

$$[2 - (\text{devices} * (.002 + (80/\text{baud})))] / [(600/\text{baud}) * \text{devices}] = \text{Max Info Frames}$$

For example, if the network has 15 devices at 19200 baud, Max Info Frames would be 4.

NOTE You may need to increase the result of the formula for controllers that need to communicate many values to other devices.

Router




The 'Router' screen features a dark background with a top navigation bar containing a home icon, a back arrow, and an exclamation mark. The title 'Router' is centered at the top. Below the title, there are two columns of input fields. The left column is labeled 'BACnet Network Number' and contains three fields: 'ARC156' with the value '0', 'MSTP' with the value '16160', and 'Ethernet' with the value '0'. The right column is labeled 'MAC Address' and contains three fields: '101', '0', and '00-E0-C9-20-73-C9'. At the bottom, there are two buttons: 'Cancel' and 'Save'.

Lets you view or edit the router's ARC156, MS/TP, or Ethernet network number. Touch a field to tap in the new number on the keypad.

IP / Time Master

Screen name	Description
IP	 <p>The IP configuration screen displays fields for IP Network, Current IP Address, Current Subnet Mask, Current Gateway IP Address, Current UDP Port, Assigned IP Address, and Assigned Subnet Mask. It includes a vertical slider on the right and 'Cancel' and 'Save' buttons at the bottom.</p>

Lets you view or edit network addresses and the UDP Port. Touch a field to tap in the new number on the keypad.

Time Master	 <p>The Time Master configuration screen displays fields for Time Sync Mode and Time Sync Interval. It includes a vertical slider on the right and 'Cancel' and 'Save' buttons at the bottom.</p>
-------------	--

If the controller can be a BACnet Time Master, this screen lets you configure how it sends time synchronization broadcasts.

Time Sync Mode - Tap in the number below that represents your selection:

- **0 = No Broadcast** - The controller will not act as Time Master.
- **1 = Local Broadcast** - If it doesn't already exist, a BACnet address with network number and MAC address length both set to zero is added to the controller's **Time Synchronization Recipients** list found on the driver's **Device** page in WebCTRL®. The controller will then send time broadcasts only to controllers on its ARCnet or MS/TP network.
- **2 = Global Broadcast** - If it doesn't already exist, a global address with network number set to 65535 and MAC address length set to zero is added to the controller's **Time Synchronization Recipients** list found on the driver's **Device** page in WebCTRL®. The controller will then send time broadcasts to all its connected networks.

Time Sync Interval - Enter how often local or global time broadcast should be sent (1-9999 minutes). If **Time Sync Interval** is set to zero, no time sync messages are sent.

NOTE If the controller looks through its Time Synchronization Recipient List and finds an entry with MAC address length set to zero and network number set to 65535, the controller's BACnet Time Master mode is set for Global Broadcast. If there is no global broadcast entry in the recipient list, the controller then looks for a local broadcast address (MAC address length set to zero and network number set to zero or to the same network number as the module's). If such an entry is found, the BACnet Time Master mode is set for Local Broadcast. Otherwise, the mode defaults to Disabled/None.

Touchscreen Setup

- 1 On the **System View** screen, touch **Setup > Touchscreen Setup**.






- 2 Touch a button to jump to one of the following screens:

Screen	Description
About	Displays information about the touchscreen firmware.
Inactivity Timeout	Lets you define how long the Equipment Touch can have no activity before returning to the Standby screen and logging out the user. Set to 0 to deactivate this feature.
Sensor Setup	Lets the installer set up the Equipment Touch's temperature and humidity sensors.
Clean Screen	Displays a one-minute countdown timer so that you can clean fingerprints from the display window without touching something that would affect equipment operation.
Key Click Off/On	Touch Key Click Off to turn off the sound when you touch a field or button. Touch Key Click On to turn on the sound.
Alarm Sound Off/On	Touch Alarm Sound Off to turn off the alarm notification sound or touch Alarm Sound On to turn on the sound. An alarm will generate a sound only if it is set up in ViewBuilder to do so.
Reload Firmware	Lets the installer update the firmware through the USB port. See "To update the Equipment Touch's firmware" in the <i>Equipment Touch Installation and Setup Guide</i> .


Alarms

When the controller generates an alarm, the following actions occur in the Equipment Touch:

-  turns red. The button remains red as long as Active Alarms or Active Faults exist.
- An audible alarm sounds if the alarm was set up in ViewBuilder to generate a sound and if Alarm Sounds are turned on in the Touchscreen Setup screen. Touch  to silence the alarm.
- The alarm is added to the Active Alarms or Active Faults screen. See table below.

To view alarms, touch  or touch Alarms on the System screen. The Active Alarms are displayed.



Touch  , then touch...	To...
Active Alarms	See all alarms except those that are defined as Faults in the control program.
Active Faults	See alarms that are defined as Faults in the control program.
Return-To-Normal	See alarms that returned to a normal state.
Manually cleared	See alarms that you cleared using the Clear Active button.
Clear Active	Clear all active alarms and faults.

NOTE The Equipment Touch can hold up to 100 alarms.

Trends

A controller can read and store point values for any point in the control program that has trending enabled. On the Equipment Touch, you can view trend data for up to 4 points on a trend graph.

To view trends

- 1 On the **System** screen, touch **Trends**.
- 2 The **Trend Selector** screen shows any points in the control program that have trending enabled. To select the points you want to see on a trend graph (up to 4 points), touch the appropriate box for the point. For example, for the zone_temp_1 analog point, touch the **Analog** box.
- 3 Touch **Next**.
- 4 The **Trend Scaling** screen displays the **Date/Time** of the oldest and newest trend samples in the controller for the selected point(s). Touch a field to enter a new date or time.
- 5 Analog points only: The **Min Y** and **Max Y** fields show the range of the Y axis based on the lowest and highest trend sample values for the selected point(s). Touch either field and edit the value to define a new range for the Y axis.
- 6 Touch **Display Trends**.



The scrolling function is used to view off screen items. Use the UP/DOWN arrows or drag the bar up and down to scroll.

On the Trends Scaling screen (no image available) press the Display Trends button to show the selected trend graphs in the chosen timeline.



Schedule

To view schedules

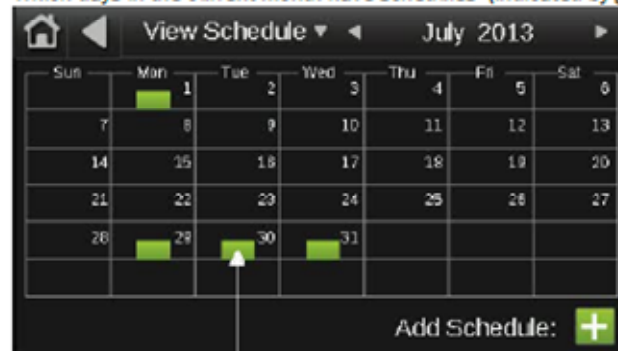
- 1 On the **System** screen, touch **Schedules**.
- 2 If the controller has multiple control programs that have a time clock microblock, touch the schedule object that you want to see.
- 3 Touch **View Schedule**, then:

Select...

To see...

Month View
(default view)

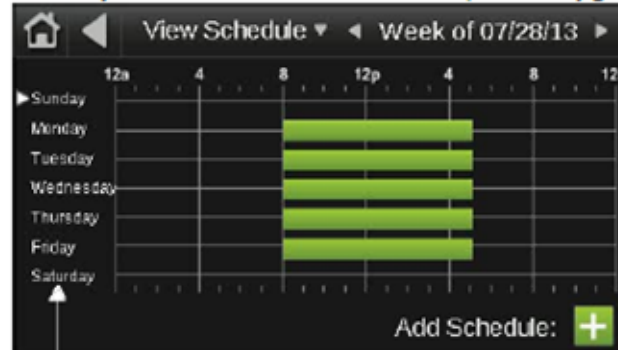
Which days in the current month have schedules (indicated by green boxes).



Touch day to see schedule(s)

Week View

Which days of the week shown have schedules (indicated by green bars).



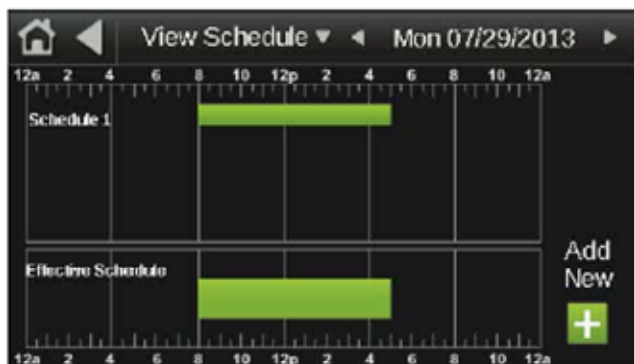
Touch day to see schedule(s)

NOTE If you see **Schedule editing disabled** at the bottom of the screen instead of **Add Schedule**, scheduling is being done through another application and is disabled for the Equipment Touch.

- 4 Touch a day to see the schedule(s) for that day.

Schedule

- 5 In the screen below, touch a schedule's name or green bar (not the **Effective Schedule** bar) to edit or delete the schedule. See *To create a schedule* (page 14) for field descriptions.



NOTES

- The **Effective Schedule** is the combined result of the day's schedule(s).
- You cannot edit a schedule's **Type** (Dated, Weekly, Continuous), its **Priority** (Normal or Override), or whether the schedule is an **ON Schedule** or **Off Schedule**. If you need to change any of these settings, delete the schedule, and then make a new one.


To create a schedule

- 1 On the **System** screen, touch **Schedules**.
- 2 If the controller has multiple control programs that have a time clock microblock, touch the schedule object that you want to add a schedule to.
- 3 Touch the plus sign to the right of **Add Schedule**.
- 4 Touch the **Schedule Name** field, and enter a name.
- 5 Select one of the following:
 - **ON Schedule** for an occupied period
 - **OFF Schedule** for an unoccupied period that is to override an ON schedule. For example, a holiday schedule that is to override a weekly schedule.
- 6 Touch the **Type** field, then select one of the following:

Select...	To use the schedule...
Dated	For a specified period of time between a start and end date. For example, 7:00 am to 7:00 pm every day between July 1st and July 22.
Weekly	Every week on the specified days. For example, every Monday through Friday, 8:00 am to 5:00 pm.
Continuous	Continuously between 2 specified dates/times. For example, a non-stop schedule that starts June 1st at 12:00 am and ends August 31st at 11:50 pm.

- 7 ON Schedule only-Select one of the following:
 - **Normal** for a typical occupied period
 - **Override** for a occupied period that is to override an OFF schedule.
- 8 Touch **Next** to define the criteria for the type of schedule you selected in step 6.
- 9 Touch **Save** when finished.

Language

Screen	Description
Language	 <p>If optional languages were defined when the touchscreen file was created, this screen lets you select which language to use for Equipment Touch system screens. If custom screens were included in the touchscreen file, they will display in the language that they were created in.</p>
Passwords	Lets you change the User or Admin password, if allowed.
Calibrate Touch Panel	Lets you recalibrate the Equipment Touch by touching targets. The device is calibrated in the factory, but time, temperature, or handling could affect the calibration. Recalibrate the screen if you touch it in one location and it responds as if you touched it in another.

Section 3

COVER PAGE

SCHEMATIC REVISIONS			
Name	Date	Rev	Reason
S NEUMAN	07/10/20	00	INITIAL RELEASE

TAG	DESCRIPTION
AFS	AIR FLOW SWITCH
CB	CIRCUIT BREAKER
CON	CONTACTOR
COMP	COMPRESSOR
CR	CONTROL RELAY
DDC	DIRECT DIGITAL CONTROLLER
DM	DAMPER ACTUATOR
DS	DISCONNECT SWITCH
FS	FLOW SWITCH
FTS	FLOAT SWITCH
FSR	FAST STOP RELAY
GND	EARTH GROUND
H	HUMIDISTAT
HC	HUMIDITY CONTROLLER
HPS	HIGH PRESSURE SWITCH
IS	CURRENT SWITCH
LCD	DISPLAY MODULE
LS	LIMIT SWITCH
LPS	LOW PRESSURE SWITCH
MTR	MOTOR
MSP	MOTOR STARTER PROTECTOR
PDB	POWER DISTRIBUTION BLOCK
PL	PILOT LIGHT
PMP	PUMP
PPR	PHASE PROTECTION RELAY
PS	PRESSURE SWITCH
PWR	POWER SUPPLY
REC	RECEPTACLE
S	SWITCH
SD	SMOKE DETECTOR
SEN	SENSOR
T	TRANSFORMER
TB	TERMINAL BLOCK
TC	TEMPERATURE CONTROLLER
TDR	TIME DELAY RELAY
TR	TIMER
TSTAT	THERMOSTAT
VFD	VARIABLE FREQUENCY DRIVE
VM	VALVE ACTUATOR
VPL	VAPOR PROOF LIGHT

NOTES:

WIRE COLOR IDENTIFICATION					
BLK	BLACK	LINE VOLTAGE	BLU	BLUE	24VDC +
WHT	WHITE	120VAC NEUTRAL	BL/WT	BLUE W/ WHITE STRIPE	24VDC -
RED	RED	120VAC +	GRN	GREEN	GROUND
ORG	ORANGE	24VAC / CONTACT CLOSURES	YEL	YELLOW	120VAC LIGHTS/GFCI

WARNING :



HAZARDOUS VOLTAGE

FAILURE TO DISCONNECT POWER BEFORE
SERVICING CAN CAUSE SEVERE PERSONAL
INJURY OR DEATH.

ALL FIELD WIRING MUST BE IN
ACCORDANCE WITH LOCAL, STATE,
AND NATIONAL ELECTRIC CODES.

**Munters**

16900, Jordan Road - Selma - TX - USA
TEL: (210) 651 5018 FAX: (210) 651 9085

CONFIDENTIALITY STATEMENT
THE TECHNICAL INFORMATION AND DESIGN DATA
DISCLOSED HEREIN CONSTITUTE PROPRIETARY
INFORMATION OF MUNTERS CORPORATION AND ARE TO BE
MAINTAINED IN STRICT CONFIDENCE, THIS INFORMATION
IS FOR THE SOLE USE OF OUR CUSTOMERS AND END USERS
OF OUR EQUIPMENT.

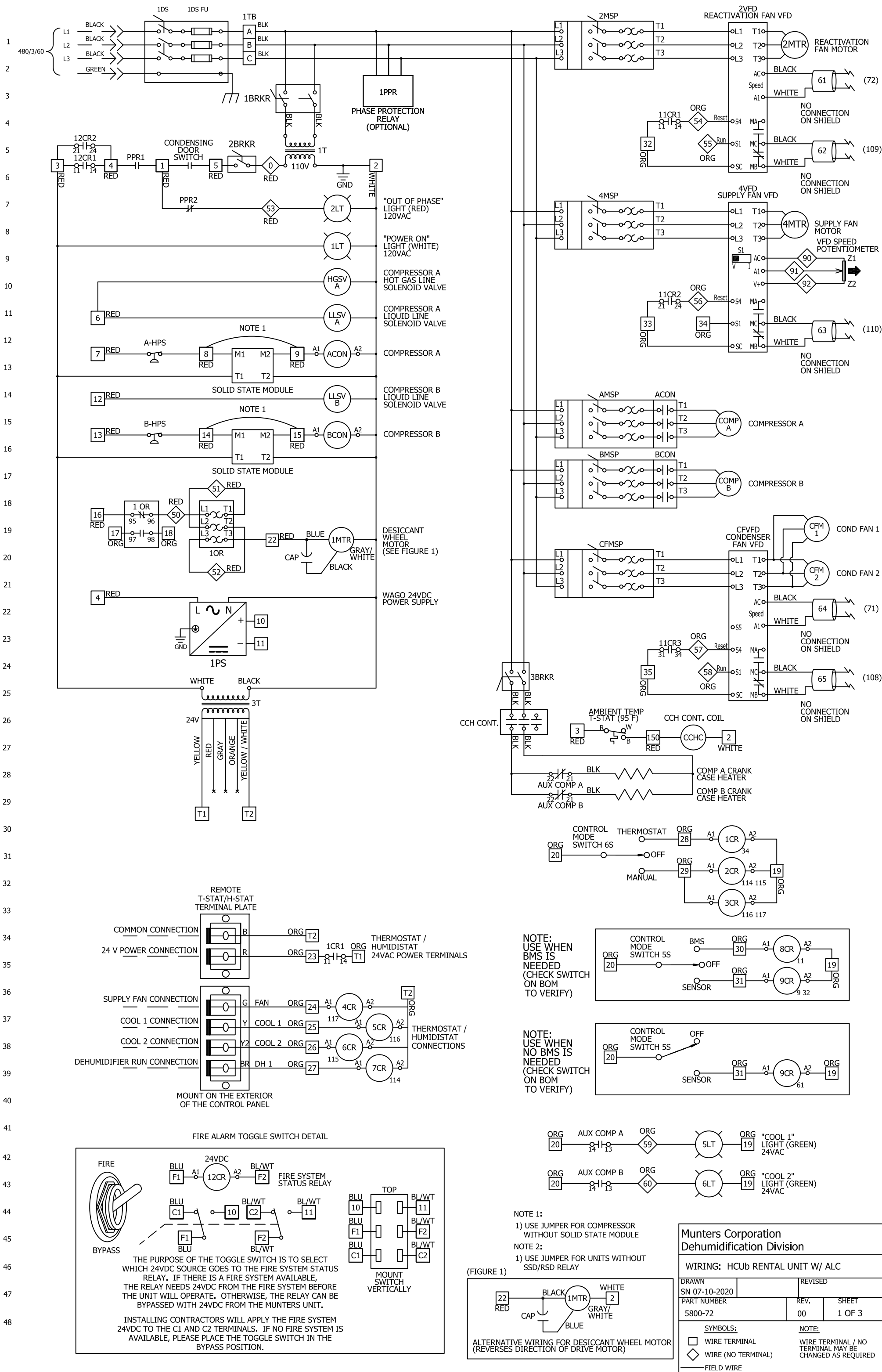
Munters Corporation
Dehumidification Division

WIRING: HCUB RENTAL UNIT W/ ALC

DRAWN		REVISED
SN 07-10-2020		
PART NUMBER	REV.	SHEET
5800-72	00	COVER

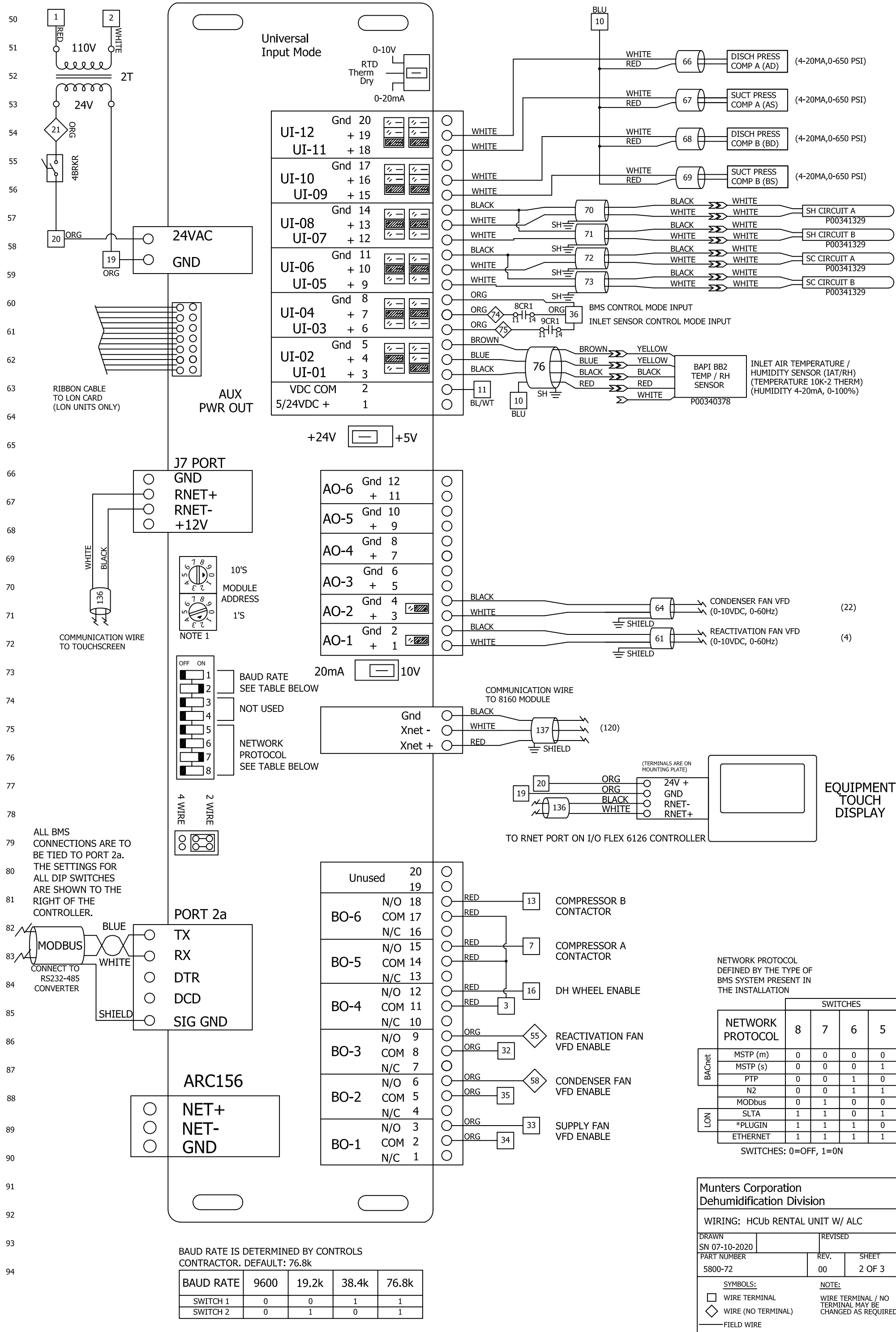
SYMBOLS:
☐ WIRE TERMINAL
☐ WIRE (NO TERMINAL)
— FIELD WIRE

NOTE:
WIRE TERMINAL / NO
TERMINAL MAY BE
CHANGED AS REQUIRED

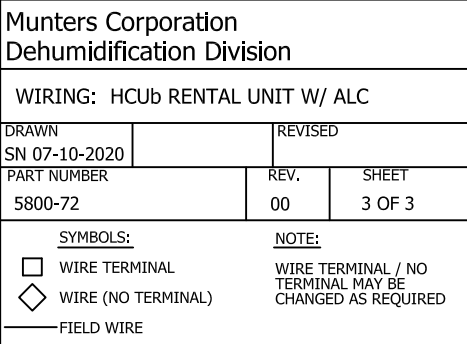


I/O Flex 6126

47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94



Gnd	16	
UI-16	15	
Gnd	14	
UI-15	13	
Gnd	12	
UI-14	11	
Gnd	10	
UI-13	9	
Gnd	8	
UI-12	7	
Gnd	6	
UI-11	5	
Gnd	4	
UI-10	3	
Gnd	2	
UI-09	1	
Gnd	16	
DI-08	15	
Gnd	14	
DI-07	13	
Gnd	12	
DI-06	11	
Gnd	10	
DI-05	9	
Gnd	8	
DI-04	7	
Gnd	6	
DI-03	5	
Gnd	4	
DI-02	3	
Gnd	2	
DI-01	1	



Section 4

Mechanovent Corporation
MVP
Fan Selection Data

Project:	HCUb6000
Location:	Supply Fan
Contact:	

Fan Design

Product:	Backward Inclined Wheel for Unhoused SWSI Apps	Arrangement:	1
Size/Model:	167	Drive type:	Direct
Wheel Type:	Acoustafoil	AMCA Performance Class:	3
Wheel Material:	Mild Steel		
Wheel Width:	107 %	Wheel Diameter:	100.0 %

The fan housing width (M) for this narrow-width fan will be 0.0 inches. This measurement is the same as that of our standard fan housing.

Operating Conditions

Volume Flow Rate:	6,000 CFM	Fan Speed:	3500 rpm
Fan Static Pressure:	7.04 in wg	Fan Input Power:	10.2 bhp
Altitude (above mean sea level):	0 ft	Operating Temperature:	71 Deg F
Operating Inlet Airstream Density:	0.0749 lb/ft3		
Static Efficiency:	64.90%		
Maximum Operating Temperature:	71 Deg F	Maximum Safe Operating Speed:	3962 rpm

Operating cost is \$1,459.07 for 1778 hours with a 93% efficient motor when energy unit cost per kW-hr is 0.10

Plenum Configuration: Three Walls, Wheel Offset; d/D ratio = 0.25

Conditions at 70 Deg F and 0 ft

Volume Flow Rate:	6,000 CFM	Fan Speed:	3500 rpm
Fan Static Pressure:	7.05 in wg	Fan Input Power:	10.2 bhp
Density at Altitude (0 ft) :	0.0750 lb/ft3	Max. Safe Speed at 70 Deg F:	3963 rpm

Sound Power Level Ratings Levels expressed in dB (power levels reference 10⁻¹² watts)

No sound data available for this fan type/size/wheel.

Your Representative:
Mechanovent Corporation
171 Factory Street
LaPorte, IN 46350 USA
Phone: 219-326-1767
Fax: 219-325-6805
E-Mail: sales@mechanovent.com

Mechanovent Corporation

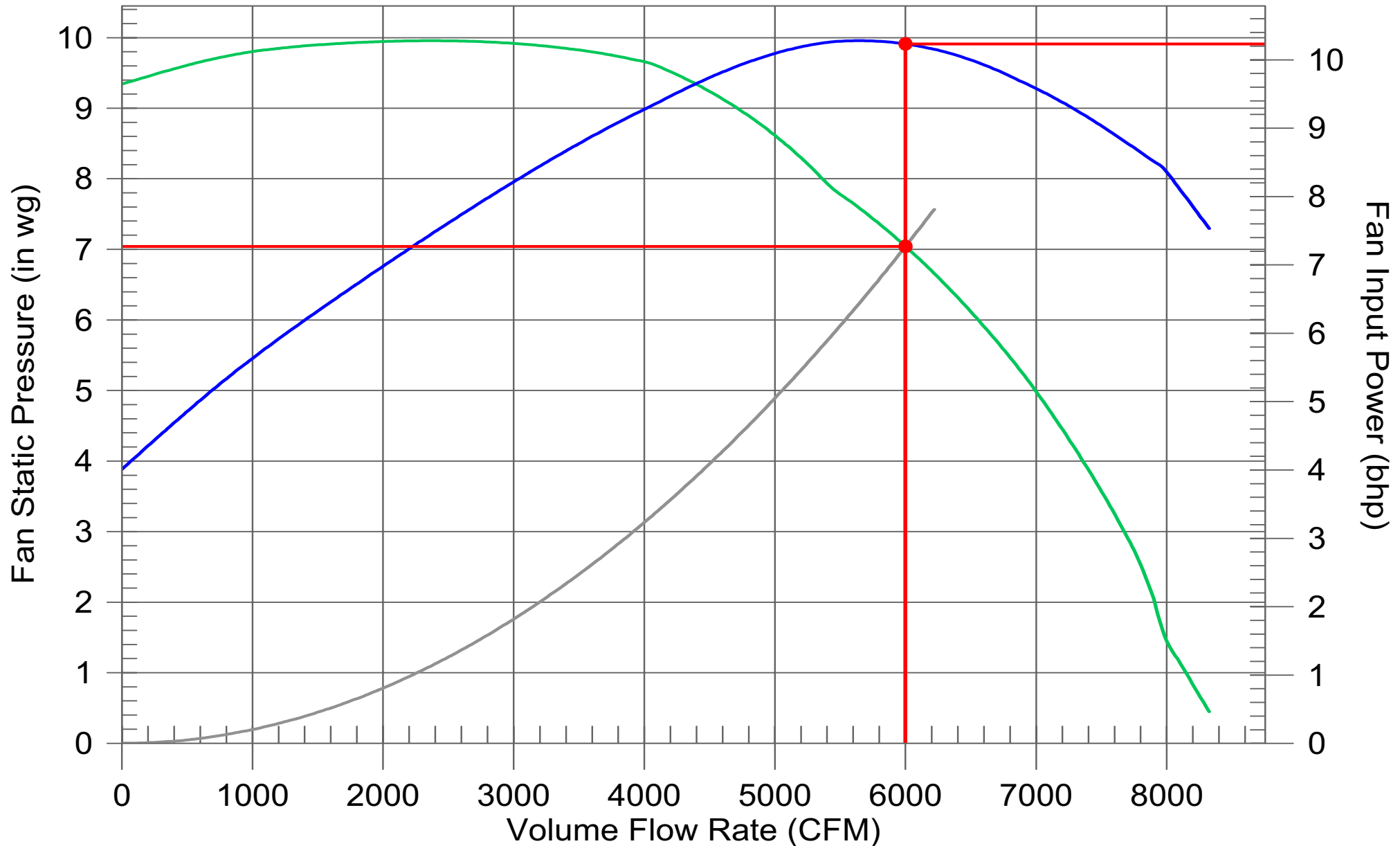
MVP

Backward Inclined Wheel for Unhoused SWSI Apps Volume Flow Rate: 6,000 CFM
167 Acoustafoil, 107.0% Width
Class: 3; Arr.: 1
Plenum Effect (Three Walls Offset, d/D = 0.25)

Fan Static Press.: 7.04 in wg
Speed: 3500 rpm
Power: 10.2 bhp

Supply Fan

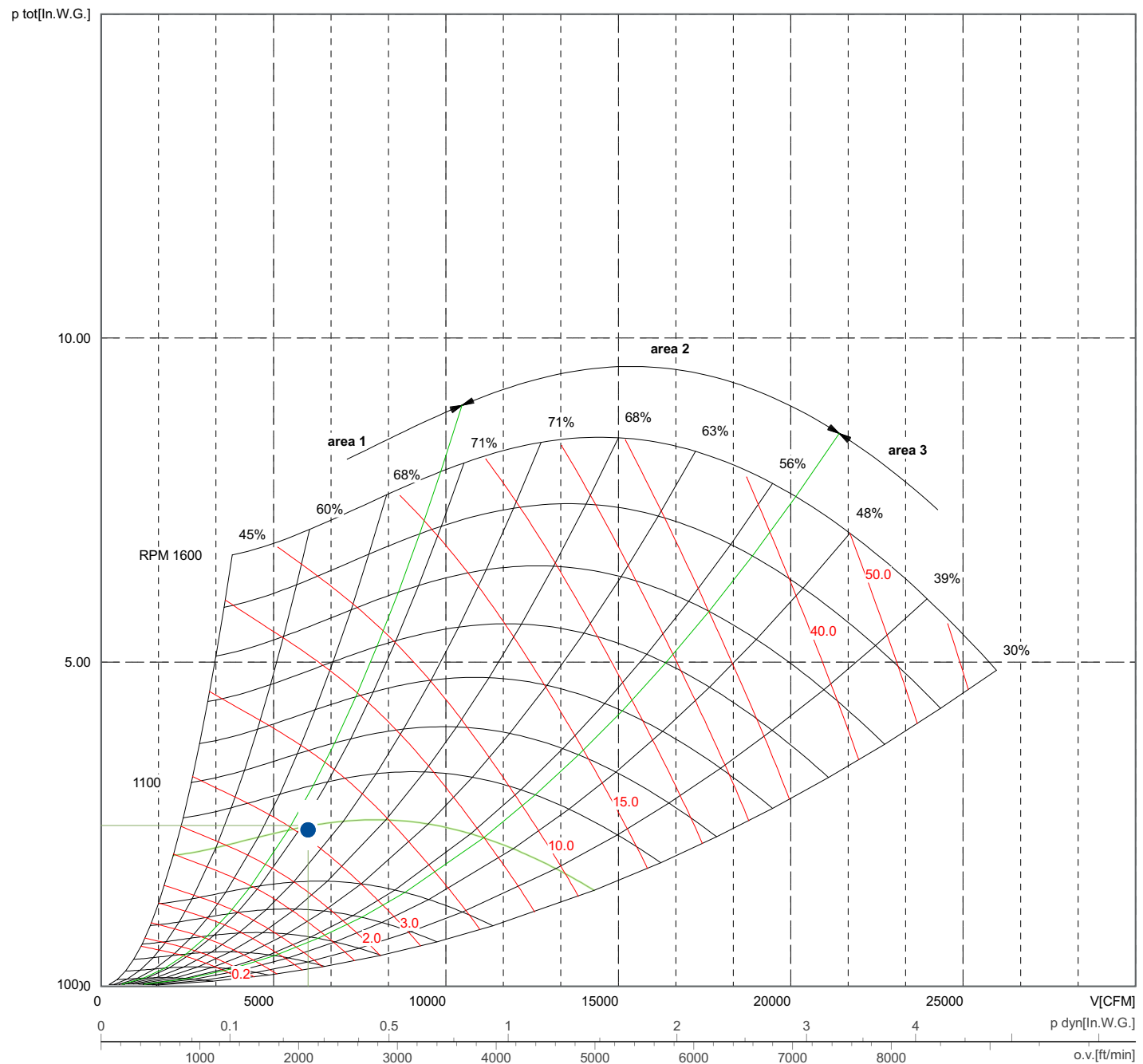
Temp.: 71 Deg F
Altitude: 0 ft
Density: 0.0749 lb/ft³



React Fan
 HCUb6000

Selected Fan	ATLI 18 - 18 T2	
Max Fan RPM	1500	1/min
Max Shaft Power	18.21	BHP
Fan power	3.27	BHP
Moment of Inertia	10.99	lb ft²
Required Working Point	●	

Fan working conditions		Free Inlet - Free Outlet	
Volume	6000	CFM	
Total Pressure	2.48	In.W.G.	
Static Pressure	2.22	In.W.G.	
Total Efficiency	71.5	%	
Static Efficiency	64.1	%	
Fan Speed	881	1/min	
Temperature	95.0	°F	
Altitude	0	ft	



	Wednesday, March 30, 2016 Aeolus Plus 1.0.8 #2 Jan 2014
---	--

Customer	-	Description	React Fan
Project	-	Our Ref.	-
Your Ref.	HCUb6000		

Input data			
Volume	6000 CFM	Temperature	95.0 °F
Total Pressure	2.48 In.W.G.	Altitude	0 ft
		Density	0.071 lb/cu.ft
		Free Inlet - Free Outlet	

Catalogue data			
Selected Fan ATLI 18 - 18 T2		n Max	Pw Max
		1/min	BHP
		1500	18.21
			J lb ft² 10.99

Fan Information											
o.v. ft/min	p tot In.W.G.	p sta In.W.G.	p dyn In.W.G.	tip speed ft/min	RPM 1/min	eta Tot %	eta Sta %	P fan BHP	Min Mot. BHP	P mot BHP	Shaft diameter mm
2095	2.48	2.22	0.26	4089	881	71.53	64.06	3.27	4.15	5.00	

fm[Hz]	63	125	250	500	1000	2000	4000	8000	Tot.	
Lw6 Total Sound Power Level at the free outlet - Lwmo Outlet Sound Power Level (free outlet) do not includes the effect of duct end correction										
Level Lw6	85	83	80	82	76	74	71	63	90	dB
Level Lw6 (filter A)	59	67	72	79	76	76	72	62	83	dB(A)

Section 5



SPARE PARTS LIST FOR JOB

CLIENT:

MODEL: HCUB60304-HMXC

Level I

Level I spare parts are the factory recommended spare parts for this unit and are suitable for most customers. It is comprised of the parts of the unit which tend to wear out the quickest and need the most frequent replacement.

Description	Munters PN	Model	Qty in Unit
DH Wheel Belt	150-005828-002	DH Wheel Belt	15.12
Motor for Condenser Fan	P00111044	MOTOR 2HP P63CMD-1113,1140RPM 460V VFD (RING)	2
Condenser Fan Blade	P00400112	COND FAN, 26-10-10-45-PPG-3HR-.625x.188-B	2
Supply Filters	P020X20X2	FILTER 30% 20" x 20" x 2"	6
React Filters	P016X20X2	FILTER 30% 16" x 20" x 2"	6

Level II

Level II spare parts are parts with an expected lifetime which is much longer than those parts on the Level I list. Applications which are extremely critical or locations which are extremely remote may want to consider keeping these items on hand.

Description	Munters PN	Model	Qty in Unit
Compressor Contactor	150-018940-016	CONTACTOR, 600V, 120V, EATON, XTCE040D00A	2
Supply Fan MSP	150-018941-016	MMP, 600V, 32-40A, EATON, XTPR040DC1	1
Compressor MSP	150-018941-046	MMP, 600V, 25-32A, 1NO/1NC, EATON, XTPR032DC1	2
Condenser Fan MSP	150-018941-013	MMP, 600V, 16-20A, EATON, XTPR020BC1	1
React Fan MSP	150-018941-013	MMP, 600V, 16-20A, EATON, XTPR020BC1	1
Relay 120V	150-019335-001	RELAY, 120 VAC, DPDT, EATON, D2PR2A/D2PF2AA/D2	1
Relay 120V	150-019335-002	RELAY, 24 VAC, DPDT, EATON, D2PR2T/D2RR2T	8
Relay Base	150-019335-004	BASE, RELAY, EATON, D2PAL	9
Relay 120V	150-019335-009	RELAY, 120 VAC, 3PDT, EATON, D5RR3A	1
Relay 24V	150-019335-011	RELAY, 24 VDC, 3PDT, EATON, D5RR3T1	1
Relay Base	150-019335-012	BASE, RELAY, EATON, D5PAL	2
Phase Protection Relay	P00203509	*PHASE PROT. MOTOR SAVER #250A 190V-480V 50/60	1
Refrigerant Pressure Transducer	P03300995	PRESSURE SENSOR DunAn HIP0650S01-S15X358 0-650	4
Refrigerant Pressure Transducer Cable	P03300996	CABLE PRESSURE SENSOR, CBL00004revA	4
OA Temp + Humidity Sensor	P00340378	BAPI, BA/10K-2-H200-O-BB2 (0-5VDC/4-20mA, 10K2	1
SA Temp + Humidity Sensor	P00340378	BAPI, BA/10K-2-H200-O-BB2 (0-5VDC/4-20mA, 10K2	1
Inlet Air Temp + Humidity Sensor	P00340378	BAPI, BA/10K-2-H200-O-BB2 (0-5VDC/4-20mA, 10K2	1
Leaving Air Temp Sensor	P00340383	BAPI - BA/10K-2-D-12"-NB-18" - 12" DUCT PROBE	1
Suction and Discharge Temp Sensors	P00341329	BAPI, BA/10K-2[XP]-PP-10'-BBX, NON POTTED	4

Level III

Level III spare parts are parts which are often replaced only once, if ever, in the lifetime of the unit and would primarily be for extremely critical applications or for a complete re-build of the unit. Note that for a complete rebuild, multiple quantiti

Description	Munters PN	Model	Qty in Unit
Supply Fan VFD	P03300802	VFD 10HP V1000 CIMR-VU4A0018FAA	1
React Fan VFD	P03300924	VFD 5HP J1000 CIMR-JU4A0009BAA	1
Condenser Fan VFD	P03300924	VFD 5HP J1000 CIMR-JU4A0009BAA	1
Motor for Supply Fan	P040340100	MOTOR, 10HP/3600/01036ET3E215T-W22/208-230/460	1
Motor for React Fan	P040140050	MOTOR, 5HP/1800/00518ET3E184T-W22/208-230/460V	1
Transformer 1T	P00218221	TRANSFRMR, CE1000MH 200/230/400/575-120/24	1
Transformer 2T	P00218687	TRANS, PH75PG, HMND, 75VA, 120/240V x 24VAC	1
Transformer 3T	P00218673	*TRANSFRMR 75VA 120/240V - 24V W/BREAKER PROT	1
ALC control board	P00690400	ALC CONTROLLER, I/OF6126	1
ALC control board	P00690400	ALC BOARD, I/OFX8160	1
ALC display	P00690433	ALC, EQUIPMENT TOUCH (EQT1-4-BNK)	1
DH Wheel Motor	150-011952-001	DH Wheel Motor	1
Wheel Seal Kit	150-010357-001	Wheel Seal Kit	35 ft
Compressor	P00390534	COMP, ZP182KCE-TED-456 COPELAND 460V 410A	2
Liquid Filter Dryer Circuit 'A'	P00245015	SPORLN, FILTER-DRIER, C-415-S 5/8"	2

11. Service Contact Information

Choosing Munters means a service you can count on.

AUSTRALIA Tel +61 2 8843 1585 service.nsw@munters.com.au	AUSTRIA Tel +43 1 6164298-0 luftenfeuchtung@munters.at	BELGIUM Tel +32 3 458 24 34 info@muntersnv.be	CHINA Tel +86 10 8048 1121 info@munters.com.cn	DENMARK Tel +45 4495 3355 info@munters.dk
FINLAND Tel +358 9 8386 030 info@munters.fi	FRANCE Tel +33 1 3411 5757 dh@munters.fr	GERMANY Tel +49 40 73416-01 mgd@munters.de	ITALY Tel +39 0183 5211 marketing@munters.it	JAPAN Tel +81 3 5970 0021 mkk@munters.co.jp
KOREA Tel +82 2 761 8701 munters@munters.co.kr	NETHERLANDS Tel +31 172 43 32 31 vochtbeheersing@munters.nl	POLAND Tel +48 58 320 01 00 dh@munters.pl	SINGAPORE Tel +65 6744 6828 info@munters.com.sg	SOUTH AFRICA Tel +27 11 971 9700
SPAIN Tel +34 91 610 09 02 marketing@munters.es	SWEDEN Tel +46 8-626 6300 avfuktning@munters.se	SWITZERLAND Tel +41 52 3438886 info.dh@munters.ch	UNITED KINGDOM Tel +44 8708 505 202 dryair@munters.co.uk	UNITED STATES Tel +1 978 241 1100 dhservice@munters.com

Munters Corporation
 Tel: (800) 843-5360
 E-mail: dhinfo@munters.com
www.munters.us

PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS

5435958, 5505769, 5423934, 5500402, 6375914, 6557365, 6622508, 6711907, 6875299
 7047751, 1241056, 1609673, 5179998, 5303771, 6684653, 6951242, 7128138, 6935131

U.S. and Worldwide Patents Pending

Munters is a global leader in energy efficient air treatment solutions.

Munters manufactures engineered products that can economically control humidity and temperature, provide energy recovery, and/or utilize direct or indirect evaporative cooling for comfort, process and environmental protection. With permanent or temporary solutions, Munters offers a wide variety of options to meet specific climate, application and budget requirements. Munters has net sales approaching \$1 billion USD with more than 20 manufacturing facilities across the globe and sales offices in over 30 countries. Munters employs approximately 4,300 people worldwide.

For more information see www.munters.us

