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INTRODUCTION

This is the service manual for the Dantherm ThermoFlow product line. Please see the table of contents below for further information about the sections of this manual.

TARGET GROUP

The target group for this service manual are the technicians who install and maintain the ThermoFlow systems, as well as, the users of the unit.

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RESERVATIONS

Dantherm reserves the right to make changes and improvements to the product and the service manual at any time without prior notice or obligation.

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UNPACKING, HANDLING, AND INSPECTION

- Congratulations on receiving a new Dantherm Cooling thermal control system!
- HVAC and heat exchanger systems should be maintained in an upright position at all times to prevent refrigerant and/or oil migration.
- While unpacking, the unit should be inspected for any damage that may have occurred during shipping.
- Any damage as a result from mishandling is not covered under Dantherm Cooling's standard warranty.
- Damage to the unit or packaging should be immediately addressed with the shipping carrier.
- Do not attempt to operate or repair the unit if it appears to be damaged.

GENERAL SAFETY

- Certain parts of electrical systems are inevitably live or may have a high operating temperature. Observe caution at all times.
- Failure to follow these precautions and installation instructions can cause injury and damage.
- The system is to be installed and maintained only by trained and qualified personnel.
- Do not apply power until all ground connections have been made.
- The unit is fitted with pressed and folded metal parts, which could have sheared metal edges. Be cautious handling the unit, especially when working in poorly accessible places.
- Check that no tools, test equipment, torches etc. have been left in or on the equipment after completion of work.
- Ensure the cover(s) and all mounting hardware is firmly secured before leaving installation.
- All cables and connectors must conform to UL standards.
- Most models are UL recognized and tested to UL484. It will comply where necessary within the safety requirements as defined in UL484.
- After servicing the unit, do not remove the cover(s) for 5 minutes once the unit is turned off to allow pipe work (compressor discharge) to cool.

WARNING

INTRODUCTION: This installation manual and the product uses various displays and labels to ensure safe use. Ignoring these displays and labels and incorrectly using the product could produce results as classified below. Please read the following warning symbol information before reading the rest of this section, and be sure to strictly observe all instructions.

GENERAL PRECAUTION: This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance. If the power cord is damaged, it must be replaced by the manufacturer, a service agent, or a similarly qualified person in order to avoid a hazard.

WARNING: Not following these instructions could result in death or serious injury. CAUTION: Not following these instructions could result in injury or property damage. This symbol will show for something that should NOT be done. Project safety is your responsibility! Follow the instructions in this manual regarding the installation method and installation orientation. Not following these instructions could result in injury, death, or damage to equipment. All work should be performed by qualified personnel using safe work practices. All proper protective equipment should be used. PPE required for this installation may include, but is not limited to: Safety glasses | Hard hat | Safety shoes | Hearing protection | Cut resistant gloves | Face shield | Proper work attire (long sleeve shirt and long pants)



NOMENCLATURE



Please strictly observe the following: Special skills are required to install Dantherm products. Non-qualified personnel should not attempt any of the actions shown in this installation guide. Dantherm shall not be responsible for improper installation or any accidents, damages, or injury resulting from improper installation.









ThermoFlow

TECHNICAL DATA

These units are designed for high reliability and electrical efficiency.

- Heat Exchange is accomplished through natural convection inside the sealed system.
- Radial Fans with backward curved impellers for higher CFM.
- Slim MPE heat exchangers for high performance thus low pressure drop.

SPECIFICATION	UNIT	230 VAC	48 VDC	480 VAC 3 φ	
UNIT DIMENSIONS (HEIGHT X WIDTH X DEPTH	Inch	48.5x19.5x14.4	48.5x19.5x14.4	48.5x19.5x14.4	
WEIGHT	Lbs	90	90	120	
OPERATIONAL TEMPERATURE RANGE	°F	-40 - 131	-40 - 131	-40 - 131	
STORAGE TEMPERATURE / HUMIDITY	° F/RH %	-40-176/ 0-99	-40-176/ 0-99	-40-176/ 0-99	
NOISE LEVEL, OUTSIDE 1.5M DISTANCE	dB(a)	65	65	65	
OUTDOOR ENCLOSURE RATING	UL 50	Type 3R	Type 3R	Type 3R	
HEAT EXCHANGER TYPE	Type	Closed Loop Thermal Absorption	Closed Loop Thermal Absorption	Closed Loop Thermal Absorption	
INTERNAL AIRFLOW	CFM	710 - 1300	710 - 1300	710 - 1300	
INPUT VOLTAGE	v	230+/-10% VAC 1 ϕ	48, +20%/-15% VDC	480+/-10% VAC 3¢	
FREQUENCY	Hz	50/60	n/a	50/60	
OPTIONAL HEATER	Watts	Optional	500	Optional	
SHEET METAL PROTECTION	Type	Powder Coat, Stainless Steel, Galvanized	Powder Coat, Stainless Steel, Galvanized	Powder Coat, Stainless Steel, Galvanized	

INSTALLATION



INTRODUCTION

This unit is designed to be mounted outdoor, flush to the wall. Any other installation method is not recommended.



WARNING

Never carry out any installation, maintenance, or service without disconnecting the power supply.

INSTALLATION PLACEMENT

Any installation should allow good air flow inside the enclosure. The unit has cold temperature supply in the lower part and return air in the upper part of the unit. Please consider how to achieve the best possible air flow when selecting appropriate placement. Any installation should be finished with a proper Polymer sealant around the outside of the unit to prevent any water intrusion.

DIMENSIONAL DIAGRAM-MOUNTING INTERFACE



INSTALLATION CONT.



Lift the unit into the cutouts and place it on the hanging brackets, if applicable. Place the bolt from the inside and secure them one by one, taking great care that no damage is done to the unit or enclosure due to the small variation in enclosure structure. The maximum torque is 120 in-lbs with a recommended assembly torque of 75 in-lbs.

After fastening all of the bolts, the unit should be sealed on the outside, top and side junctions towards the enclosure.

ELECTRICAL REQUIREMENTS

Please incorporate the following imperative requirements when installing the electrical connections:



WARNING

Any installation should always be in accordance with national wiring regulations. DC / AC external supply should be protected, with an external disconnecting device that has a contact separation of at least 3 mm. This external DC / AC supply must also be over current protected. These disconnecting devices, must always be labeled with rated voltage as well as rated current.

- The units ground connections must always be connected to the enclosures ground.
- All cables in a permanent installation are imperative to install and secure properly to prevent any damage to equipment and/or humans. Secure all cables with cable ties or appropriate cable fasteners.

ELECTRICAL CONNECTIONS

Follow requirements below for electrical connections:

WARNING

- **1.** The power and/or additional connections need to be routed, secured and connected to appropriate sources. The PrecisionAir unit is either delivered with:
 - a. 10 ft. cable with stripped wires are to be connected inside a distribution board. Refer to wiring diagrams for connections.
 - b. Unit types with extension "-L" on the label are delivered with a factory fitted plug, that should be connected to an appropriate outlet, that is not accessible to the general public.
 - c. -48 DCV units are supplied with a harness that should be connected to the fused power.
- 2. If the power supply cord is to be extended, always use at minimum the same gauge.
- **3.** Connect the PrecisionAir units ground terminal to enclosure grounding.
- **4.** All power supply connections are to be secured with an external disconnection device, as well as over current protection.
- **5.** Connect any needed accessories.





ELECTRONIC CONTROL DESCRIPTION

This section describes key features of the USHX-2 controller, and how it operates.



WARNING

Never carry out any installation, maintenance or service, without disconnecting the power supply.

The USHX2 controller includes the following functions:

- Internal fan control (4 wire)
- External fan control (4 wire)
- Test button to initiate test sequence
- Alarm Capabilities
- RS-232 connection for simple programming through HyperTerminal
- Menu Structure with user interface

The controller is designed to slow down the speed of the internal and external fans at lower temperatures to reduce noise and energy consumption. Depending on the application, the on-board thermistor may be used or the remote thermistor may be used. If a remote thermistor is used, this is connected to Pins 1 & 2 on connector P3 (SENSORS). The controller will automatically detect whether a remote sensor is used.

The internal fan operates as stated below. The settings are a function of the T3 (HEX) mode, which is user adjustable through the serial interface.

- TO (Fan off setting)
- T1 (Fan on setting)
- T2 (medium temperature setting)
- T3 (high temperature setting)
- = T1-5°C (-45°C / default)
- = User Defined (-40°C / default)
- = T3-25°C (30°C / default)
- = T3-10°C (45°C / default)

Using the default settings, the internal fan begins to operate at 1500 rpm once the controlling temperature exceeds -40°C. The fan begins to increase in speed as the temperature increases from 30° to 45°C. Above 45°C, the speed of the internal fan is 3000 rpm.





The external fan operates as stated below. The settings are a function of the T3 (HEX) mode, which is user adjustable through the serial interface.

- TO (Fan off setting)
- T1 (Fan on setting)
- T2 (medium temperature setting)
- T3 (high temperature setting)
- = T1-5°C (25°C / default)
- = T3-25°C (30°C / default)
- = T3-15°C (40°C / default)
- = User defined (55°C / default)

Using the default settings, the external fan begins to operate at 1500 rpm once the controlling temperature reaches 30°C. The fan begins to increase in speed as the temperature increases from 40° to 55°C. Above 55°C, the speed of the fan is 3000 rpm.







Tomporatura	A thormistor i		poord the con	trallar for tomp	oroturo	
Temperature Sensing	A thermistor is located on board the controller for temperature control.					
Sensing	Additionally, a connection is available for a return sensor. In the event a sensor is					
	installed, the return sensor will be used for control.					
Form C Alarm	A Form C contact alarm is available to communicate a failure in the event of:					
	Missing VDC Line Voltage					
	 Faulty Fan (Less than 50% of desired fan speed or greater than 50% of 					
	desired fan speed after 15 seconds)					
	 Faulty Temperature Signal (dead Short). Open sensor will be shown as non active sensor. Open sensor is not a fault. 					
	 High Temperature 					
	Low Temperature					
	Normally Open and Normally Closed will be read through a relay capable of					
	60VAC / 0.3 amps or 100vdc / 0.3 amps. An LED is available on the control board and indicates as follows:					
Fault LED				and indicates	as tollows:	
	 Flashing: Sensor Failure Continuous: Fan Failure or Temperature Alarm 					
Fault Codes						2 does ao into
	No individual fault codes are necessary for the USHX2. If the USHX2 does go into fault, it should terminate communication. Likewise, if the USACG-6 Controller goes					
	into fault it should terminate communication. (For the USACG-6 this can be as					
	simple as not receiving F3 if in Fault).					
	Whether the unit is in Fault is shown via the LED, the Alarm Contact, and indication on the RS-232 menu.					
Test Button	A test button is on board the controller to allow the user to initiate the following test					
	sequence:					
	Step #	Int. Fan	Ext. Fan	Alarm	LED	Duration
	1	0%	0%	Activated	Solid	30 sec.
	2	50%	0%	Activated	Flashing	30 sec.
	3	50%	50%	Activated	Flashing	30 sec.
	4	100%	50%	Activated	Flashing	30 sec.
	5	100%	100%	Activated	Flashing	30 sec.
	6	0%	0%	Normal	Flashing	15 sec.





WIRING CONT.



WARRANTY:

DANTHERM COOLING, INC., HEAT EXCHANGERS AND AIR CONDITIONING UNITS HAVE LIMITED WARRANTY.

DANTHERM COOLING, INC. ("**DANTHERM**") limited warranty extends to the original purchaser only of any **DANTHERM** heat exchanger and air conditioning unit, and to no other person or entity. **DANTHERM** warrants that such **DANTHERM** products will be free from defects in materials and workmanship in normal use for a period of twelve (12) months from the date of the original purchase. Should any part of your **DANTHERM** product fail because of a manufacturing defect within such twelve (12) month period, **DANTHERM** terms are set out below.

IMPORTANT

- Using Dantherm nominated service contractors warranty on product continues.
- Using Dantherm non-approved service contractors warranty on product becomes void.
- Warranty period starts from date of shipment warranty of replacement parts shall only apply for the remainder of the warranty period of the original product.

Any transportation, related service labor, diagnosis calls, filters, driers, and refrigerant are not included. In the event all related service labor is performed by **DANTHERM** nominated service contractors, the replacement part shall be warranted by **DANTHERM** for the remainder of the warranty period for the original product.

This warranty does not cover damages or repairs caused by improper installation, misuse of the product, negligent servicing, improper applications, unauthorized modifications, improper electrical supply, failure to follow manufacturer's instructions and rating plate information, accidents, natural disasters, damage in transportation, lack of normal preventive maintenance, or other events beyond **DANTHERM's** control. This warranty is also subject to the following operating conditions:

voltage variation not greater than 10%, 2) frequency variation not greater than 3Hz from nameplate rating
 cooling load is not greater than product label under rated conditions 4) unit is not restarted for a period of five minutes after accidental or intentional shut-off 5) operation is not subject to abnormal conditions or customer/user misapplication 6) customer or user does not modify, abuse, or neglect the product
 refrigerant specified on nameplate is only refrigerant used 8) customer or user complies with all other installation, maintenance, and operating instructions. Cost of repair or replacement of consumable parts is not covered under the terms of this warranty.

THIS WARRANTY CONSTITUTES THE EXCLUSIVE REMEDY OF ANY PURCHASER OF A DANTHERM HEAT EXCHANGER, AIR CONDITIONING UNIT AND IS IN LIEU OF ALL OTHER WARRANTIES. THIS ALSO INCLUDES, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR USE, OR FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR USE, OR FOR A PARTICULAR PURPOSE EXCEED THE TERMS OF THE APPLICABLE WARRANTY STATED ABOVE, AND DANTHERM SHALL HAVE NO OTHER OBLIGATION OR LIABILITY, EXPRESS OR IMPLIED. IN NO EVENT SHALL DANTHERM BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE. SOME STATES DO NOT ALLOW LIMITATIONS OR EXCLUSIONS, SO THE ABOVE LIMITATIONS AND EXCLUSIONS MAY NOT APPLY TO YOU.



RETURN MATERIAL AUTHORIZATION PROCEDURE

In the unlikely event of unit failure, the following return procedure shall be adopted.

- All product returns require a Return Material Authorization number regardless of reason.
- The customer is required to contact the Quality Department at Dantherm Cooling, Inc. in Spartanburg, SC at +1-864-595-9800 to obtain an RMA number.
- The following information must be provided prior to a RMA number being issued:
 - o Dantherm Cooling, Inc. part number(s) of product to be returned.
 - o Dantherm Cooling, Inc. serial number(s) of product to be returned.
 - Number of units requested to be returned.
 - Reason for return.
 - Contact name, phone and fax number.
 - o Date of product receipt.
 - o Invoice number and purchase order number covering the unit(s).
- The customer is responsible for suitably packaging the unit(s) securely, ideally in the original packaging, marking all cartons with the RMA number and shipping them prepaid to the designated site specified by Dantherm Cooling, Inc.

IN NO EVENT SHALL DANTHERM COOLING, INC. ACCEPT ANY SHIPMENT WHICH DOES NOT COMPLY WITH THE ABOVE PROCEDURES.

REMOVE THE CONDENSATE HOSE AND ADAPTER FROM THE BOTTOM OF THE UNITS PRIOR TO DISMANTLING THE AIR CONDITIONER AND RESTING IT ON THE GROUND.

DECLARATION OF CONFORMITY

Dantherm Cooling Inc., Spartanburg, SC hereby declare that the units PrecisionAir 50/60Hz are in conformity with the following directives:

UL 60335-1	Fifth Edition
UL 60335-2-40	First Edition
CAN/CSA-C22.2 No. 60335-1-11	First Edition
CAN/CSA-C22.2 No. 60335-2-40	First Edition

Spartanburg, SC - September.20.2018

Recycling: The unit should be recycled according to national rules and procedures to protect the environment. Please consult your local authorities for further information.