T Series Direct Drive

Operation, Startup and Maintenance Manual

Engineered for Reliability & Performance

Project Name: _____

Completion Date: _____

Model Number	Serial Number

Table of Contents

Field Startup Check list. Return to Thermotech to activate Warranty.

Introduction and Definitions

This manual is intended as a guide to the proper operation and maintenance of Thermowheel ® T Series assembled energy recovery units. Please read these instructions prior to operating the equipment. These units are intended to be used in air handler units.

Thermowheels ® are designed to operate effectively for a minimum of 25 years. By following these instructions carefully you will attain the same high level of reliability. Thermotech Enterprises is not responsible for units that are damaged by improper operation or maintenance.

Definitions:

 Danger Symbol - This indicates procedures that if not followed correctly could lead to serious injury or death

 Warning Symbol - This indicates procedures that if not followed correctly could result in severe damage to the unit and potentially void the warranty.

Bearing - 2 or 4 bolt pillow block tapered roller bearing supports the load of the rotor.

Casing - The steel or aluminum structure and optional sheet metal panels that

enclose the rotor.

Hub - The central connection point for the spokes. The hub's shaft ride in the bearings.

Media - The corrugated aluminum or stainless steel substrate that provides for the heat and or moisture transfer.

Motor Mount - The hinged steel plate that positions the motor and maintains belt tension.

Motor Sheave - The sheave that the belts ride in.

Purge - The purge is an angled radial seal that uses a small amount of outside air to flush the media.

Quarter Panel - The sheet metal panels that direct the airflow through the wheel.

Rem/loc button - A control on the VFD that puts the drive in remote or local control.

Rim - The outer aluminum metal encasing the media.

Rotor - The rotating portion of the heat recovery wheel.

Seals - The combination rubber and aluminum sections that seal the airstreams.

Spokes - The radial supports connecting the hub to the rim.

Speed Reducer - The speed reducer bolts to the motor and turns down the motor RPM.

TE - Thermotech Enterprises

Start-up Procedures

Pre Start-Up Checks:

⚠ Prior to start-up, check that all foreign objects, debris and tools are removed from the AHU and the fans are off. Thermotech is not responsible for damage to the wheel or other components if the start-up procedure is not followed.

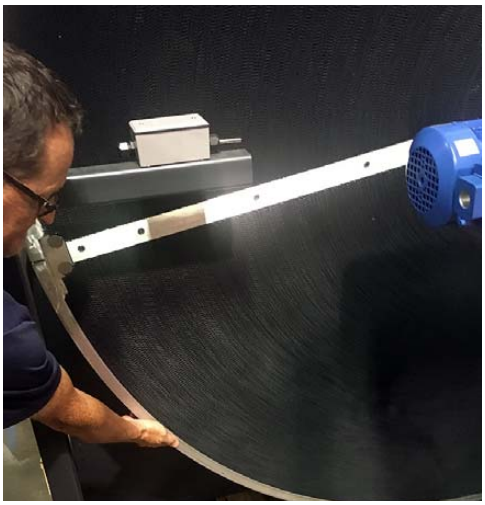
Factory Service Start-Up Procedure for T Series Energy Recovery Wheels

There is a startup checklist that must be followed and each item completed to ensure proper wheel operation. Please refer to the checklist and once completed return the check list to Thermotech Enterprises. The checklist is provided as a pdf. If you do not have a checklist contact TE and one will be provided.

Direct Drive:

1. Torque Arm installed on bracket with some play between rubber bushings.

2. Rotate the wheel a minimum of one full revolution. The seals are non-contact. If the wheel does not rotate freely it may be due to the wheel being in contact with the seal. If seal drag is noted refer to the seal adjustment procedure on page 8. If the wheel cannot be turned by hand contact TE.



Rotor: Hand Rotation Test.

3. Refer to page 5 start drive at minimum speed and note if there is any rub between rotor and seals. If wheel does not turn contact the Thermotech factory.

Purge Angle:

4. If the unit is supplied with an adjustable purge, determine the proper purge angle from the ordering code on the unit nameplate or the specific data for your project. Ensure proper purge angle setting is correct by visual inspection. The minimum purge angle is 1 degree. There are 10 adjustment points in one degree increments. Refer to page 9 and verify that the purge angle adjustment bolt is in the correct adjustment hole.

Initial Lubrication:

5. Grease bearings using Dow Corning Molykote BR2-plus Lithium based high pressure grease. Apply the grease to the fitting while turning wheel until a slight amount of grease is purged. Remove visible grease residue from the bearing. The bearings are filled with grease prior to shipment. This step may be required if the units have been idle on the job site for more than 6 months.

6. Put belts back on pulley.

VFD and Motor pre-checks:

7. If the unit is provided with a VFD, verify the motor is wired for the correct voltage provided by the VFD.

Final Pre-Start-Up Guide:

 During the following procedures the AHU systems fans will be on and the heat wheel drive will be energized. Only qualified personnel with experience in the operation of large rotating machinery should be involved with these procedures.

 Only qualified personnel with experience in the operation of high voltage motors and drives should be involved with these procedures. TE recommends that you become familiar with the operational manual for the Danfoss drive and the Distech controller manual. TE is not responsible for damage caused by improper operation and or programming of these components.

The following procedures contain references to the Danfoss FC-101 and Distech ECLYPSE Manuals. If your system is utilizing a different VFD and or controller, the start-up procedure should be performed by personnel with experience in the systems and components utilized. This guide can then be used as a framework for start-up only. Specific programming and the steps involved may be changed for the system to operate effectively.

Hard copies of the manuals are shipped in the NEMA 4 case provided for certain units utilizing the full control system.

PDF copies of these documents are available at: danfoss.com and distech-controls.com

Start-Up and VFD parameter checks:

The specific parameters for your product are pre-programmed at the factory and are available in appendix A. There should be no reason to change these parameters. The following checks should be made and are for the Danfoss FC-101 drive only. Different drives may require alternative checks and parameters.

The following steps should be performed with the fans on and set to maximum airflow in both airstreams. This will maximize the torque requirement of the motor.

9. After ensuring that no personal injury or damage to the wheel will happen when wheel begins to turn, move the circuit breaker in the control panel to the on position. If 24V is not applied to terminal 27 Hand On mode does not start the motor, connect terminal blocks 12 and 27 to start. At this time the wheel should start in <30 seconds.

Danfoss FC-101 VFD

10. Press the off button on the VFD until off is displayed. Press the hand button. Reduce the speed by pressing and holding the down arrow till the 2.0 HZ is displayed in the top left of the screen. Wait until the top line lowers to 2.0 HZ

11. Amp draw should not exceed 80% of the motor's Full Load Amperage X Service Factor from the motor name plate. Navigate to parameter 16-14 to read current motor amperage. Increase paramter 4-18 if an amperage alarm is triggered. Maximum value for parameter 4-18 is 375%.

12. Press and hold the up arrow until the HZ shown in the top left reaches maximum (parameters 3-03, 4-14, 4-19, 6-15). The HZ output takes up to 60 seconds to catch up. Wheel speed should now be approximately 20 RPM for enthalpy, 12 RPM for sensible wheels, and 18 RPH for passive wheels.

13. Check amp draw (parameter 16-14) to ensure this does not exceed FLA x SF on motor name plate. Reduce wheel speed down to min. and back to max. At no time should amp draw exceed this value.

14. Press the auto button until it displays auto. The speed of the wheel is now controlled remotely by the controller.

15. A jumper will be installed on the Distech Controller terminal blocks 16 and 17, this jumper should be removed if a remote signal is used for start/stop. Controls contractor shall wire to these terminal blocks to control start/stop of the wheel. Dependent on the specific options selected this remote start stop may be supplied as part of the control panel or be provided and wired by others.

Caution: Always disconnect main power source before working on wheel, as wheel will restart automatically after power loss when power is restored.

Start-Up and Enthalpy Controller Checks:

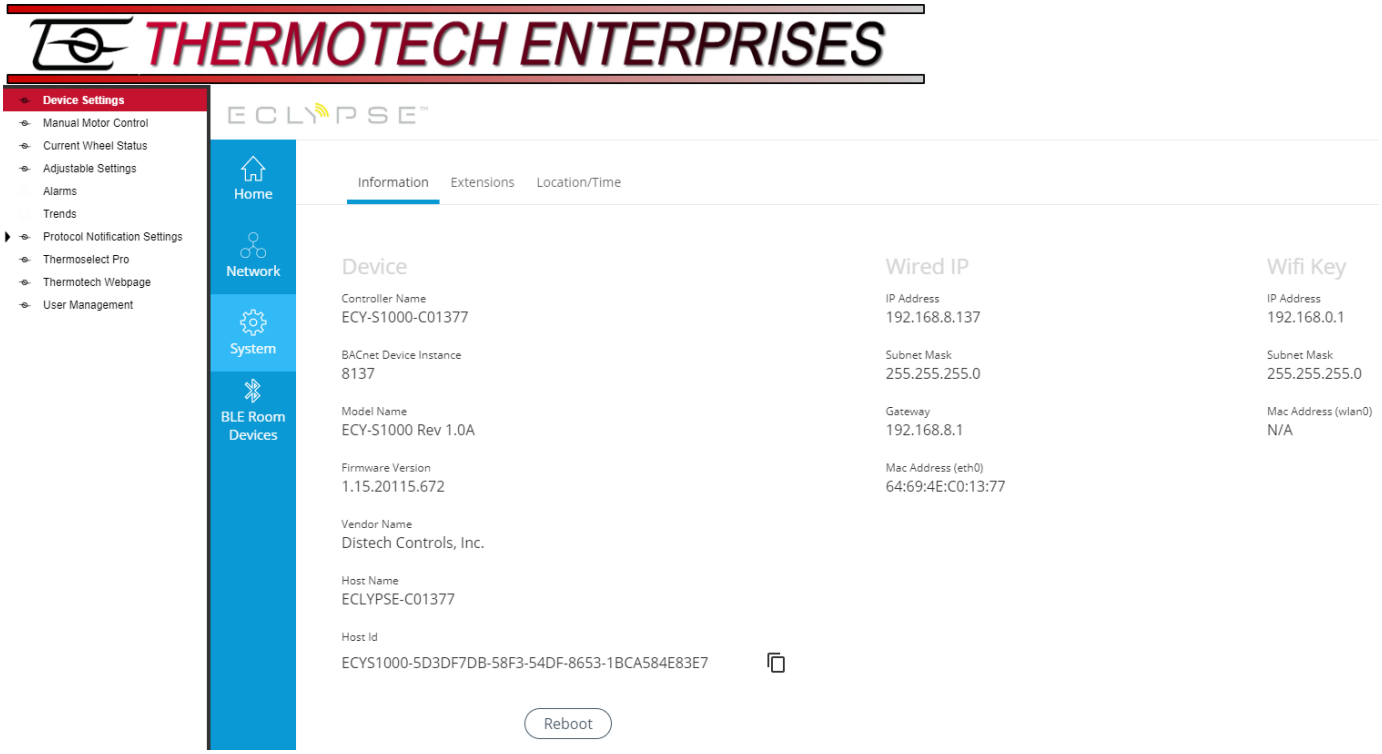
The Distech ECLYPSE is pre-programmed at the factory and is set to provide the correct sequence of operation as described on page 7 of this manual. There should be no need to change or modify any of the programming. Thermotech is not responsible for damage or improper operation caused by unauthorized re-programming.

If there is a requirement for programming changes, contact TE.

16. Verify temperature sensor wiring UI1=return air, UI2=supply air, UI3=exhaust air, and UI4=outside air are connected to the correct terminals at the Distech controller. Verify humidity sensor wiring UI5=return air, UI6=supply air, UI7=outside air are connected to the correct terminal at the Distech controller.

Distech Controller Webpage Screens:

For access to your Distech Controller's web-based interface contact Thermotech for instruction.



When logging on to the controller for the first time the first screen you see is the Device Settings, use the tab labeled Network to adjust ethernet and Wi-Fi settings for the controller.

- The far left tabs include manual motor settings, current wheel status (temperature, wheel mode, and wheel speed), adjustable settings (outlined in the controls sequence on page 7), alarms, trends, link to Thermoselect Pro, and link to Thermotech Webpage. Protocol Notification Settings is where you can find additional settings for BACnet integration. User management settings allow you to change your password. For further information contact Thermotech for detailed guide.

17. If a Rotation Sensor is part of the project, run the wheel for a minimum of 5 minutes at maximum and minimum RPM and verify that the controller is reading the correct RPM, and that the system does not go into alarm. It should be noted that an alarm condition will exist if the wheel stopped for more than 5 minutes or if any of the temperature sensors are disconnected or not properly connected.

Sequence of Operation

The controller receives temperature inputs from four air streams:

Outside Air = Outside air entering the wheel
Supply Air = Supply air, conditioned outside air leaving the wheel
Return Air = Return air from the conditioned space entering the wheel
Exhaust Air = Exhaust air temperature leaving the wheel

Sensors

Temperature sensors (4) in the Outside Air, Supply Air, Return Air and Exhaust Air
Humidity sensors (3) in the Outside Air, Supply Air and Return Air
Reed switch rotation sensor (1)

Adjustable Setpoints

Maximum Supply Air Humidity Ratio (gr/lb) Cooling Mode – The maximum Humidity Ratio the user would like the supply airstream to stay below in cooling mode. Default = 64.9 gr/lb (adjustable set point)
Maximum Supply Air Humidity Ratio (gr/lb) Heating Mode- The maximum Humidity Ratio the user would like the supply airstream to stay below in heating mode. Default = 55 gr/lb (adjustable set point)
Minimum Supply Air Humidity Ratio (gr/lb) – The minimum Humidity Ratio that the user would like the supply air stream to stay above in any mode. Default = 0 gr/lb (adjustable set point)
Maximum Supply Air Temperature (°F) Heating Mode – The maximum temperature that the supply air stream would need to stay below in heating mode. Default=55°F (adjustable setpoint).
Minimum Supply Air Temperature (°F) Cooling Mode – The minimum temperature that the supply air stream would need to stay above in cooling mode. Default=55°F (adjustable setpoint).
Minimum Exhaust Air Temperature (°F) Heating Mode – The minimum temperature that the exhaust air stream can be in heating mode before frost/condensation occurs. The minimum exhaust temperature will override the maximum heating supply air temperature. The default is 5°F, Thermoselect Pro will provide the recommended value.
Outside Air Temperature (°F) Cool Enable – Outside air temperature at which the user would like the cooling mode to be enabled, default =70°F (adjustable setpoint).
Outside Air Enthalpy (BTU/lb) Cool Enable – Outside air enthalpy at which the user would like the cooling mode to be enabled, default=25 btu/lb (adjustable setpoint).
Outside Air Temperature (°F) Heat Enable – Outside air temperature at which the user would like the heating mode to be enabled, default=40°F (adjustable setpoint).
Outside Air Enthalpy (BTU/lb) Heat Enable - Outside air enthalpy at which the user would like the heating mode to be enabled, default=13 btu/lb (adjustable setpoint).
Sleep Time (minutes) – Time wheel will be “asleep” (stopped) before it is “awaken” (run) in sleep mode, default = 30 minutes (adjustable setpoint)
Sleep Awake (minutes) – Time wheel will “awaken” (run) after being “asleep” (stopped) in sleep mode, default = 2 minutes (adjustable setpoint)

Sequence of Operation

Sequence of Operation

Cool Mode enables when:

- **Outside Air Temperature > Outside Air Temperature Cool Enable (default = 70°F adjustable**)

and

- **Outside Air Temperature > Return Air Temperature**

or it is enabled when:

- **Outside Air Enthalpy > Outside Air Enthalpy Cool Enable (default = 25 btu/lb, adjustable)**

The control outputs 10VDC to the VFD, resulting in a 20 RPM or 12 RPM rotation (wheel type dependent).

In **Cool Mode**, the wheel will modulate to maintain a **Supply Air Temperature** above the **Minimum Supply Air Temperature Cooling Mode (default = 55°F adjustable**). The control outputs 0 to 10VDC to the VFD. If the **Supply Air Temperature** is less than the **Minimum Supply Air Temperature Cooling Mode** the wheel will stop rotating. If the **Supply Air Humidity Ratio** rises above the **Maximum Supply Air Humidity Ratio Cooling Mode (default = 64.9 gr/lb, adjustable**) while in modulation mode, then the wheel will ramp up to full speed.

Heat Mode is enabled when:

- **Outside Air Temperature < Outside Air Temperature Heat Enable (default = 40°F adjustable)**
  and
- **Outside Air Temperature < Return Air Temperature**
  and
- **Outside Air Enthalpy < Outside Air Enthalpy Heat Enable (default = 13 btu/lb, adjustable)**

The control outputs 10VDC to the VFD, resulting in a 20 RPM or 12 RPM rotation (wheel type dependent).

In **Heat Mode**, the wheel will modulate to maintain a **Supply Air Temperature** below the **Maximum Supply Air Temperature Heating Mode (default = 55°F adjustable**). The control outputs 0 to 10VDC to the VFD. If the **Supply Air Temperature** is greater than the **Maximum Supply Air Temperature Heating Mode**, the wheel will stop rotating. If the **Supply Air Humidity Ratio** rises above the **Maximum Supply Air Humidity Ratio Heating Mode (default = 55 gr/lb, adjustable**) while in modulation mode, then the wheel will ramp up to full speed.

In all modes the wheel will modulate to keep the supply air humidity ratio above the set **Minimum Supply Air Humidity Ratio (default = 0 gr/lb, adjustable)**. A minimum humidity set point is used to maintain a minimum humidity level.

A **Minimum Exhaust Air Temperature Heating Mode (default = 5°F adjustable**) is used to protect the wheel from condensation and/or frost. The controller will modulate (0 to 10VDC signal to VFD) to ensure the Exhaust Airstream does not go below the set point. If the exhaust airstream goes below this setpoint, the wheel will stop rotating. The **Minimum Exhaust Air Temperature Heating Mode** overrides all other setpoints.

Sequence of Operation

Sleep Mode is enabled when:

- **Outside Air Temperature Heating Enabled (default = 40°F adjustable) < Outside Air Temperature < Outside Air Temperature Cooling Enabled (default = 70°F adjustable)**
  and
- **Outside Air Enthalpy < Outside Air Enthalpy Cool Enable (default = 25 btu/lb, adjustable)**
  or it is enabled when:
- **Outside Air Enthalpy Heat Enabled (default = 13 btu/lb, adjustable) < Outside Air Enthalpy < Outside Air Enthalpy Cool Enabled (default = 25 btu/lb, adjustable)**
  and
  Outside Air Temperature < Outside Air Temperature Cooling Enabled (default = 70°F adjustable)

In sleep mode the wheel stops rotation. **The wheel cyclically turns on for two minutes (adjustable setpoint) every 30 minutes to test air conditions.** The wheel awakes if the mode changes from Heat to Cool.

Disable – The owner may enable/disable the controls using a dry contact input or by enabling manual motor control and turning the motor to off. This stops wheel rotation completely. The wheel will not cycle on and off.

Alarms are auto resetting. An alarm cannot be reset manually but resets when its trigger is fixed. The alarms' statuses are available on the alarm tab of the web interface for:

Temperature Probes – The controller checks the temperatures are within range and if there is a fault with the temperature probes.

Rotation Alarm – User has the ability to set a low speed alarm trigger, if the wheel falls below this speed for five minutes and it is not in Sleep or Off mode than this alarm will trigger, default = 2 RPM.

Humidity Sensors – the controller checks the humidity levels are within range.

How the alarm functions for different modes:

	Cool and Heat	Sleep	Disabled
Temperature Sensor	Active	Active	Active
Rotation Sensor	Active	Ina	Inactive
Humidity Sensor	Active	Active	Active

Wheel Rotational Speed – RPM is sensed using a sensor that closes once per revolution. Rotation updates every 30 seconds.

Post Start-Up Checks

Post Start-Up Check List:

A visual inspection of all 4 quadrants of the heat wheel is a good last step. Check that all tools and other equipment are removed.

At this point the Thermowheel ® should be functioning smoothly.

Seal Adjustment Procedure

Seal Adjustment Guide:

The seals are set at the factory and should not require adjustment. If the seals are rubbing on the media face, due to installation or other factors, the seals will need to be adjusted.

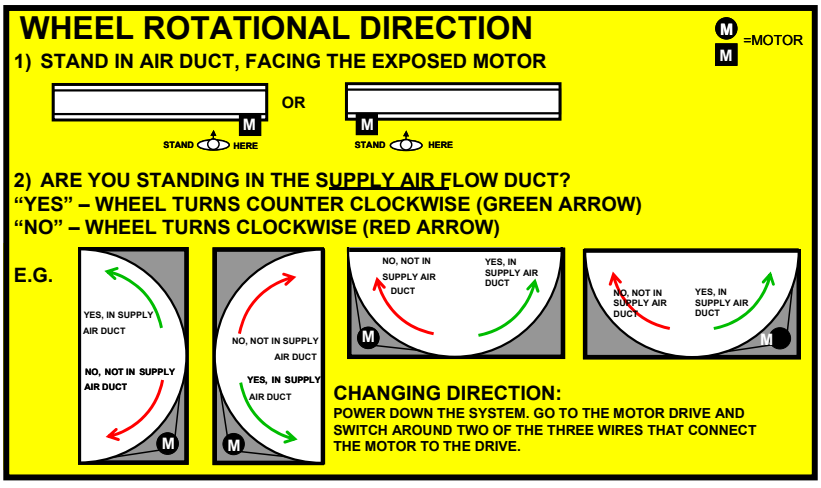
First, rotate the wheel one full revolution and determine where the wheel media face is rubbing on the seal. Working on one seal quadrant at a time, loosen the seal Tek screws. Then, move the seal away from the wheel surface until no more rubbing is noticed.

Loosening of Tek screws prior to seal adjustment.

A typical large diameter wheel will have a flatness variation of 1/16” from the high to the low point of the wheel surface. If the seals are adjusted correctly, the seal gap will vary that much as the wheel turns, but it should never be touching the wheel surface.

Wheel Rotation Check:

Use the directions to the right to determine the correct direction of wheel rotation. If the direction is incorrect, follow the instructions to change the motor wiring



Purge Adjustment Procedure

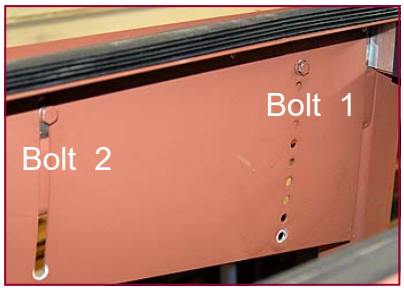
Refer to specific project data to determine if the purge angle is preset or needs to be adjusted after install. Contact Thermotech if you need to determine the proper purge angle.

Note: The wheel motor and systems fans should be off while performing this procedure. Care should be taken while working around the media so no damage is done to the media face.

Purge Adjustment For TF Series Wheels:

The purge angle can be adjusted with each purge setting hole equal to one degree. The bolts that position the purge angle are located on the backside of the purge and are not visible. First loosen bolt 2 and 3. Then remove the bolt 1. The whole purge section is then movable to a new location. Re-install bolt 1 in the new hole location and re-tighten all the bolts.

Purge angle detail showing bolt locations on front side of purge.



Purge angle detail showing bolt locations on back side of purge with no media or rotor installed.

MAINTENANCE PROCEDURES:

Rotor Bearings:

The main rotor bearings have been sized for an L-10 life of a minimum of 25 years; operating 24 hours per day, 7 days a week. The main reason for a main bearing to fail would be a lack of lubrication or hardening of existing grease in the bearing due to evaporation or by penetration of moisture causing corrosion. The bearings are filled with grease at our factory or at the time of start-up to eliminate a future failure. A small amount of grease should be added every 6 months in order to maintain fresh grease inside the bearing. Any excess purged grease needs to be wiped off to avoid it getting blown on to the wheel surface.

All our bearings are greased with a Dow Corning Molycote BR2 Plus Grease which is available through most bearing distributors or from McMaster-Carr Supply Co.

Drive System:

The motor does not require any maintenance and has permanently lubricated bearings.

Cleaning:

The wheel media does not require any cleaning under normal operating conditions. The key is to make sure the wheel is always turning in order to utilize the counter flow airstreams and the purge sector to keep the media clean. Over the years there might be some accumulation of dirt on the face of the media but the inside will remain clean.

The best method to clean is to brush the surface on the air discharge side with the airflow on or by using a vacuum cleaner. If the wheel is severely clogged contact Thermotech.

Troubleshooting

All Thermotech products are tested at the factory and should function normally upon start-up. In the unlikely event of a problem here are some basic troubleshooting steps.

Do not hesitate to contact TE for assistance with any of these issues.

Symptom	Solution
Wheel Does Not Turn	If a Distech controller is provided, depending on the software version, the wheel may be in sleep mode. This is a normal condition for sleep mode. If a remote enable / disable is provided check that it is enabled. If not provided check that a jumper is installed per the wiring diagram. Check circuit breaker. Visual inspection to confirm belts are on the sheave and the rotor. With breaker off, follow steps on page 3 to check that the wheel can rotate by hand. If wheel moves freely, check that the motor and speed reducer can be rotated by hand. If either the wheel or motor will not turn contact TE. Restore power. Verify proper power to VFD. Verify proper power to motor. and connections. If motor is energized and not turning, contact TE.
Wheel Rotation Direction Incorrect.	Reverse power connections to motor.
Noise	Some minor noise should be expected as the wheel spokes pass the lateral or vertical seals. If there is a constant scraping or intermittent scraping, this could be seals rubbing on the rotor. Refer to page 3 to check free rotation of the rotor. If there are other loud or unexpected sounds or vibrations, contact TEI.
Wheel RPM Incorrect	For variable speed wheels. An enthalpy wheel should operate in a range from 20 to 1/2 RPM. A sensible wheel should operate in a range from 12 rpm to 1/3 RPM. Refer to page 7 and verify that the sequence of operation is correct. Check sensor wiring, controller and VFD connections. If wheel is still at incorrect RPM, contact TE.
Wheel RPM Readout Incorrect	On units with a rotation sensor, if the sensor is not reporting accurate RPM. First determine actual wheel RPM with a stopwatch. Compare this to the readout. The rotation sensor should be within 1/8” of the target to accurately report RPM. If read out is still incorrect, contact TE. The rotation sensor can have a lag time of up to 5 minutes in reporting correct RPM.
Incorrect Temperature Readings	Verify sensor wiring. Verify sensor location. The supply and exhaust sensor location are critical for accurate readings. Refer to the installation manual for correct sensor location.
High air loss.	Check seals refer to page 8 for seal adjustment procedure. Other causes for high air loss may be due to problems in the AHU.
High pressure drop	Check wheel face for obstruction and fouling. If the wheel face is clogged, it may be cleaned by brushing the surface with the airflow on or by using a vacuum cleaner.

APPENDIX A

- Warranty Statement
- ABB VFD Programming Changes
- Wiring Diagram
- BACnet Settings and Points Access Guide

TF and TR Series 10 YEAR PARTS & LABOR WARRANTY

TC Series 3 YEAR PARTS & LABOR WARRANTY

This warranty covers the items listed in this manual and starts on the date listed on the cover of this manual.

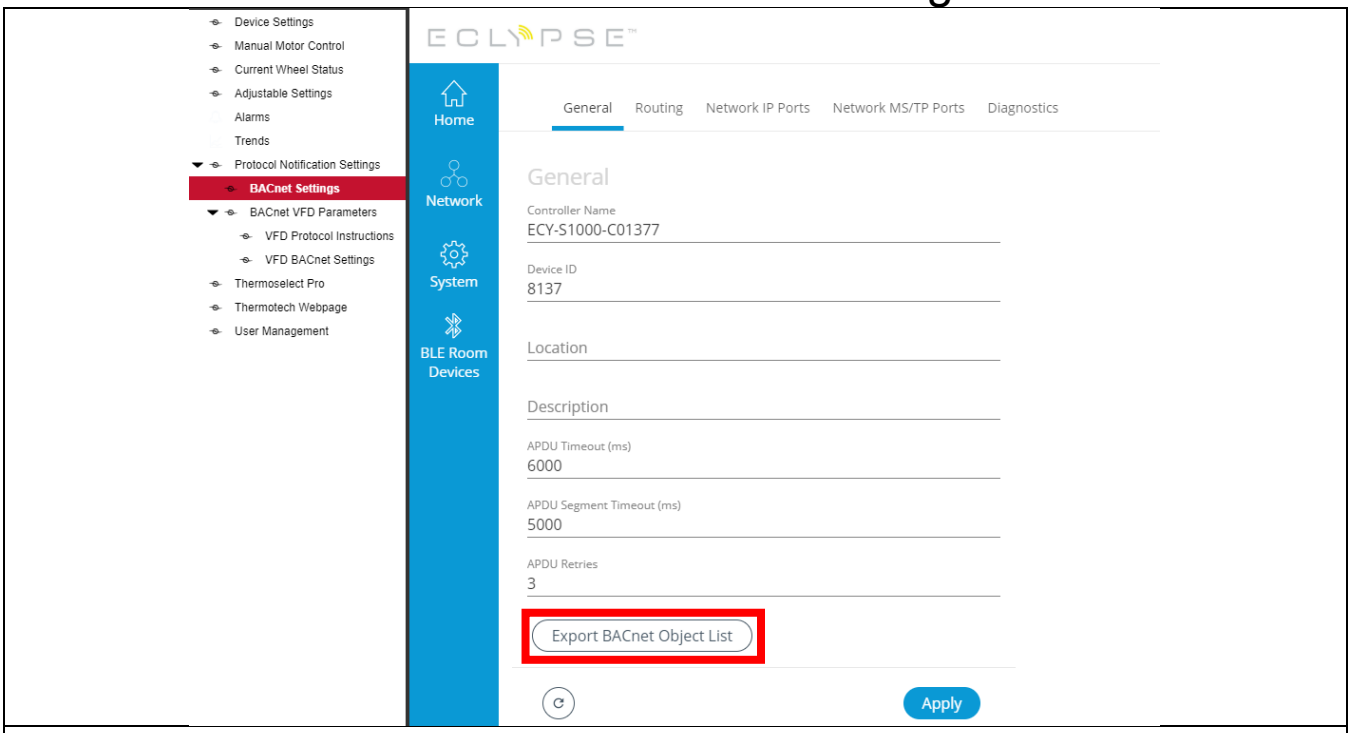
Warranty Statement:

This warranty includes all* equipment as stated herein, materials, and workmanship associated with the energy recovery wheels and accessories provided and installed by Thermotech. All material is warranted to be free from defects in material and workmanship when used in a proper and normal manner. Should any failure to conform to the above appear within the warranty period, Thermotech Enterprises shall upon prompt notification and confirmation that the product has been stored, installed, started, operated, and maintained properly, and in accordance with the THERMOWHEEL® OWNERS MANUAL and STARTUP CHECKLIST, correct the non-conformity at Thermotech's option, either by repairing any defective part or by providing a repaired or replacement part. Installation labor where applicable, will be provided at no additional cost to the owner.

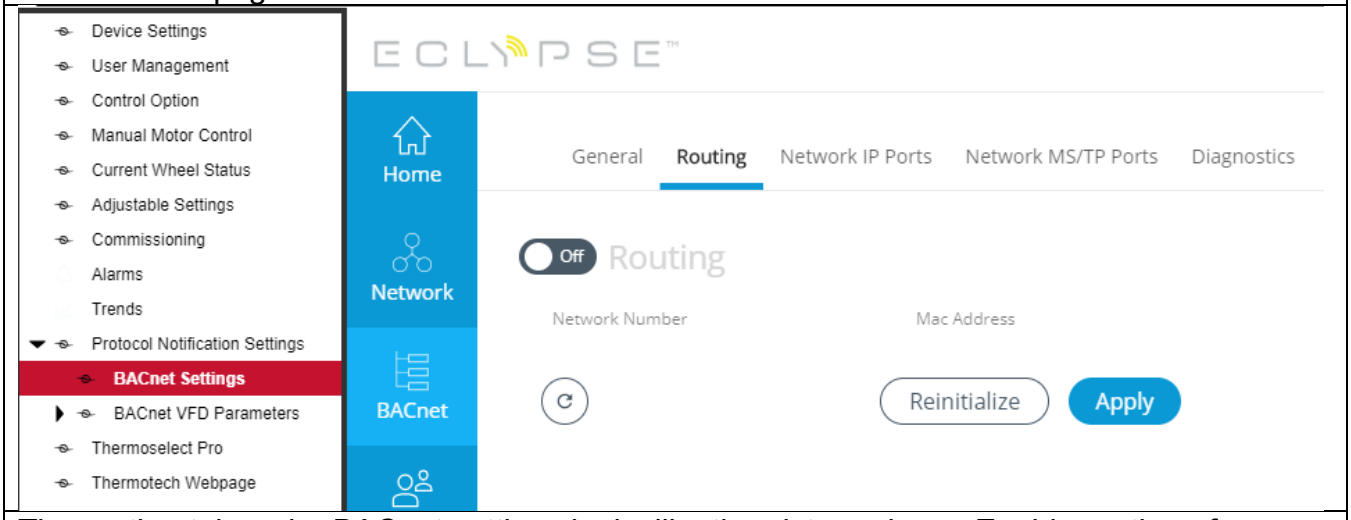
The completed startup checklist must be returned to Thermotech Enterprises within 30 days of unit on site operation to activate warranty.

* This warranty applies to drive and control components when purchased and assembled by Thermotech. If control components and/or variable frequency drive are provided by others, Thermotech will provide motor manufacturer standard warranty only.

Distech Controller BACnet Settings Guide

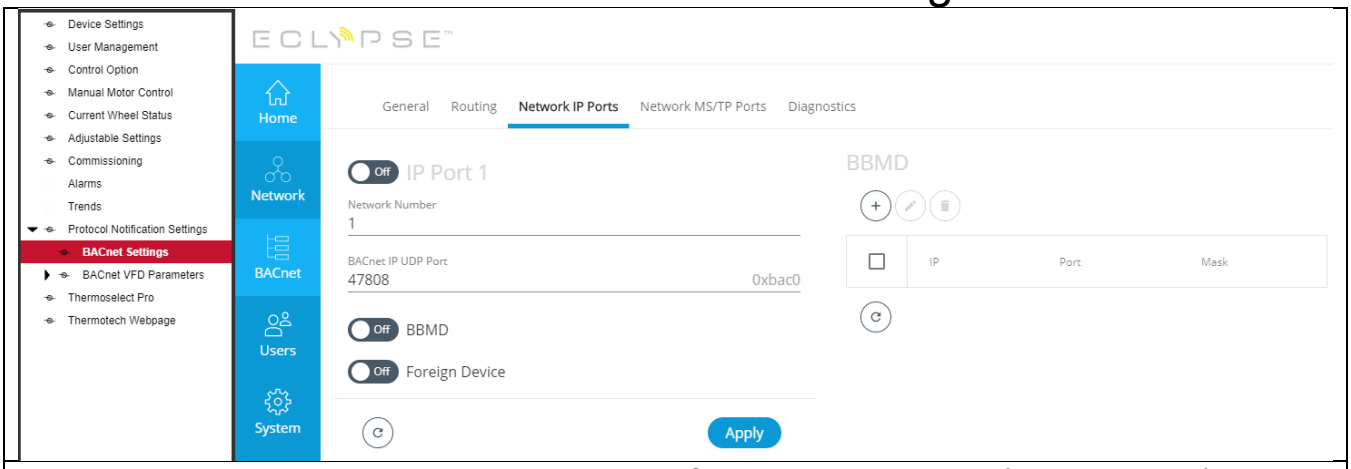


After logging onto the controller, click the drop down arrow next to Protocol Notification Settings on the left side of the page. Then click BACnet Settings, page should like picture above. To access the list of BACnet Object, click Export BACnet Object List towards the bottom of the page.

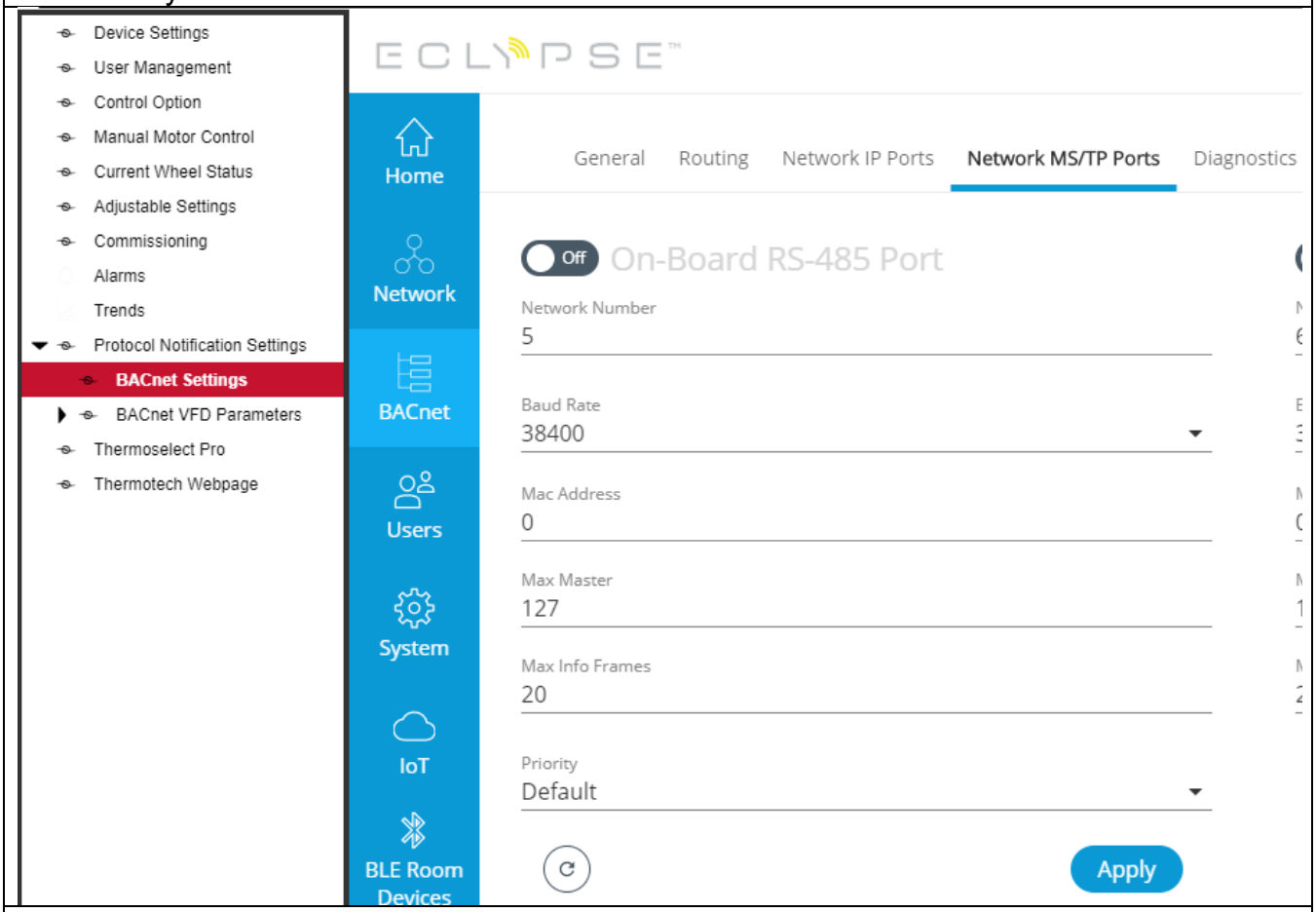


The routing tab under BACnet settings looks like the picture above. Enable routing of BACnet packets between BACnet MS/TP controllers connected to the ECLYPSE Connected System Controller's RS-485 port and BACnet/IP controllers connected to the ECLYPSE Connected System Controller's Ethernet Switch ports.

Distech Controller BACnet Settings Guide



Network IP Ports - This sets the IP network configuration parameters (on-board port) as well as the BACnet Broadcast Management Device (BBMD) and Foreign Device for intranetwork connectivity.



Network MS/TP Ports – Controller supports one RS-485 port, default settings are shown above.

For further information visit distech-controls.com.

THERMOTECH ENTERPRISES

DC-EG-006

Rev. 2/10/16

THERMOWHEEL FIELD STARTUP CHECK LIST FOR T SERIES-Units

PROJECT NAME:	**DATE:**	
CITY & STATE:	**A.H.U. #:**	
TEI MODEL #:	**SER #:**	
REFER TO THE OM FOR THE FOLLOWING STEPS, SPECIFIC SETTINGS ARE IN THE APPENDIX (PAGE #17 OM)		
VFD VOLTAGE : PHASE:		
DESCRIPTION OF STARTUP STEP	**COMPLETED BY:**	**COMMENTS OR TORQUE VALUE USED**
VERIFY MOUNTING ARRANGEMENT AND CORRECT INSTALLATION		
WHEEL ROTATION BY HAND TEST (PAGE #3 OM)		
SEAL CHECKED FOR RUBBING (PAGE #3 OM)		
WAS RE-ADJUSTMENT OF SEALS REQUIRED (PAGE #8 OM)		
SIDE SEAL CHECK (PAGE #3 OM)		
SEALS SET TO WITHIN 0.06" TO HIGH POINT OF WHEEL (PAGE #8 OM)		
PURGE ANGLE CHECK (PAGE #9 OM)		
WAS RE-ADJUSTMENT OF BEARINGS REQUIRED (PAGE #3 OM) NOTE: BEARING BOLT SIZE AND TORQUE VALUE USED		
CHECK PILLOW BLOCK BEARING SET SCREWS ARE TIGHTENED		
TOP OFF BEARINGS WITH BR2+ LITHIUM BASED GREASE		
VERIFY GREASE PURGES FROM BEARING AND REMOVE EXCESS		
SECONDARY SPOKES INSTALLED / TIGHT AGAINST PRIMARY SPOKES		MAX TORQUE LIMIT 40 FT.LBS.
RIMS PULLED TIGHT AND RIM BOLTS TORQUED TO 60-70 FT.LBS.		
OVERALL ROTOR & MEDIA ROTATION FLATNESS OF +/- 1/32 "		
VERIFY MOTOR WIRED FOR CORRECT VOLTAGE (PAGE #4 OM)		
MOTOR INSTALLED WITH LOVE-JOY COUPLING CHECKED		
CHECK MOTOR BASE BEARING SET SCREWS ARE TIGHTENED		
BELT INSTALLED WITH PIN IN LOCKED POSITION WITH ANTI-SEIZE		TO PROTECT IT FROM CORROSION
CHECK BELT ALIGNMENT BETWEEN WHEEL AND SHEAVE GROOVES		
ROTATION SENSOR MOUNTED AND CHECKED OUT		
START WHEEL IN LOCAL MODE		
VERIFY WHEEL ROTATION DIRECTION (PAGE #8 OM)		
RECORD RPM @ MIN @ MAX (PAGE #8 OM)		CHECK WITH STOP WATCH
FOLLOWING TESTS WITH FANS @ MAX RATED AIRFLOW		TURN ON FANS
RECORD AMPS @ MIN @ MAX (PAGE #5 OM)		NOTE VFD MANUFACTURER AND MODEL
ROTATION SENSOR READING @ MIN @ MAX		FOR UNITS WITH ROTATION SENSOR ONLY
RUN UNIT FOR 5 MIN. @ MIN VERIFY NO ROTATION ALARM		FOR UNITS WITH ROTATION SENSOR ONLY
SET VFD TO REMOTE OPERATION		
VERIFY ALL TEMP READINGS		FOR UNITS WITH CONTROLER ONLY
OA= RA= SA= EA= (PAGE #6 OM)		FOR UNITS WITH CONTROLER ONLY
NOTE MODE OF OPERATION COOL, HEAT, SLEEP		FOR UNITS WITH CONTROLER ONLY
VERIFY UNIT IS MODULATING WHEEL SPEED TO ATTAIN SA SET POINT		IN COOLING MODE MAX SPEED ONLY WILL NOT ATTAIN SET PT.
PLEASE RETURN CHECKLIST TO Thermotech ATTN: STARTUP		jdfeeley@thermotech-usa.com
NOTE ANY PROBLEMS:		
	TECHNICAN:	
STARTUP COMPLETE	**CUSTOMER:**	

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