Troubleshooting the Drainac™

Pneumatics

The pneumatics system is the core of the Drainac™ online freeness analyzer. Proper system operation depends on each component of the pneumatics system functioning properly.

Supply Air

The Drainac™ requires a reliable source of dry, instrument-quality air with a minimum pressure at least 10 psi greater than the maximum expected stockline pressure. This overpressure is necessary to prevent filtrate from back flowing into the instrument. Supply air provides the pneumatic power supply to several components. These include the two precision differential pressure regulator relays, the pneumatic booster and the riser stockline pneumatic pressure transmitter. The pneumatics system is illustrated in detail in drawings included with your manual.

Stockline Pneumatic Pressure Transmitter

A PMC pressure transmitter is mounted below the ball valve on the riser. This transmitter measures the stockline pressure and outputs a pressure signal which matches the stockline. An exhaust port on the side of the PMC vents excess air. Ensure that there are no leaks in the lines servicing the transmitter and that the exhaust port is not blocked. Blockages or leaks will result in inaccurate pressure signals. During outages, remove and inspect the PMC for damage to the diaphragm. Replace if damaged.

Differential Pressure Regulator Relay Assemblies

There are two precision differential pressure regulator relays in the Drainac III Series of freeness transmitters. One is dedicated to sourcing intake pressure and the other to exhaust pressure. Each regulator receives a reference stockline pressure signal from the pneumatic pressure transmitter mounted on the riser. Each regulator is adjusted to produce a pressure some PSI larger or smaller than the reference stockline pressure. As stockline pressure varies, each regulator will constantly adjust its output pressure accordingly so as to deliver a constant delta to the solenoid valve.

The exhaust regulator is normally set to 10 psi greater than the stockline pressure. A check valve is installed on the output port of the regulator to prevent backflow incursion.

The intake regulator is typically set to -5 psi relative to stockline pressure. A pressure gauge is mounted on the reference port to provide an indication of current stockline pressure.

The exhaust of each regulator is tied to a common exhaust line which exits the pneumatics cabinet at the lower right corner. Moisture at the exhaust port is an indication of impending trouble, either due to wet supply air or a backflow event.

These regulators are hardy instruments and will provide years of reliable service unless subjected to moisture. Ensure that supply air is dry, of instrument-quality and free of particulates. A loss of supply air pressure can result in a backflow event. Inspect the regulators for evidence of moisture if a backflow event is suspected.

Solenoid Valve

The pneumatic solenoid valve is electronically controlled to select either the intake or exhaust pressure, depending on the current mode of the system. During the intake mode, the intake pressure is selected. Similarly, exhaust pressure is

selected during the exhaust cycle. If a backflow event has occurred, inspect the valve for obstructions and proper operation.

Differential Pressure Gauge

The differential pressure gauge indicates the current output pressure of the system. One side of the gauge is connected to the stockline pressure transmitter. The other side is connected to the output of the pneumatic solenoid valve.

Pneumatic Booster

The pneumatic high-volume booster accepts the output signal from the solenoid valve and retransmits the signal to the riser. Please note that the booster assembly is omitted from low pressure and open vessel configurations of the Drainac. Inspect the exhaust ports on the booster for moisture. Moisture at these ports is indicative of a backflow event.

Riser

The riser accepts the pneumatic signal from the booster. A pressure gauge mounted at the top of the riser indicates the magnitude of the pressure currently being applied to the riser.

Vacuum Supply

Applications with roughly 20 psi of stockline pressure or less are typically fitted with a vacuum supply to provide extra pneumatic sampling capability. Vacuum is produced by a industrial venturi fitted with a silencer, a supply pressure gauge and a vacuum gauge. Output of the vacuum supply is connected to the exhaust port of the Drainac and to the reference port of the stockline pressure transmitter. The pneumatic booster is omitted from configurations utilizing the vacuum supply.

Tubing

All pneumatic components are connected by clear polypropylene tubing. Inspect tubing for leaks and evidence of moisture or fiber.

Backflow Events

Backflow can occur when the system fails to properly detect the level in the analysis chamber; when stockline pressure exceeds the air supply pressure; or when the system ball valve is closed without first having been placed in exhaust hold mode. In this circumstance, either filtrate or flush water will force its way back up the tube pressure line and contaminate the booster. The booster has been designed to tolerate such events for a time, however, significant overpressure or repeated backflow events will ultimately cause the booster to fail and allow filtrate or flush water to pass back further upstream into the pneumatics system.

Such backflow events are destructive and will significantly shorten the service lifespan of the various components. In the worst case, the blockage and corrosion caused by backflow events may require that affected components be replaced. Please note that damage to the Drainac caused by backflow events are not covered by warranty.

In severe backflow events, the filtrate can work its way past the solenoid valve and flood the intake differential pressure regulator relay and differential pressure gauge. Normally, the exhaust pressure regulator is protected by a check valve on its output port and is typically not flooded. In rare circumstances, the check valve can be clogged with fiber material and will pass filtrate into the exhaust regulator.

Each of these components must be inspected following a backflow event: booster, solenoid valve, intake regulator, exhaust regulator check valve, exhaust regulator, all tubing. Components showing evidence of fiber or moisture are suspect and should be cleaned and repaired or replaced.