Customer Value Proposition:

The Model V200 Auto Purger is a unique energy-saving device designed to efficiently remove foreign non-condensable gases from ammonia refrigeration systems.

Product Features:

- Smaller compact design with equivalent capacity of our current model
- Light weight (65 lbs)
- Proprietary microprocessor control for all sensing and control functions
- Factory calibrated and wired
- Auto or manual cycling capabilities
- Up to 36 “Purge Points”
- Automatically adjusts vent pressures
- Energy saving sleep mode that will activate with lack of non-condensables
- Electronic level, temperature, and pressure monitoring for improved performance
- Records number of purge cycles and times for each purge point during a 7 day period
- Purger is made of corrosion resistant material

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ENGINEERING YOUR SUCCESS.
**Introduction**

Non-condensables like air, hydrogen, nitrogen, and hydrocarbon gases reduce the overall capacity of the refrigeration system. Higher pressures, which in turn causes longer compressor runtime, longer condenser fan runtime, higher compressor discharge temperatures, increase compressor power costs, increase wear and tear on equipment, increase leaks, reduce system efficiency, increase overall system energy costs are all consequences of non-condensables in the refrigeration system.

In a refrigeration system non-condensables can be introduced by:

- Inadequate system evacuation such as servicing compressors, strainers, valves, start-up, etc.
- Refrigerant additions
- Leaks from valve stem packings, bonnet gasket, compressor shaft seal, control transducers, etc.
- Separation of ammonia molecules (hydrogen and nitrogen)
- Compressor oil breakdown (hydrocarbon gases)

The base V200 Rapid Auto Purger removes the non-condensable gases from four purge points. With the addition of up to two slave units, 36 purge points possible. This leads to lower condensing pressure, runtime of the compressors, and operating costs.

Non-condensable indicators are excessively high condensing temperatures/pressures and saturated temperature/pressure deviations. One indicator is a higher saturated condensing pressure/temperature at the evap condenser for the given outdoor air wet bulb and heat rejection load. Another indicator is the increasing difference between the observed condensing pressure and the saturation pressure corresponding to the liquid refrigerant temperature exiting the condenser.

**Purge Points**

The most common purge points in a refrigeration system are at the condenser drain, pilot receivers, thermostyphon receivers, high pressure receivers, liquid drain header, equalizing lines, and low velocity-high side areas.

Purge points should be located to ensure no liquid refrigerant is drawn by the purger. The Auto Purger V200 has a liquid drainer at the foul gas inlet to prevent any liquid refrigerant from entering the shell side of the heat exchanger.

**Auto Purging**

The start of a purge cycle can commence automatically, manually, time based, central management, and/or using the microprocessor. The Auto Purger V200 can only purge one point at any given time.

In automatic mode each purge point is sampled for a minimum of five minutes. If the purge conditions are not met within the sample time limit, the Auto Purger continues to the next purge point. When a purge point
meets the purge conditions within the sample time limit the Auto Purger starts the purge cycle. The purge cycle shuts off when the non-purge conditions are met.

A built in feature of the Auto Purger is sleep mode. Sleep mode allows the system to bypass purge points after two cycles of not meeting the purge conditions within the minimum sample time of five minutes. After the Auto Purger samples each purge point twice without a vent occurring, the system will shut off for two hours.

**Purge Cycle**
The purge cycle consist of three main operations: fill & pre-cool, separating non-condensable gases & refrigerant, and the release of non-condensable gases.

**1. Fill & Pre-Cool**
Foul gas enters the V200 Auto purger at the foul gas line. The liquid drainer separates the liquid refrigerant from the foul gas. Using the suction line; the liquid refrigerant from the liquid drainer is transported to the shell side of the heat exchanger.

Liquid makeup to the heat exchanger is controlled by the level sensor. As liquid refrigerant boils off in the heat exchanger the level drops. When the refrigerant reaches a critical level the sensor energizes the liquid solenoid, opening the check valve, and letting liquid refrigerant through to fill up the heat exchanger. The level sensor is set on a timer to prevent from over filling the heat exchanger.

**2. Separating Non-Condensable Gases & Refrigerant**
The foul gas enters the heat exchanger through a check valve with an orifice and condenses immediately. The non-condensable gases remain in a gas state, because the non-condensable gases require lower temperatures to condense. Condensed refrigerant and non-condensable gases rise through the heat exchanger and into the vapor vent. As the liquid rises it lifts an
orifice, flow controller, to the top of
the vapor vent allowing pressure to
build. Once the pressure exceeds
the high pressure check valve the
refrigerant then flows back into the
tube side of the heat exchanger.

The high pressure refrigerant
runs through the tubes of the heat
exchanger absorbing heat from the
high temperature foul gas of the
shell side of the heat exchanger. The
refrigerant begins to boil and vapor
refrigerant, free of non-condensable
gases, is returned to the plant by the
suction line.

Any oil that may collect in the V200
purger can be drained off from the
two oil drains. Before draining
the oil, shut-off the purger and
close the liquid and foul gas valves.
Allow the purger to pump out any
remaining refrigerant and close
the suction line valve. Use normal
oil draining precautions to prevent
injury or property damage.

3. Release of Non-Condensable Gases
As the refrigerant level drops in
the vapor vent the float will fall
allowing the non-condensable
gases to escape through the orifice.
Non-condensable gases will
continue to accumulate, producing
an elevated pressure. Once the
pressure of the non-condensable
gases exceed the set point of the
vent solenoid and vent check valve
with orifice, the gases are then
released into the bubbler. At the
same time the vent solenoid is
activated the water supply solenoid
is also activated.

As the non-condensable gases and
residual amounts of refrigerant
enters the bubbler they are diluted
into the water. As the water in the
bubbler rises it will overflow the
drain tube and exit the drain line.

Once the vent line pressure drops
below the pressure switch set point
the vent solenoid and water supply
solenoid close.

Installation Instructions
1. Mount the Rapid Auto Purger to a
wall or structure that can easily
Auto Purger (Model V200) Release of Non-Condensable Gases

handle its weight and installation hardware. Make sure to leave access for servicing the unit if required. Pipe the unit into the refrigeration system along with an electrical supply, water, and a water drain as needed.

**Note:** Wire only one purge point solenoid to each controller contact relay. See electrical wiring diagram on page 6.

2. Before opening the purger to the refrigeration system turn power on to the controller and open the water supply ball valve.

3. This is done by pressing and holding the “Initiate” (INIT) button on
the controller keypad when the initial start-up screen is displayed. The water solenoid will energize and water should be seen filling the tank. The tank is full when water runs over the overflow tube. After the tank is full, release the “Initiate” (INIT) button to stop the water flow. **Note:** Because both the water and vent solenoids are energized at the same time, this procedure must be done prior to opening the system to refrigeration. Failure to do so will result in a venting of ammonia.

4. Press and release the “Menu” key to bring up the main menu screen.

5. Fahrenheit v/s Celsius display readings are user selectable by following these simple keypad entries. Press both the Up and Down arrow keys at the same time and release. **Note:** Timing is critical and may take several tries.

6. Screen contrast is adjustable by pressing both the “Enter” and “Terminate” (TERM) keys at the same time. As with step 5, timing is critical. Use the Up/Down arrow keys to lighten or darken the display to your liking. Press and release the “Enter” key to return to the main menu.
Control Features Setup
This includes date, time, purge type (automatic, manual, etc.), and the number of purge points being sampled.

1. Press and release the “Menu” button on the keypad. The rapid purger setup main menu will appear.

   **Main Menu Options**
   - Use the Up/Down arrow buttons to select the “Setup” option. Press and release the “Enter” key.

   **Setup Menu**
   - Press and release the “Enter” key a second time to enter the current date. Use the Up/Down arrow keys to select the correct month. Press and release the “Enter” button to move to the next field. Repeat these steps to enter the day and year. When finished, press, and release the “Enter” key. Enter the current day of the week by again using the Up/Down arrow keys. Next, enter the current time using the same set of key strokes. Don’t forget to select between AM and PM in this screen. When you’re done, press the “Enter” key to return to the main menu.

   **Time / Date Setup Screen**
   - When in the main operating screen press and release the “Menu” button. Use the Up/Down arrow buttons to select the “Setup” option. Press and release the “Enter” button. Use the Up/Down arrow keys to select the “Purge Options” field. Press and release the “Enter” button. “Setup Points” will be highlighted. Press and release the “Enter” key on the keypad. Using the Up/Down arrow keys, select how many purge points are being used. When done, press and release the “Enter” key. Now we must enter the time (in minutes) each purge point is sampled. This setting is less important when the “Automatic” purge mode is selected. In this mode, sample times will change up or down based on vent cycle history. With the Point and Duration highlighted (darkened bar across the field), press and release the “Enter” key. An arrow will appear to the left of the time to be changed. Using the Up/Down arrow keys, select a time from 5 - 20 minutes in 5 minute increments. Press and release the “Enter” key when done. Use the Up/Down arrow key to select the next point and duration to be set. Follow the same procedure for each of the purge points being used. When done, press and release the “Menu” key to return to the purge options screen.

   **Purge Point Duration Setup Screen**
   - Use the Up/Down arrow keys to select the “Purge Type” option and press and release the “Enter” key. 3 Purge Options are available to you in this screen.

   **Purge Option Menu**
   - “Auto” To select “Auto”, press and release the “Enter” key. This is all that is required to operate in the “Auto” mode (as defined in this manual). Press and release the “Menu” key to return to the main screen. If you need to terminate the active point being sampled and move to the next, press and release the “Terminate” (TERM) key. Terminate Active Point (1-20) should be highlighted. Press and release the “Enter” key to move to the next purge point. If you need to stop all Purging in the “Auto” mode, select the Terminate Purge Cycle by using the Up/Down arrow keys. Press “Enter” and release to make your selection. In order to release the system from Purge Hold, re-select the “Auto” purge option again as explained at the beginning of this step.

   **Terminate Purge Menu**
   - “Manual” To select the “Manual” mode, use the Up/Down arrow key to highlight the manual option. Press and release the “Enter” key to save your selection. To initiate a purge cycle in the Manual mode, press and release the “Initiate” (INIT) key. Using the Up/Down arrow keys, select the point that you wish to purge. Press the “Enter” key. The point selected along with the duration of time this point will be sampled is shown toward the top of the display. To terminate a purge in the Manual mode, press and release the “Terminate” (TERM) key. Using the Up/Down arrow key, select
either of the two options displayed. Press and release the “Enter” key to terminate the purge.

“Time Based” To select the “Time Based” mode, use the Up/ Down arrow key to highlight the Time Based option. Press and release the “Enter” key to save your selection. The next step is to enter the time the purge cycle will start. Use the Up/ Down arrow keys to select the hour. Press and release the “Enter” button to move to the next field. Repeat these steps to enter minutes and AM v/s PM. When finished, press and release the “Enter” key. Using the same steps, enter the time of day the purge cycle will stop. Don’t forget to select between AM and PM.

When finished, press and release the “Enter” key. If you have already set the number of purge points needed, press and release the “Enter” key again to bring you back to the main menu. If you haven’t yet selected how many purge points are needed, refer back to step 2 for instruction.

To initiate a purge cycle in the Time Based mode, press and release the “Initiate” (INIT) key. Using the Up/ Down arrow keys, select the point that you wish to purge. Press the “Enter” key. The point selected along with the duration of time this point will be sampled is shown toward the top of the display.

To terminate a purge in the Time Based mode, press and release the “Terminate” (TERM) key. Using the Up/ Down arrow key, select the Terminate Active Point (#) and press and release the “Enter” Key. The selected point will terminate and the next programmed purge point will become active and move to the next active purge point.

To stop all purging while in the “Time Based” mode, select Terminate Purge Cycle. Using the Up/ Down arrow key, select Terminate Purge Cycle and press and release the “Enter” key. This will put the controller in a Purge Hold mode that is displayed in the upper right corner of the display. In order to release the system from Purge Hold, you will have to re-select the “Time Based” purge option again as explained at the beginning of this step.

**Purger Safety Features**

The temperature controller and sensor are wired in series with the pressure switch. This prevents venting of non-condensed refrigerant to the water bubbler before the heat exchanger reaches temperature.
Auto Purger (Model V200) Key Components

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Purger Controller, Drilled (4 points)</td>
</tr>
<tr>
<td>2</td>
<td>Slave Controller Unit (16 points)</td>
</tr>
<tr>
<td>3</td>
<td>3/8&quot; Clamp, Pipe</td>
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<tr>
<td>4</td>
<td>Water Solenoid Valve (1/4&quot; Threaded Connection)</td>
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<tr>
<td>5</td>
<td>Level Sensor</td>
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<tr>
<td>6</td>
<td>Water Bubbler</td>
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<td>7</td>
<td>Junction Box</td>
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<tr>
<td>8</td>
<td>Pressure Regulator (1/2&quot; Threaded Connection)</td>
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<td>9</td>
<td>Pressure Transducer</td>
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<tr>
<td>10</td>
<td>Vent Solenoid</td>
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<tr>
<td>11</td>
<td>Vapor Vent Float</td>
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<td>Liquid Solenoid (SV2) (1/2&quot; Threaded Connection)</td>
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<td>13</td>
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<td>14</td>
<td>RTD Probe</td>
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<tr>
<td>15</td>
<td>Liquid Drainer (1/2&quot; Threaded Connection)</td>
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Auto Purger (Model V200) Assemblies

<table>
<thead>
<tr>
<th>Purger P/N</th>
<th>Purge Points</th>
<th>Voltage (V)</th>
<th>#2 Slave Unit</th>
<th>#4 Water Soln</th>
<th>#10 Vent Soln</th>
<th>#12 Liquid Soln</th>
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<td>202850</td>
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Note: 36 purge points are available (two slave units).
Electrical Wiring Diagram for the Slave Unit (16 Additional Purge Points)

**Note**: Common shown on the purge point solenoids connections are common to the relay. Incoming line power (120/240 volts) should be supplied to these terminals. An incoming neutral should be supplied to one of each of the coil leads. The other coil lead should be attached to the N.O. terminal for each independent purge point solenoid (S6N, S8F).
Safe Operation
(See Bulletin RSBCV)
People doing any work on a refrigeration system must be qualified and completely familiar with the system and the Refrigerating Specialties Division valves involved, or all other precautions will be meaningless. This includes reading and understanding pertinent Refrigerating Specialties Division Product Bulletins and Safety Bulletin RSB prior to installation or servicing work.

Where cold refrigerant liquid lines are used, it is necessary that certain precautions be taken to avoid damage which could result from liquid expansion. Temperature increase in a piping section full of solid liquid will cause high pressure due to the expanding liquid which can possibly rupture a gasket, pipe or valve. All hand valves isolating such sections should be marked, warning against accidental closing, and must not be closed until the liquid is removed. Check valves must never be installed upstream of solenoid valves, or regulators with electric shut-off, nor should hand valves upstream of solenoid valves or downstream of check valves be closed until the liquid has been removed.

It is advisable to properly install relief devices in any section where liquid expansion could take place. Avoid all piping or control arrangements which might produce thermal or pressure shock.

For the protection of people and products, all refrigerant must be removed from the section to be worked on before a valve, strainer, or other device is opened or removed. Flanges with ODS connections are not suitable for ammonia service.

Warranty
All Refrigerating Specialties products are under warranty against defects in workmanship and materials for a period of one year from date of shipment from factory. This warranty is in force only when products are properly installed, field assembled, maintained, and operated in use and service as specifically stated in Refrigerating Specialties Catalogs or Bulletins for normal refrigeration applications, unless otherwise approved in writing by the Refrigerating Specialties Division. Defective products, or parts thereof returned to the factory with transportation charges prepaid and found to be defective by factory inspection, will be replaced or repaired at Refrigerating Specialties option, free of charge, F.O.B. factory. Warranty does not cover products which have been altered, or repaired in the field, damaged in transit, or have suffered accidents, misuse, or abuse. Products disabled by dirt or other foreign substances will not be considered defective.

The express warranty set forth above constitutes the only warranty applicable to Refrigerating Specialties products, and is in lieu of all other warranties, expressed or implied, written including any warranty of merchantability, or fitness for a particular purpose. In no event is Refrigerating Specialties responsible for any consequential damages of any nature whatsoever. No employee, agent, dealer or other person is authorized to give any warranties on behalf of Refrigerating Specialties, nor to assume, for Refrigerating Specialties, any other liability in connection with any of its products.