





H. A. Phillips & Co. | Phillips Auto Purgers | PURGERS-21E

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Intro

### Introduction to H. A. Phillips & Co. (AKA Phillips Refrigeration)

#### Capabilities:

H. A. Phillips & Co. is a single source manufacturer and supplier of modulating control solutions for industrial refrigeration systems. Our product lines include float valves, electronic and pressure regulating valves, ASME code pressure vessels, recirculation systems, Anhydrator system cleaners, PUR air Purgers and accessory components. No other industrial refrigeration manufacturer offers a comparable range of products!

#### **Pioneers in Ammonia Refrigeration**

Since 1928, H. A. Phillips & Co. has designed and manufactured ammonia refrigeration controls for industrial refrigeration applications worldwide. The company was founded by one of the pioneers of the ammonia refrigeration industry, Harry Alexander Phillips. Harry developed numerous patents related to modulating liquid level controls, refrigerant injectors, and automatic systems to protect refrigeration compressors from liquid ammonia slop-over.



Harry Alexander Phillips

#### Engineering

H. A. Phillips & Co. employs engineers with relevant refrigeration education and experience. We take pride in the ability of our applications engineers to service our customer base at a high level, and we feel this technical acumen helps separate us from our competitors. Allow our applications and sales engineers to answer your questions about the application or design of our products.



### Cost of Air in the System



When air enters into a refrigeration system it will accumulate in the high side of the system and can be found in both the condenser and high pressure receiver vessel. The air and non-condensables act as an insulator inside the condenser by reducing the amount of usable surface area and heat transfer that is allowed to take place inside the condenser. This will then force the condensing temperature to increase which would cause your compressor to work that much harder to maintain your established condensing set point temperature. The increase in workload for the compressor will result in higher operating costs which will ultimately make the refrigeration system less efficient and more expensive to run. Since the compressor is responsible for the majority of the energy usage in a refrigeration system, reducing the condensing temperature will have a large impact on your overall energy usage. Adding a Phillips Air Purger to a refrigeration system will provide the ability for the user to remove the air and non condensables that are accumulating in the system which will help increase efficiency and lower operating costs.

#### **VALVES • VESSELS • SYSTEMS • CONTROLS**



#### How to tell if you have excessive amounts of air in a system





By looking at your refrigerant's saturation point and comparing that value to your actual operating temperature, you are able to tell whether or not air and non-condensables are present. If for example your condensing temperature set point is at 95°F (181 psig) and the temperature measured on your condenser is actually 100°F (197 psig), then something is causing this temperature difference. Many factors could be causing this such as scaling on your condenser piping, clogged spray nozzles, or air/non-condensables being present inside the condenser. Scaling and clogged spray nozzles can be visibly inspected from the outside of the condenser. If both of these look to be working sufficiently then the other cause of this temperature difference is air or non-condensables. Below is a simplified example.

# $Q_{Conduction} = U * A * \Delta T$

#### **Let's consider a simplified example:** 96°F vs 100°F Were condensing at 96°F @ 10°F $\Delta T$ , but new condensing is 100°F (14°F $\Delta T$ ). That's a 40% increase in $\Delta T$ .

$$U_1 * A * \Delta T_1 = U_2 * A * \Delta T_2 \xrightarrow{\text{yields}} U_2 = U_1 * \frac{\Delta T_1}{\Delta T_2}$$

Thus, for our above example we must have lost around 29% of our original overall heat transfer coefficient ( $U_1$ ). [10°F / 14°F = 0.71]

#### VALVES • VESSELS • SYSTEMS • CONTROLS

### **Purger Models**

The Phillips' Air Purgers are simple, robust, high-capacity devises that remove non-condensable gases from the refrigerant vapor in a system. The units operate by condensing foul gas (the mixture of refrigerant vapor and non-condensables) from 1 up to 30 purge points, metering the purified liquid refrigerant back to the system through a protected wet suction connection, and venting the non-condensables to atmosphere.

Although only extremely small traces of refrigerant are present with the vented non-condensable gases and several safety components prevent the accidental release of pure refrigerant, it is recommended that vented gas be "bubbled" through a liquid reservoir or optional bubbler. The reservoir should be filled with water for ammonia applications, or oil for halocarbons. Due to the fact that halocarbon refrigerants are difficult to detect (compared to ammonia) it is recommended that a gas detector be installed near the non-condensable vent for added safety when the Purger is applied to R-22 or other halocarbons.

The primary component of the Phillips Purger is a stainless steel main vessel that contains a separate inner stainless steel collection chamber and a condensing coil. A probe responds to the liquid level inside the collection chamber. An optional electrical control panel provided with the PUR includes connections for electrical power and control of the vent solenoid, with provisions for up to (30) purge points. The PURJR model includes a 3-point control as standard. Purge solenoids are not included with the Purger but can be purchased from Phillips at the time the order is placed.

Both Purgers include brackets for mounting on a wall or other structure capable of safely supporting the unit weight.





#### High Level Specs:

- •Stainless steel construction (~250 lbs)
- •Simple design
- •HPL, Pumped, or Gravity fed liquid for cold bath (Approx. 2.85 TR [10 kW])
- •300 psig design pressure @ -50°F
- •Main Chamber : 10-3/4" OD x 23" OAL SS [273mm x 584mm]
- •Net Volume: 1.01 ft3 [0.028 m3] excluding Coil & Collection Chamber
- •CRN (On Request)

#### **Connection Sizes:**

- •Foul Gas In 3/8" Connection
- •Non Condensable Vent 1/2" SW
- •Wet Suction 1-1/4" SW
- •Safety Relief 1/2" NPT
- •Drains 1/2" (Supplied with MPT)
- •Cold Liquid Feed 1/2" SW

#### Condensing/Evap Capacity:

•Just over 78 feet of 3/8" S/40 304/304L SS pipe coil!

–Only need 35°F ΔT between Suction and Foul Gas temperature

-Three times as much capacity as Hansen's Purger models

•Be mindful of suction NPS if retrofitting (AP = ¾", APP =1", PUR = 1-1/4")

#### **Standard Trim and Control Options:**

#### (Controls, insulation, and Bubbler are optional)

- •Liquid feed type (HPL, Pump, Gravity)
- •PUR-CV: Purger with valves
- •PUR-B: Purger with valves and bubbler
- PUR-I: Purger with valves and factory insulation
- PUR-P: Purger with valves and 3 point control panel
- •PUR-BI: Purger with valves, bubbler and factory insulation
- •PUR-BP: Purger with valves, bubbler and 3 point control panel
- •PUR-IP: Purger with valves, factory insulation and 3 point control panel

•PUR-BIP: Purger with valves, bubbler, factory insulation and 3 point control panel

•Controls Options: 3pt, 10pt, or 30 pt.



#### **Purger Components**



- Liquid feed The Air Purger can be fed by either high pressure liquid, pumped or gravity fed. If the Purger is fed using high pressure liquid (as shown), a ½" SW solenoid is installed with a 0.047" (1.2mm) stainless steel orifice screw installed in the bottom of the solenoid. If the Purger is fed using pumped liquid, ½" SW solenoid is installed. If installed on a gravity fed system, the Purger will be provided with ½" SW housing with no orifice installed. NOTE: for installs on gravity systems the Purger should be mounted a minimum of 20" (500mm) lower than the lowest liquid level in the separator feeding it in order to ensure sufficient gravity feed.
- 2. Expansion Solenoid This 0.047" (1.2mm) stainless steel orifice screw is installed into a solenoid and is designed to work as an expansion value for the return of condensed liquid from the internal chamber to the outer chamber and into the suction side of the system. Once the solenoid value is open, the condensed subcooled liquid in the Purger separation chamber is expanded through the built-in orifice to the Purger external chamber. When the separation chamber is drained of condensed liquid, new refrigerant/non-condensable gas are drawn into the Purger for separation.
- **3. Vent Solenoid** This 0.04" (1.0mm) stainless steel orifice screw is installed into a solenoid and allows the air to purge. This solenoid opens when liquid level in the separation chamber is below the lowest switch point on the level switch, meaning that there is an adequate amount of air/non-condensables to purge. The valve closes again once the liquid level has reached the upper switch point on the level switch.
- **4. Capacitive liquid level probe** HB Products HBLC special calibrated level control with two pre-set switch points, one for low level and one for high level. The probe sends a signal to the controls based on the liquid level in the inner chamber. When the liquid level is low (indicating a large presence of air/non-condensables in the unit), the probe sends a signal to open the vent solenoid. When the air leaves the unit the liquid level will again rise, triggering the upper switch point and closing the vent solenoid.



- 5. Air Vent The Armstrong air vent type 11AV is an extra safety against liquid refrigerant release in the event of controls, electrical, or mechanical malfunctions. The air vent acts as a float valve that will only allow vapor to pass.
- **6.** Check valve Danfoss 1/2" NRVA check valve ensures that ambient air or water from a bubbler or water reservoir are not drawn into the Purger in the event of a malfunction, or if the air Purger pressure drops below atmospheric pressure.
- 7. Stop valve Danfoss SVA stop valve for service of vent solenoid and check valve.
- **8.** Relief valve Cyrus shank 800D relief valve set at 250 PSI. Safety relief valve to relieve pressure if it were to exceed 250 PSI.
- 9. Temp sensors Danfoss EKS 221 surface temperature sensor. These two temperature sensors are used to monitor the suction and foul gas temperatures to make sure we have at minimum a 35°F temperature difference, which is required to ensure that all of the ammonia has condensed by the time it reaches the end of the coil. In the event that this temperature difference does not exist the smart controls will turn on an alarm and prevent the vent solenoid from opening.
- **10.** Liquid feed and Foul Gas Strainers Strainers are used to prevent the small liquid feed and expansion orifices from clogging due to debris in the system. The strainer insert is sized small enough that it will catch any debris large enough to clog the orifices during normal operation. If these orifices are clogged the unit will not function properly. Both strainers ship loose for field install.
- **11. Wet Suction** Returns liquid to low temp accumulator or other low side vessel. Factory piped with elbow and reducing tee for relief valve.
- **12.** Drain Connections The vessel includes (2) Danfoss SVA valves with ½" FPT connection. The user should supply and mount quick closing "Deadman" valves on the unit according to the local rules and regulations where the Purger is mounted, if the customer feels it is necessary.
- **13. Optional Bubbler** The optional bubbler is installed in order to absorb any ammonia gas that might be purged with the non-condensables. Bubbles that pass through the water to the surface are non-condensables, while bubbles that disappear in the water will be ammonia gas. The water supply should run whenever the vent solenoid is open. The optional Phillips controls allow the user to run the water before the vent solenoid opens, and for a time after it closes to ensure complete absorption. The user must make sure that a minimum of 1 GPM of water is being pumped through the bubbler per every 1 lb. of vent gas.
- 14. Optional Smart controls The optional smart controls are offered in 3 different versions, a 3 point, 10 point and 30 point version. The new controls allow the user to set different purge point times, keeps an accurate count on the amount of time each purge point is open for, as well as estimates ammonia loss and volume of air removed from your system. For more information on the smart controls see pages 16-27.
- **15. Customer Supplied Bubbler Water Solenoid** The user must supply a water solenoid that can supply at least 1 GPM of water per 1 lb. of vent gas, and connect to the water bubbler inlet connection. The water connection on the bubbler is a <sup>3</sup>/<sub>4</sub>" hose fitting.

#### **Purger Operation**

- 1. Make sure water is present in the optional water bubbler/reservoir (Item 13), and suction and foul gas temp sensors (Item 9) are mounted in the correct locations before the system is powered up. Also make sure all service valves are open to allow refrigerant flow to the vessel.
- \*If using optional Phillips Controls refer to Quick Start Guide on Page 37-39.
- 2. Once the unit is powered up, open the liquid feed solenoid (Item 1) if fed by HPL to create the cold bath inside the main vessel. If pump or gravity fed, as long as the service valve up stream of the vessel is open, the vessel will be fed with cold liquid. At the same time the expansion solenoid (Item 2) should be opened, allowing liquid refrigerant in the inner chamber to return to the outer vessel and through the wet suction line. At this time the purge points should be opened and sequencing based on the control setup. NOTE: a purge point must always be open during operation (or whenever the expansion solenoid (Item 2) is open).
- 3. The foul gas will flow from the purge points to the Purger and through the condensing coil. By the time the foul gas reaches the end of the coil and as long as we have a minimum 35°F temperature difference between our suction and foul gas, then all the ammonia will condense out and separate from the air/non-condensables in the collection chamber.
- 4. The now condensed subcooled ammonia in the collection chamber will travel down the drain pipe and be expanded through the expansion orifice (Item 2) to the external chamber. This liquid will then return to a low side vessel through the wet suction piping (Item 11).
- 5. Steps 3 and 4 above should continue until enough air/non-condensables has accumulated in the collection chamber, pushing the liquid level down and triggering the low switch point on the level probe (Item 4).
- 6. As long as the 35°F minimum temperature difference between the suction and foul gas exists and the liquid level is below the switch point on the level probe, then the vent solenoid (Item 3) can be opened, purging the air/non-condensables from the collection chamber and into the optional water bubbler/reservoir (Item 13).
- 7. Once a sufficient amount of air/non-condensables has been purged, raising the liquid level in the collection chamber to upper switch point, the vent solenoid (Item 3) should be closed, and the Purger will begin accumulating air/non-condensables again until it can purge again.
- 8. Steps 3-7 above will repeat over and over as long as the Purger unit is turned on.



#### High Level Specs:

- •Stainless steel construction (~30 lbs)
- •Simple design
- •HPL, Pumped, or Gravity fed liquid for cold bath (Approx. 0.57 TR [2 kW])
- •300 psig design pressure @ -50°F suction
- •Main Chamber : 4-1/2" OD x 8-1/2" OAL SS [114mm x 216mm]
- •Net Volume: 0.57 ft3 [0.0016 m3] excluding Coil & Collection Chamber
- •CRN (On Request)

#### **Connection Sizes:**

- •Foul Gas In 1/4" MPT
- •Non Condensable Vent 3/8" SW
- •Wet Suction 3/8" MPT
- •Liquid Drain 3/8" FPT
- •Inner Chamber Drain 1/4" FPT
- •Cold Liquid Feed 3/8" MPT (3/8" FPT for gravity feed)

#### Condensing/Evap Capacity:

- •Just over 13 feet of 3/8" tubing SA213-304/304L SS coil!
  - –Only need 24°F  $\Delta$ T (Hansen wants their thermostat set at 20°F)
  - -Gives up to roughly 0.57 TR of heat transfer

#### **Standard Trim and Control Options:**

- •Liquid feed type (HPL, Pump, Gravity)
- •PURJR (Includes bubbler, factory insulation, and 3 point controls)



#### Purger Junior Components



- 1. Liquid feed The Air Purger Junior can be fed by either high pressure liquid, pumped or gravity fed. If the Purger is fed using high pressure liquid (as shown), a 3/8" solenoid is installed with a 0.0196" (0.5mm) stainless steel orifice screw installed in the bottom of the solenoid. If the Purger is fed using pumped liquid, 3/8" solenoid will be provided with a 0.059" (1.5mm) stainless steel orifice screw installed. If installed on a gravity fed system, the Purger will be provided without any solenoid or orifice. NOTE: for installs on gravity systems the Purger should be mounted a minimum of 20" (500mm) lower than the lowest liquid level in the separator feeding it in order to ensure sufficient gravity feed.
- 2. Expansion Orifice and Access This 7/8" hex head stainless steel plug allows the user to access the expansion orifice assembly inside the vessel. The expansion orifice assembly consists of a filter, 3/8" hex head screw, and orifice with 0.012" (0.3mm) hole. NOTE: the operator must first remove any liquid from the vessel and inner chamber through the vessel drain (Item 7) and chamber drain (Item 8) before removing this orifice assembly in the event of a clogged orifice.
- **3. Vent Solenoid** This 0.0196" (0.5mm) stainless steel orifice screw is installed into a solenoid and allows the air to purge. This solenoid opens when liquid level in the separation chamber is below the lowest switch point on the level switch, meaning that there is an adequate amount of air/non-condensables to purge. The valve closes again once the liquid level has reached the upper switch point on the level switch.



- 4. Capacitive liquid level probe HB Products HBLC special calibrated level control with two pre-set switch points, one for low level and one for high level. The probe sends a signal to the controls based on the liquid level in the inner chamber. When the liquid level is low (indicating a large presence of air/non-condensables in the unit), the probe sends a signal to open the vent solenoid. When the air leaves the unit the liquid level will again rise, triggering the upper switch point and closing the vent solenoid.
- **5.** Check valve Danfoss 3/8" NRVA check valve ensures that ambient air or water from a bubbler or water reservoir are not drawn into the Purger in the event of a malfunction, or if the air Purger pressure drops below atmospheric pressure.
- **6. Stop valve** Danfoss 3/8" SNV-ST stop needle valve for service of vent solenoid and check valve.
- **7.** Vessel Drain Danfoss 3/8" SNV-ST stop needle valve which allows the user to empty the vessel of any remaining refrigerant prior to servicing the expansion orifice (Item 1).
- **8. Chamber Drain** Danfoss ¼" SNV-ST stop needle valve which allows the user to empty the inner chamber of any remaining refrigerant prior to servicing the expansion orifice (Item 1).
- 9. Temp sensors Danfoss EKS 221 surface temperature sensor. These two temperature sensors are used to monitor the suction and foul gas temperatures to make sure we have at minimum a 24°F temperature difference, which is required to ensure that all of the ammonia has condensed by the time it reaches the end of the coil. In the event that this temperature difference does not exist the smart controls will turn on an alarm and prevent the vent solenoid from opening.
- 10. Liquid feed and Foul Gas Strainers Strainers are used to prevent the small liquid feed and expansion orifices from clogging due to debris in the system. The strainer insert is sized small enough that it will catch any debris large enough to clog the orifices during normal operation. If these orifices are clogged the unit will not function properly. Both strainers ship loose for field install.
- **11. Wet Suction** 3/8" pipe returns liquid to low temp accumulator or other low side vessel.
- 12 Bubbler The bubbler is installed in order to absorb any ammonia gas that might be purged with the non-condensables. Bubbles that pass through the water to the surface are non-condensables, while bubbles that disappear in the water will be ammonia gas. The water supply should run whenever the vent solenoid is open. The Phillips controls allow the user to run the water before the vent solenoid opens, and for a time after it closes to ensure complete absorption. The user must make sure that a minimum of 1 GPM of water is being pumped through the bubbler per every 1 lb. of vent gas.
- **13. Smart controls** The smart control offered has the ability to purge up to 3 purge points. The new controls allow the user to set different purge point times, keeps an accurate count on the amount of time each purge point is open for, as well as estimates ammonia loss and volume of air removed from your system. For more information on the smart controls see pages 16-27.
- **14. Customer Supplied Bubbler Water Solenoid** The user must supply a water solenoid that can supply at least 1 GPM of water per 1 lb. of vent gas, and connect to the water bubbler inlet connection. The water connection on the bubbler is a <sup>3</sup>/<sub>4</sub>" hose fitting.

#### **Purger Junior Operation**

1. Make sure water is present in the water bubbler/reservoir (Item 12), and suction and foul gas temp sensors (Item 9) are mounted in the correct locations before the system is powered up. Also make sure all service valves are open to allow refrigerant flow to the vessel.

\*If setting up for the first time, refer to Quick Start Guide on pages 37-39.

- 2. Once the unit and controls are powered up the liquid feed solenoid (Item 1) if fed by high pressure or pumped liquid will open creating the cold bath inside the main vessel. If gravity fed as long as the service valve up stream of the vessel is open, the vessel will be fed with cold liquid. At the same time the purge points will also open up and start sequencing based on the user settings on the controller.
- 3. The foul gas will flow from the purge points to the Purger and through the condensing coil. By the time the foul gas reaches the end of the coil and as long as we have a minimum 24°F temperature difference between our suction and foul gas, then all the ammonia will condense out and separate from the air/non-condensables in the collection chamber.
- 4. The now condensed subcooled ammonia in the collection chamber be expanded through the expansion orifice (Item 2) to the external chamber. This liquid will then return to a low side vessel through the wet suction piping (Item 11).
- Steps 3 and 4 above will continue until enough air/non-condensables has accumulated in the collection chamber, pushing the liquid level down and triggering the low switch point on the level probe (Item 4).
- 6. As long as the 24°F minimum temperature difference between our suction and foul gas exists and the liquid level is below the switch point on the level probe, then the vent solenoid (Item 3) will open, purging the air/non-condensables from the collection chamber and into the water bubbler/ reservoir (Item 13).
- 7. Once a sufficient amount of air/non-condensables has been purged, raising the liquid level in the collection chamber to the upper switch point, the vent solenoid (Item 3) will close, and the Purger will begin accumulating air/non-condensables again until it can purge again.
- 8. Steps 3-7 above will repeat over and over as long as the Purger unit is turned on.



**Combo Purger and Water Removal System Piping** 

# Piping Combination for Air Purger and Anhydrator



If you are interested in a combination Air Purger and Anhydrator see the above piping. This will allow the user to purge air at the same time that they are emptying water from their system. There is no need to stop purging air in order to boil off the refrigerant and concentrate the water. This piping allows the two units to operate independent of each other and utilizes the foul gas from the purge points as the heat source to boil off the ammonia in the Anhydrator.



#### VALVES • VESSELS • SYSTEMS • CONTROLS

# **Controls/Enclosures**



#### **PUR-10 Panel**

The Phillips' Purger controls utilize the Danfoss MCX programmable control platform. Based on the inputs from the temperature sensors and level probe the controls open and close the vent solenoid to allowing purging to take place. They also control the sequencing of the purge point solenoids, water solenoid, liquid feed solenoid and expansion solenoids if necessary. The PUR-3 panel comes standard on the PURJR Purger model. The PUR-3, PUR-10 and PUR-30 panels are optional on the PUR model Purger.

These controls allow the operator to set different purge times for each purge point as well as setting 3 different time schedules for Purger operation throughout the day. It also has manual and automatic sequences features that allow the user to purge a specific set of points for one cycle (manual operation), or all available points on a continuous loop (automatic operation). There is also a smart detect feature that will automatically move on from a point if it has not seen a significant increase in air/non-condensables over a customer-defined time period. The amount of time each purge point has vented is tracked, along with estimated ammonia loss and total volume of air purged from the system.

The controls can be password protected and will send an alarm signal in the event of a malfunction. RS485 communication capabilities are also included.



PUR-3



#### PUR-3 Control Panel High Level Specs:

- NEMA 4, UL & CSA panel
- 11-1/4" W x 12" H x 7-1/4" D
- 3 indicator LED's (Unit on, Venting, Common Alarm)
- RS485 Coms
- Comes standard on PURJR. Optional on PUR
- Power supply 110 VAC or 230 VAC

The PUR-3 Purger control is built in a NEMA 4 enclosure which has approximate dimensions of 11-1/4'' W x 12'' H x 7-1/4'' D. The PUR-3 Purger control allows the operators to connect up to 3 purge points to the main MCX controller. This unit is designed for smaller single condenser systems where you have 2 purge points on the condenser and 1 on the high pressure receiver. The MCX controller has the same program installed as the larger control panels but will not allow the user to go above 3 purge points.

The panel includes 3 LED lights for Unit On, Venting and Common Alarm as well as a unit "On/Off" switch on the side. Labeled terminal blocks are included and located at the bottom of the panel for wiring of all external components including all control valves, purge point solenoids, customer supplied water solenoid, temperature sensors, level probe, and power to the unit, making field wiring very simple. This control panel is also equipped with RS485 communication capabilities by wiring directly into the main controller.

#### VALVES • VESSELS • SYSTEMS • CONTROLS

# PUR-10 & PUR-30





#### PUR-10 Control Panel High Level Specs:

- NEMA 4, UL & CSA panel
- 16" W x 14" H x 8-1/2"D
- "On/Off "switch on front
- 3 indicator LED's (Unit on, Venting, Common Alarm)
- Remote LED backlit display with built in buzzer and (3) LED Buttons
- Defeatable quick disconnect door inlock switch (with Lockout Option)
- RS485 Coms
- Optional on PUR
- Power supply 110 VAC or 230 VAC

#### PUR-30 Control Panel High Level Specs:

- NEMA 4, UL & CSA panel
- 20'' W x 24'' H x 7'' D
- "On/Off "switch on front
- 3 indicator LED's (Unit on, Venting, Common Alarm)
- Remote LED backlit display with built in buzzer and (3) LED Buttons
- Defeatable quick disconnect door inlock switch (with Lockout Option)
- RS485 Coms
- Optional on PUR
- Power supply 110 VAC or 230 VAC

The Phillips PUR-10 and PUR-30 Purger controls allow the operators to connect up to 10 or 30 purge points to the main MCX controller, using one or two expansion modules depending on the panel selected. These units are designed to fit on any size system. The panel includes 3 LED lights for Unit On, Venting and Common Alarm. It also includes an "On/Off" switch on the front door with remote display and defeatable disconnect switch. Labeled terminal blocks are located at the bottom of the panel for wiring of all external components including all control valves, purge point solenoids, customer supplied water solenoid, temperature sensors, level probe, and power to the unit, making field wiring very simple. Each control panel is also equipped with RS485 communication capabilities by wiring directly into the main controller.



### Purger Controller Menu Structure

Menu or Sub-Menu	Description / Eurotion	<b>Minimum Required</b>
Name	Description/Function	Password Level
Login	Enter password via up/down buttons in order to gain access to more parameters	0
Operations	Place the Purger in standby mode, or give it the run signal. Choose your purge point sequence mode (Auto or Manual), and initiate the manual sequence via this menu (must be in Manual Sequence Mode)	0
Settings	Change some of the sensor set points/settings	1 & 2
Configuration	Configure your Purger to best fit your particular application	1 & 2
Purge Points	Tell the controller how many purge points and expansion/slave controller modules are in use	1
Purge Times	Assign the amount of time to spend on each purge point	1
Smart Detect	Enable or Disable the controller to automatically skip over points that are not providing appreciable amounts of non-condensables	2
Water Solenoid	Dial in your water solenoid settings	1
Auto Time Schedule	Set up to 3 separate on/off time windows for each day of the week, and give the auto sequence the signal to run per the scheduled times	1
Auto Schedule 1	First time window	1
Auto Schedule 2	Second time window	1
Auto Schedule 3	Third time window	1
Manual Sequence	Setup what point(s) you want to be included in the manual sequence.	1
Alarms	View and change alarms and view/reset log history	2
Alarm Settings	Change temp sensor and liquid level sensor alarm criteria	2
Sensor Alarms	Make changes to alarms with regards to sensors	2
Alarm Isolation	Isolate alarms if desired (isolating an alarm condition will mute the internal buzzer and will also keep the common alarm relay from switching for that particular alarm criteria)	2
Active Alarms	Shows current active alarms (also quickly accessible by holding 'X' button when looking at main screen)	2
Reset Alarms	Resets active alarms	2
Log History	Shows alarm history and change history	2
Clear Log History	Clears alarm and change history	2
Inputs	All parameters in this sub-menu require a minimum Level 2 password to R/W	2
Input Calibration	All parameters in this sub-menu require a minimum Level 2 password to R/W	2
Commissioning	Manually force outputs (e.g. force the common alarm to be energized) for a short period of time (automatically turns off after a while, if you don't first turn off yourself). This feature is very handy for testing wiring, etc	2
Time Purged	View (and override) values showing details such as total time spent on particular points, estimated ammonia loss, total time vent solenoid has been on, estimated volume of air removed from system, etc.	0
Service	All parameters in this menu require a minimum Level 2 password to R/W	2
Input/Output	All parameters in this menu require a minimum Level 2 password to R/W	2
RTC Setup	Setup Real Time Clock (Date and time).	2
Serial settings	Change serial settings if required for communications	2
Device Info	States version of device	2
Software Info	States version of Phillips Purger software installed	2

# Parameter List/Modbus Map

LABEL	MENU OR PARAMATER DESCRIPTION (please note that "->" designates a sub-menu)	MIN	MAX	DEFAULT VALUE	UNIT/ ENUM.	NOTES	RW	ADU
	Login	000	999	100 or 200		Enter password via up/down buttons in order to gain		
ор	Operations							
01	System Operation Switch	0	1	0 - Off	0 - Off 1 - On	Off On Turning this, and/or the hardwired switch on the enclosur cover, to the off position will result in the system going to standby mode. Power will remain on, but no purging/ venting will occur. Water Solenoid may still run while in standby mode.		3001
02	Sequence Mode	0	1	0 - Auto	0 - Auto 1 - Manual	Requires a minimum Level 1 password to R/W         User can Choose Auto Mode (will automatically sequence through points on repeat if within scheduled time) or         Manual Mode (Will sequence through selected points onl once through regardless of the time schedule).         Both modes spend the allocated amount of minutes allotted to each purge point per "Configuration > Purge Times" sub-menu.         See o1 and q1 for switches used to initiate sequences.		3002
q1	Start Manual Sequence	0	1	0 - Off	0 - Off 1 - On	Software switch to initiate a manual sequence and open the selected purge points (as assigned below). If you want to have the controller sequence through the purge points per the Manual Sequence Mode, you must set o2 to "1", and then this switch to "On".		3003
09	System Type	0	2	0-Purger	0 - Purger 1 - PURJR 2 - Freon	Sets the calculated results based on the Purger. Calculations are based on ammonia purging, freon based applications will not calculate.		3004
set	Settings							
o5	Sensor DeltaT Setpoint	о7	250.0	25.0	°F	Requires a Level 2 password to R/W Setpoint for the Delta T (Temperature difference) between the suction and foul gas probes	RW	3007
06	DeltaT Time Delay	08	60	10	min	The Delta T between the suction and foul gas probes (see o5) must be maintained for this amount of time before we will allow the vent solenoid to be energized. If the Delta T is lost at any point, this time delay will have to lapse before the vent will open again. Purger will also hold open purge point 1 to get a reading, and wont move on from point 1 until the DeltaT conditions are satisfied.	RW	3008
pur	Configuration -> Purge Points					All parameters in this sub-menu require a minimum Level 1 password to R/W		
c0	Expansion Module 1 Installed	0	1	0 - No	0 - No 1 - Yes	Level 1 password to K/W Switch to enable expansion module 1. If enabled, Master controller will expect to be able to establish and maintain communications with this module. Failure to communicate will result in an alarm after a time delay. Used for up to 10 Purge Points		3011
c1	Expansion Module 2 Installed	0	1	0 - No	0 - No 1 - Yes	Switch to enable expansion module 2. If enabled, Master controller will expect to be able to establish and maintain communications with this module. Failure to communicate will result in an alarm after a time delay. Used for up to 30 Purge Points	RW	3012
c2	Number of Points Installed	1	сЗ	2		Number of points installed/ wired on the controller. Maximum allowable input is auto calculated depending on how many slave/expansion controller modules you say are installed.	RW	3013



### Parameter List/Modbus Map

LABEL	MENU OR PARAMATER DESCRIPTION (please note that "->" designates a sub-menu)	MIN	МАХ	DEFAULT VALUE	UNIT/ ENUM.	NOTES	RW	ADU
prt	Configuration -> Purge Times					Level 1 password to R/W		
c4	Purge Point 1	0	60	15	min		RW	3015
c5	Purge Point 2	0	60	15	min		RW	3016
c6	Purge Point 3	0	60	15	min		RW	3017
c7	Purge Point 4	0	60	15	min		RW	3018
c8	Purge Point 5	0	60	15	min		RW	3019
c9	Purge Point 6	0	60	15	min		RW	3020
c10	Purge Point 7	0	60	15	min		RW	3021
c11	Purge Point 8	0	60	15	min		RW	3022
c12	Purge Point 9	0	60	15	min		RW	3023
c13	Purge Point 10	0	60	15	min		RW	3024
c14	Purge Point 11	0	60	15	min		RW	3025
c15	Purge Point 12	0	60	15	min		RW	3026
c16	Purge Point 13	0	60	15	min		RW	3027
c17	Purge Point 14	0	60	15	min		RW	3028
c18	Purge Point 15	0	60	15	min	Use these parameters to assign/allot the amount of time	RW	3029
c19	Purge Point 16	0	60	15	min	sequence modes (o2) run based on these values.		3030
c20	Purge Point 17	0	60	15	min			3031
c21	Purge Point 18	0	60	15	min			3032
c22	Purge Point 19	0	60	15	min			3033
c23	Purge Point 20	0	60	15	min		RW	3034
c24	Purge Point 21	0	60	15	min		RW	3035
c25	Purge Point 22	0	60	15	min		RW	3036
c26	Purge Point 23	0	60	15	min		RW	3037
c27	Purge Point 24	0	60	15	min		RW	3038
c28	Purge Point 25	0	60	15	min		RW	3039
c29	Purge Point 26	0	60	15	min		RW	3040
c30	Purge Point 27	0	60	15	min		RW	3041
c31	Purge Point 28	0	60	15	min		RW	3042
c32	Purge Point 29	0	60	15	min		RW	3043
c33	Purge Point 30	0	60	15	min		RW	3044
smt	Configuration -> Smart Detect					All parameters in this sub-menu require a minimum Level 2 password to R/W		
c34	Smart Detect Feature	0	1	1 - On	0 - Off 1 - On	Smart detect feature enable switch. The smart detect feature will cause the current point to be skipped over if the liquid level inside the purger's inner chamber has not decreased more than the differential amount (c36) within the specified timeframe (c35). However, please note that if the vent is energized at any point in time during the current purge point's cycle, this will cause the point to run for the full time.	RW	3045

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# Parameter List/Modbus Map

LABEL	MENU OR PARAMATER DESCRIPTION (please note that "->" designates a sub-menu)	MIN	МАХ	DEFAULT VALUE	UNIT/ ENUM.	NOTES	RW	ADU
c35	Smart Detect Time	1	60	3	min	Maximum length of time spent on purge if no appreciable change in liquid level has occurred	RW	3046
c36	Smart Detect Level Differential	0	100	20	%	Minimum differential value required for the liquid level to move before full purge time with be allowed to run rather than smart detect time. Example: With the factory default value of 20%, and if the level inside the Purger is 60% when the purge point is initiated, that point will be skipped over if the level has not dropped beneath 40% before the Smart Detect Time (c36) has lapsed.	RW	3047
wtr	Configuration -> Water Solenoid					All parameters in this sub-menu require a minimum Level 1 password to R/W		
c37	Auto Flush	0	1	0 - Off	0 - Off 1 - On	Auto flush software switch	RW	3048
c38	Auto Flush Time	1	30	1	min	Auto flush operation time	RW	3049
c39	Pre Vent Open Time	2	600	3	sec	Time the water solenoid opens before the vent solenoid opens	RW	3050
c40	Post Vent Open Time	2	600	45	sec	Time the water solenoid opens after the vent solenoid has shut	RW	3051
c41	Minimum Open Time	15	600	45	sec	Minimum open time length for the water solenoid	RW	3052
c42	Auto Flush Maximum Off Time	0	200	48	hr.	Maximum time between water solenoid openings, after this period without opening the system will perform an auto flush		3053
ts1	Auto Time Schedule -> Auto Schedule 1					All parameters in this sub-menu require a minimum Level 1 password to R/W		
t1	Monday On	0	97	0:00	24hr	Use one, two, or all three of these auto time schedule	RW	3054
t2	Monday Off	0	97	24:00	24hr	windows to choose when to allow the Purger to run when in Auto Sequence Mode (o2).	RW	3055
t3	Tuesday On	0	97	0:00	24hr		RW	3056
t4	Tuesday Off	0	97	24:00	24hr	go signal, the Purger will run through the Auto Sequence	RW	3057
t5	Wednesday On	0	97	0:00	24hr	Mode as long as the other requirements are satisfied.	RW	3058
t6	Wednesday Off	0	97	24:00	24hr	12hr format to 24 hr. format conversions:	RW	3059
t7	Thursday On	0	97	0:00	24hr	12:00 AM = 00:00 12:00 PM = 12:00 1:00 AM = 01:00 1:00 PM = 13:00	RW	3060
t8	Thursday Off	0	97	24:00	24hr	2:00  AM = 02:00 $2:00  PM = 14:00$	RW	3061
t9	Friday On	0	97	0:00	24hr	3:00 AM = 03:00 3:00 PM = 15:00 4:00 AM = 04:00 4:00 PM = 16:00	RW	3062
t10	Friday Off	0	97	24:00	24hr	5:00 AM = 05:00 5:00 PM = 17:00	RW	3063
t11	Saturday On	0	97	0:00	24hr	7:00  AM = 07:00 $7:00  PM = 19:00$	RW	3064
t12	Saturday Off	0	97	24:00	24hr	8:00  AM = 08:00 $8:00  PM = 20:009:00  AM = 09:00$ $9:00  PM = 21:00$	RW	3065
t13	Sunday On	0	97	0:00	24hr	10:00  AM = 10:00 $10:00  PM = 22:00$	RW	3066
t14	Sunday Off	0	97	24:00	24hr	11:00 AM = 11:00 11:00 PM = 23:00	RW	3067
ts2	Auto Time Schedule -> Auto Schedule 2					All parameters in this sub-menu require a minimum Level 1 password to R/W		
t21	Monday On	0	97	0:00	24hr		RW	3068
t22	Monday Off	0	97	24:00	24hr		RW	3069
t23	Tuesday On	0	97	0:00	24hr	Use one, two, or all three of these auto time schedule	RW	3070
t24	Tuesday Off	0	97	24:00	24hr	in Auto Sequence Mode (o2).	RW	3071
t25	Wednesday On	0	97	0:00	24hr		RW	3072
t26	Wednesday Off	0	97	24:00	24hr		RW	3073



# Parameter List/Modbus Map

LABEL	MENU OR PARAMATER DESCRIPTION (please note that "->" designates a sub-menu)	MIN	МАХ	DEFAULT VALUE	UNIT/ ENUM.	NOTES	RW	ADU
t27	Thursday On	0	97	0:00	24hr		RW	3074
t28	Thursday Off	0	97	24:00	24hr		RW	3075
t29	Friday On	0	97	0:00	24hr		RW	3076
t30	Friday Off	0	97	24:00	24hr	If any of the three time schedule windows are giving the	RW	3077
t31	Saturday On	0	97	0:00	24hr	Mode as long as the other requirements are satisfied.	RW	3078
t32	Saturday Off	0	97	24:00	24hr		RW	3079
t33	Sunday On	0	97	0:00	24hr		RW	3080
t34	Sunday Off	0	97	24:00	24hr		RW	3081
ts3	Auto Time Schedule -> Auto Schedule 3					All parameters in this sub-menu require a minimum Level 1 password to R/W	7	
t41	Monday On	0	97	0:00	24hr		RW	3082
t42	Monday Off	0	97	24:00	24hr		RW	3083
t43	Tuesday On	0	97	0:00	24hr		RW	3084
t44	Tuesday Off	0	97	24:00	24hr		RW	3085
t45	Wednesday On	0	97	0:00	24hr		RW	3086
t46	Wednesday Off	0	97	24:00	24hr		RW	3087
t47	Thursday On	0	97	0:00	24hr	24hrIf any of the three time schedule windows are giving the go signal, the Purger will run through the Auto Sequence Mode as long as the other requirements are satisfied.24hr24hr24hr24hr		3088
t48	Thursday Off	0	97	24:00	24hr			3089
t49	Friday On	0	97	0:00	24hr			3090
t50	Friday Off	0	97	24:00	24hr			3091
t51	Saturday On	0	97	0:00	24hr		RW	3092
t52	Saturday Off	0	97	24:00	24hr		RW	3093
t53	Sunday On	0	97	0:00	24hr		RW	3094
t54	Sunday Off	0	97	24:00	24hr		RW	3095
tsg	Auto Time Schedule -> Auto General					All parameters in this sub-menu require a minimum Level 1 password to R/W	/	
t99	Time On Type	0	1	0 - Equal	0 - Equal 1 - Greater	Sets sequence to start at exact set time, or greater than set time.	RW	3096
msq	Manual Sequence					All parameters in this menu require a minimum Level 1 password to R/W		
q2	Purge Point 1	0	1	0 - Off			RW	3097
q3	Purge Point 2	0	1	0 - Off			RW	3098
q4	Purge Point 3	0	1	0 - Off			RW	3099
q5	Purge Point 4	0	1	0 - Off			RW	3100
q6	Purge Point 5	0	1	0 - Off		Turn points to the "On" position if you desire them to be	RW	3101
q7	Purge Point 6	0	1	0 - Off	0 - Off 1 - On	sequenced through when the controller is in Manual	RW	3102
q8	Purge Point 7	0	1	0 - Off		sequence mode, otherwise they will be skipped over.	RW	3103
q9	Purge Point 8	0	1	0 - Off			RW	3104
q10	Purge Point 9	0	1	0 - Off			RW	3105
q11	Purge Point 10	0	1	0 - Off			RW	3106
q12	Purge Point 11	0	1	0 - Off			RW	3107

# Parameter List/Modbus Map

LABEL	MENU OR PARAMATER DESCRIPTION (please note that "->" designates a sub-menu)	MIN	МАХ	DEFAULT VALUE	UNIT/ ENUM.	NOTES	RW	ADU
q13	Purge Point 12	0	1	0 - Off			RW	3108
q14	Purge Point 13	0	1	0 - Off			RW	3109
q15	Purge Point 14	0	1	0 - Off			RW	3110
q16	Purge Point 15	0	1	0 - Off			RW	3111
q17	Purge Point 16	0	1	0 - Off			RW	3112
q18	Purge Point 17	0	1	0 - Off			RW	3113
q19	Purge Point 18	0	1	0 - Off			RW	3114
q20	Purge Point 19	0	1	0 - Off			RW	3115
q21	Purge Point 20	0	1	0 - Off		Turn points to the "Op" position if you desire them to be	RW	3116
q22	Purge Point 21	0	1	0 - Off	0 - Off 1 - On	sequenced through when the controller is in Manual	RW	3117
q23	Purge Point 22	0	1	0 - Off	1 011	sequence mode, otherwise they will be skipped over.	RW	3118
q24	Purge Point 23	0	1	0 - Off			RW	3119
q25	Purge Point 24	0	1	0 - Off			RW	3120
q26	Purge Point 25	0	1	0 - Off			RW	3121
q27	Purge Point 26	0	1	0 - Off			RW	3122
q28	Purge Point 27	0	1	0 - Off			RW	3123
q29	Purge Point 28	0	1	0 - Off			RW	3124
q30	Purge Point 29	0	1	0 - Off				3125
q31	Purge Point 30	0	1	0 - Off			RW	3126
ast	Alarms -> Alarm Settings					All parameters in this sub-menu require a minimum Level 2 password to R/W		
a1	Sensor DeltaT Setpoint Delay	0	30	5	min	Time delay for the sensor delta alarm	RW	3127
a3	Low Liquid Level	0	100	15	%	Low liquid level alarm %	RW	3129
a4	Low Liquid Level Delay	0	120	5	min	Time delay for the low liquid alarm	RW	3130
als	Alarms -> Sensor Alarms							
a7	Suction Temp Fail Value	-100.0	300.0	-100.0	°F	Value displayed and used when sensor is in failure	RW	3131
a8	Suction Temp Fail Delay	0	600	20	sec	Time delay for sensor failure	RW	3132
a9	Foul Gas Temp Fail Value	-50.0	300.0	300.0	°F	Value displayed and used when sensor is in failure	RW	3133
a10	Foul Gas Temp Fail Delay	0	600	20	sec	Time delay for sensor failure	RW	3134
a11	Liquid Level Fail Value	-100	200	-100	%	Value displayed and used when sensor is in failure	RW	3135
a12	Liquid Level Fail Delay	0	600	20	sec	Time delay for sensor failure	RW	3136
a13	Foul Gas Pressure Fail Value	-100.0	300.0	65.0	psig	Value displayed and used when sensor is in failure	RW	3137
a14	Foul Gas Pressure Fail Delay	-500	1000	20	sec	Time delay for sensor failure	RW	3138
ali	Alarms -> Alarm Isolation					All parameters in this sub-menu require a minimum Level 2 password to R/W		
a15	Emergency Stop Alarm	0	1	1 - Auto	0.7	You can choose to isolate any of these alarms. Set	RW	3139
a16	Sensor DeltaT Setpoint Alarm	0	1	1 - Auto	0 - Iso 1 - Auto	parameter to "Iso" if you don't want the common alarm	RW	3140
a18	Suction Temp Fail Alarm	0	1	1 - Auto		relay to switch when in alarm.	RW	3141



# Parameter List/Modbus Map

LABEL	MENU OR PARAMATER DESCRIPTION (please note that "->" designates a sub-menu)	MIN	МАХ	DEFAULT VALUE	UNIT/ ENUM.	NOTES	RW	ADU
a19	Foul Gas Temp Fail Alarm	0	1	1 - Auto			RW	3142
a20	Liquid Level Fail Alarm	0	1	1 - Auto			RW	3143
a21	Suction Pressure Fail Alarm	0	1	0 - Iso	o	You can choose to isolate any of these alarms. Set	RW	3144
a22	Expansion Module 1 Coms Alarm	0	1	1 - Auto	0 - Iso 1 - Auto	parameter to "Iso" if you don't want the common alarm relay to switch when in alarm.	RW	3145
a23	Expansion Module 2 Coms Alarm	0	1	1 - Auto			RW	3146
a24	Low Liquid Level Alarm	0	1	1 - Auto			RW	3147
	Alarms -> Active Alarms					Shows current active alarms		
	Alarms -> Reset Alarms					Resets active alarms		
	Alarms -> Log History					Shows alarm history		
	Alarms -> Clear Log History					Clears alarm history		
icl	Inputs -> Input Calibration					All parameters in this sub-menu require a minimum Level 2 password to R/W		
e1	Suction Probe Calibration	-10.0	10.0	0.0	°F	Calibration for sensor	RW	3153
e2	Foul Gas Probe Calibration	-10.0	10.0	0.0	°F	Calibration for sensor	RW	3154
e5	Pressure Loss	0.0	30.0	0.0	psig	Offset to account for any pressure loss between purge point and Foul Gas inlet to Purger	RW	3157
man	Commissioning					All parameters in this menu require a minimum Level 2 password to R/W		
m0	Maximum Manual Open Time	0	5	1	min	Maximum time for manual operation	RW	3171
m1	Water Solenoid Enable	0	2	1 - Auto			RW	3172
m2	Vent Solenoid Enable	0	2	1 - Auto			RW	3173
m3	Liquid Fill Solenoid Enable	0	2	1 - Auto			RW	3174
m4	Liquid Drain Solenoid Enable	0	2	1 - Auto			RW	3175
m7	Common Alarm Enable	0	2	1 - Auto		Manual Operations feature can be used to manually force an output. This can be very useful for testing your wiring	RW	3176
m8	Purge Point 1 Enable	0	2	1 - Auto		for commissioning process and troubleshooting.	RW	3177
m9	Purge Point 2 Enable	0	2	1 - Auto	0 - Off	Switch to "Man" to manually force on, and can switch back	RW	3178
m10	Purge Point 3 Enable	0	2	1 - Auto	1 - Auto	to "Auto" when done. Otherwise, the switch will	RW	3179
m11	Purge Point 4 Enable	0	2	1 - Auto	2 - Man	"Maximum Manual Open Time" (m0) time has elapsed.	RW	3180
m12	Purge Point 5 Enable	0	2	1 - Auto		Off Teelshed Autor Automatic Cofficiency Man. Manually,	RW	3181
m13	Purge Point 6 Enable	0	2	1 - Auto		On On	RW	3182
m14	Purge Point 7 Enable	0	2	1 - Auto			RW	3183
m15	Purge Point 8 Enable	0	2	1 - Auto			RW	3184
m16	Purge Point 9 Enable	0	2	1 - Auto			RW	3185
m17	Purge Point 10 Enable	0	2	1 - Auto			RW	3186

# Parameter List/Modbus Map

LABEL	MENU OR PARAMATER DESCRIPTION (please note that "->" designates a sub-menu)	MIN	МАХ	DEFAULT VALUE	UNIT/ ENUM.	NOTES	RW	ADU
m18	Purge Point 11 Enable	0	2	1 - Auto			RW	3187
m19	Purge Point 12 Enable	0	2	1 - Auto			RW	3188
m20	Purge Point 13 Enable	0	2	1 - Auto			RW	3189
m21	Purge Point 14 Enable	0	2	1 - Auto			RW	3190
m22	Purge Point 15 Enable	0	2	1 - Auto			RW	3191
m23	Purge Point 16 Enable	0	2	1 - Auto			RW	3192
m24	Purge Point 17 Enable	0	2	1 - Auto		Manual Operations feature can be used to manually force	RW	3193
m25	Purge Point 18 Enable	0	2	1 - Auto		an output. This can be very useful for testing your wiring	RW	3194
m26	Purge Point 19 Enable	0	2	1 - Auto		for commissioning process and troubleshooting.	RW	3195
m27	Purge Point 20 Enable	0	2	1 - Auto	0 - Off 1 - Auto	Switch to "Man" to manually force on, and can switch back	RW	3196
m28	Purge Point 21 Enable	0	2	1 - Auto	2 - Man	automatically be turned back to "Auto" when the	RW	3197
m29	Purge Point 22 Enable	0	2	1 - Auto		"Maximum Manual Open Time" (m0) time has elapsed.	RW	3198
m30	Purge Point 23 Enable	0	2	1 - Auto		Off= Isolated, Auto: Automatic Software, Man= Manually	RW	3199
m31	Purge Point 24 Enable	0	2	1 - Auto		On	RW	3200
m32	Purge Point 25 Enable	0	2	1 - Auto			RW	3201
m33	Purge Point 26 Enable	0	2	1 - Auto			RW	3202
m34	Purge Point 27 Enable	0	2	1 - Auto			RW	3203
m35	Purge Point 28 Enable	0	2	1 - Auto			RW	3204
m36	Purge Point 29 Enable	0	2	1 - Auto			RW	3205
m37	Purge Point 30 Enable	0	2	1 - Auto			RW	3206
run	Time Purged							
r0	Foul Gas Removed	0.00	320.00	0.00	ft3/min	This is the cumulative estimated amount of air/non- condensable vapor removed from your purge points in cubic feet. This estimate can be user adjusted if desired.	RW	3207
r1	Air Leaving Device	0.0	3200.0	0.0	ft3/min	This is the cumulative estimated amount of air/non- condensable vapor leaving the vent in cubic feet. This estimate can be user adjusted if desired.	RW	3208
r2	Ammonia Loss	0.00	320.00	0.00	lbs	This is the cumulative estimated amount of ammonia lost with the air/non-condensable vapor leaving the vent in cubic feet. This estimate can be user adjusted if desired.	RW	3209
r10	Vent Solenoid	0	32000	0	min	This is the cumulative amount of time in minutes that the vent solenoid has been energized. This value can be user adjusted if desired.	RW	3210
r11	Purge Point 1	0	32000	0	min		RW	3211
r12	Purge Point 2	0	32000	0	min		RW	3212
r13	Purge Point 3	0	32000	0	min		RW	3213
r14	Purge Point 4	0	32000	0	min	These values are the cumulative amount of time in	RW	3214
r15	Purge Point 5	0	32000	0	min	minutes that each purge point solenoid has been	RW	3215
r16	Purge Point 6	0	32000	0	min	energized. These values can be user adjusted if desired.	RW	3216
r17	Purge Point 7	0	32000	0	min		RW	3217
r18	Purge Point 8	0	32000	0	min		RW	3218
r19	Purge Point 9	0	32000	0	min		RW	3219



# Parameter List/Modbus Map

LABEL	MENU OR PARAMATER DESCRIPTION (please note that "->" designates a sub-menu)	MIN	МАХ	DEFAULT VALUE	UNIT/ ENUM.	NOTES	RW	ADU
r20	Purge Point 10	0	32000	0	min		RW	3220
r21	Purge Point 11	0	32000	0	min		RW	3221
r22	Purge Point 12	0	32000	0	min		RW	3222
r23	Purge Point 13	0	32000	0	min		RW	3223
r24	Purge Point 14	0	32000	0	min		RW	3224
r25	Purge Point 15	0	32000	0	min		RW	3225
r26	Purge Point 16	0	32000	0	min		RW	3226
r27	Purge Point 17	0	32000	0	min		RW	3227
r28	Purge Point 18	0	32000	0	min		RW	3228
r29	Purge Point 19	0	32000	0	min	These values are the cumulative amount of time in	RW	3229
r30	Purge Point 20	0	32000	0	min	minutes that each purge point solenoid has been	RW	3230
r31	Purge Point 21	0	32000	0	min	energized. These values can be user adjusted it desired.	RW	3231
r32	Purge Point 22	0	32000	0	min		RW	3232
r33	Purge Point 23	0	32000	0	min		RW	3233
r34	Purge Point 24	0	32000	0	min		RW	3234
r36	Purge Point 25	0	32000	0	min		RW	3235
r37	Purge Point 26	0	32000	0	min		RW	3236
r38	Purge Point 27	0	32000	0	min		RW	3237
r39	Purge Point 28	0	32000	0	min		RW	3238
r40	Purge Point 29	0	32000	0	min		RW	3239
r41	Purge Point 30	0	32000	0	min		RW	3240
r42	Reset Run Timers	0	1	0 - Off	0 - Off 1 - On	Software switch to reset the run timers.	RW	3241
	Service -> RTC Setup					<i>Setup Real Time Clock</i> <i>Please note that the RTC time clock will not automatically</i> <i>update with Daylight savings time changes, so be sure to</i> <i>make changes if/as needed.</i>		
SEr	Service -> Serial settings					All parameters in this menu require a minimum Level 2 password to R/W		
SEr	Serial address (Modbus and CAN)	1	100	1		Serial Settings	RW	3242
bAU	Serial baudrate (Modbus)	0	8	8 - 384	Enum 12	Serial Settings	RW	3243
COM	Serial settings (Modbus)	0	2	1 - 8E1	Enum 13	Serial Settings	RW	3244
	Device Info					States version of device		
	Software Info					States version of software installed		

# Installation Guide (Field Piping) High Pressure Liquid / Direct Expansion



Application in a high pressure liquid feed system is shown above. A solenoid, orifice, and housing will be supplied with the unit to change from high pressure, high temperature liquid to low temperature liquid at suction pressure. This solenoid must close when power to the Purger is off, or if the high level alarm on the liquid separator is giving a high alarm.



# **Installation Guide (Field Piping)**

#### **Pumped Overfeed**





Application in a pumped overfeed system is shown above. A solenoid, orifice and housing for the PURJR and liquid feed orifice and flange for PUR are supplied with the unit to provide between 3 and 4:1 overfeed for pumped liquid at 20 to 30 psi [1.5 to 2 bar] above suction. The solenoid valve on the PURJR must close when power to the Purger is off, or if the high level alarm on the liquid separator is giving a high alarm.

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# **Installation Guide (Field Piping)**

# **Gravity Flooded**



Application in a gravity feed system is shown above. On a gravity flooded system, the liquid feed solenoid and orifice is omitted and the unit must be situated lower than the liquid level of the source vessel. The entire Purger main vessel must be filled with liquid (covering the collecting chamber), and sufficient static head (minimum of 20" below lowest liquid level) be available to provide good circulation.

#### VALVES • VESSELS • SYSTEMS • CONTROLS



# Installation Guide (Field Piping)

**Multiple Points** 



Multiple purge points may be connected to a single Purger, as shown above. (Note that on halocarbon systems the optimal purge point locations may differ somewhat.) Adjustable controls, such as the PUR-3, PUR-10, and PUR-30 controls offered by Phillips, should be provided to permit purge points to open individually for up to 60 minutes. Foul gas flow should be continuous to maintain pressure inside the collecting chamber. A brief "overlap" time when two purge points are open simultaneously is permissible. However, because slight pressure differences between purge points could enable air or non-condensable gases to pass from one purge point to another, overlap time should be limited to ten seconds or less. Aside from this brief overlap, at least one purge point must be open whenever the Purger is running.

# **Electrical Components**

# Master Controller (Up to 3 Points)





INDEX	DESCRIPTION	TYPE OR POLARITY
	ANALOG INPUTS	
AI 1	Liquid Level Input [MIN = 0 - MAX = 100]	4-20 mA
AI 2	Suction Temperature Sensor	NTC-10K
AI 3	Foul Gas Temperature Sensor	NTC-10K
AI 4	Suction Pressure Sensor (Not Used)	0-20 mA
AI 5-8	Not Used	NO
	DIGITAL INPUTS	
DI 1	On Off Switch	N.O.
DI 2	Emergency Stop	N.O.
DI 3	Start Purge Switch	N.O.
DI 4	Skip Point Switch	N.O.
DI 5-8	Not Used	N.C.
	ANALOG OUTPUTS	
AO 1-4	Not Used	NO
	DIGITAL OUTPUTS	
DO 1	Purge 1 Enable	N.O.
DO 2	Purge 2 Enable	N.O.
DO 3	Purge 3 Enable	N.O.
DO 4	Water Solenoid	N.O.
DO 5	Vent Solenoid	N.O.
DO 6	Liquid Fill Solenoid	N.O.
DO 7	Liquid Drain Solenoid	N.O.
DO 8	Common Alarm	N.C.

#### NOTES

INDEX	DESCRIPTION
E-Stop	Customer can replace jumper between DI 2 and COM with E-Stop relay/ button if desired.
Purge Switch	Customer can add buttons for DI 3 and/or DI 4 if desired
Power Supply	Default Master Controller will take 85-265 V AC, 20 VA, 50/60 Hz
CAN	Slave Comms. 3-strand shielded wire for Communications between controllers Daisy chain to Slave#1 then Slave#2
RS485	Customer to field wire in if desired via 3-strand shielded cable
RS485	RS485 Comms. Customer to field wire in if desired via 3-strand shielded cable. 3-strand shielded wire for communications with SM-810 or 820 (or Customer's PLC system)
Loss of Power	NOTE: Enclosure to be supplied with Common Alarm circuit going through DI 8 (NC) so that alarm is made on loss of power to main controller.

63mm = 2.48"



# Electrical Components

# Slave 1 Controller (Up to 10 Points)



		-1
INDEX	DESCRIPTION	TYPE OR POLARITY
	ANALOG INPUTS	
AI 1-8	Not Used	0-20 mA
	DIGITAL INPUTS	
DI 1-8	Not Used	N.O.
	ANALOG OUTPUTS	
AO 1-4	Not Used	NO
	DIGITAL OUTPUTS	
DO 1	Purge 4 Enable	N.O.
DO 2	Purge 5 Enable	N.O.
DO 3	Purge 6 Enable	N.O.
DO 4	Purge 7 Enable	N.O.
DO 5	Purge 8 Enable	N.O.
DO 6	Purge 9 Enable	N.O.
DO 7	Purge 10 Enable	N.O.
DO 8	Spare	N.C.

#### NOTES

INDEX DESCRIPTION	
Power Supply	Default Slave#1 Controller will take 85-265 V AC, 20 VA, 50/60 Hz
CAN	Slave Comms. 3-strand shielded wire for Communications between controllers Daisy chain to Slave#1 then Slave#2 Jumper between "CAN H" and "CAN R" should be installed on slave#1 only if there is no slave #2 controller.
CAN H - R 120	This jumper connection only to be added if this MCX08 is the only slave controller. Otherwise, the jumper will be added to slave controller number 2 (MCX20B).





\*NOTE: connection has to be made on the first and last local network units, make the connection as close as possible to the connector.

### **Electrical Components** Slave 2 Controller (Up to 30 Points)



\*NOTE: connection has to be made on the first and last local network units, make the connection as close as possible to the connector.

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INDEX	DESCRIPTION	TYPE OR POLARITY
	ANALOG INPUTS	
AI 1-16	Not Used	0-10 V
	DIGITAL INPUTS	
DI 1-22	Not Used	N.O.
	ANALOG OUTPUTS	
AO 1-6	Not Used	0-10 V
	DIGITAL OUTPUTS	
DO 1	Purge 11 Enable	N.O.
DO 2	Purge 12 Enable	N.O.
DO 3	Purge 13 Enable	N.O.
DO 4	Purge 14 Enable	N.O.
DO 5	Purge 15 Enable	N.O.
DO 6	Purge 16 Enable	N.O.
DO 7	Purge 17 Enable	N.O.
DO 8	Purge 18 Enable	N.O.
DO 9	Purge 19 Enable	N.O.
DO 10	Purge 20 Enable	N.O.
DO 11	Purge 21 Enable	N.O.
DO 12	Purge 22 Enable	N.O.
DO 13	Purge 23 Enable	N.O.
DO 14	Purge 24 Enable	N.O.
DO 15	Purge 25 Enable	N.O.
DO 16	Purge 26 Enable	N.O.
DO 17	Purge 27 Enable	N.O.
DO 18	Purge 28 Enable	N.O.
DO 19	Purge 29 Enable	N.O.
DO 20	Purge 30 Enable	N.O.

#### NOTES

INDEX	DESCRIPTION	
Power Supply	Default Slave# 2 Controller will take 85-265 V AC, 31 VA, 50/60 Hz	
Can H - R 120	Slave Comms. 3-strand shielded wire for Communications between controllers Daisy chain to Slave#1 then Slave#2	



### **Electrical Components** Remote Display (Only used on PUR-10 & PUR-30)









\* NOTE: when MMI is not connected to Danfoss controller via telephone cable, the autodetection feature of the MCX CAN address will not work

Therefore check the following MMIGRS2 setting: 1) enter BIOS menu pressing and holding X + Enter keys for 5 seconds 2) select "MCXselection"-> "Manual Mode" and set the CAN address of the MCX you wish to connect to

#### Connection

CONNECTORS	ТҮРЕ	DIMENSIONS
Power supply connector	24 V AC - 2 way screw plug-in connector type	<ul> <li>pitch 3.5 mm</li> <li>section cable 0.08-1.5 mm<sup>2</sup></li> </ul>
CAN connector	4 way screw plug-in connector type	<ul> <li>pitch 3.5 mm</li> <li>section cable 0.08-1.5 mm<sup>2</sup></li> </ul>
CAN-RJ connector	6/6 way telephone RJ11 plug type	

### VALVES • VESSELS • SYSTEMS • CONTROLS

# **Electrical Field Wiring**

# Panel Field Wiring



# **Phillips Air Purger Control Panel Specifications**

Before shipment, all Phillips Purger control panels will include the below:

- Pre-wired and labeled temperature sensors
- Pre-wired liquid level probe
- Testing of functionality of probe signal, temperature sensors, panel box lights, purge points and solenoids
- Pre-Setting of number of purge points, PUR/PURJR model selection, refrigerant fluid, time, auto-time schedule set to 24/7
- Purger catalog inside control panel



### **Quick Startup Guide**

### **Phillips Purger Controls Quick Start-Up Guide**

- 1. Field wire sensors and solenoids to control panel (see page 4 for reference). If desired, customer can wire E-Stop and/or Remote On/Off feature.
- 2. Power up controls (disconnect switch on front door is defeatable type)



Button /Letter	Main Function	Notes
А	Up/Increase Value	Hold button for a couple seconds to quickly increase values.
В	Down/Decrease Value	Hold button for a couple seconds to quickly decrease values.
С	Scroll Left	On the remote display, this green button with be backlit by an LED when the Purger is in run mode. There is also a separate LED indicator light built into the enclosure's front door.
D	Scroll Right	On the remote display, this red button with be backlit by an LED when the Purger is in alarm mode. There is also a separate LED indicator light built into the enclosure's front door.
E	Enter/Apply Entry	Press or Hold the enter button to bring up login menu. On the remote display, this orange button with be backlit by an LED when the Purger has power.
F	Exit	Hold down the Exit button to see active alarm detail list.

- 3. If remote display doesn't load program with home screen (should see the Phillips Logo when on the Home screen), press Enter on "*Application*" to synchronize remote display with master controller. You can use either the screen on the master controller (within the enclosure) and/or the remote display to carry the rest of the process. Please note that the remote display and the main controller can operate independently (two different users could be making changes at the same time if desired).
- 4. Press enter from main menu to bring up parameter list, then select *Login*. Use the up/down arrows to enter passcode "200", then enter. (2 Passcodes available level 100 and level 200)
- 5. Select Operations and press enter. Check to ensure that <u>System Operation Switch</u> is set to off (this will keep the unit from purging).
  - a. Scroll and select Sequence Mode:
    - i. Select desired sequence mode (See parameter list table for details about Auto and Manual sequences) Press "X" to return to Operations screen

### **Quick Startup Guide**

- b. Scroll and select System Type
  - i. Set to Purger, Pur Jr or Freon for you desired application
  - ii. This will adjust your outputted calculations
  - iii. Press X to return to Operations screen
- c. Press X to return to Main Menu
- 6. <u>Select Configuration:</u>
  - a. Select Purge Points:
    - i. Tell Master controller if you have any Expansion Modules installed:
      - 1. 3 Point Purger  $\rightarrow$  No Expansion Modules installed
      - 2. 10 Point Purger  $\rightarrow$  Yes, Expansion module 1 installed
      - 3. 30 Point Purger  $\rightarrow$  Yes, Expansion Module 1 & 2 installed
    - ii. Select/set total number of purge points installed.
    - iii. Press X to return to configuration menu.
  - b. Select Purge Times:
    - i. Set desired time to be spent on each purge point (or keep at factory default of 15 minutes for each point if acceptable).
    - ii. Press X to return to configuration menu
  - c. Select Smart Detect (if desired):
    - i. Only need to enter into this menu if you want to make changes to the factory

recommended settings. Please refer to parameter C34 in parameter list for description of smart detect feature and parameter details.

- d. Select Water Solenoid (if desired):
  - i. Turn On/Off *Auto Flush* (Manually flushes bubbler for set time, can be used to fill bubbler for the first time).
  - ii. Set amount of time Auto Flush takes place.
  - iii. Set amount of time water solenoid is open before venting begins (you may need to increase this amount of time if your water solenoid is located far away).
  - iv. Set amount of time water solenoid is open after purging has completed (you may need to increase this amount of time if you have an oversized water bubbler/ reservoir).
  - v. Set minimum duration of time water solenoid is open for (this should be set so that you adequately cycle enough water through your bubbler each time in order to keep it "fresh").
  - vi. Set amount of time between *Auto Flush*. (If bubbler has not received any fresh water within this time, water solenoid will automatically turn on and flush fresh water through the bubbler. This can be useful to help prevent calcification buildup due to evaporation.)
  - vii. Press X to return to configuration menu and Press X to return to Main menu



### **Quick Startup Guide**

#### 7. Select Commissioning

a. Set max time for each output to be energized/tested.

b. Test water solenoid by changing from Auto to Manual.

c. Test vent solenoid by changing from Auto to Manual (NOTE: this will open vent solenoid, if refrigerant is present this could cause ammonia to be purged into the bubbler. Make sure water is present in bubbler before testing.) Please note that for safety reasons the water solenoid will be energized whenever the vent is energized, and it will remain on for a while after the vent solenoid has turned off.

d. Repeat process for testing output to liquid fill solenoid, liquid drain, common alarm, and each purge point to make sure each contact is wired/functioning correctly.

e. Once complete, press X to return to Main Menu

#### 8. Select Service

- a. Select RTC Setup
- b. Set Date and Time
- c. X to go back to main menu

Note: please note that the RTC time clocks will not automatically update with Daylight savings time changes, so be sure to make changes if/as needed.

#### 9. Select Auto Time Schedule:

a. Set schedule(s) for start and end times for each day of the week. Please note that time schedule is in 24hr format (see beneath conversion table if desired). If you want to turn a day off, keep decreasing the time until you reach "Off".

- i. Please note that you can have up to (3) separate/independent run windows for each day of the week. Example, by using the 3 different schedules, you can have every Monday run from 7am to Noon, take a break, turn back on and run from 2pm-4pm, take another break and then run from 6pm-9pm. The controller is provided factory default with only the first window (see "Auto Schedule 1" for the first window) set to run from 8 AM to 5 PM.
  - 1. If desired, set separate independent second time window to run the Purger
  - 2. If desired, set separate independent third schedule to run the Purger
- 10. Lastly if ready to run unit turn internal and external switch to "On/Run":
  - a. Switch external switch on front of panel to "On/Run"
  - b. Select Operations
    - i. Change from "Off" to "On"
- 11. The operation sequence will commence and green light on remote display will light up.

# Troubleshooting

#### PUR

CONDITION:	CAUSE / SOLUTION	
Unit does not reach suction temperature	Main suction valve not open	
	<ul> <li>Liquid feed orifice clogged</li> </ul>	
	<ul> <li>In gravity applications, liquid feed orifice not removed</li> </ul>	
Ammonia escapes through vent solenoid	<ul> <li>The foul gas connection to purge points is not open to at least one purge point</li> </ul>	
	<ul> <li>Probe incorrectly reading low position</li> </ul>	
	Vent solenoid leaks	
	<ul> <li>Liquid feed orifice clogged</li> </ul>	
Vent solenoid energizes (vent light	<ul> <li>Vent orifice clogged</li> </ul>	
illuminates), but no gas vents	Faulty vent solenoid coil	
Vent solenoid never opens	No air in system	
(Vent light never illuminates)	<ul> <li>Probe stuck in high position</li> </ul>	
Expansion solenoid never opens (Expansion	<ul> <li>Missing "compressor running" signal from refrigeration system</li> </ul>	
light never illuminates)	<ul> <li>Purger Controls not ON</li> </ul>	
Internal chamber Liquid Level reaches 100%, but external chamber does not drain	<ul> <li>Expansion solenoid may be clogged. This can block the liquid inside the internal chamber from entering outside chamber</li> </ul>	

#### PURJR

CONDITION:	CAUSE / SOLUTION	
Unit does not reach suction temperature	Main suction valve not open	
	Liquid feed orifice clogged	
Ammonia escapes through vent solenoid	<ul> <li>The fouled gas connection to purge points is not open to at least one purge point</li> </ul>	
	Probe incorrectly reading low position	
	Vent solenoid leaks	
	Liquid feed orifice clogged	
Vent solenoid energizes (vent light	Vent orifice clogged	
illuminates), but no gas vents	Faulty vent solenoid coil	
Vent solenoid never opens	No air in system	
(Vent light never illuminates)	Probe stuck in high position	
Liquid feed solenoid never opens	Missing "compressor running" signal from refrigeration	
(only necessary on HPL or Pumped	system	
Liquid Feed)	Faulty liquid feed solenoid coil	

Small orifices are key components used in the air Purger. Any debris getting past the strainers has the potential to clog these and impede performance of the unit. For suspected issues with the Phillips Controls please call H.A. Phillips



### **Maintenance/Spare Parts**

#### PUR—Unit Pump Down

- 1. Isolate the Foul Gas, High pressure liquid, vent, and suction lines.
- 2. Mount a service hose on the 2 drain connections at the bottom of the Purger and connect to a protected wet suction line connection.
- 3. When liquid in both drain connections have drained to the suction line the Purger will be free and empty of liquid.
- 4. Check to make sure the oil drain valve is not frosted anymore to confirm liquid is not present.

#### PURJR—Unit Pump Down

- 1. Shut-off the suction globe valve
- 2. Shut-off the stop valve in the air vent line.
- 3. Shut-off liquid feed stop valve and foul gas stop valve.
- 4. Mount a hose to each of the needle valves on the bottom of the unit, and run the hoses into a bucket of water. One connection is ¼" and the other is ¾". One of the valves drains the inner chamber and the other drains the outer vessel. Once the hoses are in the bucket of water open the needle valves and begin to drain.
- 5. Check to make sure the drain valves are not frosted anymore to confirm liquid is not present.

#### **Change or Renew Water in Reservoir or Bubbler**

A strong ammonia odor indicates that water in the reservoir or bubbler has absorbed all the ammonia that it can from the vented gas. Switch off the unit and dispose of the old water, following your organization's established guidelines.

- Reservoir- Empty reservoir and refill with fresh water.
- Bubbler- Drain through drain plug or by removing top cap assembly and dumping water out. Refill with fresh
  water. This process occurs with the use of water solenoid when Purger is venting. If the Purger has not vented
  over a two week period we recommend running water through the bubbler to add fresh water, removing any
  possible contaminants that may still exist. This automatic flushing of fresh water can be achieved using the
  auto flush feature in the Phillips smart control.

#### **Preventive Maintenance / Cleaning Strainers**

Strainers should be installed on both the liquid feed and foul gas lines. During normal operation these strainers should help catch any debris that might have a chance of clogging the orifices. If the liquid feed orifice gets clogged the unit will not be able to get down to temperature, which is indicated by lack of frost on the suction line, and the Purger will not be able to condense the ammonia out of the foul gas. If the expansion solenoid were to get clogged, liquid ammonia will back up in the collection chamber and open the vent solenoid in the presence of air. Cleaning these strainers should be done on an as needed basis during normal operation.

# Maintenance/Spare Parts

## **Cleaning Orifices**

Strainers, supplied with the unit, should be installed in the foul gas and liquid feed piping to prevent these orifices from being clogged. In the event that the Purger orifices get clogged, the unit should be pumped down and the clogged orifice should be removed and cleaned of debris before being re-installed. Below are pictures of each of the orifices that could be installed on either the PUR or PURJR. **NOTE: Expansion orifice on the PURJR is a different design and location from the PUR. Instructions for removing the PURJR expansion orifice are below.** 



#### **PURJR Expansion Orifice cleaning**

1. If the Purger JR expansion orifice gets clogged, first pump down the unit following the directions previously noted.

2. Once the vessel has been fully pumped down and drained, unscrew the center plug on the bottom of the vessel.

3. After the plug is unscrewed the operator should be able to use a <sup>3</sup>/<sub>6</sub> Allen wrench to unscrew the orifice and filter assembly from the Purger. Note: Very minor amounts of refrigerant may still be in the inner chamber, proper safety equipment is necessary.

4. Once the assembly is removed either clean the filter and orifice using compressed air or replace the whole assembly. Replacement assemblies can be purchased from Phillips.

5. After the assembly has been properly cleaned screw the assembly back into position until the screw seats on the shoulder in the fitting. Also screw the center plug back in place and proceed to start-up again.



# **Maintenance/Spare Parts**

### Spare/Optional Parts

#### PUR REPLACEMENT PART NUMBERS

#### **PUR OPTIONAL PART NUMBERS**

PART	PART NUMBER
Probe	PUR-PROBE
Air Vent	1204
Vent Orifice	1203
Expansion Orifice	1207
Gravity Feed Union	U-4S
Pumped Feed - Union	U-4S
Orifice	1201
HPL Feed - Housing	027F1091
Solenoid	027B1120
Coil (110V)	018F7991
Orifice	1207
Temp Sensors (Foul Gas & Suction)	084N3210
Danfoss Strainer Insert (250 Micron)	148H3126
Phillips Strainer Insert (74 Micron)	517

PART	PART NUMBER
Bubbler	PUR-BUB
Purger Insulation Kit	PUR-INS
Optional control panel 3 purge points (110 VAC)	PUR-3
Optional 10-point purge point sequencer (110 VAC)	PUR-10
Optional 30-point purge point sequencer (110 VAC)	PUR-30
Purge point EVRAT solenoid valves	027X0142 006-1012 018F7991 (110V)
Purge point ICF Valve Station solenoid valves	027L4527 018F7991 (110V)
Coil 220 VAC 60 Hz w/terminal box	018F6814
Coil 220/230 VAC 50/60 Hz w/terminal box	018F6732

#### PURJR REPLACEMENT PART NUMBERS PURJR OPTIONAL PART NUMBERS

PART	PART NUMBER
Probe	PUR-PROBE
Vent Orifice	1208
Capillary assembly	PURJR-CAP
HPL & Pumped Liq. Feed - Housing Solenoid Coil (110V) Orifice	027F1047 027B1120 018F7991 HPL -1208 Pumped - 1209
Temp Sensors (Foul Gas & Suction)	084N3210
Danfoss Strainer Insert	148H3126
Phillips Strainer Insert	517

PART	PART NUMBER
Purge point EVRAT solenoid valves (110 VAC)	027X0142 006-1012 018F7991
Purge point ICF Valve Station solenoid valves (110 VAC)	027L4527 018F7991
Coil 220 VAC 60 Hz w/terminal box	018F6814
Coil 220/230 VAC 50/60 Hz w/terminal box	018F6732

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