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Defrost Controller Quick Start Guide

Brochure R-230



ENGINEERING YOUR SUCCESS.

Defrost Controller

Product Information, Features, and Defrost Cycle



Product Description

The Refrigerating Specialties defrost controller is a powerful, yet user friendly, device for controlling the sequence of events that occur during system defrost cycles. The controller may be applied to both industrial and commercial refrigeration systems, and is suitable for use on hot gas, electric, or water defrost applications.

Product Features

- Digital display
- Wide range of programmable features
- Easily upgradable to new versions of software
- Three selectable defrost initiation and termination modes
- Real time 24 hour digital clock
- 30 day time/date/day retention after power failure
- Weekend/holiday energy-saving schedules
- Settings stored indefinitely in nonvolatile memory
- RS485 communication port
- Operating temperature range 5°F to 120°F (-20°C to 50°C)
- UL/CSA/CE Approval

Basic Operating Modes

The Refrigerating Specialties defrost controller operates in any of the three basic modes below.

Normal Operation: Defrost cycles occur according to any of the initiation and termination modes.

Initiation modes: 24 hour / constant interval, constant interval, exact time, liquid feed time, remote, 24 hour / constant / remote, constant remote, or exact remote.

Termination modes: Time, time / temperature, or time remote

Weekend Operation: Allows the user to specify a special schedule to occur once each week for 1-3 days. At the end of the weekend, the normal schedule resumes. Weekend operation only works in conjunction with 24 hour / constant interval initiation.

Holiday Operation: Allows the user to specify a holiday schedule that occurs one-time only for a period of one to six days. At the end of the holiday schedule, either the normal or weekend Schedule will resume, depending on the day of the week. Holiday operation observes the defrost frequency programmed for weekend operation.

Within each of these operating modes, the controller will initiate or terminate defrost cycles based on a variety of criteria.

Defrost Cycle

The Refrigerating Specialties defrost controller will go through the following sequence when initiating a defrost cycle.

Pump Out Cycle: This prepares the evaporator for defrost by allowing the liquid refrigerant in the evaporator to be pumped or drained out through the suction line. The length of this pump out cycle is user defined, and can vary from 1 to 30 minutes.

Soft Gas Cycle (optional): The soft gas cycle reduces the likelihood of damaging pressure shocks on the evaporator coil. The length of this soft gas cycle is user defined, and can vary from 0 to 15 minutes.

Hot Gas Cycle: The length of the hot gas cycle is user defined, and can vary from 1 to 45 minutes. This cycle may also be terminated before the time expires by an analog temperature measurement that has reached its pre-set limit, or a closed remote contact.

Equalization Cycle: The equalization phase can reduce or eliminate system disruptions and sudden compressor loading caused by warm refrigerant being quickly released into the system, as well as a reduction of vapor propelled liquid. The length of this equalization cycle is user defined, and can vary from 1 to 60 minutes.

Fan Delay Cycle: This allows any remaining droplets of water on the evaporator coil to freeze, so they are not blown into the refrigerated space upon fan start up. The length of the fan delay is user defined, and can vary from 1 to 5 minutes.

For more defrost controller technical and programming information please see bulletin 90-00, available on the Parker web site:

www.parker.com/refspec

Liquid Recirculation Hot Gas Defrost, Top Feed

Defrost Controller Wiring Diagram

When defrost is initiated, the hot gas will flow through the piping in the drain pan, and into the inlet of the evaporator coil. Since the liquid solenoid valve and suction stop solenoid valve have been closed by the defrost controller, the hot gas will flow through the evaporator coil passing through the defrost relief regulator with electric wide opening. The hot gas will then be routed downstream of the suction stop solenoid valve.

The Refrigerating Specialties defrost controller will go through the following sequence when initiating a defrost cycle.

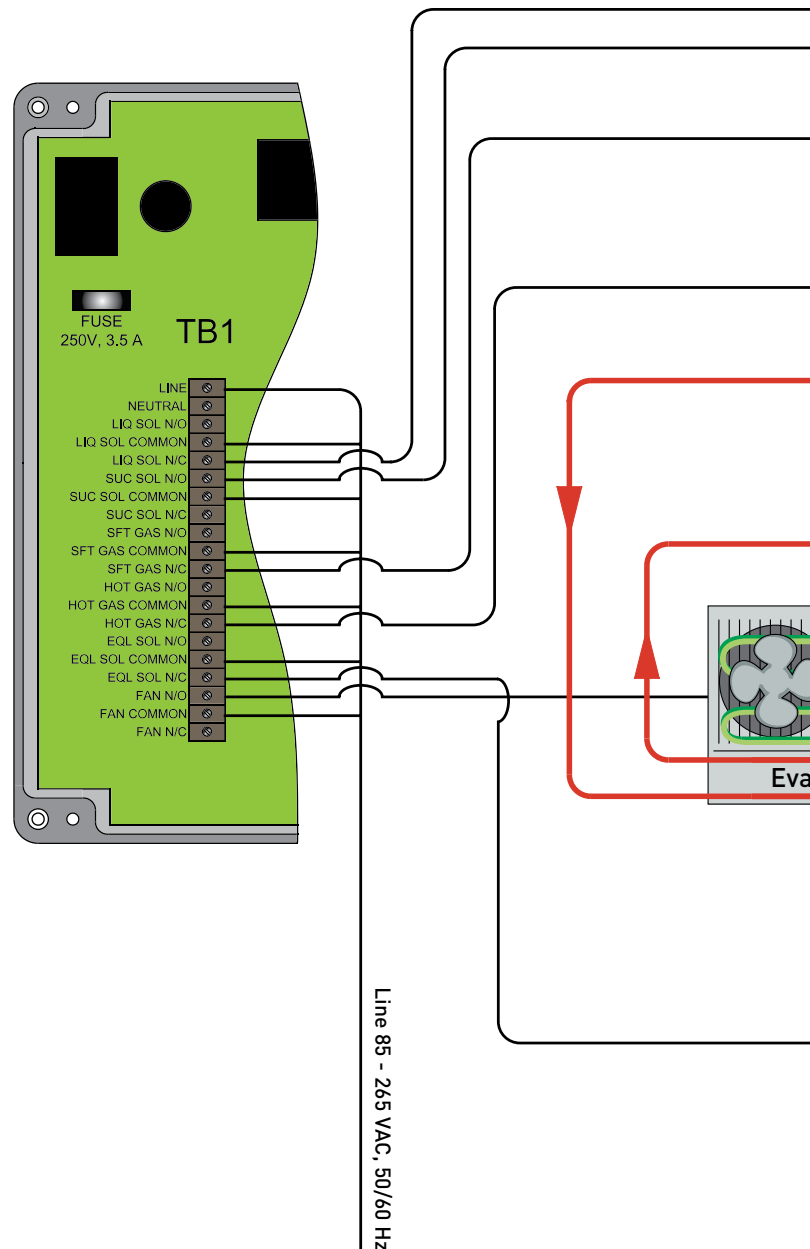
Pump Out Cycle: The first cycle consists of de-energizing the solenoid coil on the normally closed liquid line solenoid valve, allowing it to close.

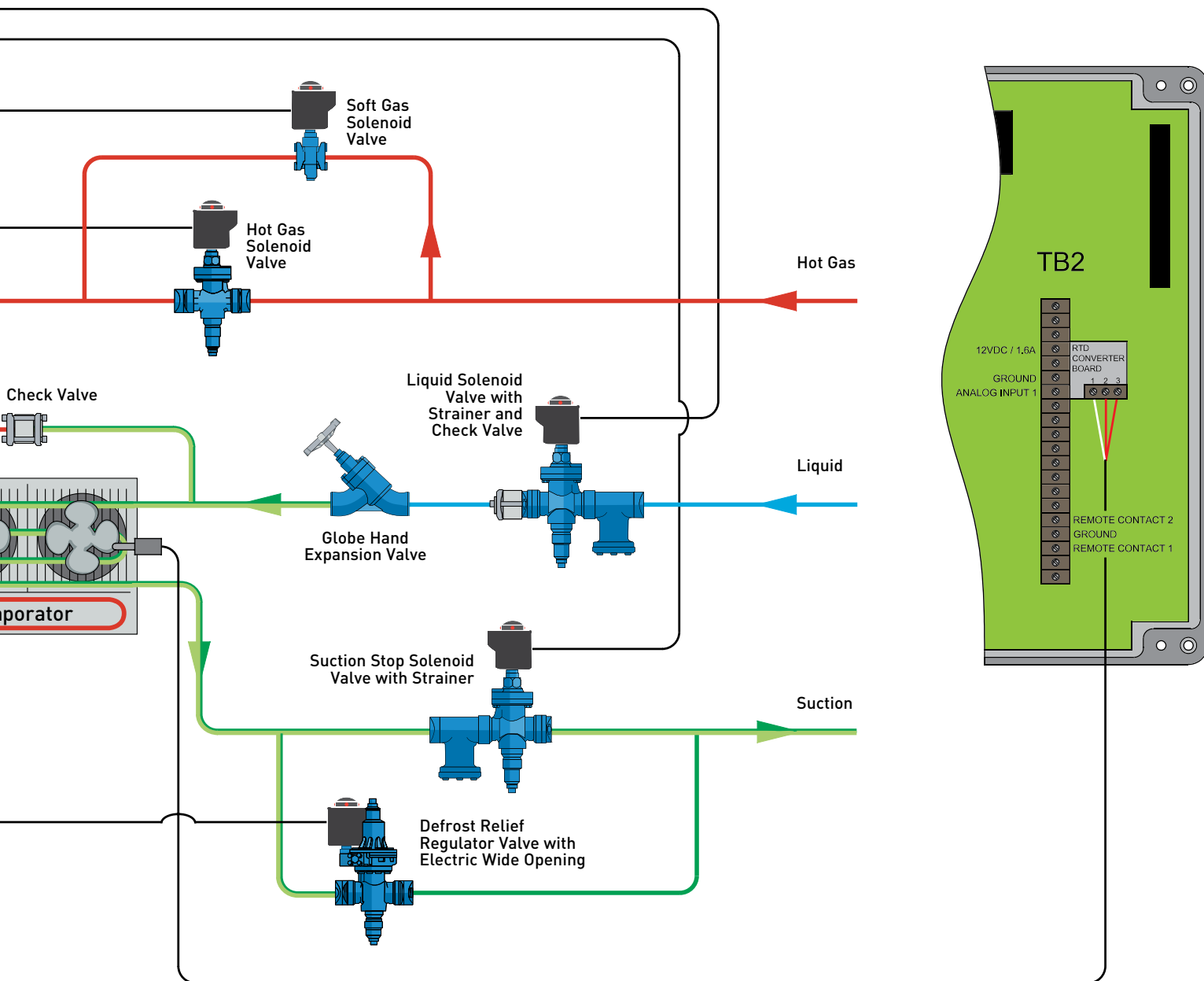
Soft Gas Cycle: In the second cycle, the evaporator fans are turned off and the solenoid coil is energized on the normally open suction stop solenoid valve, allowing it to close. Then the soft gas is initialized by energizing the solenoid coil on the normally closed soft gas solenoid valve.

Hot Gas Cycle: The third cycle begins the full flow of hot gas by energizing the solenoid coil on the normally closed hot gas solenoid valve, and de-energizing the solenoid coil on the normally closed soft gas solenoid valve. This sequence allows the opening of the hot gas solenoid valve and closing of the soft gas solenoid valve.

Equalization Cycle: In the fourth cycle, the solenoid coil on the normally closed hot gas solenoid valve is de-energized, allowing it to close. Then the solenoid coil on the defrost relief regulator with electric wide opening is energized, starting the equalization cycle.

Fan Delay Cycle: In the final cycle, both solenoid coils on the normally closed suction stop solenoid valve and defrost relief regulator with electric wide open are de-energized, allowing the suction stop solenoid valve to open, and the defrost relief regulator with electric wide open to close. The liquid solenoid valve is opened, resuming refrigeration. Once the time has expired for the user defined fan delay, the fans will resume operation.





Liquid Recirculation Hot Gas Defrost, Bottom Feed

Defrost Controller Wiring Diagram

When defrost is initiated, the hot gas will flow through the piping in the drain pan, and into the outlet of the evaporator coil. Since the liquid solenoid valve and suction stop solenoid valve have been closed by the defrost controller, the hot gas will flow in the reverse direction through the evaporator coil passing through the defrost relief regulator. The hot gas will then be routed downstream of the suction stop solenoid valve.

The Refrigerating Specialties defrost controller will go through the following sequence when initiating a defrost cycle.

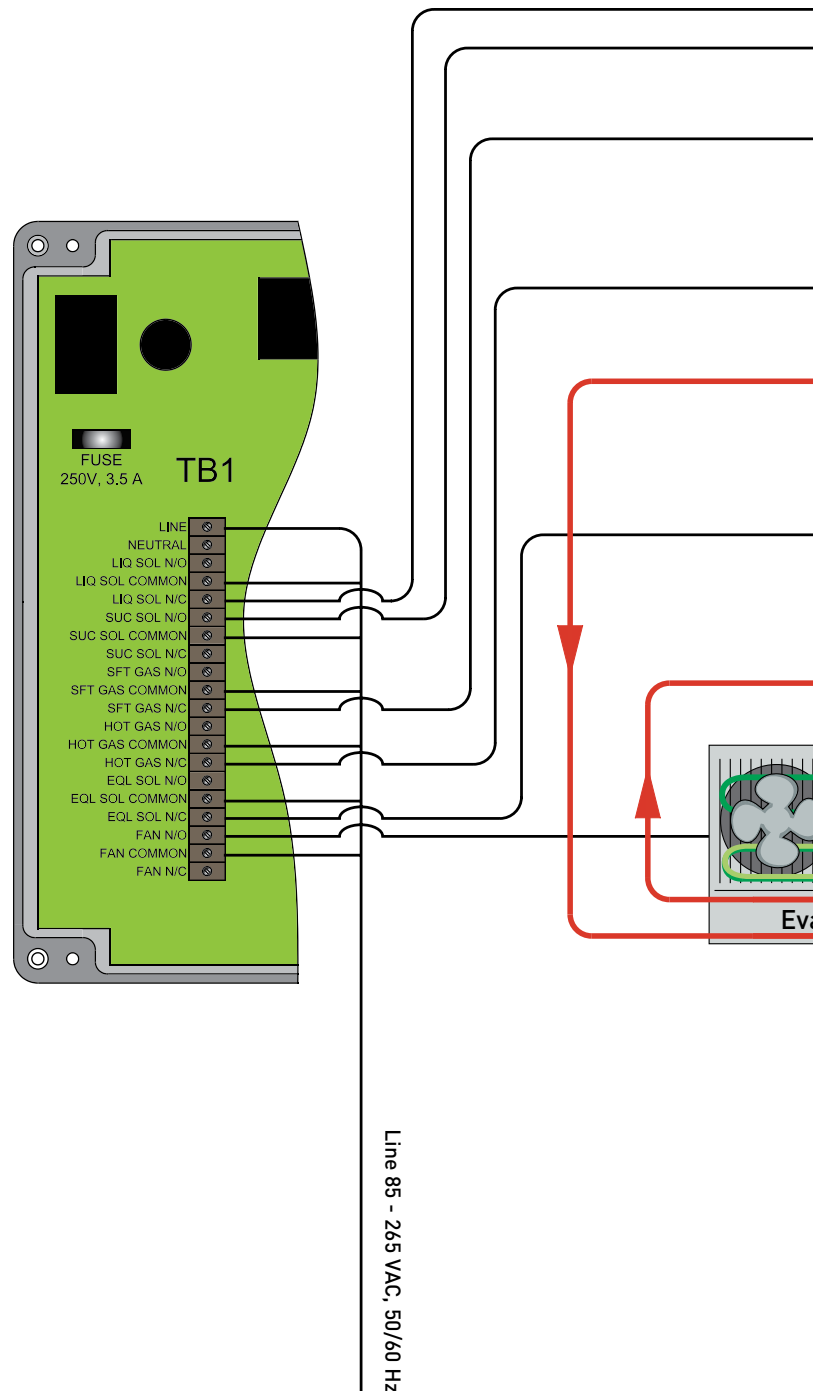
Pump Out Cycle: The first cycle consists of de-energizing the solenoid coil on the normally closed liquid line solenoid valve, allowing it to close.

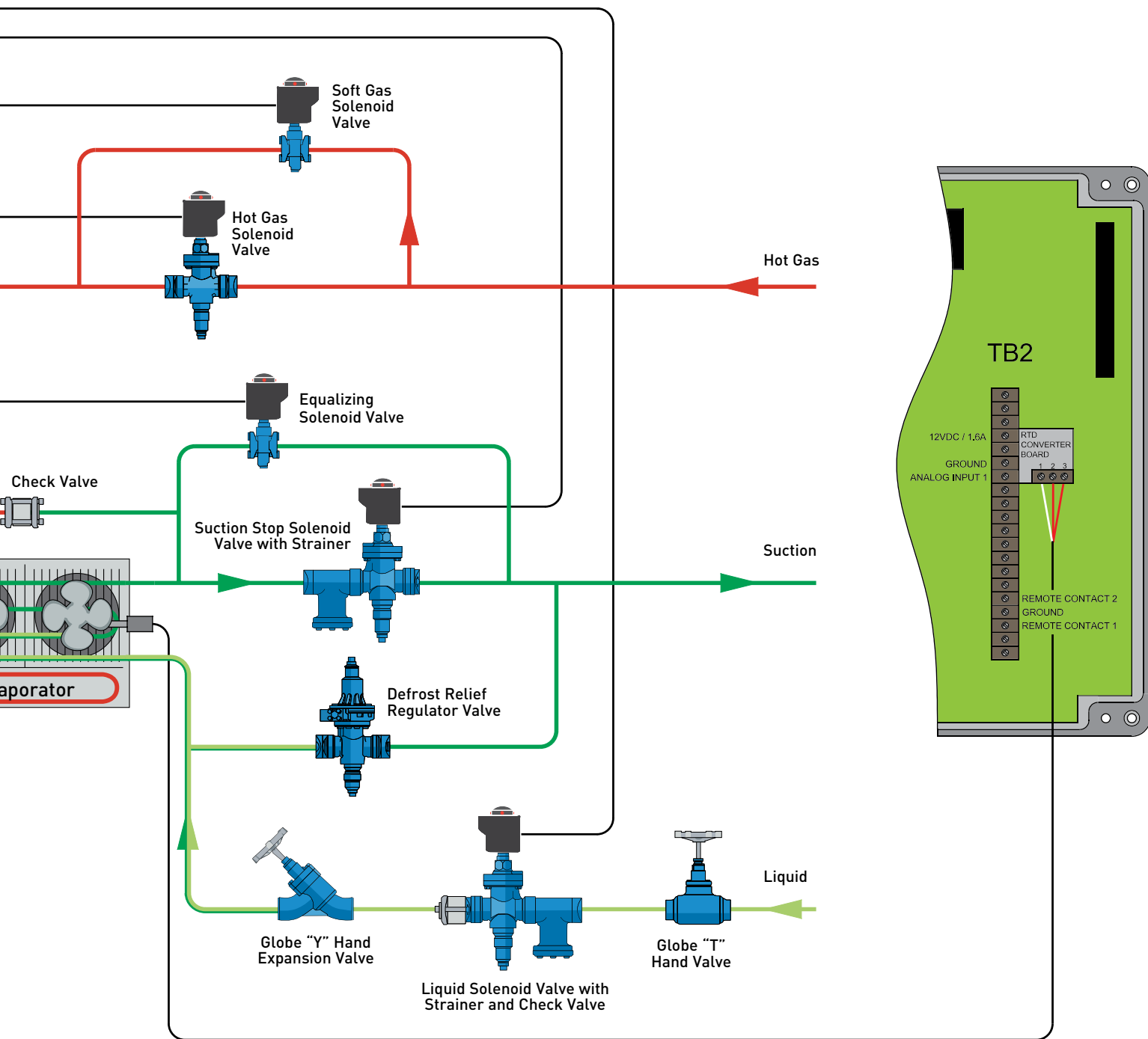
Soft Gas Cycle: In the second cycle, the evaporator fans are turned off and the solenoid coil is energized on the normally open suction stop solenoid valve, allowing it to close. Then the soft gas is initialized by energizing the solenoid coil on the normally closed soft gas solenoid valve.

Hot Gas Cycle: The third cycle begins the full flow of hot gas by energizing the solenoid coil on the normally closed hot gas solenoid valve, and de-energizing the solenoid coil on the normally closed soft gas solenoid valve. This sequence allows the opening of the hot gas solenoid valve and closing of the soft gas solenoid valve.

Equalization Cycle: In the fourth cycle, the solenoid coil on the normally closed hot gas solenoid valve is de-energized, allowing it to close. Then the solenoid coil on the normally closed equalizing solenoid valve is energized, starting the equalization cycle.

Fan Delay Cycle: In the final cycle, both solenoid coils on the normally open suction stop solenoid valve and normally closed equalizing solenoid valve are de-energized, causing the suction stop solenoid valve to open, and the equalizing solenoid valve to close. The liquid solenoid valve is opened, resuming refrigeration. Once the time has expired for the user defined fan delay, the fans will resume operation.





Liquid Recirculation 4 - Pipe System

Defrost Controller Wiring Diagram

When defrost is initiated, the hot gas will flow through the piping in the drain pan, and into the outlet of the low temperature evaporator coil. Since the liquid solenoid valve and suction stop solenoid valve have been closed by the defrost controller, the hot gas will flow in the reverse direction through the evaporator coil passing through the defrost relief regulator. The refrigerant mixture will then be routed into the high temperature suction line.

The Refrigerating Specialties defrost controller will go through the following sequence when initiating a defrost cycle.

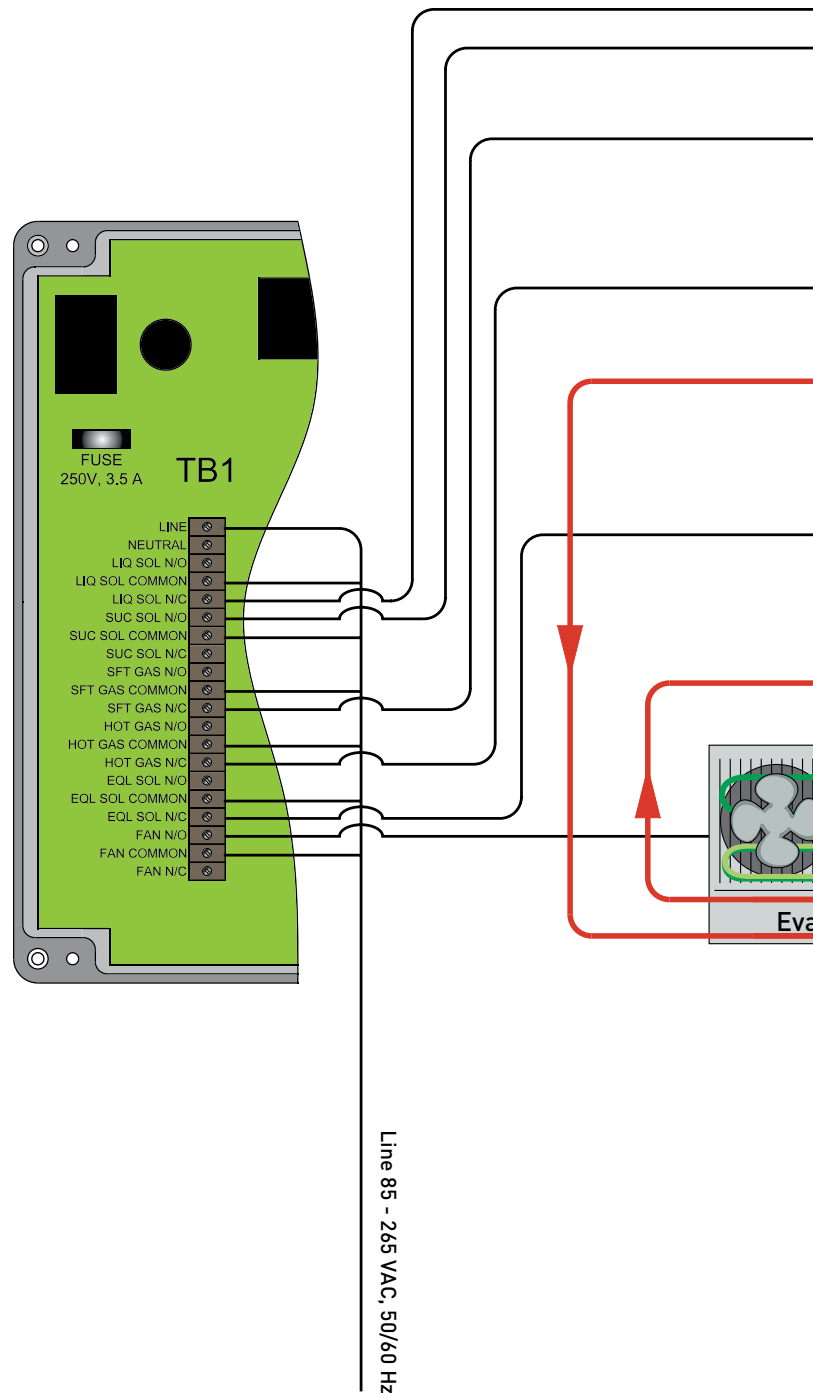
Pump Out Cycle: The first cycle consists of de-energizing the solenoid coil on the normally closed liquid line solenoid valve, allowing it to close.

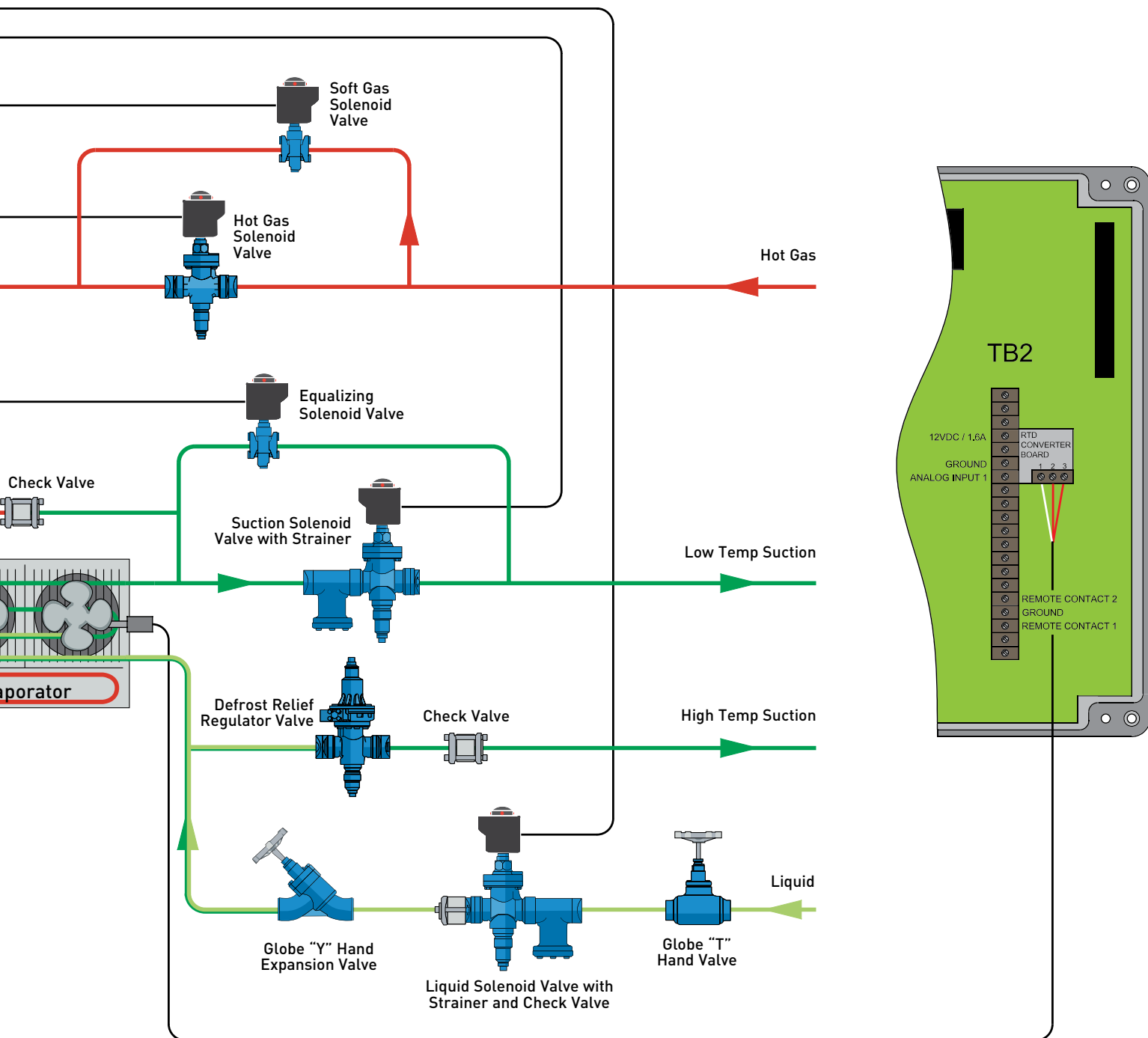
Soft Gas Cycle: In the second cycle, the evaporator fans are turned off and the solenoid coil is energized on the normally open suction stop solenoid valve, allowing it to close. Then the soft gas is initialized by energizing the solenoid coil on the normally closed soft gas solenoid valve.

Hot Gas Cycle: The third cycle begins the full flow of hot gas by energizing the solenoid coil on the normally closed hot gas solenoid valve, and de-energizing the solenoid coil on the normally closed soft gas solenoid valve. This sequence allows the opening of the hot gas solenoid valve and closing of the soft gas solenoid valve.

Equalization Cycle: In the fourth cycle, the solenoid coil on the normally closed hot gas solenoid valve is de-energized, allowing it to close. Then the solenoid coil on the normally closed equalizing solenoid valve is energized, starting the equalization cycle.

Fan Delay Cycle: In the final cycle, both solenoid coils on the normally open suction stop solenoid valve and normally closed equalizing solenoid valve are de-energized, causing the suction stop solenoid valve to open, and the equalizing solenoid valve to close. The liquid solenoid valve is opened, resuming refrigeration. Once the time has expired for the user defined fan delay, the fans will resume operation.





Pump Recirculation Hot Gas Defrost

Defrost Controller Wiring Diagram

When defrost is initiated, the hot gas will flow through the piping in the drain pan, and into the outlet of the evaporator coil. Since the liquid solenoid valve and suction stop solenoid valve have been closed by the defrost controller, the hot gas will flow in the reverse direction through the evaporator coil passing through the defrost relief regulator. The hot gas will then be routed downstream of the suction stop solenoid valve.

The Refrigerating Specialties defrost controller will go through the following sequence when initiating a defrost cycle.

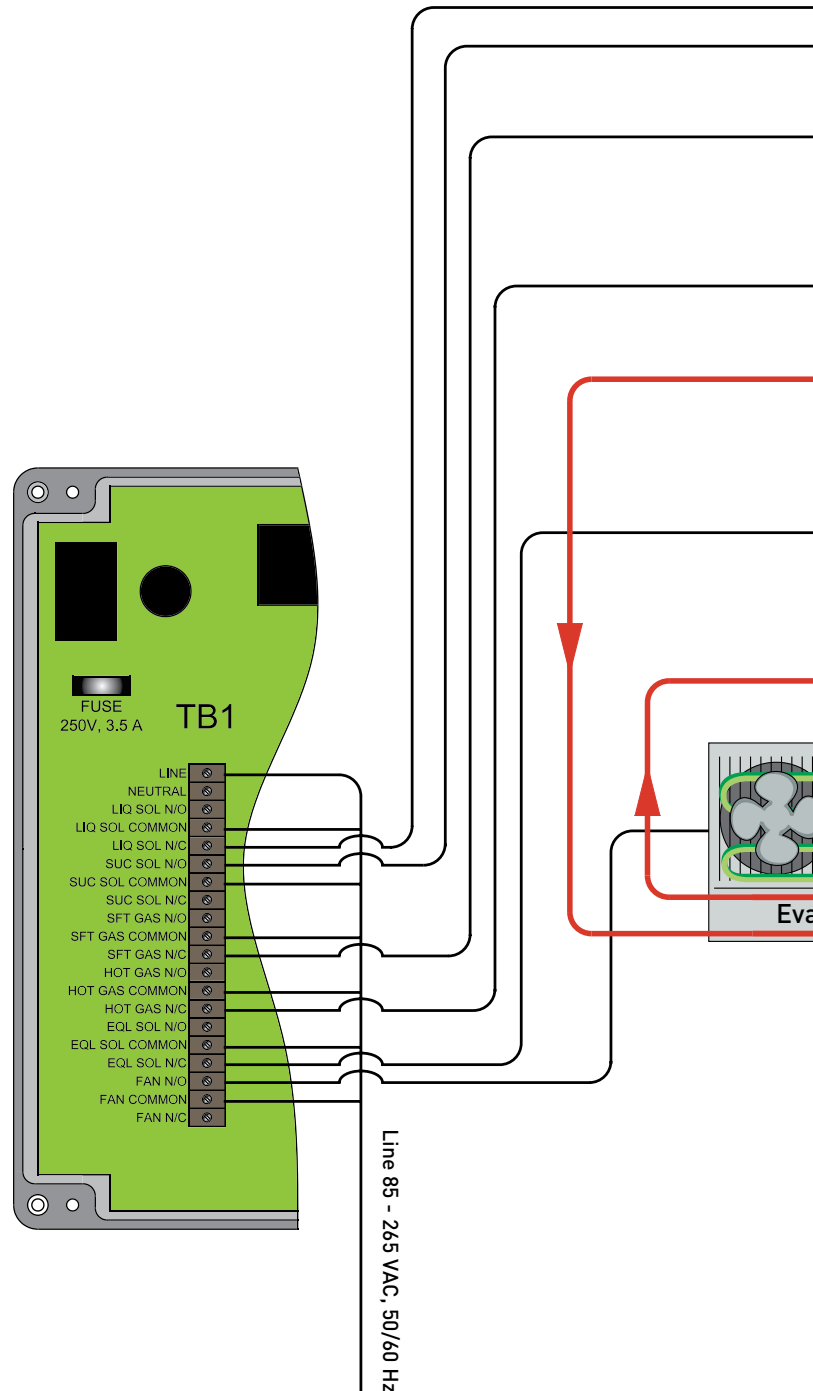
Pump Out Cycle: The first cycle consists of de-energizing the solenoid coil on the normally closed liquid line solenoid valve, allowing it to close.

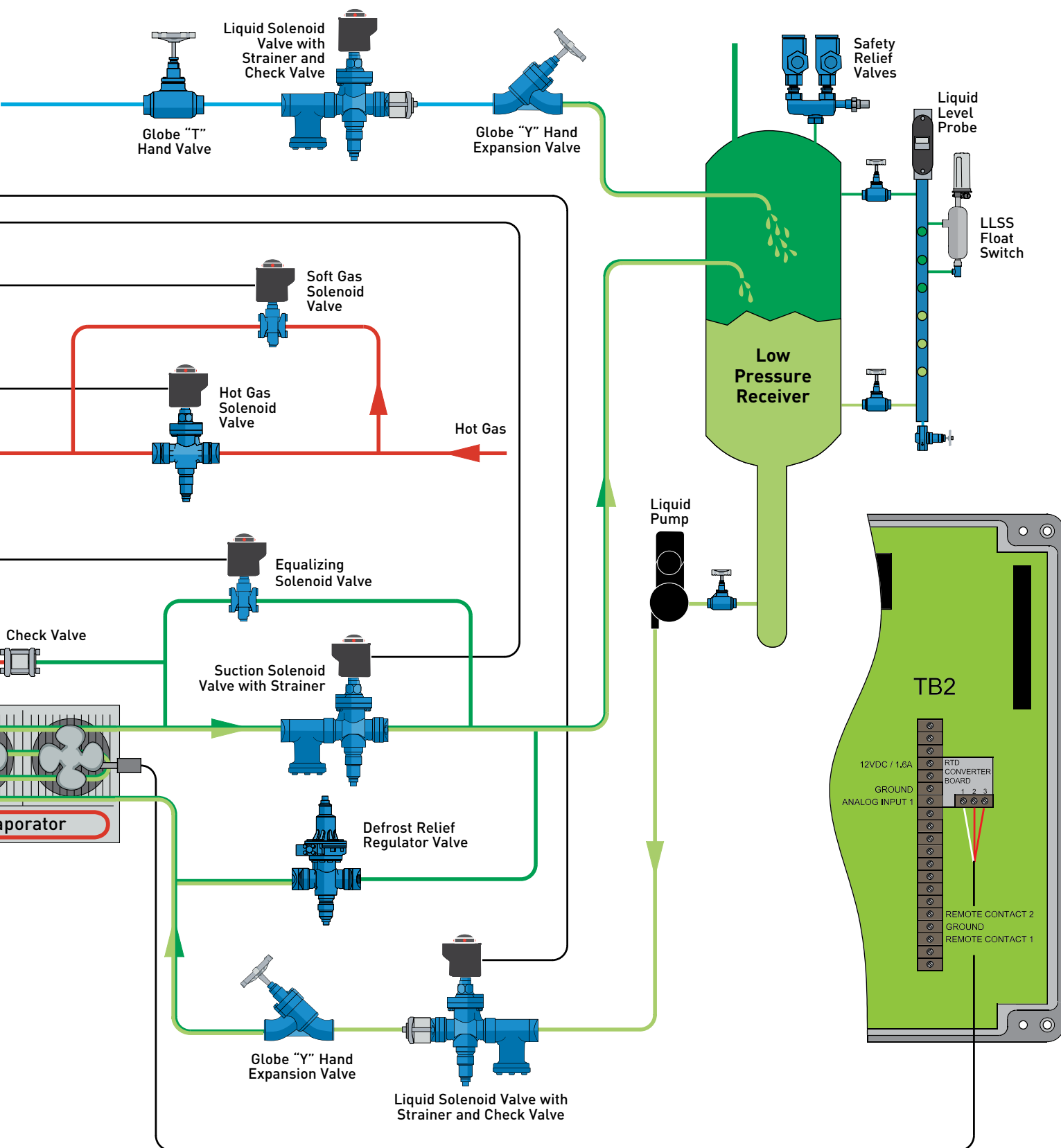
Soft Gas Cycle: In the second cycle, the evaporator fans are turned off and the solenoid coil is energized on the normally open suction stop solenoid valve, allowing it to close. Then the soft gas is initialized by energizing the solenoid coil on the normally closed soft gas solenoid valve.

Hot Gas Cycle: The third cycle begins the full flow of hot gas by energizing the solenoid coil on the normally closed hot gas solenoid valve, and de-energizing the solenoid coil on the normally closed soft gas solenoid valve. This sequence allows the opening of the hot gas solenoid valve and closing of the soft gas solenoid valve.

Equalization Cycle: In the fourth cycle, the solenoid coil on the normally closed hot gas solenoid valve is de-energized, allowing it to close. Then the solenoid coil on the normally closed equalizing solenoid valve is energized, starting the equalization cycle.

Fan Delay Cycle: In the final cycle, both solenoid coils on the normally open suction stop solenoid valve and normally closed equalizing solenoid valve are de-energized, causing the suction stop solenoid valve to open, and the equalizing solenoid valve to close. The liquid solenoid valve is opened, resuming refrigeration. Once the time has expired for the user defined fan delay, the fans will resume operation.





Liquid Recirculation Water Defrost, Top Feed

Defrost Controller Wiring Diagram

When defrost is initiated, the defrost water will flow through the piping in the drain pan, and into the water header. The water is then dispersed over the evaporator coil until all of the frost is melted and the drain pan is clear of any ice.

The Refrigerating Specialties defrost controller will go through the following sequence when initiating a defrost cycle.

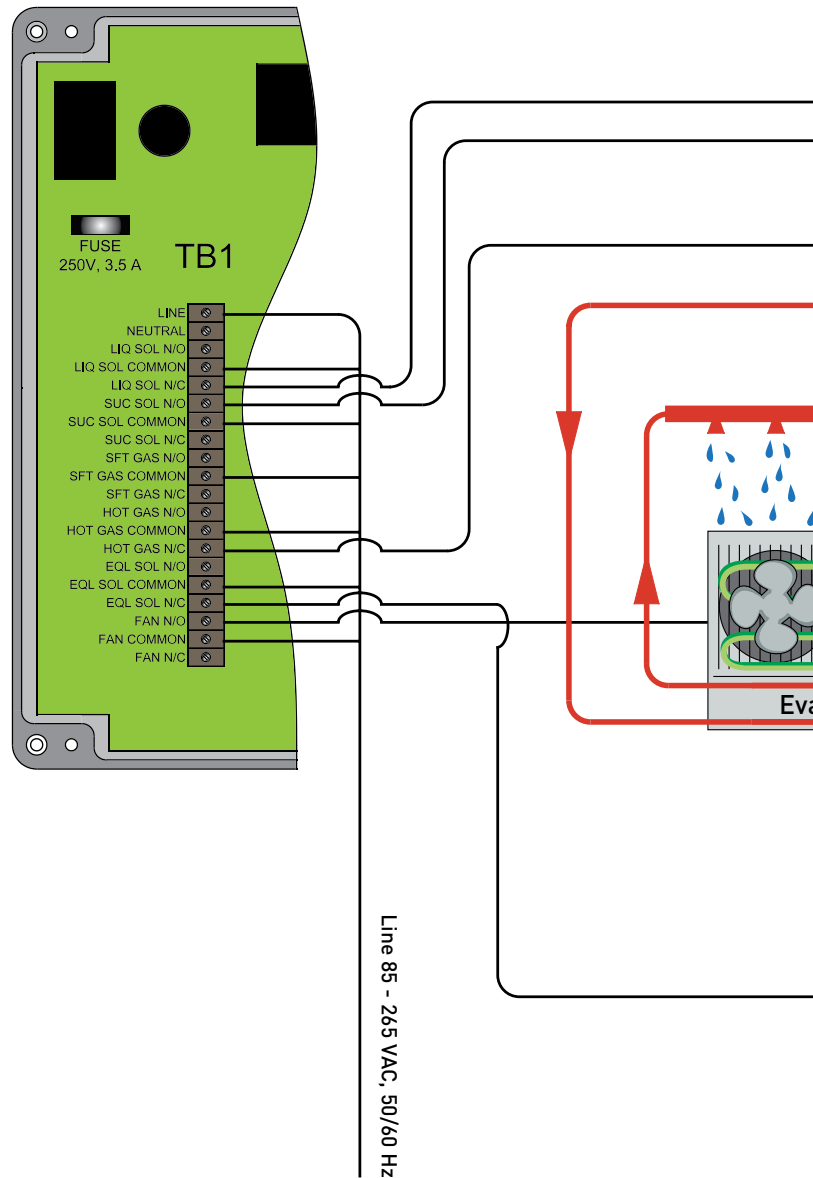
Pump Out Cycle: The first cycle consists of de-energizing the solenoid coil on the normally closed liquid line solenoid valve, allowing it to close.

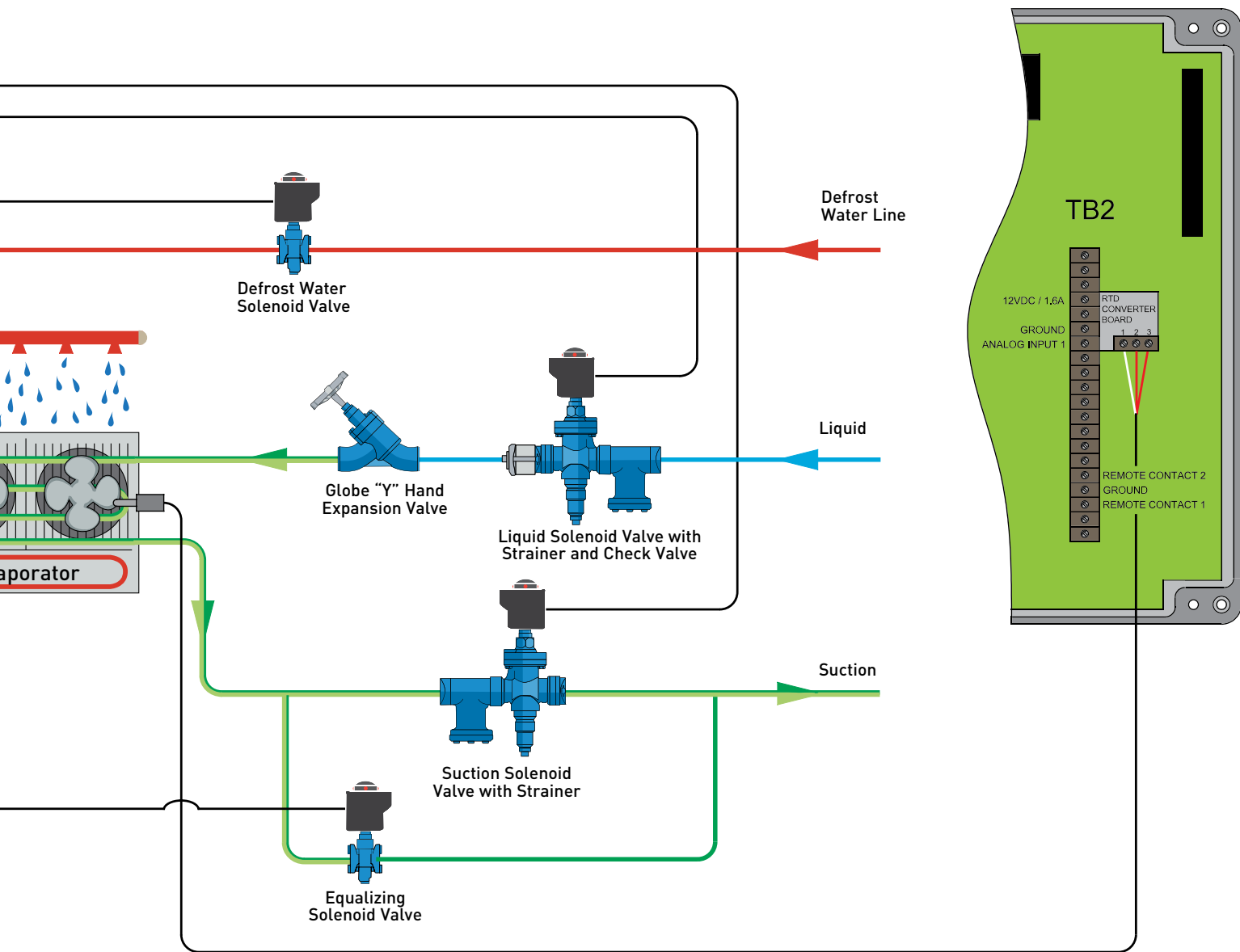
Soft Gas Cycle: In the second cycle, the evaporator fans are turned off and the solenoid coil is energized on the normally open suction stop solenoid valve, allowing it to close. There is no need for a soft gas cycle so the controller advances to the hot gas cycle.

Hot Gas Cycle: The third cycle begins the flow of defrost water by energizing the solenoid coil on the normally closed defrost water solenoid valve.

Equalization Cycle: In the fourth cycle the solenoid coil on the normally closed defrost water solenoid valve is de-energized, allowing it to close. Then the solenoid coil on the normally closed equalizing solenoid valve is energized, starting the equalization cycle.

Fan Delay Cycle: In the final cycle, both solenoid coils on the normally open suction stop solenoid valve and normally closed equalizing solenoid valve are de-energized, causing the suction stop solenoid valve to open, and the equalizing solenoid valve to close. The liquid solenoid valve is opened, resuming refrigeration. Once the time has expired for the user defined fan delay, the fans will resume operation.





Liquid Recirculation Electric Defrost, Top Feed

Defrost Controller Wiring Diagram

When defrost is initiated, the defrost heater contact will be closed and the heaters will begin to warm the drain pan and melt the frost that has accumulated on the evaporator. This will continue until all of the frost has melted and the drain pan is clear of any ice.

The Refrigerating Specialties defrost controller will go through the following sequence when initiating a defrost cycle.

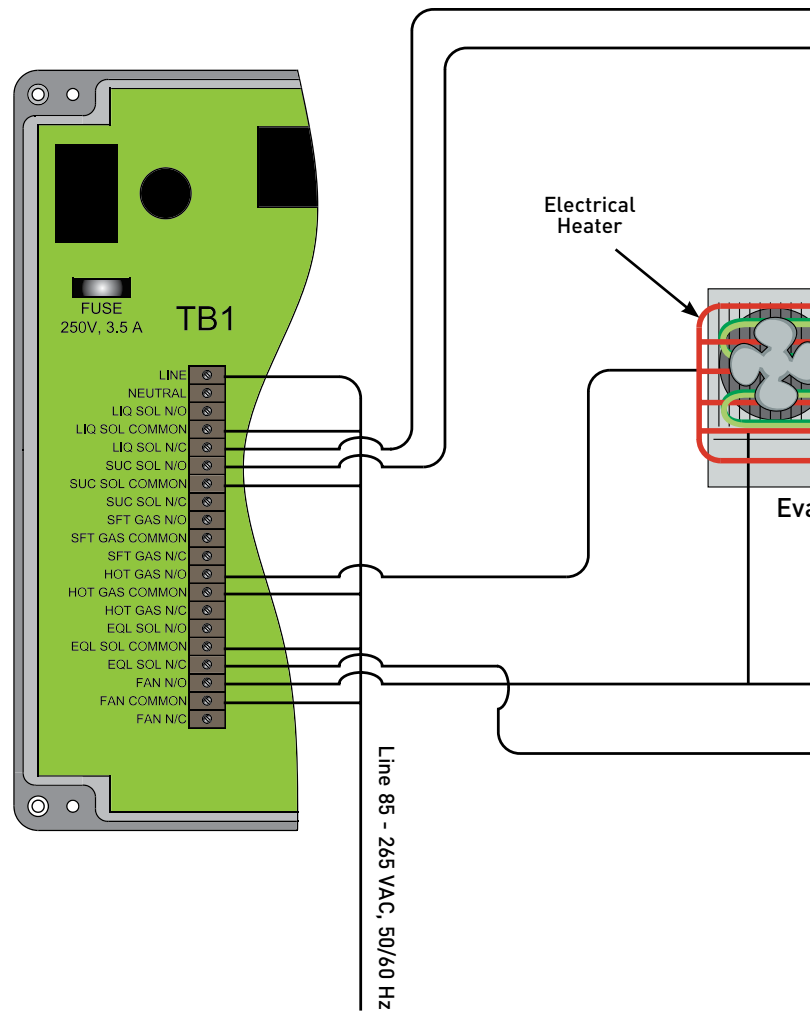
Pump Out Cycle: The first cycle consists of de-energizing the solenoid coil on the normally closed liquid line solenoid valve, allowing it to close.

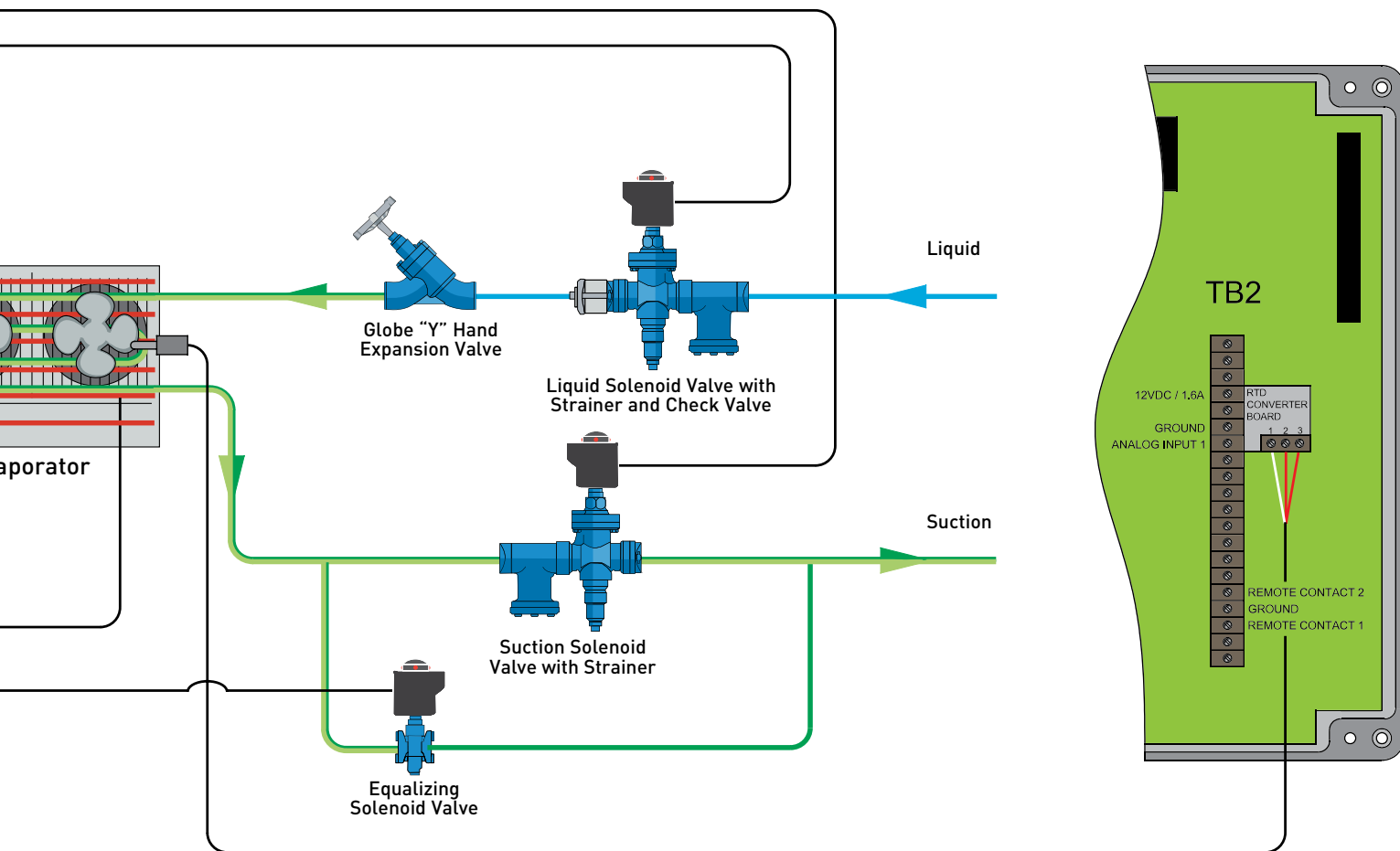
Soft Gas Cycle: In the second cycle, the evaporator fans are turned off and the solenoid coil is energized on the normally open suction stop solenoid valve, allowing it to close. There is no need for a soft gas cycle so the controller advances to the hot gas cycle.

Hot Gas Cycle: The third cycle begins the activation of the electric defrost heaters, which is accomplished by closing the defrost heater contact.

Equalization Cycle: In the fourth cycle, the defrost heaters are turned off by opening the defrost heater contact. Then the solenoid coil on the normally closed equalizing solenoid valve is energized, starting the equalization cycle.

Fan Delay Cycle: In the final cycle, both solenoid coils on the normally open suction stop solenoid valve and normally closed equalizing solenoid valve are de-energized, causing the suction stop solenoid valve to open, and the equalizing solenoid valve to close. The liquid solenoid valve is opened, resuming refrigeration. Once the time has expired for the user defined fan delay, the fans will resume operation.





Defrost Solutions™ Liquid Recirculation Hot Gas Defrost, Top Feed

Defrost Controller Wiring Diagram

In the DX hot gas defrost system shown, the suction stop solenoid valve and defrost relief regulator with electric wide opening have been replaced with one dual position gas powered suction stop solenoid valve and a defrost relief regulator. The hot gas and soft gas solenoid valves have been replaced with one dual position hot gas solenoid valve. When the system is in defrost, the hot gas will flow through the piping in the drain pan, and into the inlet of the evaporator coil. Since the dual position gas powered suction stop solenoid valve and liquid solenoid valve have been fully closed by the defrost controller, the hot gas will flow through the evaporator coil passing through the defrost relief regulator. The hot gas will then be routed downstream of the dual position gas powered suction stop solenoid valve.

The Refrigerating Specialties defrost controller will go through the following sequence when initiating a defrost cycle.

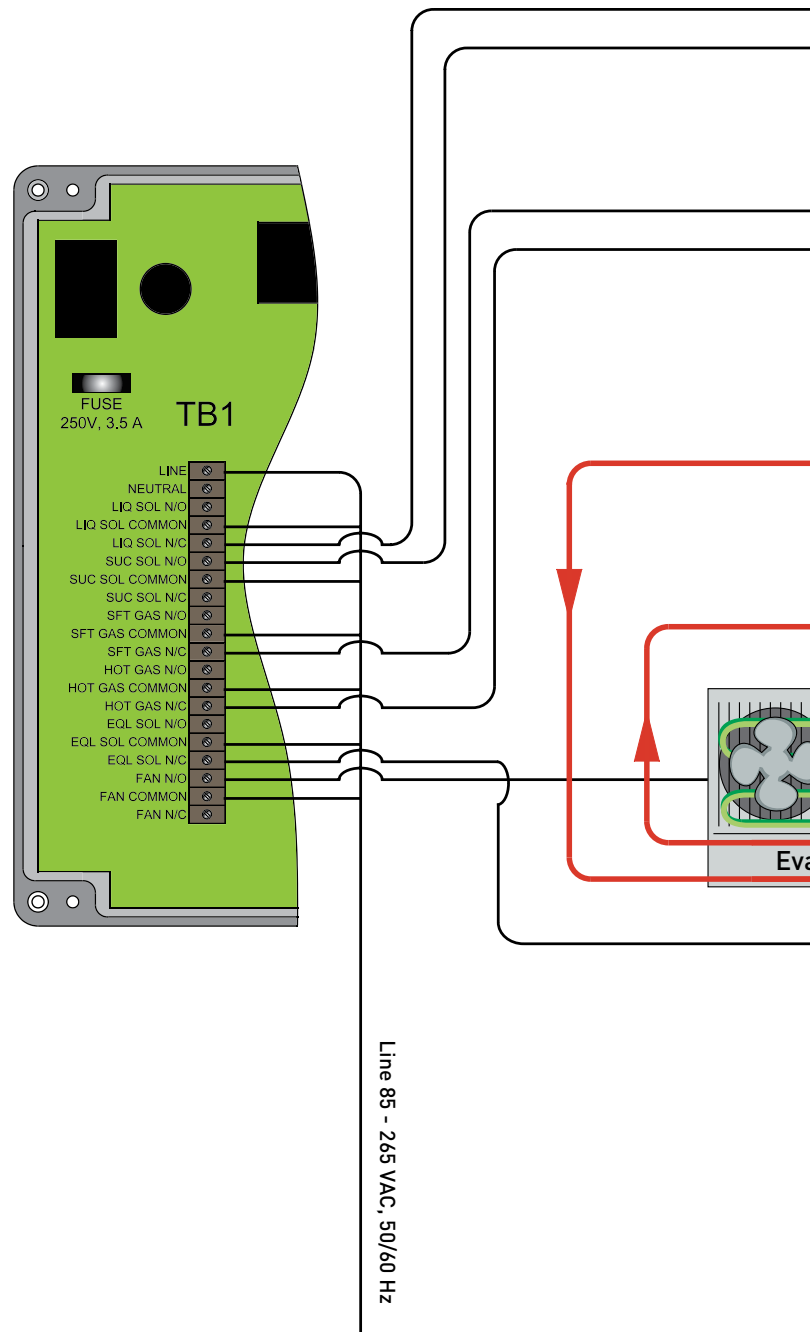
Pump Out Cycle: The first cycle consists of de-energizing the solenoid coil on the liquid line solenoid valve, closing it.

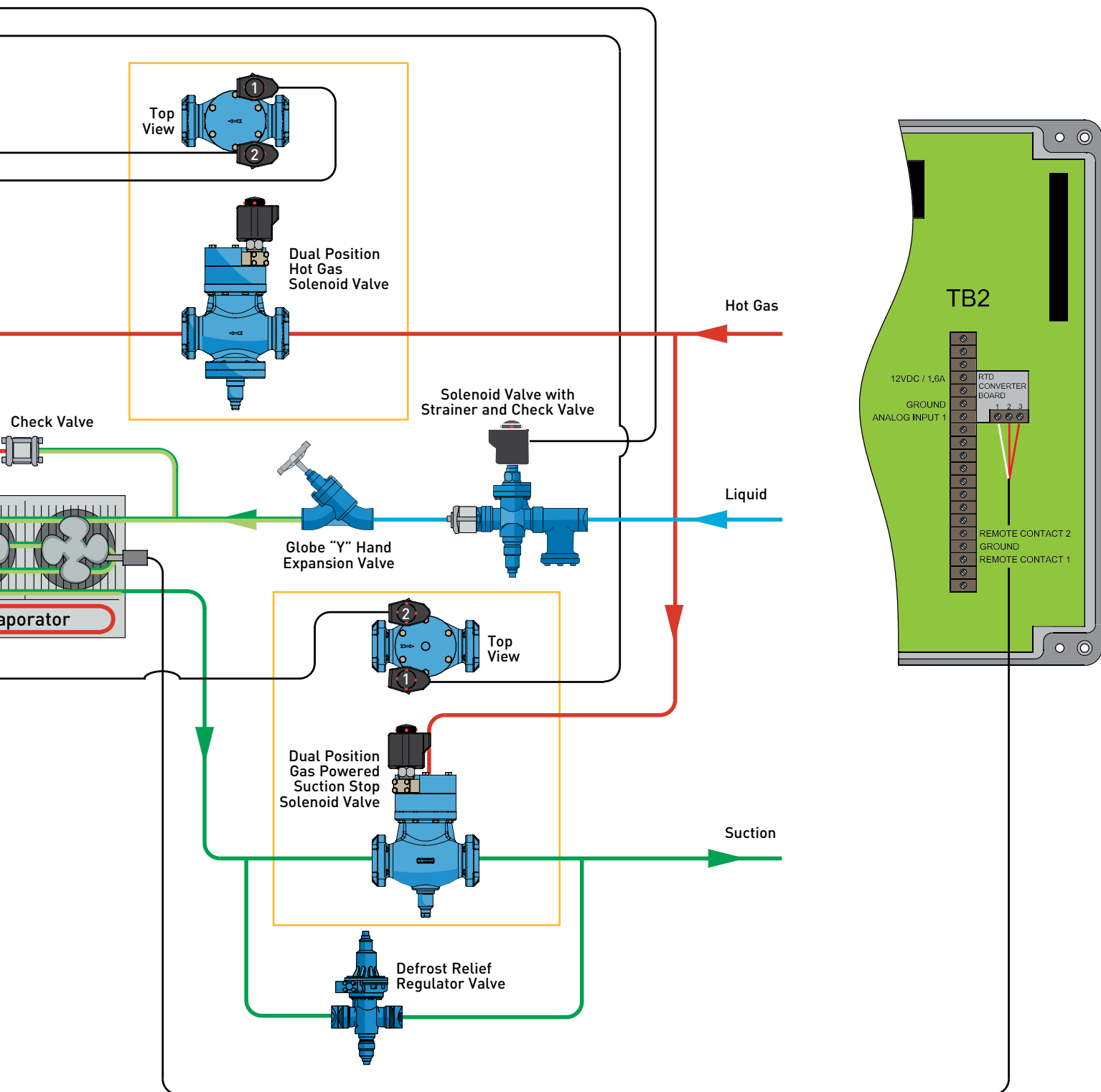
Soft Gas Cycle: In the second cycle, the evaporator fans are turned off and both solenoid coils #1 and #2 are energized on the dual position gas powered suction stop solenoid valve, causing it to fully close. Then the soft gas is initialized by energizing solenoid coil #2 on the dual position hot gas solenoid valve.

Hot Gas Cycle: The third cycle begins the full flow of hot gas by energizing solenoid coils #1 and #2 on the dual position hot gas solenoid valve, causing it to fully open.

Equalization Cycle: In the fourth cycle both solenoid coils #1 and #2 on the dual position hot gas solenoid valve are de-energized, causing the valve to fully close. Then solenoid coil #2 on the dual position gas powered suction stop solenoid valve is energized, starting the equalization cycle.

Fan Delay Cycle: In the final cycle, both solenoid coils #1 and #2 are de-energized on the dual position gas powered suction stop solenoid valve, causing it to fully open. The liquid solenoid valve is opened, resuming refrigeration. Once the time has expired for the user defined fan delay, the fans will resume operation.





Defrost Solutions™ Liquid Recirculation Hot Gas Defrost, Bottom Feed

Defrost Controller Wiring Diagram

In the DX reverse hot gas defrost system shown, the suction stop solenoid valve and equalizing valve have been replaced with one dual position gas powered suction stop solenoid valve. The hot gas and soft gas solenoid valves have been replaced with one dual position hot gas solenoid valve. When the system is in defrost, the hot gas will flow through the piping in the drain pan, and into the suction line. Since the dual position gas powered suction stop solenoid valve and liquid solenoid valve have been fully closed by the defrost controller, the hot gas will flow in the reverse direction through the evaporator coil passing through the defrost relief regulator. The hot gas will then be routed downstream of the dual position gas powered suction stop solenoid valve.

The Refrigerating Specialties defrost controller will go through the following sequence when initiating a defrost cycle.

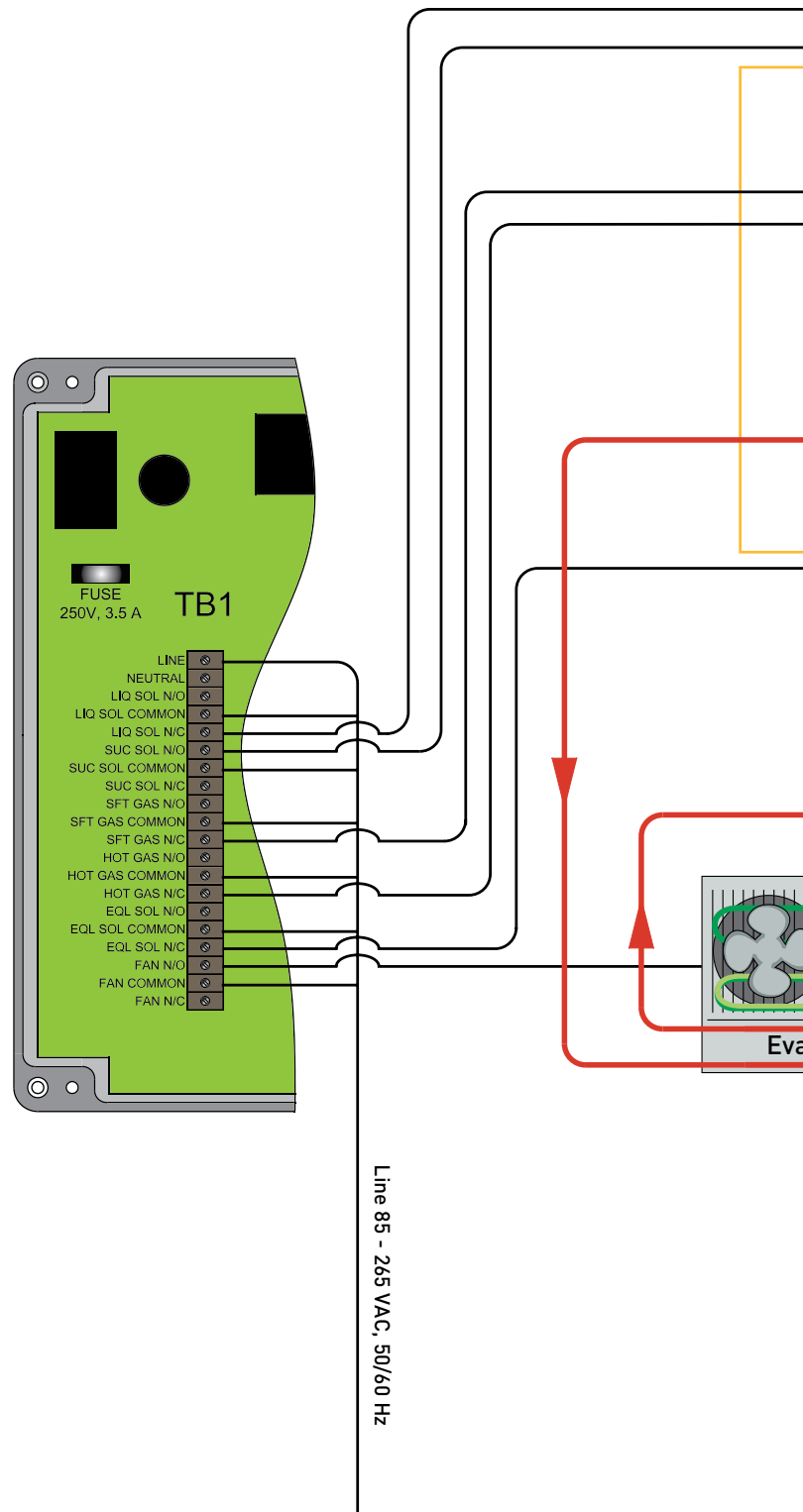
Pump Out Cycle: The first cycle consists of de-energizing the solenoid coil on the liquid line solenoid valve, closing it.

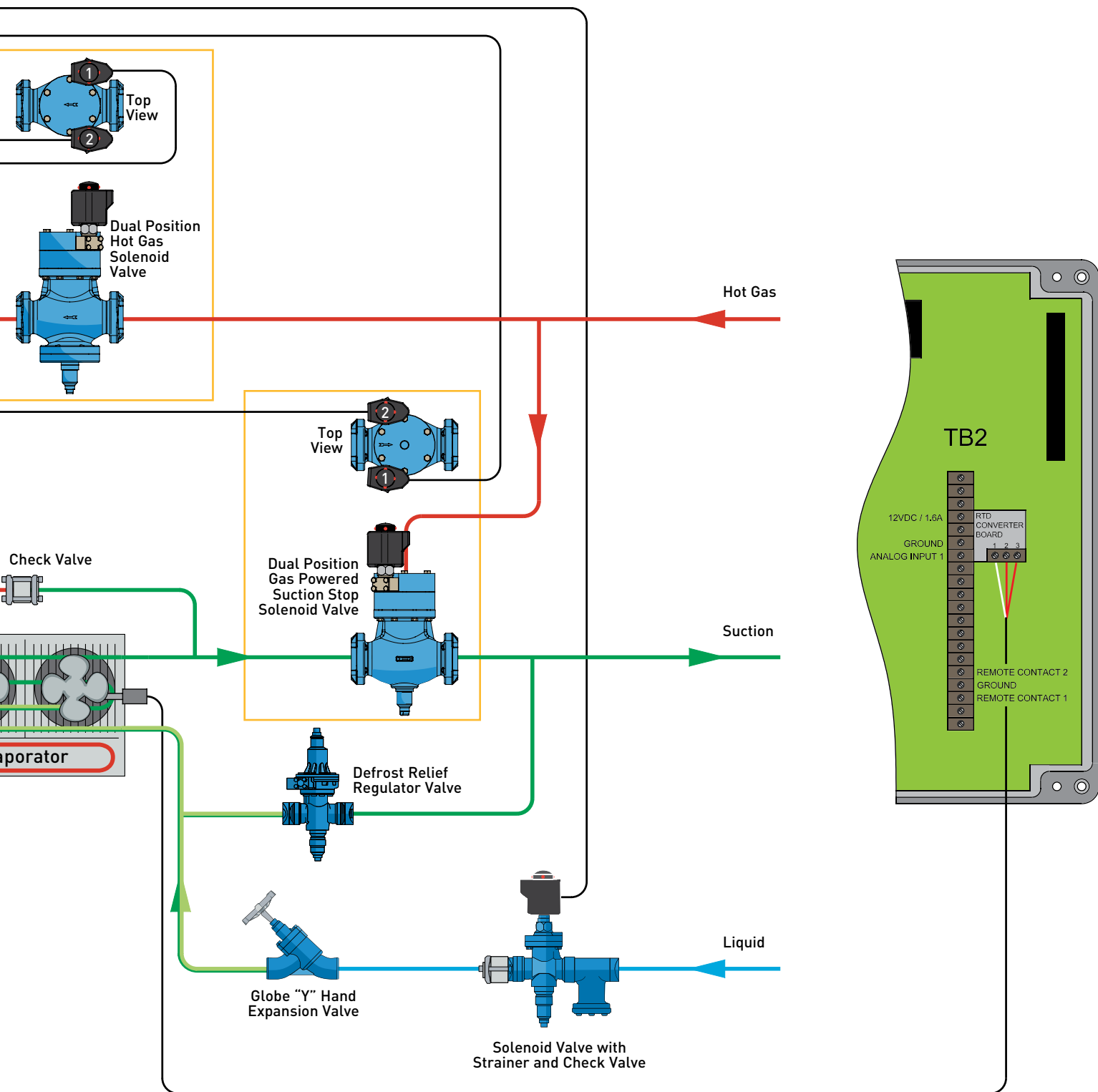
Soft Gas Cycle: In the second cycle, the evaporator fans are turned off and both solenoid coils #1 and #2 are energized on the dual position gas powered suction stop solenoid valve, causing it to fully close. Then the soft gas is initialized by energizing solenoid coil #2 on the dual position hot gas solenoid valve.

Hot Gas Cycle: The third cycle begins the full flow of hot gas by energizing solenoid coils #1 and #2 on the dual position hot gas solenoid valve, causing it to fully open.

Equalization Cycle: In the fourth cycle both solenoid coils #1 and #2 on the dual position hot gas solenoid valve are de-energized, causing the valve to fully close. Then solenoid coil #2 on the dual position gas powered suction stop solenoid valve is energized, starting the equalization cycle.

Fan Delay Cycle: In the final cycle, both solenoid coils #1 and #2 are de-energized on the dual position gas powered suction stop solenoid valve, causing it to fully open. The liquid solenoid valve is opened, resuming refrigeration. Once the time has expired for the user defined fan delay, the fans will resume operation.







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