



Single-Tower Regenerative Natural Gas Dryer

USER MANUAL

For Installation, Operation and Maintenance of Models

Dryer Model: STR24NGX-2S-150A208W-SP

Job Number: 23952

Customer name: ANGI ENERGY SYSTEMS

Z103664 R09

FOREWORD

Reading this user manual will fully familiarize you with the STR-NGX dryer from Xebec Adsorption Inc. (Xebec). You will be better able to run this equipment in accordance with its intended use.

This manual contains important information for safe, proper and economic dryer installation, start-up, operation and maintenance. Always keep it within reach where the dryer is being used.

It is necessary to follow all instructions as written. Careful reading will avert danger, avoid unnecessary downtime, and minimize work for you and wear on the equipment.

In addition to carefully reading this technical manual in its entirety, you must understand your National, State and local rules and regulations regarding safety in the workplace, their necessary precautions and procedures.

Each person responsible for the set-up, start-up, operation, maintenance or repair of this STR-NGX dryer must have first read and understood this user manual – including all the safety tips.

NOTE: *Xebec recommends that installation, start-up and maintenance be carried out by its factory-trained technicians in a regularly scheduled, site-dedicated program. This will ensure the safety of personnel, the integrity of equipment and the surety of warranty coverage.*



Danger!

This STR-NGX unit is specifically designed to safely remove moisture and debris during line delivery of natural gas. However, its installation site may be rendered dangerous if proper installation, operation, maintenance and repair procedures are not performed in strict accordance with this user manual.

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1. INTRODUCTION

1.1 GENERAL

The STR-NGX-series heater-regenerated natural gas dryer includes the latest technology and safety features. Its use, however, can endanger life and limb and can lead to considerable damage to the equipment and other material assets if:

- it is operated by personnel not instructed in its use,
- it is improperly used,
- it is improperly maintained or serviced.

Furthermore, ignorance of its use and maintenance can result in the loss of any claim for damage.

This dryer is designed for treatment of natural gas which is free of aggressive water, oil and solid elements. Applications other than those cited in this manual must be agreed to by Xebec and confirmed in writing. Xebec accepts no liability for corrosion damage or malfunctions caused by aggressive media in the gas.

Xebec reserves the right to make changes at any time as may be necessary for increasing safety or efficiency, or in the interests of further development.

1.2 PRODUCT INFORMATION

This dryer is used for the purpose of drying natural gas according to its contracted design. Depending on certain conditions at the inlet, it provides pure, dry and oil-free gas. This model of dryer is equipped with one desiccant-filled pressure vessel, an electric heater regeneration system, a prefilter and an afterfilter.

This specific model of dryer includes an AutoDew energy management system that provides automatic monitoring of the work/regeneration cycle to optimize equipment efficiency.

When contacting Xebec for assistance, please provide the following information:

- Equipment model and serial number (see section 7),
- Normal equipment operating line feed pressure, flow and temperature,
- Any recent upsets/spikes to feed pressure, flow and temperature,
- Approximate time in service, and
- Nature of problem.

Contact Xebec: Telephone – 1 877-469-3232;
 Facsimile – 1 450-979-7869;
 Email – service@xebecinc.com.

1.2.1 PRESSURE VESSEL REGULATION

The pressure vessels are designed and built to meet the American Society of Mechanical Engineers (ASME) standards. They fulfill the test of the certifying procedure and carry the ASME symbols **U** or **UM**.

1.2.2 PRESSURE TEST

Each Xebec STR-NGX dryer is subjected to, and passes, a pressure test prior to shipment.

1.3 TRANSPORT

Immediately upon delivery of the dryer, it must be checked for any damage that may have occurred during transport. If necessary, the damage must be recorded on the shipping waybill/receipt. Liability for such damage usually rests with the shipper. Contact Xebec to arrange for any required service or replacement parts.



Warning!

For transport within the company, only the skids of the dryer may be used. Lifting at any other points on the equipment will void the warranty and damage the equipment.

1.4 STORAGE

If the dryer is to be stored for a long period of time, its place of storage must be dry and free of dust.

2. SAFETY

This technical manual contains basic tips which must be followed during set-up, operation and servicing. It is of utmost importance that it be read by the assembly technician before installation and start-up as well as by the specialist/operator in charge. It must always be within reach at the place where the dryer is being used. The equipment is designed for operation in a Class 1, Division II, Group D hazardous area.

2.1.1 IDENTIFICATION of Signs and Symbols in this Manual

The safety tips contained in this manual, whose disregard could endanger people and equipment, are indicated by a general danger sign and the additional markings **Danger!** or **Attention!** or **Warning!**



Danger!

These danger notes with a grey background warn against personal injury and/or danger to life and limb. Danger notes help you to avoid serious injury or life-threatening situations for yourself or others.



Warning!

These safety notes warn against damage to property and help you to avoid such damage.

Safety tips printed directly on the STR-NGX dryer must be heeded at all times and must be kept completely legible.

2.1.2 GENERAL SAFETY TIPS FOR ASSEMBLY, INSPECTION AND MAINTENANCE

The purchaser is to ensure that all assembly, maintenance, and inspection work is carried out by personnel qualified to do it.

The personnel involved in assembly, operation, maintenance and inspection must have the corresponding qualifications to do this work. Areas of responsibility and supervision of the personnel must be clearly established by the purchaser. Should the personnel not possess the necessary knowledge, then they must be instructed. If need be, this training may be carried out by the manufacturer/supplier at the request of the purchaser. Further, the purchaser is to ensure that all personnel completely understand the contents of this manual.

Warning!



- Never make structural changes to the STR-NGX dryer
- Only use recommended spare parts as listed in section 8
- Never weld on a pressure vessel or change it in any way
- Carry out maintenance only when the site is confirmed as safe and the STR-NGX dryer is OFF, depressurized and disconnected from the electric power supply.

Danger!



- Refer to the desiccant Material Safety Data Sheet (MSDS) when installing or disposing of desiccant
- Wear protective goggles when working with the desiccant
- A mask must be worn whenever handling desiccant
- If desiccant comes into contact with the eyes, rinse eyes immediately with a lot of clear water
- If the desiccant is spilled, clean up without causing swirls of dust
- In case of fire, there is no restriction in the use of fire extinguishing material on the desiccant; the reaction with water and foam is defined as neutral.

3. INSTALLATION

3.1 PREREQUISITES

Preparation of the installation site for the Xebec dryer should be completed before its delivery.

The site will be free of dirt and litter. The floor foundation will be solid, level and designed to hold the equipment.

Generally, ensure that there is clearance of three feet around the equipment for safety and convenience of access. Refer to section 10 for specific installation site dimension requirements regarding maintenance access. Additionally, a clearance of four feet is required above the adsorber tower for desiccant loading.

Delivery access to the site will be as close as possible in order to minimize any chance of damage to the equipment.

Ensure that the appropriate load-rated lifting equipment is available to offload the shipment and to position it properly at the site.

3.2 INSPECTION UPON DELIVERY

Examine the shipment for signs of damage in transit. It is the customer's responsibility to find and report any damage to the shipper. Liability for damage rests with the shipper. Contact Xebec to order any necessary replacement parts.

3.3 INSTALLATION TASKS

Before the Xebec factory-trained technician can proceed with equipment start up, the following tasks must be performed by customer personnel:

- **Unpack:** Remove all protective shipping crates or wrappings, flange covers, etc.
- **Anchor:** Using the mounting holes on the skids, anchor the Xebec dryer to the foundation.
- **Test:** Do not hydrostatic test the pressure vessels. All Xebec pressure vessels and welded piping are hydrostatic tested after fabrication and before assembly.
- **Protect:** If the equipment is installed in a high traffic area, protective barriers may be required to prevent possible damage.
- **Inspect:** Because of vibration during shipping some tube fittings may have loosened. Therefore, inspect all connections for tightness.

- **Connect:** Ensure that the inlet and outlet connections to and from the dryer are made using the correctly rated flanges and piping to meet the design conditions (refer to section 5 herein). The piping leading to and from the dryer must not be smaller than the piping supplied on the dryer.
 - o If a regulator is installed upstream of the dryer, it must be rated in SCFM equivalent to or larger than what is on the dryer (refer to section 5).
 - o Failing to correctly select and install the appropriate regulator can result in damage to the dryer prefilter, afterfilter, separator and regeneration blower, due to high velocities in the gas stream.



Warning!

Consult Xebec for installation recommendations when a regulator is required or if the operating pressure is within 20 psig of dryer design pressure.

- **Drains:** Connect both the prefilter drain assembly and the regeneration accumulator tank drain to a gas/liquid recovery system. During the regeneration of the dryer, the separator will automatically drain liquids into the accumulator. The prefilter drain will require periodic manual operation to remove liquids present in the prefilter. The accumulator drain valve will require only occasional manual operation.
- **Desiccant:** Desiccant is shipped with the equipment and must be loaded at the site. Smaller dryers will have desiccant loaded at the factory.



Warning!

Prior to loading desiccant, inspect through the pressure vessel fill port to confirm that the tabular bed (ceramic beads about 0.25-in [6mm] diameter) is installed.

Note: *Refer to section 5 of this manual for the quantity of desiccant required for the desiccant chamber.*

Desiccant life is determined by the care with which it is handled, the quality of filtered inlet gas provided and by its time in use. Be careful to not abrade (i.e., wear down) the desiccant when installing it.

- **Exhaust:** A chamber relief valve is required to protect the main vessel and the system. If the dryer system is located inside a building or enclosure, the relief valve must be piped to the exterior of the building. The relief valve has a National Pipe Taper (NPT) thread exhaust connection for this

purpose. The port size of the relief valve provided. Any exhaust piping connected to the relief valve shall be no smaller than the exhaust valve, must be supported independently and not supported by the relief valve itself.

- **Warm:** The dryer should normally be installed and operated in a minimum of 36°F (3°C) ambient temperature. In cases when this is not possible, heat tracing is required on vessels and piping where wet natural gas is present.

Warning!



Failure to heat trace the dryer as required will adversely affect its operation when the ambient temperature drops below 36°F (3°C). At temperatures below 32°F, freeze up of components may occur and could result in damage to the equipment.

NOTE: *Xebec recommends building an enclosure around the dryer to protect it from corrosive weather effects.*

- **Power:** Connect the dryer to a correctly sized power supply. Refer to section 7 for the design voltage, heater kW rating and blower motor horsepower (which determine the service amperage). Ensure that the connections to the high voltage panel are made in accordance with the requirements of the region in which the dryer is installed.
- **Alarm Contacts:** There are two alarm contacts provided within the NEMA 4 panel. The first alarm contact is activated by general faults related to the regeneration of the dryer, and the second alarm contact is specific to the hygrometer. As a minimum, it is recommended that the alarm contact for the regeneration faults be wired back to a remote monitoring panel to ensure response if the dryer generates an alarm. Refer to the wiring drawing provided.
- **Compressor Contact:** A compressor contact has been provided and will allow this dryer to monitor compressor operation. It is recommended that the compressor contact be wired to the dryer control panel.
- Ground the frame of the dryer in accordance with local electrical code requirements.

NOTE: *The equipment is designed for operation in a Class I, Division 2, Group D hazardous area location.*



Warning – high voltage!

- Be sure that power is removed from the line feed before making connection between the site drop and the equipment
- Install the equipment in accordance with National, State and local rules, regulations and codes.

Warning!



The electrical heater assembly should be inspected to determine that no moisture has accumulated in the heater enclosure or terminations. This will prevent damage to the heater assembly and associated components due to ground faults. A 1,000-Volt megohmmeter should be used to determine the phase-to-ground insulation resistance for each phase. A minimum value of 500 k-Ohms should be shown.

4. START-UP & COMMISSIONING



DANGER!

This equipment is designed for operation in a Class I, Div. 2, Group D hazardous location. Do not work with this equipment powered unless the area is known to be non-hazardous as personnel injury and/or equipment damage could result.

4.1 GENERAL CHECKOUT

The technician performing the start-up needs to confirm that the dryer installation was done properly and that none of the installation steps were missed.

Check for the following:

- The area is safe and secured and non-hazardous.
- The system bypass valve is open.
- The dryer system inlet and outlet valves are properly closed.
- All the system block valves are closed (at the prefilter, afterfilter, separator, blower, and hygrometer).
- There is no visual damage on the dryer system.
- There is enough clearance to safely proceed with the start-up (refer to section 10, General Assembling drawing).
- The dryer is connected to the power supply.
- The pressure relief valve is installed (may have been shipped loose).
- The inlet and outlet process piping is properly connected.
- The desiccant is loaded in the desiccant chambers.
- The prefilter and the accumulator tank drains are connected to a liquid recovery system.

4.2 ELECTRICAL CHECKOUT

Ensure the electrical integrity of the system by:

- Inspecting the conduit y-seals and make sure they were properly filled and plugged.
- Confirming wire size and ampacity per the dryer data sheet.

- Confirming that the main voltage is in accordance with the dryer electrical system.
- Confirming the rotation for motors and adjust if required. The following procedure must be performed before operating the dryer, or blower and cooler components will be damaged.

Warning!



A 3-phase motor driving the regeneration blower is installed inside the blower housing. Rotation of the motor must be verified or damage to the blower impellers will occur.

PROCEED AS FOLLOWS, REFER TO FLOW SCHEMATIC PROVIDED IN SECTION 10, APPLICABLE DRAWINGS.

- o Ensure that system isolation valves are closed.
- o The area must be known to be non-hazardous as the control panel will be both open and live for the next operation.
- o The two motors have circuit breakers with integral overloads and the blower breaker-overload (MS-1) must be switched to the off position (turn breaker reloading switch counter clockwise).
- o Verify that the dryer POWER ON - OFF switch is in the OFF position.
- o Verify that the REGENERATION START push button key is in the switch.



DANGER – HIGH VOLTAGE!

There are exposed high-voltage components within the control panel and extreme caution must be observed if the control panel is opened and an operator intends to work within the panel.

- o Power can now be made live in the dryer control panel.
- o With live power at the dryer control panel, the dryer POWER ON - OFF switch is in the ON position, and the cooler motor breaker-overload is in the active not-tripped position, the REGENERATION START keyed push button can be turned clockwise, then briefly pressed. This will allow the cooler motor to operate.
- o Observe the rotation of the cooler motor fan blades. A rotation direction arrow is provided.
- o The cooler fan blades should, in all cases, pull air from the motor side of the cooler and displace the air into the cooler.

- o If the cooler fan blades are rotating correctly then blower motor will be correct in its rotation as the motors were factory synchronized.
- o In the event that the cooler rotation was not correct, two phases of the main entrance to the dryer panel must be reversed or switched to correct the rotation of the motors. If this was the case, then the wires should be reversed (with no power present) and the rotation verification should be re-performed to ensure correct rotation.
- o Remove power from the dryer system until power is required to operate the dryer.
- o Restore the blower motor overload-breaker to its original live position (turn breaker reloading switch clockwise).
- o Close all valves when blower and cooler motor rotation is correct.
- Confirming the alarm contacts are wired back to the operator station.
- Confirming if intrinsic devices have been grounded in accordance with device and local regulations.

4.3 SYSTEM PRESSURE CHECKOUT

The start-up technician must verify that all of the manual drain valves for the prefilter, afterfilter, blower, hygrometer and separator are in the closed position. This will enable the system to be slowly pressurized equally throughout the entire system piping while avoiding pressure traps and differential pressures in the system that could cause damage to the dryer. The technician will also confirm that the outlet valve and the dryer bypass valves are still closed properly. Regeneration valves **V5** and **V6** should be opened for the duration of the pressure test, and then closed when the test is complete.

Select the media for the pressure test based upon the customer preference and/or the local regulations. Compressed natural gas, air or nitrogen are examples of some gases that can be used to pressure test the unit. Please note that, regardless of which of these gases is used, the test media will have to be completely vented to avoid contaminating the downstream media. Small quantities of the test gas will remain in the dryer piping at atmospheric pressure.

The sample gas for the pressure test should be introduced to the dryer from the inlet port of the dryer system. The start-up technician will gently open the inlet valve to let (e.g., natural gas) enter the system and pressurize the dryer. Look for a filling rate of 5 to 10 psi per minute. Opening the valve too abruptly can cause serious damage to the filter elements and other system components. It could also have a serious impact on the desiccant integrity through fluidization of the desiccant bed.

Once the pre-determined pressure is attained, the start-up technician can check for leaks using a gas detector and/or soap bubble test. Depressurize the unit before making any necessary repairs.

After repairing any leaks, the system must be purged of the test gas (air, nitrogen, or CNG-air mixture) before placing the dryer in service. Proceed as listed below.

WARNING!



If natural gas is vented from the dryer system, ensure that the area is free of arc and sparking devices, sources of heat or ignition, and electronic devices such as cellular phones or beepers. The vented gas can be piped to an elevation above grade (10-15 feet) to reduce the risk of gas residing in the proximity of the operator performing this equipment purging. Advise all personnel in the immediate area that gas is being vented. The dryer electrical enclosures should remain closed and power should be removed from these panels.

- Close regeneration valves V5 and V6.
- Close dryer outlet and bypass valves.
- Open prefilter drain valve V7 to purge the prefilter housing. Close when complete.
- Open afterfilter service valve V3 and afterfilter vent valve V8 to purge the dryer tower and the afterfilter. Close when complete.
- Open regeneration valve V5, blower vent valve V10, regeneration separator drain valve V9 and accumulator tank drain valve V12 to purge the heater housing, blower housing and separator. When complete, close valves V5, V9, V10 and V12.
- Open regeneration valve V6 and separator-accumulator valves V9 and V12 to purge the cooler assembly. Close all valves.

4.4 SYSTEM START-UP

To place the dryer system into a drying cycle, the following valves are to be in the open position: V1, V2, V3 and V4. Valves V5, V6 and V11 must remain closed.

The dryer has a mercaptan bypass valve assembly located between the inlet and outlet of the dryer. During the initial start-up of the dryer, the mercaptan odorant in the gas will be adsorbed by the new desiccant so you won't be able to smell it for detecting leaks downstream. Open the mercaptan bypass valve to allow the odorant to be retained in some of the gas flow. The desiccant will lose its initial capacity to retain this odorant after about one week, and then the valve can be closed, and will remain closed, until new desiccant is installed.

4.4.1 REGENERATION START-UP

The programmable logic controller (PLC) provided is active only when the dryer system is in the regeneration phase. Start a regeneration cycle as follows:

- Close dryer inlet and outlet isolation valves V1 and V4, open regeneration isolation valves V5 and V6 (refer to section 10, the flow schematic drawing for valve locations). Ensure that V9 is open.

NOTE: V9 allows liquids to be drained from the filter-separator to an accumulator tank, and must remain open at all times during regeneration.

- Adjust dryer pressure to between 15 (103 kPag) and 30 psig (206 kPag) – the higher pressure is preferred.
- Turn then press the REGENERATION START push-button key-switch on the electrical control panel. The heating timer starts. It is set for 5 hours maximum.

The PLC starts the regeneration blower and cooler and, after a 10-second delay, starts the regeneration heater. Temperature controller **TSH-3** controls the heater outlet temperature and is set for 425°F (218°C).

Heating of the chamber will be automatically terminated when 5 hours have elapsed, or when 200°F cooler inlet temperature and 1 hour minimum of heating are obtained. The chamber will advance to a cooling period set for 5 hours maximum. The cooling period will be terminated automatically when 5 hours of cooling have elapsed or when 120°F cooler inlet temperature and 1 hour minimum of cooling are obtained.



Danger!

During the regeneration cycle, liquids will be drained from the separator. These liquids may be flammable and may contain traces of hazardous materials. Exercise caution when handling: wear hand and eye protection, securely dispose of the contents as required for hazardous waste according to local laws and regulations.

NOTE: The dryer has several safety shutdown features that will terminate regeneration if a fault is detected. Refer to section 9 for complete details.

4.4.2 TEXT DISPLAY OPERATION

This dryer provides a text display for dryer outlet dewpoint, alarm status and regeneration status when in regeneration mode. The text display controls include two arrow buttons that will allow the operator to scroll up and down in the messages. The text display will present a flashing ▲ or ▼ arrow when additional data is available to be accessed.

The text display default message is the dryer outlet **DEWPOINT** presented (as factory-set) in degrees Celsius or Fahrenheit as well as the two alarm settings for the hygrometer. They are defined as:

- **AL-1** for the first level of failing dewpoint (AutoDew), prepare to regenerate dewpoint, and
- **AL-2** for the second level of failing dewpoint (high humidity), dryer requires regeneration to maintain gas quality to specification.

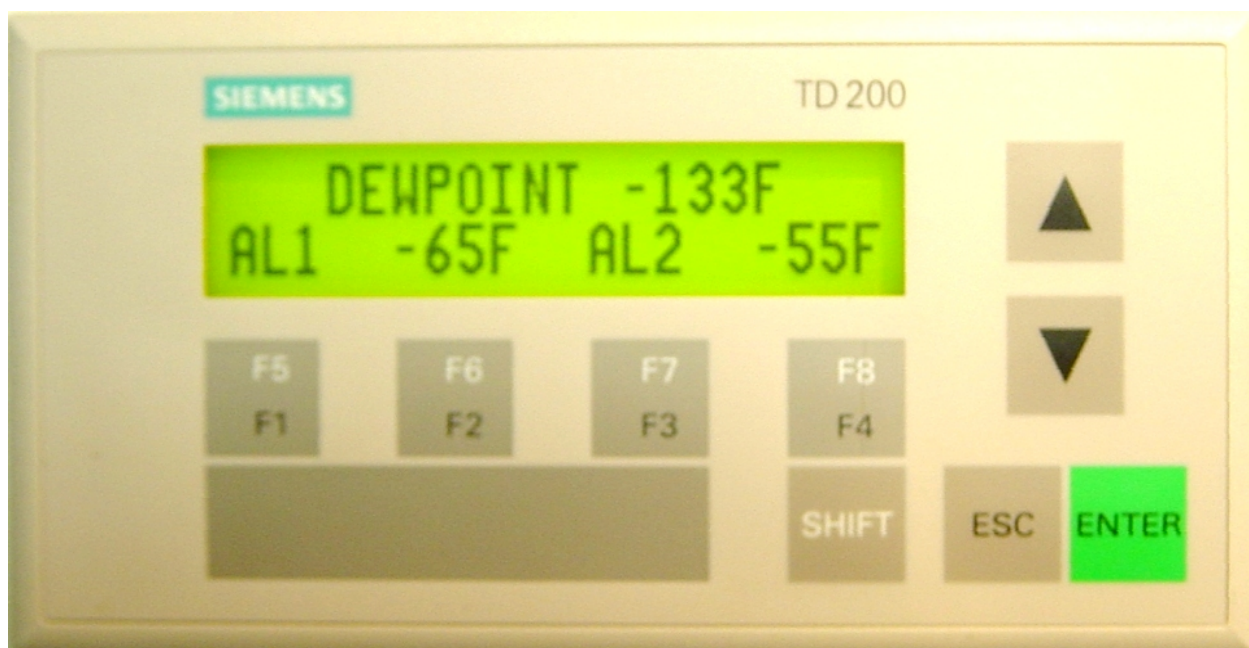


Figure 1 Text Display Control with Sample Message

The dewpoint data and settings will be continually presented until the dryer regeneration process is initiated, at which point the regeneration status will appear.

When the regeneration process is initiated, the text display will indicate **CHAMBER IN HEATING** for the duration of the heating period, followed by **CHAMBER IN COOLING** for the duration of the cooling period. In both the heating and cooling processes, you can scroll down the message list by pressing the down arrow key (▼), which will also flash on the text display, to observe the dryer outlet dewpoint. When the regeneration is completed the text display will revert back automatically to the dryer outlet dewpoint.

4.4.2.1 F1 Keypad: Last Regeneration Statistics

The data indicated will reflect the last regeneration time, measured in minutes. The information **HEATING TIME XXX** represents the previous regeneration total heating time. The information **COOLING TIME XXX** represents the previous regeneration total cooling. This data will be retained in memory until replaced by new data for each regeneration.

4.4.2.2 F2 Keypad: Heater Outlet Temperature

There are three data messages indicated when pressing the F2 keypad. This data is specific to the regeneration process of the dryer. Use the arrow keypads (▲ and ▼) to view all data.

- Heater outlet temperature xxxF (xxxC) – the heater actual outlet temperature.
- Temperature control 425F (218C) – the heater outlet on-off control setting.
- Fail to heat 250F (120C) – the heater outlet fail-to-heat setting.

4.4.2.3 F3 Keypad: Cooler Temperature

There are four data messages indicated when pressing the F3 keypad. This data is specific to the regeneration process of the dryer. Use the arrow keypads (▲ and ▼) to view all data.

- Cooler inlet temperature xxxF (xxxC) – the cooler actual inlet temperature.
- Cooler outlet temperature xxxF (xxxC) – the cooler actual outlet temperature.
- End of heat 200F (93C) – terminates regeneration heating, measured at cooler inlet.
- End of cool 120F (49C) – terminates regeneration cooling, measured at cooler inlet.

4.4.2.4 F4 Keypad: Heater Sheath Temperature

The data indicated will be the heater sheath actual temperature. This data is specific to the current regeneration process of the dryer.

NOTE: F5, F6, F7 keypads are not used; they have no assigned function.

4.4.2.5 F8 Keypad: Alarm Reset

The **F8** keypad is designated as the alarm reset switch in the event that an alarm is generated during the operation of the dryer. To reset an alarm that was activated, you must press first the **SHIFT** keypad then the **F8** keypad (which is shared with the **F4** keypad). An alarm that was generated can only be reset when the triggering error or fault is corrected.

There are two alarm relays provided, refer to the wiring drawing provided.

The first alarm relay (CR-1) is activated for dryer regeneration faults. An alarm light is provided and will be illuminated continually when a fault is detected. The alarm can be reset when the fault is corrected.

The second alarm relay (CR-3) is activated when the dryer dewpoint begins to fail (AL-1). The same alarm light will flash on and off when the dewpoint fail alarm is active. The first level of dewpoint failure (AL-1) can be reset as the dewpoint has not deteriorated to below specification and it is expected the operator will plan to regenerate the dryer at some point in the near future. When the second level of dewpoint failure is reached (AL-2), the alarm light and relay will again be activated but cannot be reset until the dewpoint has recovered. This will most likely require dryer tower regeneration.

4.5 PERIODS OF DRYER/COMPRESSOR DISUSE – NO FUELING

After extended hours where the dryer is not used (compressor is off and no fuelling is performed, no gas flow through the dryer), the dewpoint will tend to deteriorate to the “wet” side. This trend is not abnormal as traces of humidity downstream of the dryer may contaminate the probe reading.

NOTE: *Regenerate the dryer if the dewpoint at the outlet of the dryer fails during or after fuelling or compressor use to avoid unnecessary regeneration of the dryer tower.*

When the compressor contact is wired back to the dryer control panel, the (AL-1) and (AL-2) alarm will be delayed 20 minutes after compressor starting to allow gas to flow through the dryer. This allows the dryer to recover its dewpoint after long periods of no flow, and will prevent unnecessary alarms.

NOTE: *When the compressor contact is not wired back to the dryer panel, the dewpoint alarm will be active continually.*

5. OPERATION

5.1 GENERAL OPERATING PRINCIPLES

This single-tower heater-regenerated natural gas dryer is designed to dry pipeline-quality natural gas. The gas is dried in a downward direction as it flows through a desiccant bed.

A prefilter is provided at the dryer inlet to filter liquid water and particles that may migrate from the supply pipeline. An afterfilter at the dryer outlet provides for filtration of dust and desiccant particles. Filter differential pressure indicators have been supplied to monitor the filter element condition.

The dryer system bypass valves will be normally closed during drying operations. When the dryer requires servicing, the bypass valves are opened and dryer inlet-outlet valves must be closed.

All STR-NGX dryers are supplied with an AUTODEW dewpoint monitoring system. The AUTODEW system indicates the dryer outlet gas humidity level. The sensor sampling line, installed just downstream of the afterfilter, has service valves allowing for the removal of the humidity probe from its housing for recalibration. These service valves, when in the open position, allow a sample of gas to be introduced to the humidity probe. The AUTODEW system will give an alarm when the dryer outlet gas dewpoint deteriorates below the set point.

Regeneration of the desiccant should take place before the drying chamber is no longer capable of providing an acceptable dewpoint. When the drying chamber requires regeneration, the dryer inlet and outlet block valves must be closed. If gas for fuelling is required, the bypass valve can be opened.

NOTE: This dryer-model provides for manual regeneration.

Regeneration of the desiccant bed takes place in a downward direction, the same as for drying. The regeneration blower forces gas toward the low-Watt regeneration heater. A programmable logic controller (PLC) sets the maximum heater discharge temperature.



Warning!

Failure to correctly heat the desiccant bed means that previously adsorbed moisture will not be removed, resulting in a dew-point failure alarm when the chamber is returned to service.

From the heater, the regeneration gas passes down through the desiccant bed to liberate previously adsorbed moisture. This moisture is carried out to the cooler. As the gas is cooled, the moisture is condensed in the regeneration separator, removing the water prior to the gas returning to the blower inlet for recirculation. The regeneration separator drains liquids to the regeneration accumulator tank.



Danger!

Dispose of regeneration separator waste as hazardous material according to local laws and regulations.

At the completion of the heating period, the cooling step is initiated. Cooling takes place in the same direction as the heating flow. Gas at the discharge temperature of the blower is passed through the desiccant bed to remove heat. The gas passes through the cooler where its temperature is reduced.



Warning!

Failure to correctly cool the desiccant bed means that a hot desiccant bed will be placed in service which may cause damage to after-filter elements and regeneration isolation valve. This will also result in a dewpoint bump since hot desiccant will not remove.

5.1.1 OPERATING WITH AUTODEW

With the AUTODEW feature, the adsorptive capacity of the desiccant is monitored to optimize its use before initiating tower regeneration. This may result in substantial savings in power consumption and will extend the desiccant life due to reduction in thermal shock and flow abrasion.

The AUTODEW feature includes a precision hygrometer with humidity probe for sensing the dewpoint at the outlet of the dryer. It ensures that a desiccant chamber will continue to be in service drying gas for as long as the dryer produces gas with a dewpoint better than the factory-set limit. The chamber working time may therefore be extended if the dryer is operating under any or all of the following conditions:

- Inlet flow lower than specified.
- Inlet pressure higher than specified.
- Inlet gas water content lower than normal
- New desiccant.

Warning! Maintain humidity probe calibration



Probes need recalibration annually or when contaminated.

Ensure that the sampler line from dryer output to the hygrometer probe assembly is functioning. Failing to provide a sample of gas to the humidity probe will lead to inaccurate dewpoint reading at the dryer outlet.

The AUTODEW system will generate alarm signals when the dewpoint at the dryer outlet begins to deteriorate. The first alarm set point (**AL-1**, Autodew) indicates the dryer outlet dewpoint has started to deteriorate, the second alarm set point (**AL-2**, high humidity) indicates the need for regeneration of the system.

The dryer outlet dewpoint is presented on the text display provided on the NEMA 4 panel. Consult the factory for any adjustments to the hygrometer alarm setpoints.

5.2 OPERATOR CONTROLS

There are manual valve controls distributed as appropriate throughout the system: the operator should become familiar with the system flow drawing (refer to section 10) and with the actual equipment-valve locations.

The dryer type and model identification placard is located on the lower NEMA 7 enclosure.

The dryer has a NEMA 4 panel (rated Class 1 Div 2 Group D) with switches, light, and text display. It also has as a NEMA 7 panel (main power and high voltage entrance) mounted below it. The upper panel provides three switches and one indicator as well as the text display:

- POWER ON/OFF switch
- REGENERATION START switch (keyed) for manual switchover dryers
- REGENERATION EMERGENCY STOP push button
- ALARM lamp
- Text display for dryer, dewpoint and alarm status.

6. SERVICE & MAINTENANCE

6.1 PREVENTIVE MAINTENANCE

Proper preventive maintenance is the key to safety in operation for this gas dryer. This section details those simple steps required to ensure safe, effective and economical operation of the dryer. A service record data entry form is included (section 10.2) and should remain either with the STR-NGX dryer on site or with the maintenance supervisor.

The service record allows the maintenance supervisor or a service technician to observe dryer performance trends over time.

6.1.1 MAINTENANCE INSPECTION DURING REGENERATION

This gas dryer is essentially passive during gas drying operations. It can become an active danger when regeneration operations for drying its desiccant engage the heater, blower and cooling systems. The following checks should be carried out while the system is operating in the regeneration cycle:



DANGER!

This equipment is designed for operation in a Class I, Div. 2, Group D hazardous location. Do not work with this equipment powered unless the area is known to be secured and non-hazardous as personnel injury and/or equipment damage could result.

- Verify regeneration blower motor amperage reading. The baseline values are provided in section 7.
- Verify regeneration cooler motor amperage reading
- Verify regeneration heater(s) amperage reading
- Verify fuses and heaters.

6.1.2 MAINTENANCE INSPECTION EVERY 3 MONTHS

- Verify dryer for gas leaks
- Verify all threaded electrical enclosures for condensation.

6.1.3 MAINTENANCE INSPECTION EVERY 12 MONTHS

- Inspect regeneration blower motor coupling
- Clean regeneration cooler fins (turn all power OFF)

- Inspect regeneration blower shaft bearings
- Test blower motor insulation resistance using a dielectric strength tester or megohmmeter.

6.1.4 MAINTENANCE INSPECTION EVERY 36 MONTHS

- Complete system inspection and overhaul by Xebec service technicians or factory-trained service personnel.

6.2 MAINTENANCE WITH CONSUMABLES

The dryer requires that certain consumable parts be regularly replaced to ensure reliable operation. The following section outlines the recommended intervals and the parts requiring replacement.

NOTE: *A service log has been provided (section 10.2) to record the service you perform on the dryer.*

- FOR MODEL STRD36NGX ONLY: Replace blower oil every 6 months. Do not substitute the ROOTS ISO VG220 installed with any other type of oil.
- Replace prefilter and afterfilter elements every 12 months or when differential pressure exceeds 3 to 4 psi (see paragraph 6.3).
- Replace regeneration separator filter element every 12 months.
- Perform hygrometer probe calibration every 12 months.
- Inspect blower shaft end seals every year – they may require replacement every 2 years.
- The dryer system vessel relief valves may require cleaning and certification every 1 or 2 years. Review local regulations for these relief valves.

6.3 FILTER ELEMENT REPLACEMENT

When a differential operating pressure of 3 to 4 psi is observed on the prefilter and/or afterfilter, they should be removed from service to allow filter element exchange. The separator element should be replaced every 12 months.

NOTE: *Any plant operating and safety procedures for process vessels in CNG service must be adhered to as required for filter element exchange.*

- Close dryer isolation valves. Depressurize the filter vessel through its vent valve.
- When the system is depressurized and safe, remove the filter housing closure bolts or bowl assembly.

- Remove the filter element by CCW rotating the seal nuts or elements and carefully remove the element.
- Install new filter elements of the correct grade and part number (see section 8). Ensure the elements are correctly engaged on the filter tie rod and internal seat.
- Replace the filter closure gasket with a new one; ensure blind flange and bolting materials are correctly tightened. Purge the dryer system then repressurize the system and soap bubble test the flange joint or filter bowl assembly for leaks. Return the equipment to service.

The separator element should be replaced every year. Follow the above procedures for filter bowl removal and element removal.



Danger – high voltage!

On systems with heat tracing on the separator assembly, power to the dryer and or heat trace system must be switched off to avoid an electrical shock hazard.

- The dryer system regeneration valves must be closed as the regeneration piping, including cooler, blower and heater, will be depressurized.
- Depressurize the regeneration system using the vent valve provided below the blower vessel.
- Purge the regeneration piping of air when reassembly is completed:

NOTE: Refer to paragraph 4.4 for the proper start-up procedure after this type of maintenance.

6.4 AUTODEW HYGROMETER PROBE MAINTENANCE

The AUTODEW hygrometer probe assembly requires periodic inspection and maintenance. The following procedure is to replace the probe in its housing (which is located near the afterfilter):

- The first step in removing the hygrometer probe assembly is to remove its electrical power to the operator control panel.
- Close both isolation valves for the hygrometer probe assembly and depressurize the assembly.
- Remove the enclosure cover (see figure 2) by unscrewing it in a counter-clockwise direction.

- Observe the wiring to the terminal block within the enclosure. Disconnect that wiring and the grounding wire, which is terminated on the body of the circuit board.
- The next step is to separate the supply conduit fitting at the fitting break (see figure following). The red fitting break nut separates the two parts of the electrical fitting.

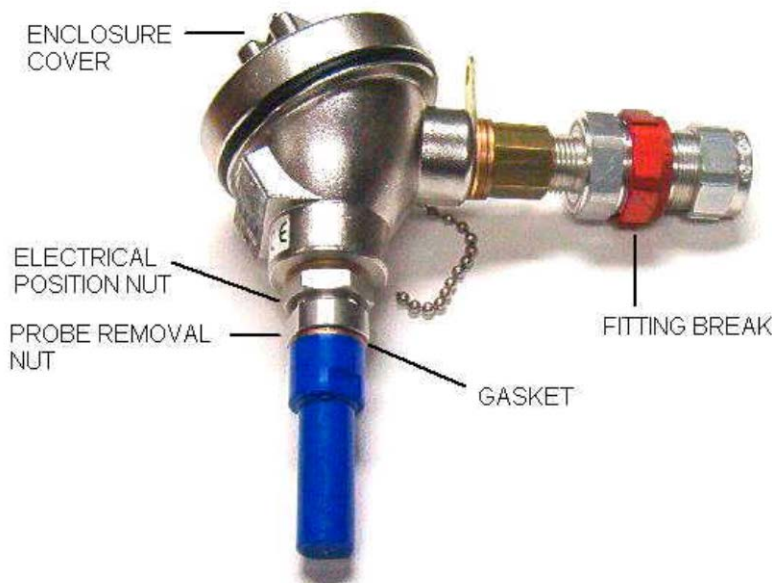


Figure 2: Hygrometer Probe Assembly

- With the fitting break nut loosened, and the wires separated from the terminals within the enclosure, pull the supply cable away from the enclosure.
- Now that the cable has been removed from the enclosure, replace the cover on the enclosure to protect internal circuitry.



Warning – Short Circuit!

Before power is restored to the dryer, the cable end must be properly terminated to prevent damage to sensitive electronic equipment. Ensure wire ends are terminated in accordance with local electrical regulations.

- The hygrometer probe assembly can now be removed from the sampler housing.

NOTE: *The probe removal nut is rounded with 2 flats. The electrical position nut is provided to allow positioning of the electrical enclosure, and cannot be used to disassemble the hygrometer probe assembly from the sampler housing. Review the attached technical details on rotation of the enclosure or damage can occur to the hygrometer probe assembly.*

- The hygrometer probe-housing assembly has a straight thread (5/8 NF) and therefore should require almost no mechanical effort to unscrew from the sampler housing.
- Upon removal of the probe assembly from the housing, the probe should be protected from dirt and particle contamination. The probe housing should be plugged to prevent dirt particles from entering it. The isolation valves must remain closed when the hygrometer probe is removed from the housing.
- The sealing gasket should be inspected each time the hygrometer probe is removed from the sampler housing. Replace the gasket when the hygrometer probe is calibrated or replaced.
- When re-installing the hygrometer probe into the sampler housing, ensure there are no dirt particles on either the sample housing thread, probe thread, or sampler housing internals. A leak test should be performed whenever the probe is removed and re-installed into the sampler housing.

6.5 SERVICE INSPECTION RECORD

A service record data entry form is provided here. It should remain either with the dryer at site or with its maintenance supervisor. The service record will allow both the maintenance supervisor and an outside service technician to observe dryer performance trends over time.

7. TECHNICAL DATA

Danger!



The set points specified herein shall not be revised, changed or altered without written approval from Xebec. Equipment damage and/or personal injury can result if controlling devices are tampered with, replaced with other than original factory replacement parts, reconfigured or repaired by other than a Xebec factory-trained technician. Replacement of electrical components with other than factory original parts can void compliance to the NEC and will void the applicable hazardous location certification.

NOTE: This dryer is model number STR24-2, serial number 23952.

7.1 230-VAC DRYER

	STR18NGX	STR20NGX	STR24NGX-2	STR24NGX-3	STR30NGX-2	STR30NGX-3
INSTALLATION SITE CLASSIFICATION	CLASS I, DIVISION 2, GROUP D					
ASME VESSEL CODE CONSTRUCTION	UW12c					
SYSTEM RELIEF VALVE SETTING	150 psig (1,034 kPag) standard, higher pressure available					
OPERATING PRESSURE	5 – 120 psig (34 – 827 kPag)					
OPERATING FLOW						
INLET GAS WATER CONTENT						
OUTLET DEW POINT						
INLET GAS TEMPERATURE	-10°F to +100°F (-23°C to +38°C)					
CONNECTION SIZE – CLASS 150# RF ANSI B16.5	1.5-in flange	2-in flange	2-in flange	3-in flange	2-in flange	3-in flange
DRYER DESIGN VOLTAGE	230 Vac/3-ph/60 Hz					
MIN. CURRENT DRAW ON 230 Vac	30A	30A	38A	38A	38A	38A
DESICCANT TYPE M001-QTY IN POUNDS/ KILOGRAMS	330/150	440/200	600/272	600/272	970/440	970/440
BLOWER MOTOR – 2 hp, 1800 rpm, Class 1 Div 1 Grp D	230 Vac: 5.6A full load current (FLC) overload setting					
COOLER MOTOR – 0.25 hp, 1800 rpm, Class 1 Div 2 Grp D type TEFC	230 Vac: 1.2A FLC overload setting					
HEATER SIZE (MINIMUM)	12kW	12kW	15kW	15kW	15kW	15kW
REGEN HEAT TIMER (PLC)	Set at 5 hours max.					
REGEN COOL TIMER (PLC)	Set at 5 hours max.					
TSH-1A ALARM SETTING	Heater sheath: set at 720°F (382°C)					
TSH-2 ALARM SETTING	Heater outlet: set at 500°F (260°C)					
TSH-3 CONTROL SETTING	Heater outlet: set at 425°F (218°C)					
TSI-3 ALARM SETTING	Heater outlet: set at 250°F (121°C)					
TSH-4 CONTROL SET	Cooler inlet, terminate heating: set 200°F (93°C)					
TSL-4 CONTROL SET	Cooler inlet, terminate cooling: set 120°F (49°C)					
TSH-5 ALARM SETTING	Cooler outlet: set 135°F (57°C)					
PI-1 PRESS INDICATOR	0 – 200 psig for 150 psig systems (0 – 1379 kPag for 1034 kPag systems)					

7.2 380-VAC DRYER

	STR18NGX	STR20NGX	STR24NGX-2	STR24NGX-3	STR30NGX-2	STR30NGX-3
INSTALLATION SITE CLASSIFICATION	CLASS I, DIVISION 2, GROUP D					
ASME VESSEL CODE CONSTRUCTION	UW12c					
SYSTEM RELIEF VALVE SETTING	150 psig (1,034 kPag) standard, higher pressure available					
OPERATING PRESSURE	5 – 120 psig (34 – 827 kPag)					
OPERATING FLOW						
INLET GAS WATER CONTENT						
OUTLET DEW POINT						
INLET GAS TEMPERATURE	-10°F to +100°F (-23°C to +38°C)					
CONNECTION SIZE – CLASS 150# RF ANSI B16.5	1.5-in flange	2-in flange	2-in flange	3-in flange	2-in flange	3-in flange
DRYER DESIGN VOLTAGE	380 Vac/3-ph/50 Hz					
MIN. CURRENT DRAW ON 380 Vac	25A	25A	29A	29A	29A	29A
DESICCANT TYPE M001-QTY IN POUNDS/ KILOGRAMS	330/150	440/200	600/272	600/272	970/440	970/440
BLOWER MOTOR – 1.5 hp, 1500 rpm, Class 1 Div 1 Grp D	380 Vac: 2.6A full load current (FLC) overload setting					
COOLER MOTOR – 0.33 hp, 1500 rpm, Class 1 Div 2 Grp D type TEFC	380 Vac: 1.0A FLC overload setting					
HEATER SIZE (MINIMUM)	12kW	12kW	15kW	15kW	15kW	15kW
REGEN HEAT TIMER (PLC)	Set at 5 hours max.					
REGEN COOL TIMER (PLC)	Set at 5 hours max.					
TSH-1A ALARM SETTING	Heater sheath: set at 720°F (382°C)					
TSH-2 ALARM SETTING	Heater outlet: set at 500°F (260°C)					
TSH-3 CONTROL SETTING	Heater outlet: set at 425°F (218°C)					
TSI-3 ALARM SETTING	Heater outlet: set at 250°F (121°C)					
TSH-4 CONTROL SET	Cooler inlet, terminate heating: set 200°F (93°C)					
TSL-4 CONTROL SET	Cooler inlet, terminate cooling: set 120°F (49°C)					
TSH-5 ALARM SETTING	Cooler outlet: set 135°F (57°C)					
PI-1 PRESS INDICATOR	0 – 200 psig for 150 psig systems (0 – 1379 kPag for 1034 kPag systems)					

7.3 460-VAC DRYER

	STR18NGX	STR20NGX	STR24NGX-2	STR24NGX-3	STR30NGX-2	STR30NGX-3
INSTALLATION SITE CLASSIFICATION	CLASS I, DIVISION 2, GROUP D					
ASME VESSEL CODE CONSTRUCTION	UW12c					
SYSTEM RELIEF VALVE SETTING	150 psig (1,034 kPag) standard, higher pressure available					
OPERATING PRESSURE	5 – 120 psig (34 – 827 kPag)					
OPERATING FLOW						
INLET GAS WATER CONTENT						
OUTLET DEW POINT						
INLET GAS TEMPERATURE	-10°F to +100°F (-23°C to +38°C)					
CONNECTION SIZE – CLASS 150# RF ANSI B16.5	1.5-in flange	2-in flange	2-in flange	3-in flange	2-in flange	3-in flange
DRYER DESIGN VOLTAGE	460 Vac/3-ph/60 Hz					
MIN. CURRENT DRAW ON 460 Vac	18A	18A	22A	22A	22A	22A
DESICCANT TYPE M001-QTY IN POUNDS/ KILOGRAMS	330/150	440/200	600/272	600/272	970/440	970/440
BLOWER MOTOR – 2 hp, 1800 rpm, Class 1 Div 1 Grp D	460 Vac: 2.8A full load current (FLC) overload setting					
COOLER MOTOR – 0.225 hp, 1800 rpm, Class 1 Div 2 Grp D type TEFC	460 Vac: 0.6A FLC overload setting					
HEATER SIZE (MINIMUM)	12kW	12kW	15kW	15kW	15kW	15kW
REGEN HEAT TIMER (PLC)	Set at 5 hours max.					
REGEN COOL TIMER (PLC)	Set at 5 hours max.					
TSH-1A ALARM SETTING	Heater sheath: set at 720°F (382°C)					
TSH-2 ALARM SETTING	Heater outlet: set at 500°F (260°C)					
TSH-3 CONTROL SETTING	Heater outlet: set at 425°F (218°C)					
TSI-3 ALARM SETTING	Heater outlet: set at 250°F (121°C)					
TSH-4 CONTROL SET	Cooler inlet, terminate heating: set 200°F (93°C)					
TSL-4 CONTROL SET	Cooler inlet, terminate cooling: set 120°F (49°C)					
TSH-5 ALARM SETTING	Cooler outlet: set 135°F (57°C)					
PI-1 PRESS INDICATOR	0 – 200 psig for 150 psig systems (0 – 1379 kPag for 1034 kPag systems)					

7.4 208-VAC DRYER STR24-2S-150A208W-SP

			STR24NGX-2			
INSTALLATION SITE CLASSIFICATION	CLASS I, DIVISION 2, GROUP D					
ASME VESSEL CODE CONSTRUCTION	UW12c					
SYSTEM RELIEF VALVE SETTING	150 psig (1,034 kPag) standard, higher pressure available					
OPERATING PRESSURE	5 – 120 psig (34 – 827 kPag)					
OPERATING FLOW						
INLET GAS WATER CONTENT						
OUTLET DEW POINT						
INLET GAS TEMPERATURE	-10°F to +100°F (-23°C to +38°C)					
CONNECTION SIZE – CLASS 150# RF ANSI B16.5			2-in flange			
DRYER DESIGN VOLTAGE	230 Vac/3-ph/60 Hz					
MIN. CURRENT DRAW ON 230 Vac			51A			
DESICCANT TYPE M001-QTY IN POUNDS/ KILOGRAMS			600/272			
BLOWER MOTOR – 2 hp, 1800 rpm, Class 1 Div 1 Grp D	208 Vac: 6.1A full load current (FLC) overload setting					
COOLER MOTOR – 0.25 hp, 1800 rpm, Class 1 Div 2 Grp D type TEFC	208 Vac: 1.4A FLC overload setting					
HEATER SIZE (MINIMUM)			15kW			
REGEN HEAT TIMER (PLC)	Set at 5 hours max.					
REGEN COOL TIMER (PLC)	Set at 5 hours max.					
TSH-1A ALARM SETTING	Heater sheath: set at 720°F (382°C)					
TSH-2 ALARM SETTING	Heater outlet: set at 500°F (260°C)					
TSH-3 CONTROL SETTING	Heater outlet: set at 425°F (218°C)					
TSI-3 ALARM SETTING	Heater outlet: set at 250°F (121°C)					
TSH-4 CONTROL SET	Cooler inlet, terminate heating: set 200°F (93°C)					
TSL-4 CONTROL SET	Cooler inlet, terminate cooling: set 120°F (49°C)					
TSH-5 ALARM SETTING	Cooler outlet: set 135°F (57°C)					
PI-1 PRESS INDICATOR	0 – 200 psig for 150 psig systems (0 – 1379 kPag for 1034 kPag systems)					

8. PARTS LIST

8.1 PARTS LIST FOR STR-NGX – 230 VAC 60HZ

DESCRIPTION	STR18NGX	STR20NGX	STR24NGX-2	STR24NGX-3	STR30NGX-2	STR30NGX-3
Regeneration Blower	B003-004	B003-004	B003-004	B003-004	B003-004	B003-004
Regeneration Blower Coupling	B003-051	B003-051	B003-051	B003-051	B003-051	B003-051
Regeneration Blower Motor	E010-012	E010-012	E010-012	E010-012	E010-012	E010-012
Regeneration Cooler Motor	E010-010	E010-010	E010-010	E010-010	E010-010	E010-010
Pressure Gauge	B002-022	B002-022	B002-022	B002-022	B002-022	B002-022
Filter Differential Pressure Gauge	B002-074	B002-074	B002-074	B002-074	B002-074	B002-074
Heater Assembly	H001-303-230	H001-303-230	H001-303-230	H001-303-230	H001-303-230	H001-303-230
Desiccant – Molecular Sieve (pounds/kg)	M001-200 (330/150)	M001-200 (440/200)	M001-200 (600/272)	M001-200 (600/272)	M001-200 (970/440)	M001-200 (970/440)
Prefilter Element						
Afterfilter Element						
Regeneration Separator Element						
PLC Controller	C020-019	C020-019	C020-019	C020-019	C020-019	C020-019
Power supply 24 Vdc	C020-008	C020-008	C020-008	C020-008	C020-008	C020-008
Temperature Controller TSH-1A, TSH-2	C001-052	C001-052	C001-052	C001-052	C001-052	C001-052
Text display	C020-010	C020-010	C020-010	C020-010	C020-010	C020-010
High Voltage Transformer	E006-035	E006-035	E006-035	E006-035	E006-035	E006-035
Transformer Fuse 2A	E009-058	E009-058	E009-058	E009-058	E009-058	E009-058
Cooler Motor Starter	E002-222	E002-222	E002-222	E002-222	E002-222	E002-222
Blower Motor Starter	E002-222	E002-222	E002-222	E002-222	E002-222	E002-222
Heater Contactor	E002-223	E002-223	E002-224	E002-224	E002-224	E002-224
Alarm Relays	E009-322	E009-322	E009-322	E009-322	E009-322	E009-322
Autodew Hygrometer Probe	J006-060	J006-060	J006-060	J006-060	J006-060	J006-060

8.2 PARTS LIST FOR STR-NGX – 380 VAC 50HZ

DESCRIPTION	STR18NGX	STR20NGX	STR24NGX-2	STR24NGX-3	STR30NGX-2	STR30NGX-3
Regeneration Blower	B003-004	B003-004	B003-004	B003-004	B003-004	B003-004
Regeneration Blower Coupling	B003-051	B003-051	B003-051	B003-051	B003-051	B003-051
Regeneration Blower Motor	E010-012	E010-012	E010-012	E010-012	E010-012	E010-012
Regeneration Cooler Motor	E010-010	E010-010	E010-010	E010-010	E010-010	E010-010
Pressure Gauge	B002-022	B002-022	B002-022	B002-022	B002-022	B002-022
Filter Differential Pressure Gauge	B002-074	B002-074	B002-074	B002-074	B002-074	B002-074
Heater Assembly	H001-303-380	H001-303-380	H001-303-380	H001-303-380	H001-303-380	H001-303-380
Desiccant – Molecular Sieve (pounds/kg)	M001-200 (330/150)	M001-200 (440/200)	M001-200 (600/272)	M001-200 (600/272)	M001-200 (970/440)	M001-200 (970/440)
Prefilter Element						
Afterfilter Element						
Regeneration Separator Element						
PLC Controller	C020-019	C020-019	C020-019	C020-019	C020-019	C020-019
Power supply 24 Vdc	C020-008	C020-008	C020-008	C020-008	C020-008	C020-008
Temperature Controller TSH-1A, TSH-2	C001-052	C001-052	C001-052	C001-052	C001-052	C001-052
Text display	C020-010	C020-010	C020-010	C020-010	C020-010	C020-010
High Voltage Transformer	E006-033	E006-033	E006-033	E006-033	E006-033	E006-033
Transformer Fuse 2A	E006-058	E006-058	E006-058	E006-058	E006-058	E006-058
Cooler Motor Starter	E002-222	E002-222	E002-222	E002-222	E002-222	E002-222
Blower Motor Starter	E002-222	E002-222	E002-222	E002-222	E002-222	E002-222
Heater Contactor	E002-222	E002-222	E002-223	E002-223	E002-223	E002-223
Alarm Relays	E009-322	E009-322	E009-322	E009-322	E009-322	E009-322
Autodew Hygrometer Probe	J006-060	J006-060	J006-060	J006-060	J006-060	J006-060

8.3 PARTS LIST FOR STR-NGX – 460 VAC 60 HZ

DESCRIPTION	STR18NGX	STR20NGX	STR24NGX-2	STR24NGX-3	STR30NGX-2	STR30NGX-3
Regeneration Blower	B003-004	B003-004	B003-004	B003-004	B003-004	B003-004
Regeneration Blower Coupling	B003-051	B003-051	B003-051	B003-051	B003-051	B003-051
Regeneration Blower Motor	E010-012	E010-012	E010-012	E010-012	E010-012	E010-012
Regeneration Cooler Motor	E010-010	E010-010	E010-010	E010-010	E010-010	E010-010
Pressure Gauge	B002-022	B002-022	B002-022	B002-022	B002-022	B002-022
Filter Differential Pressure Gauge	B002-074	B002-074	B002-074	B002-074	B002-074	B002-074
Heater Assembly	H001-303	H001-303	H001-300	H001-300	H001-300	H001-300
Desiccant – Molecular Sieve (pounds/kg)	M001-200 (330/150)	M001-200 (440/200)	M001-200 (600/272)	M001-200 (600/272)	M001-200 (970/440)	M001-200 (970/440)
Prefilter Element						
Afterfilter Element						
Regeneration Separator Element						
PLC Controller	C020-019	C020-019	C020-019	C020-019	C020-019	C020-019
Power supply 24 Vdc	C020-008	C020-008	C020-008	C020-008	C020-008	C020-008
Temperature Controller TSH-1A, TSH-2	C001-052	C001-052	C001-052	C001-052	C001-052	C001-052
Text display	C020-010	C020-010	C020-010	C020-010	C020-010	C020-010
High Voltage Transformer	E006-019	E006-019	E006-019	E006-019	E006-019	E006-019
Transformer Fuse 2A	E009-058	E009-058	E009-058	E009-058	E009-058	E009-058
Cooler Motor Starter	E002-203	E002-203	E002-203	E002-203	E002-203	E002-203
Blower Motor Starter	E002-206	E002-206	E002-206	E002-206	E002-206	E002-206
Heater Contactor	E002-222	E002-222	E002-223	E002-223	E002-223	E002-223
Alarm Relays	E009-322	E009-322	E009-322	E009-322	E009-322	E009-322
Autodew Hygrometer Probe	J006-060	J006-060	J006-060	J006-060	J006-060	J006-060

8.1 PARTS LIST FOR-STR24-2S-150A208W-SP -208 VAC 60HZ

DESCRIPTION			STR24NGX-2			
Regeneration Blower			B003-004			
Regeneration Blower Coupling			B003-051			
Regeneration Blower Motor			E010-012			
Regeneration Cooler Motor			E010-010			
Pressure Gauge			B002-022			
Filter Differential Pressure Gauge			B002-074			
Heater Assembly			H001-303-208			
Desiccant – Molecular Sieve (pounds/kg)			M001-200 (600/272)			
Prefilter Element						
Afterfilter Element						
Regeneration Separator Element						
PLC Controller			C020-019			
Power supply 24 Vdc			C020-008			
Temperature Controller TSH-1A, TSH-2			C001-052			
Text display			C020-010			
High Voltage Transformer			E006-052			
Transformer Fuse 1.5A			E009-057			
Transformer Fuse 3A			E009-135			
Blower Fuse 15A			E009-060			
Heater Fuse 60A			E009-176-60A			
Cooler Motor Starter			E002-102			
Blower Motor Starter			E002-102			
Heater Contactor			E002-107			
Alarm Relays			E009-322			
Autodew Hygrometer Probe			J006-060			

9. TROUBLESHOOTING & ALARMS

This section lists the alarms provided and their most common causes.

NOTE: *Contact Xebec for more assistance if an alarm is recurrent.*

9.1 DRYER OUTLET HIGH HUMIDITY

If this dryer fails to produce an acceptable dewpoint (monitored by the hygrometer supplied), a high humidity alarm will be activated. The set point is noted in section 7, Technical Data. The following are the most likely reasons for the dewpoint failure:

- System main bypass valves leak wet gas to outlet
- Dryer requires regeneration
- Improper regeneration of exhausted desiccant bed
- Humidity probe calibration required
- Dryer operating to conditions other than noted in the technical specification.

9.2 BLOWER FAILURE MOTOR OVERLOAD TRIP

The regeneration blower alarm has two functions. The alarm will be activated if the motor overload trips due to an excessive current draw, and if the breaker trips. The regeneration blower motor will shut down under this condition. The STRNGX dryer regeneration process will stop. The breaker must be manually reset. Causes for motor overload condition can be among the following:

- Blower or motor bearings failed
- Faulty thermal overload
- Blower misaligned
- Blower-motor coupling damaged or worn
- Defective blower motor
- Damaged or worn blower.

9.3 COOLER FAILURE MOTOR OVERLOAD TRIP

The regeneration cooler alarm has two functions. The alarm will be activated if the motor overload trips due to an excessive current draw, and if the breaker trips. The regeneration heaters, blower and cooler will shut down. The motor breaker must be manually reset. Causes for the motor overload condition can be among the following:

- Motor bearings failed
- Faulty thermal overload
- Obstruction in cooler fan system.

9.4 COOLER FAILURE HIGH OUTLET TEMPERATURE

The regeneration cooler alarm will be activated when the regeneration cooler outlet temperature rises above the alarm set point. Causes for the alarm can be among the following:

- Insufficient air flow across the radiator fins due to damaged fan blade
- Radiator fins are dirty or obstructed
- Breaker-overload defective for the cooler motor
- Defective thermocouple wire at cooler outlet
- Defective thermocouple jack
- Radiant heat from other equipment directed at cooler.

9.5 HEATER OVER TEMPERATURE

A thermocouple is installed on both the heater bundle sheath and the outlet of the regeneration heater. If the temperature of either the sheath or outlet exceeds the setpoint as noted in section 7, the dryer will activate an alarm. The signal generated by the thermocouples is sent to a high-limit temperature controller. The regeneration heaters, blower and cooler will shut down.

Causes for regeneration gas temperature and heater sheath to exceed the high setpoints can be among the following:

- Defective thermocouple wire or controller
- Dryer regenerating at pressure lower than specified
- Blower discharge hose damaged
- Blower-motor coupling damaged
- Blower damaged or worn
- Manual regeneration valve, partially closed, is restricting flow
- Insufficient flow of gas across the heaters

- Damaged thermocouple wire
- Damaged or defective thermocouple jack (located in heater junction box).

9.6 HEATER OUTLET FAILED TO HEAT

The heater outlet failed to heat alarm will be activated when the temperature measured at the outlet of the heater fails to achieve 250°F (121°C) within 20 minutes of heating time. The heater contactor will de-energize, an alarm will be generated and the regeneration process will be shut down, including the regeneration blower motor. Causes for the heater outlet temperature to be below the setpoint in the designated time period can be as follows:

- Defective heater element(s)
- Faulty heater contactor
- Loss of power on one or more phase to the heater or contactor
- Regeneration pressure higher than pressure range specified.

9.7 HEATER CONTACTOR FAILED TO OPEN

The heater contactor failed to open alarm will be activated when the heater contactor does not de-energize at the end of the regeneration heating cycle. This is a major fault as the heater will remain energized. An alarm will be activated and the blower and cooler motors will continue to operate until the high voltage power is shut off to the dryer.



Danger!

Do not restore power to the dryer until the heater contactor is replaced.

Causes for the heater contactor failing to close can be the following:

- Contactor is damaged and mechanically not releasing
- Contacts of the contactor are welded-spotted freezing the contactor.

9.8 BROKEN THERMOCOUPLE WIRE

The broken thermocouple wire alarm will be activated when the PLC detects a broken thermocouple wire. There is a single internal PLC bit that can detect this fault, but it does not identify the faulty cable(s).

Causes for the broken thermocouple wire alarm to be activated can be the following:

- Thermocouple cable physically damaged during service operation
- Thermocouple cable-wire damaged within control panel
- Thermocouple unplugged from PLC input module.

9.9 THERMOCOUPLE ERROR

The thermocouple error alarm will be activated when the PLC detects a damaged, defective or unplugged thermocouple module. Causes for the thermocouple error alarm to be activated can be the following:

- Thermocouple module defective or damaged
- Thermocouple module ribbon cable not correctly installed into module
- Wires from power source to module are loose.

9.10 DEFECTIVE TSH-1A CONTROLLER

The defective TSH-1 controller alarm will be activated when the regeneration heater sheath temperature exceeds the high temperature alarm setpoint. The TSH-1A controller is set at 720°F (383°C). This dryer has a second regeneration heater sheath thermocouple that is wired back to the PLC and, when an elevated temperature in excess of 720°F is sensed, the dryer regeneration shuts down. It is recommended that the controller be inspected and tested to ensure it is not faulty. If faulty, it must be replaced. It cannot be repaired.

Causes for this alarm to be activated can be the following:

- The flow of gas across the heaters is insufficient
- Blower discharge hose damaged
- Blower-motor coupling damaged
- Manual regeneration valve partially closed
- Blower worn or damaged
- Damaged thermocouple wire
- Damaged or defective thermocouple jack (located in heater junction box)
- Unplugged thermocouple jack (located in heater junction box).

10. APPENDIX

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10.1 WARRANTY

Xebec Adsorption Inc. (Xebec) shall repair or replace, without charge but carriage paid to Blainville, QC, Canada, any part⁽¹⁾ or parts of the equipment sold which, within the period of one year from the date of startup⁽²⁾ or 18 months from the date of Xebec's invoice, whichever period expires first, shall prove to have been defective. This requires that the Purchaser give Xebec immediate notice in writing of the discovery of any defect and immediately deliver, at the Purchaser's cost, such defective part or parts to Xebec or its nearest authorized distributor.

This Xebec warranty shall only apply if routine preventive maintenance has been undertaken and documented in accordance with the Xebec User Manual.

Xebec shall not grant any allowance for any repairs, alterations or replacements made by the Purchaser without Xebec's written consent. Equipment, parts and accessories furnished by third parties are warranted only to the extent of the original manufacturer's warranty to Xebec.

This warranty shall not apply to any defects resulting from misuse, negligence, accident or damage in transportation. Xebec shall not be liable for any loss, costs, injury, or damage to person or property, nor for any loss of profits, nor for any loss of use of the equipment, nor for any indirect or consequential damage of whatsoever kind or nature.

This warranty is in lieu of all other warranties, expressed or implied, arising in law or otherwise.

Important:

Note (1): Use of any parts other than Xebec parts shall void the warranty.

Note (2): This warranty is subject to the Xebec equipment sold being commissioned and started up by our factory-trained field service technicians in accordance with the Xebec User Manuals and/or by Xebec's authorized distributor's factory-trained representative.

10.2 START-UP & COMMISSIONING CHECKLIST

STR Start-up and Site Check List

Pre-Power-up check List					PAS S	FAILE D	DON E
1	Check all electrical connections and wiring						
2	Check wiring and customer installation						
3	Check main power supply voltage						
4	Check insulation compound on Y seals and X-proof connectors						
5	Check complete system for leaks all fasteners must be re-tighten						
6	Test Inlet and Outlet valve for Internal integrity and alignment						
7	Check safety relief valves for any defect						
8	Check isolation valve is fully open and lock in open position						
9	Check pilot air installation						
10	Test solenoid on inlet, outlet and regen manually						
11	Check pre and after filter Installation						

Power Up Dryer					PAS S	FAILE D	DON E
1	Check PLC is on run position						
2	Check Dew point sensor is responding						
3	Check all lights and electrical components are on						
4	Purge Oxygen from system (Repress and Depress down to 10psi 3 times)						
5	Check motor rotation on Blower and cooler						
6	Run Dryer program in manual mode						
7	Start dryer cycles in normal mode						
8	Check dryer performance using regen data Sheet (see Document)						
9	Check voltage and amperage during regen (Blower, Cooler, Heater)						
10	Run dryer in Autodew mode						

10.3 XEBEC SERVICE PLAN

[E-MAIL: parts.service@xebecinc.com](mailto:parts.service@xebecinc.com)

RECOMMENDED TO CHANGE EVERY 12 MONTHS			
PART NO.	DESCRIPTION	Qty / Dryer	Unit list USD
	SEPARATOR ELEMENT	1	
	PRE-FILTER ELEMENT	5	
	AFTER-FILTER ELEMENT	5	
	PROBE RECALIBRATION (Ask for EXCHANGE Program)	1	
	PROBE FILTER ELEMENT	1	
	BLOWER OIL (GALLON)	1	

RECOMMENDED TO CHANGE EVERY 10,000 HOURS OR EVERY 3-4 YEARS WHICH OCCURS FIRST			
PART NO.	DESCRIPTION	Qty / Dryer	Unit list USD
	MOLECULAR SIEVE (PRICE PER LB)	2250	
	TABULAR BED SUPPORT	400	

OTHER SPARE PARTS			
PART NO.	DESCRIPTION	Qty / Dryer	Unit list USD
	DEWPOINT PROBE	1	
	2" GATE VALVE, CL150, FLANGED ENDS	1	
	BUTTERFLY VALVE, 6", CL150	5	
	BALL VALVE, 1/2", SS, NPT PORTS, C/W LOCKABLE HANDLE	3	
	RELIEF VALVE	1	
	BALL VALVE, 1/4"	3	
	BALL VALVE, 1/2"	2	
	HEATER	1	
	COOLER MOTOR	1	
	THERMOCOUPLE, TYPE "K", 240"LG,	2	
	DUAL THERMOCOUPLE, TYPE "K", 180"LG	1	
	BLOWER	1	
	BLOWER COUPLING	1	
	BLOWER MOTOR	1	
	POWER SUPPLY	1	
	FUSE 2 AMP	3	
	RELAY MANUAL OVERRIDE MECHANISM REMOVED	3	
	DPI IN LINE	4	
	PRESS.GAUGE 0-200 PSI	1	
	GASKET 12", CL150	2	
	GASKET 18", CL150	1	
	GASKET 6", CL150	15	
	GASKET 2", CL150	9	
	SEAL NUT O-RING	1	
	LIGHT BULB	1	

NOTE: Provide the date, indicated total running hours and your initials. Check off or provide the value noted for the maintenance tasks as they are accomplished. Keep this record near the dryer or in the care of the maintenance supervisor.

[illegible]

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10.3 APPLICABLE DRAWINGS



Xebec Adsorption Inc. – gas treatment systems for every requirement – common and custom

- High- and low-pressure dryers
- Natural gas dryers (CNG)
- Hydrogen and petroleum gas dryers
- Hydrogen and petroleum gas purifiers and separators
- Landfill and digester gas purifiers and separators
- Siloxane removal systems
- Inert gas dryers
- Coalescing filters
- Hospital air dryers
- Automatic drains
- Particulate filters
- Oil/water separators
- Autodew systems
- Emergency towers
- Adsorption towers
- Dryer/filter/purifier system support, maintenance, repair and upgrade

Xebec Adsorption Inc. has over 40 years of service to the gas process industry, and is an active member of NGV America, the International Association for Natural Gas Vehicles (IANGV), the Canadian Natural Gas Vehicle Alliance (CNGVA), and the US National Fire Protection Association (NFPA). Xebec is also a sponsor of the Natural Gas Vehicle Institute.

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