

Rejuvenation Instructions

#401 – Air Systems – UPR



This NRI covers the following:

- Understanding the applications and operation of flow meters.
- Understand the application and operation of test pressure gauges.
- Understand the application and operation of high-pressure, low-pressure, and miniature pressure regulators.

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WARNING: It is dangerous working around energized high-voltage systems, pressurized systems, and chemicals. Always work in accordance to the Novinium Field Operations Safety Handbook (FOSH) or other local governing safety standards.

Table of Contents

Test Pressure Gauge	2
1. Applications.....	2
2. Pressure rating	2
3. Limitations.....	2
4. Operation.....	2
5. Maintenance.....	3
Flow Meter.....	4
1. Applications.....	4
2. Pressure rating	4
3. Limitations.....	4
4. Operation.....	5
Pressure Regulators	5
1. Applications.....	6
2. Pressure rating	6
3. Limitations.....	6
4. Operation.....	6
5. Configurations.....	6
Miniature Pressure Regulator.....	7
1. Applications.....	8
2. Pressure rating	8
3. Limitations.....	8
4. Operation.....	8
5. Maintenance.....	9
Trans-filling Hose	10
4. Operation.....	10
5. Maintenance.....	11

Test Pressure Gauge

Test pressure gauges are often more accurate than the pressure gauges typically found on the feed tanks and on regulators, and they can calibrate readings measured on both ends of the cable system. Three configurations exist.

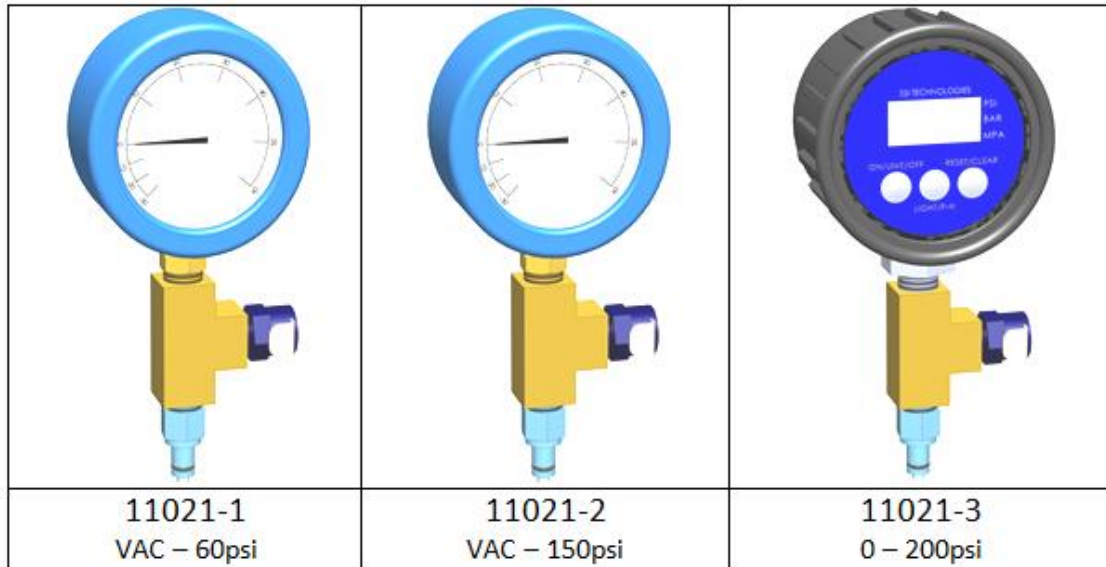


Figure 1: Flow meter configurations of test pressure gauges.

1. Applications.

- Measure and verify the pressure reading on regulators, feed tanks, and vacuum tanks.
- Calibrate the pressure gauges used by technicians working on opposite ends of the cable.

2. Pressure rating.

- Up to 200psi.
- Analog gauges 11021-1 and -2 also read vacuum pressure.

3. Limitations.

- 11021-3 measures positive pressure only and should not be used for vacuum.
- Operating temperature: 0°F – 160°F (11021-1, -2) and 12°F – 140°F (11021-3).

4. Operation.

- The Analog Test Gauge Assemblies (11021-1 and -2) have a grommet located at the top of the gauge under the blue rubber boot that will allow the gauge to calibration to the surrounding atmosphere.
- The Digital Test Gauge Assembly (11021-3) has three function buttons on its keypad: ON/UNIT/OFF, LIGHT/P-H, and RESET/CLEAR.

- c. To power on the unit, press the ON/UNIT/OFF button once.
- d. To manually power down the unit, press the ON/UNIT/OFF button and hold down for three seconds until OFF is displayed; then release the button.
- e. To turn on/off the LCD backlight, press the LIGHT/P-H button once.
- f. To reset the Digital Test Gauge zero pressure, ensure that the input valve is open and vented to atmosphere; then press the RESET/CLEAR button and hold for three seconds.
 - **NOTE:** If pressure is blinking, the PEAK-HOLD function has been activated. Press the LIGHT/P-H button and hold down for three seconds to exit out of PEAK-HOLD mode. The pressure should stop blinking.

5. Maintenance.

- Replacement parts are listed in Table 1.
- Use Teflon tape when replacing the Tee adapter.

Description	Part No.		
	11021-1	11021-2	11021-3
Mechanical Gauge	818458	819762	-
Digital Gauge	-	-	820030
Rubber Boot	818649	818649	820031
Tee Adapter	11683-1	11683-1	11683-1

Table 1: Replacement part numbers for test pressure gauges.

Flow Meter

The flow meter assembly is used to measure gas flow into and out of cables. It consists of a flow meter and a control valve that is used to switch the direction of flow through the flow meter. Two configurations exist and measure flow in unique ranges of 5-50cc/min and 0-7cc/min.



Figure 2: Flow meter configurations.

1. Applications.

- Flow test cables.
- Pressure test cables.

2. Pressure rating.

- 100psi.

3. Limitations.

- For use above 20°F.
- Cablecure fluids and cable solvents like alcohols will damage the flow test valve assembly. Always use new tubing to connect to the flow test valve assembly. Residual fluid will be blown into the flow meter assembly as gases exit the cable. This will destroy the flow meter assembly.
- Low Flow Meter assembly 11357-2 measures extremely small flow rates and is sensitive to dust and vapor. Prevent contaminants from entering through the tube fittings.

4. Operation.

- a. Use a section of tubing to connect the bottom port of the flow test valve to the gas supply.
- b. Use a section of tubing to connect the middle port of the flow test valve to the cable.
- c. Switch the valve to the exhaust position.
- d. Turn on the gas supply and set the test pressure.
- e. Hold the assembly vertical to make flow readings.
- f. When the valve is in the exhaust position, the gas supply is closed and the flow coming from the cable will be measured on the flow test valve assembly.
- g. When the valve is in the pressurize position, the gas supply will be allowed to flow into the cable. The rate of flow will be measured on the flow test valve assembly.

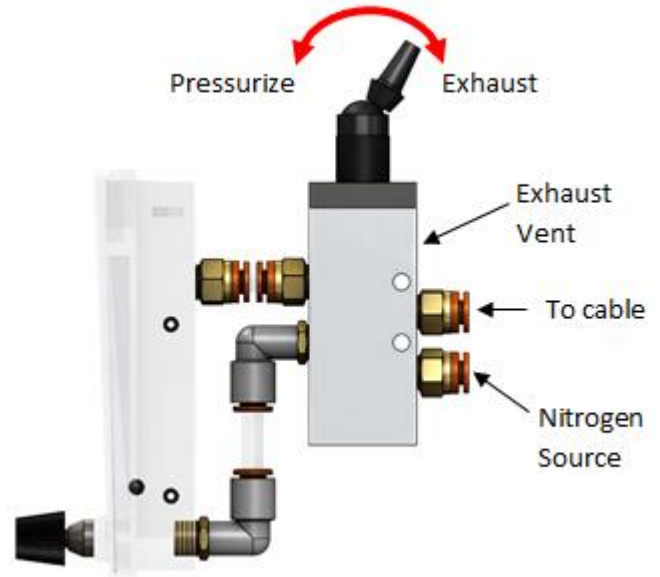


Figure 3: Flow meter operation.

Pressure Regulators

Pressure regulators are valves that cut off the flow of a compressed gas at a certain pressure. There are two main types of pressure regulators used in UPR injections – high-pressure regulators and low-pressure regulators.

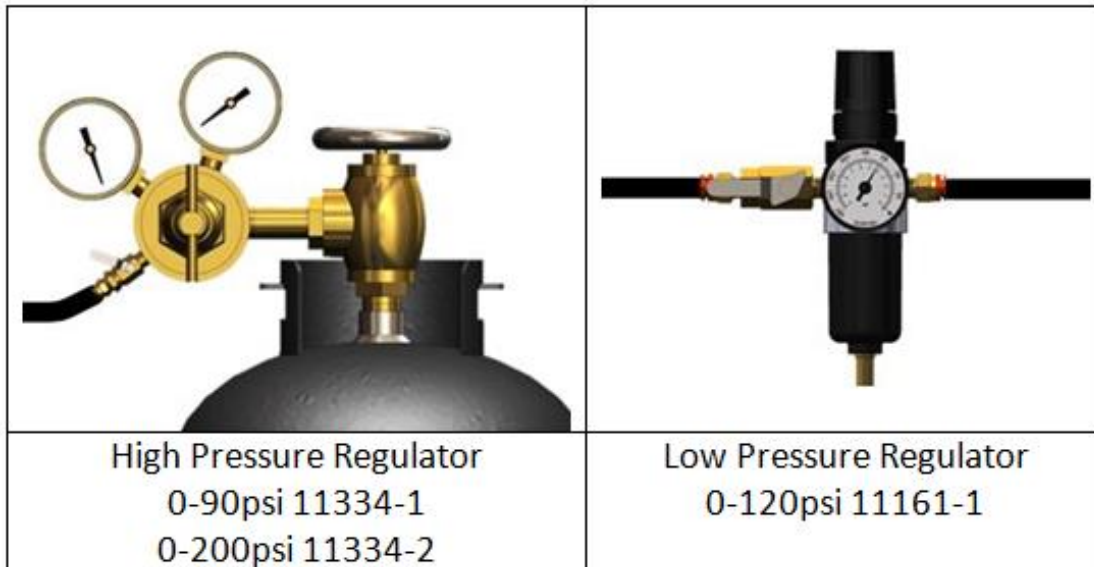


Figure 4: Pressure regulators.

1. Applications.

- High pressure regulators are connected to compressed gas cylinders.
- Low pressure regulators are used in line as a secondary step down in pressure.

2. Pressure rating.

- Always use regulators designed for the maximum output of the cylinder being used.
- Use a regulator designed to operate in the range required for your application.

3. Limitations.

- Regulators that have broken or cracked gauges must never be used. Test pressure gauges are available and should be used regularly to ensure that the regulators are properly set and calibrated.
- When pressure in the compressed cylinders drops below 100 psi, single-stage regulators such as 11334-1 may release all remaining gas.

4. Operation.

- a. Before installing, inspect the regulator including the threads, broken or cracked gauges, ball valve, and tube fittings for damage.
- b. Close the regulator by turning the adjuster counterclockwise all the way and ensure that the ball valve is closed.
- c. Install the regulator onto the compressed-gas cylinder.
- d. For CO₂ applications, ensure that a clean and un-damaged CO₂ washer is used.
- e. Open the main valve on the cylinder.
- f. Turn the adjuster clockwise to open the regulator and to increase the pressure of its output.
- g. Modifying regulators by adding an on/off valve (p/n 815611) and tube fitting or QD is an approved field modification. This modification to the two-stage regulator will reduce its pressure rating to 120psig.

5. Configurations.

Common configurations of the compressed gas cylinders and pressure regulators are shown that streamline the flow and pressure tests where:

- Pressure test is performed at high pressure to identify leaks in cable and its accessories.
- Flow test is performed at low pressure to identify flow issues such as blockages or flow restrictions.

Conventionally, this would require repetitive hand manipulation of a single regulator to switch between the two pressures.

Alternate Setup #1:

- This setup uses two compressed-gas cylinders, each equipped with high-pressure regulators.
- The first cylinder is set to the pressure test pressure and the second cylinder is set to flow test pressure.

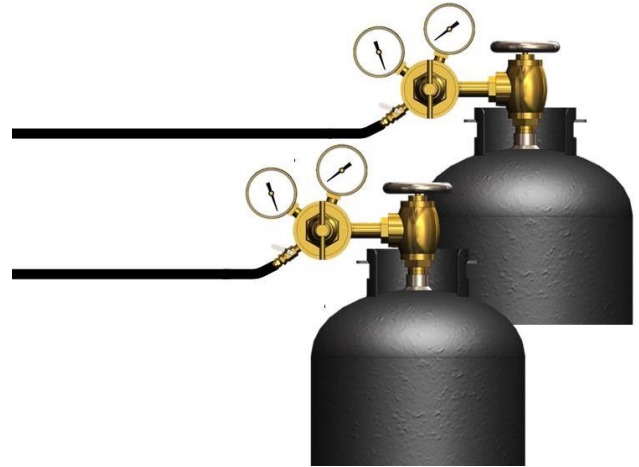


Figure 5: Alternate setup #1.

Alternated Setup #2:

- This setup uses a single compressed gas cylinder with a high-pressure regulator and an additional low-pressure regulator that is inline.
- The high-pressure regulator is set to pressure test pressure.
- A Y-splitter tube fitting is used to branch off another line that is further regulated down to flow test pressure through a low-pressure regulator.

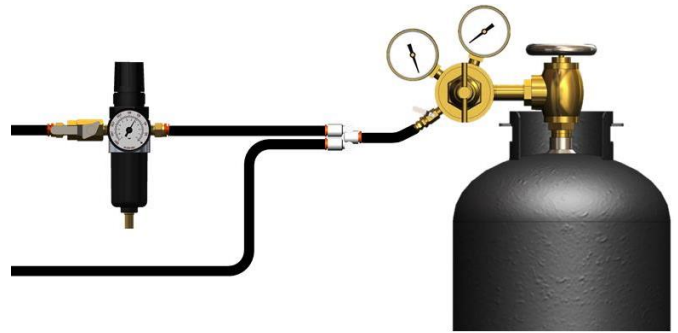


Figure 6: Alternate setup #2.

Miniature Pressure Regulator

Miniature pressure regulators are optional accessories for treating URD cables. The device consists of a regulator and a miniature compressed carbon dioxide cylinder assembly housed in a protective PVC sleeve (Figure 7). The miniature pressure regulator is best suited for applications where the primary feed tank is nearly full of fluid and a second feed tank would be needed to supply the gas pressure. Part numbers for the assembly and the consumable gas cylinder are provided in Table 2.

Description	Part No.
Miniature pressure regulator	11744-1
Miniature CO ₂ cylinder	819825

Table 2: Part numbers.

1. Applications.

- Inject and soak URD cables where insufficient volume is left in a feed tank(s) to drive fluid into the cable.
- Inject and soak URD cables where constant pressure is required for flow.

2. Pressure rating.

- 29psi.

3. Limitations.

- Once installed, the compressed-gas cylinders may not be removed from regulator until empty.
- Miniature CO2 cylinders contain enough gas to fill three full feed tanks (11709's or 10988's).

4. Operation.

- h. Loosen the release knob and remove the regulator assembly from the PVC sleeve.
- i. Remove the orange plug from the pressure port and replace it with Teflon tubing (818462) and the male quick disconnect fitting (890083).
- j. Verify that the regulator is in the close/off position. Thread the gas cylinder into regulator until it bottoms out.
 - **WARNING:** Once the diaphragm on the gas cylinder is pierced, it should not be removed until empty.
- k. Slide the regulator assembly back into the protective sleeve and tighten the release knob until snug.

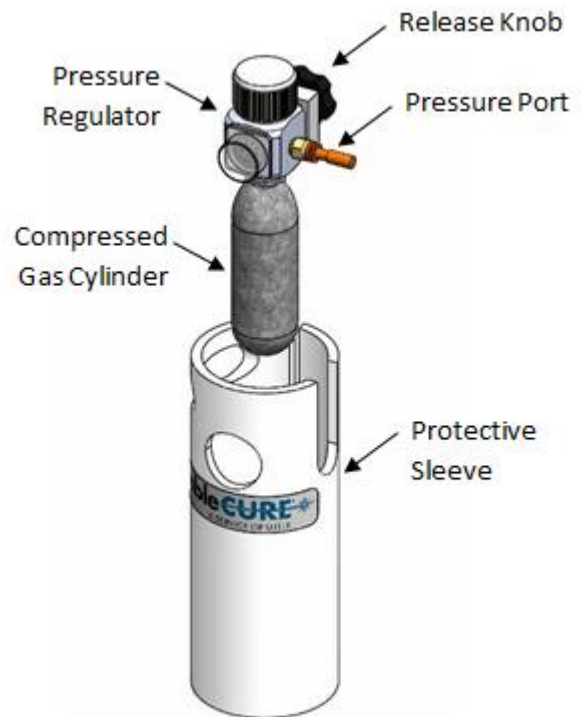


Figure 7: Miniature pressure regulator.

- l. If multiple (2-3) feed tanks need to be connected to the miniature pressure regulator, use Teflon tubing and tube fittings to make the necessary connections (Figure 8).
- m. Adjust the regulator to set the desired pressure and check it with a test pressure gauge assembly (11021-1).
- n. Connect the tubing to the pressure/vacuum port of the feed tank(s) and secure safely inside of a transformer or on a pole.
- o. To disconnect, separate the QD fittings between the feed tank and the regulator.
- p. Turn the regulator knob clockwise to the close/off position.
- q. Bleed off any residual pressure from the tube.

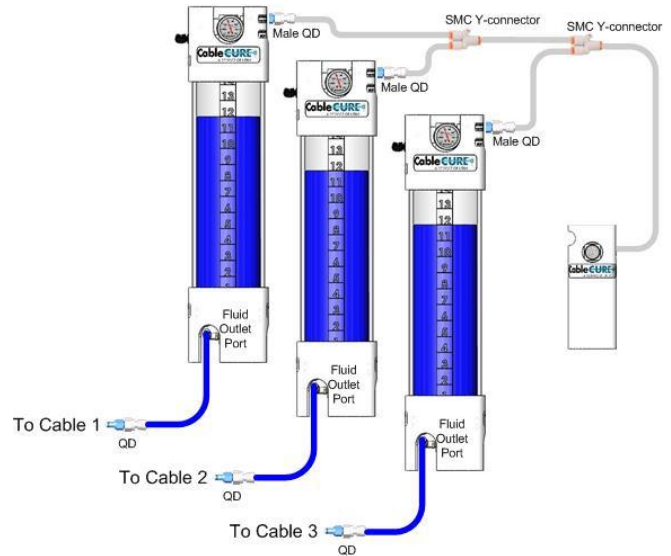


Figure 8: Configurations with multiple feed tanks.

5. Maintenance.

- a. To replace the compressed gas cylinder between uses or when empty, loosen the release knob and remove the regulator assembly from the protective sleeve.
 - b. Open the regulator completely and bleed off any residual gas from the compressed-gas cylinder and regulator through the pressure port.
 - c. Unthread the empty miniature gas cylinder from the regulator and turn the regulator knob clockwise to the close/off position.
 - d. Thread the new compressed-gas cylinder into regulator until it bottoms out.
- WARNING:** Once the diaphragm on the miniature gas cylinder is pierced, it should not be removed until empty.

Trans-filling Hose

1. Applications.

- For trans-filling non-combustible gases such as carbon dioxide, nitrogen, and helium between two cylinders used on jobsites.

2. Pressure rating.

- 2,800psi.

3. Limitations.

- Do not use trans-filling equipment for the trans-filling of combustible gases because it may result in a fire or explosion.
- Keep the trans-filling hose free of dirt, dust, lint, and other foreign debris.
- No oil or grease may be used on any portion of the trans-filling hose, the cylinder valves, connections, or other surfaces.

4. Operation.

- Before refilling any cylinder, perform the following inspections:
 - MARKING:** Check the pressure rating, retest date, and label for type of gas. Only cylinders with a current test date and pressure rating that is equal to the supply cylinder pressure rating or greater can be refilled (see FOSH, compressed gas section).
 - CONDITION:** Visually inspect the entire cylinder for cracks, dents, bulges, arc burns, and fire damage, etc. If any defects are found, **DO NOT REFILL**. Discard the cylinder. Never attempt to repair or alter cylinders.
 - OIL/GREASE:** Visually inspect the valve and cylinder exterior for the presence of oil or grease. If found, **DO NOT TRANS-FILL**.
 - CHECK SUPPLY TANK PRESSURE:** Due to temperature variations, the supply tank gas pressure may vary significantly. **DO NOT TRANS-FILL** if the supply tank gas pressure is above the operating pressure rating of the trans-filling hose (>2800 psi).
- Carefully discharge any gas remaining in the cylinder to be filled in a well ventilated area.
 - Direct gas away from all personnel when discharging.
- Secure the cylinder so it will not tip or fall over.
- Crack open the supply cylinder valve momentarily to clean any debris from the inside of the valve.
- Thread the supply end of the trans-filling hose (end with gauge) into the supply cylinder valve. Tighten the connection to create a gas tight seal. Do not kink or twist the pigtail.



Figure 9: Trans-filling hose.

- f. Connect the filling end of the pigtail to the cylinder to be filled.
 - Be sure all connections are adequately secured.
 - Fully open the valve on the cylinder to be filled.
- g. Slowly open the supply cylinder valve.
 - **CAUTION:** Opening the valve too quickly is very loud and may harm ears.
- h. Monitor the cylinder being filled with the filling pressure gauge on the trans-filling hose.
 - When the filled cylinder and the supply cylinder equalize in pressure, close the valve on the supply cylinder and the valve on the filled cylinder.
- i. Slowly open the bleeder valve on the supply end and allow residual gas to escape.
- j. Close the bleeder valve.
- k. Remove the filling end of the pigtail from the filled cylinder.
 - **CAUTION:** Do not allow the pigtail to hang unsupported from the supply cylinder as this will reduce service life.
- l. When the supply cylinder pressure decreases to approximately 250-300psi, trans-filling becomes impractical and a replacement supply cylinder is needed.
 - **NOTE:** Empty cylinders will heat as they are filled and it is normal for the temperature of the filled cylinder to rise.

5. Maintenance.

- Inspect the trans-filling hose before and after every use.
- If the trans-filling hose appears damaged in any way, it should be discarded and replaced with a new one.