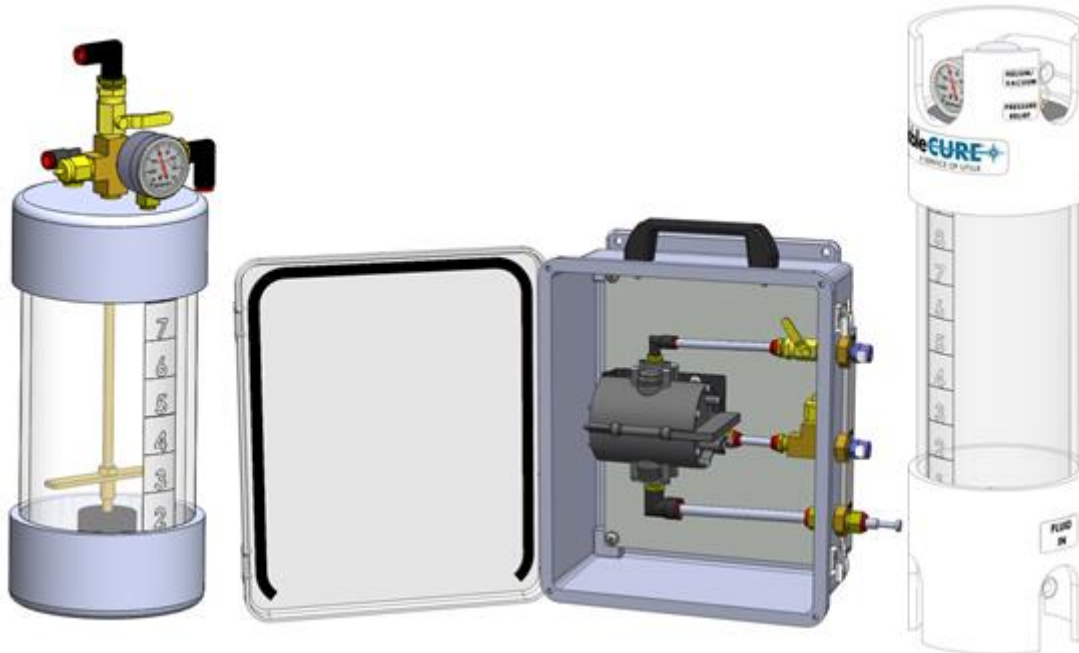


Rejuvenation Instructions

#411 – Fluid Systems – UPR



This NRI covers the following:

- Understanding the applications of the 3 fluid feed systems for UPR.
- How to operate and maintain the feed tank, charge tank, and pump used in UPR injections.
- Understanding the application and operation of the dip-tube/dryer cap assembly.

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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.

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Feed Tank

1. Applications.

- Energized or de-energized injections.
- Injecting and soaking cables.
- Used with Cablecure XL, XLe, DMDB, and iDMDB fluids.
- Three configurations of the feed tank are available to cover the fluid requirements and space limitations of most cable systems (see Table 1).

Part No.	Cylinder Dia. x Ht.	Actual Height
11709-1	3" x 15"	22"
11709-2	4" x 10"	17"
11709-3	4" x 15"	22"

Table 1: Feed tank sizes.

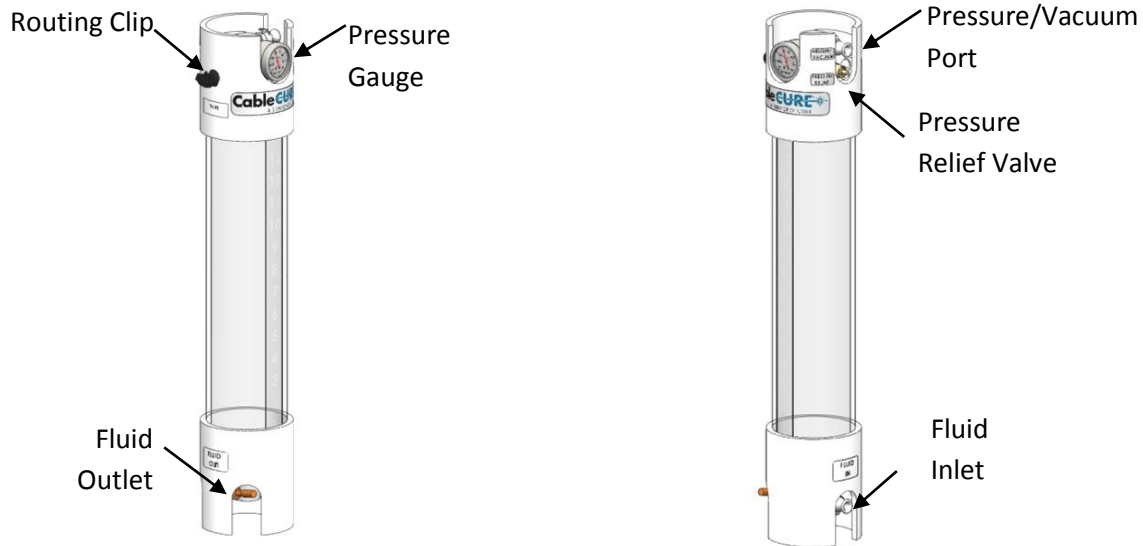


Figure 1: Feed tank.

2. Pressure rating.

- The pressure rating of feed tanks is 30psi.

3. Limitations.

- Feed tank is bottom feeding and must remain upright.
- Must be used with the Discard Control System if left unattended during use.

- Maximum sustained operating temperature is 140°F (165°F for 3" diameter tanks).

4. Operation and filling.

- Remove the orange plug from the fluid outlet and replace it with a clean piece of 1/4" Teflon tubing (818462).
 - The tubing should be long enough to be helically wrapped around the tank and fastened to the top collar using the black routing clip.

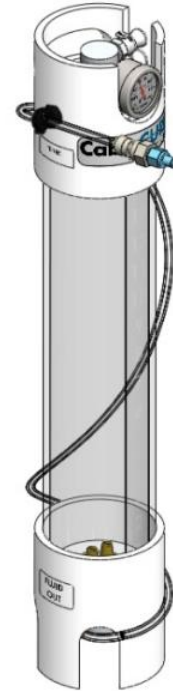


Figure 2: Helically wrap the tubing.

- Cap the Teflon tube with quick disconnect (QD) fitting and use locking clip 819825.
 - This will prevent the QD from popping off if snagged.



Figure 3: Install locking clip.

- c. An optional ball valve (11744-1) may be installed.
 - The installation is shown in Figure 4 and the cut-length for the tubing is detailed in Table 2.

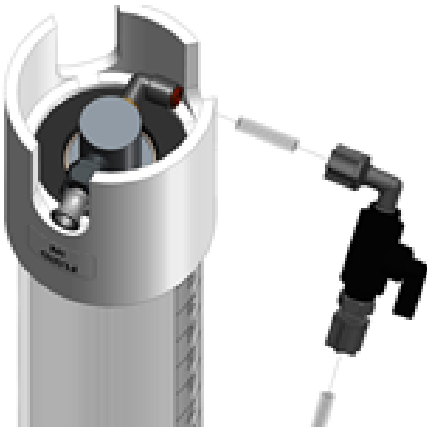


Figure 4: Optional ball valve.

Feed Tank	Tube Length
11709-1 (3x15")	1.2"
11709-2 (4x10")	1.7"
11709-3 (4x15")	1.7"

Table 2: Ball valve assembly tube length.

- d. Remove the white QD plug from the pressure/vacuum port and connect a vacuum pump and pull a 27"Hg vacuum in the tank.
- e. With the pump running, remove the white QD plug from the fluid inlet and connect the supply of Cablecure fluid.
- f. Disconnect the fluid supply when the desired fluid level is reached in the tank.
 - **NOTE:** the feed tank does not contain a float valve so there is no need to add an additional 2" of fluid to the tank.
- g. With a 25-27"Hg vacuum, rock the tank back and forth so that the fluid sloshes against the sides of the tank and tiny bubbles of gas are observed escaping from the fluid surface.
- h. Disconnect the vacuum pump and reinstall the white QD plugs into the pressure/vacuum port and the fluid inlet.
 - These plugs protect the female QDs from dirt and ensure long-term and leak-free operation.
- i. After filling the tank to the desired level, do not relieve the vacuum in the feed tank.

Pressurizing for Soak applications.

XL fluids absorb CO₂ gas quickly, leading to rapid pressure loss in the feed tank. The time commitment of the soak period impacts resource availability, as additional gas cylinders left with the feed tank are used for the full duration of the soak.

The following steps address pressurizing feed tank for soak applications:

- a. Connect a regulated supply of nitrogen to the pressure/vacuum port at the top of the tank and pressurize to the desired pressure.
 - If a reserve of helium is available, it may be depleted first.

- b. Disconnect the nitrogen supply and reinstall the white QD plug into the pressure/vacuum port.
- c. To relieve pressure, pull on the pull-ring from the pressure relief valve.

Pressurizing for No-soak applications

XLe fluids absorb CO₂ gas quickly. No-soak applications are free of the soak period and have a smaller time commitment for CO₂ gas cylinders.

The following steps address pressurizing feed tanks for no-soak applications:

- a. Connect a Novinium Compact CO₂ kit (Part Number: 0-PN-CO2-UP-12), to the pressure/vacuum port at the top of the tank and pressurize to the desired pressure.
 - Connect tubing to the white JACO fitting on the Compact CO₂ kit's regulator.
 - Connect a male QD fitting to the tubing's opposite end to connect to the UPR feed tank.



Figure 5: The Novinium Compact CO₂ kit.

- b. Leave the Compact CO₂ kit connected to the UPR feed tank for the duration of the injection.
- c. To relieve pressure, remove the connection to the Compact CO₂ kit and pull on the pull-ring from the pressure relief valve.

5. Connecting to the cable.

- a. Purge any trapped gasses from the fluid outlet tubing and QD before connecting to a cable.
- b. Connect the new feed tank to the cable by joining the QDs together.
- c. To disconnect the feed tank from the cable, remove the tank from the enclosure and disconnect the tank from the cable by separating the QDs.

6. Storage and maintenance.

- a. All Cablecure fluids should be drained from the tank before the tank is stored on the truck, in the warehouse, or shipped between locations.

b. Store tanks upright or on their side in a cool and dry place.

c. Rebuild kits that contain the parts necessary to rebuild the feed tank are available and are listed in Table 3.

d. In addition, the rebuild tool kit 11771-1 will be required and contains all the tools and instructions necessary to rebuild feed tanks.

- The rebuild should take place in a warehouse environment for cleanliness.

Description	Part No.
Rebuild Kit for 3x15" Feed Tank	11770-1
Rebuild Kit for 4x10" Feed Tank	11770-2
Rebuild Kit for 4x15" Feed Tank	11770-3

Table 3: Rebuild kit.

e. Replacement parts are shown in Figures 6 and 7.

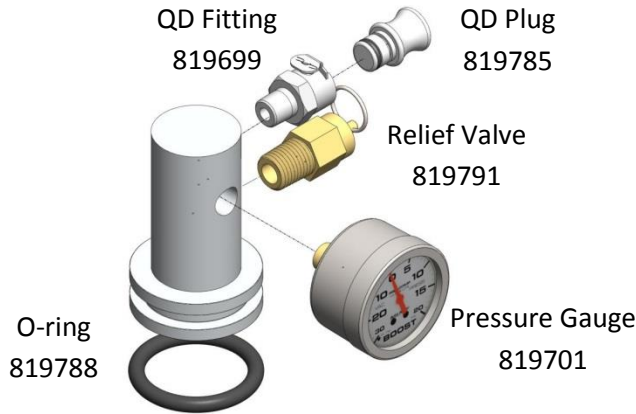


Figure 6: Top manifold assembly 11711-1.

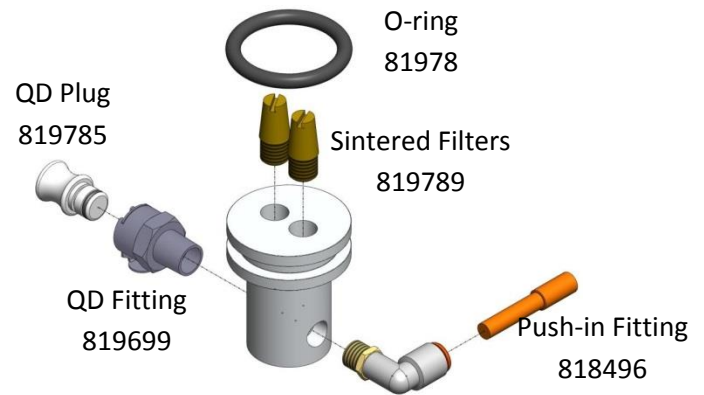


Figure 7: Bottom manifold assembly 11712-1.

Charge Tank

1. Applications.

- Energized or de-energized injections.
- Injecting and soaking cables.
- Used with Cablecure XL, XLe, DMDB, and iDMDB fluids.

- Three configurations of the charge tank are available to cover the fluid requirements and space limitations of most cable systems (see Table 4).

Part No.	Cylinder Dia. x Ht.	Actual Height
10988-1	4" x 10"	15.75"
10988-2	4" x 12"	17.75"
10988-3	4" x 18"	23.75"

Table 4: Charge tank sizes.

2. Pressure rating.

- The pressure rating of charge tanks is 30psi.

3. Limitations.

- Must remain upright and vertical to allow fluid to flow through the float valve located in the bottom of the tank.
- When the tank reaches the end of its useful life, it should be removed from use and discarded.

4. Operation and filling.

- Install a piece of tubing at the fluid outlet and terminate with a quick disconnect (QD) fitting.
- Close the ball valve at the fluid outlet.
- Remove the orange plug from the fluid inlet port and use a clean piece of tubing to connect the charge tank to the fluid supply.
- Remove the orange plug from the pressure/vacuum port and use a clean piece of tubing to connect the charge tank to the vacuum pump.
- Open the ball valve at the pressure/vacuum port and maintain a constant vacuum at 25-27"Hg. Fluid should begin to fill the tank.
- When the fluid reaches the desired level, disconnect the fluid inlet port from the fluid supply and reinstall the orange plug.

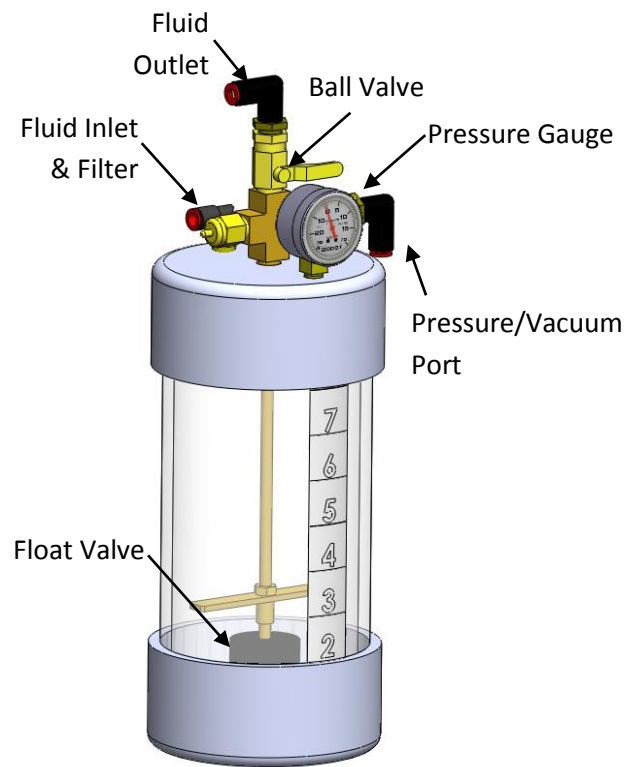


Figure 8: Charge tank.

- g. Remove dissolved gasses from the fluid by drawing a 25-27" Hg vacuum on the tank.
- h. Close the ball valve on the pressure vacuum port and disconnect the vacuum pump and tubing.

Soak applications

- a. Connect a regulated supply of nitrogen to the pressure/vacuum port at the top of the tank and pressurize to the desired pressure.
 - If a reserve of helium is available, it may be depleted first.
- b. Close the ball valve at the pressure/vacuum port and disconnect the CO₂ supply. Reinstall the orange plug when finished.
- c. Connect the new feed tank to the cable by joining the QDs together.
- d. To relieve pressure, pull on the pull-ring from the pressure relief valve.

No-soak applications

- a. Connect a Novinium Compact CO₂ kit (Part Number: 0-PN-CO₂-UP-12, to the pressure/vacuum port at the top of the tank and pressurize to the desired pressure.
 - Connect tubing to the white JACO fitting on the Compact CO₂ kit's regulator.
 - Connect a male QD fitting to the tubing's opposite end to connect to the UPR feed tank.
- b. Leave the Compact CO₂ kit connected to the UPR feed tank for the duration of the injection.
- c. To relieve pressure, pull on the pull-ring from the pressure relief valve.

5. Connecting to the cable.

- a. Before connecting to the cable, check the pressure in the charge tank and ensure that the ball valve at the fluid outlet is open.
 - If the pressure has dropped, the feed tank has a leak and must be changed out or addressed before continuing.
- b. Connect the charge tank to the cable by joining the fluid outlet QD to the QD running to the injection adapter.
- c. To disconnect the feed tank from the cable, remove the tank from the enclosure. Close the ball valve at the fluid outlet and disconnect the tank from the cable by separating the QDs.
- d. To reduce the pressure in the charge tank, remove the plug from the pressure/vacuum port. Turn the charge tank away from people and sources of ignition. Cover the port with a rag and crack open the ball valve to let the pressure drop.

6. Storage and maintenance.

- Feed tanks are not storage tanks. Empty all Cablecure fluid when placing tanks in storage.
- Feed tanks are not transportation containers. Empty all Cablecure fluid when shipping them.

- Tanks should be transported upright.
- Store tanks in a cool dry place.
- The float valve is not serviceable. If it becomes clogged or will not close when out of fluid, the tank must be removed from circulation and discarded.

Cablecure Pump

1. Applications.

- De-energized injections.
- Ideal for URD and feeder applications where large fluid volumes must be injected.
- For use with Cablecure XL, XLe, DMDB, iDMDB, and CB fluids.

2. Pressure rating.

- The pressure rating of Cablecure pumps is 60psig maximum.
- The pump might not cycle smoothly below 15psig.

3. Limitations.

- The fluid supply to the pump must not be restricted.
- Pump requires a regulator and a supply of compressed and filtered air (such as Nitrogen or Carbon Dioxide) to operate.
- Only operate the pump between 34°F and 120°F.

4. Operation.

- a. Locate a flat surface for the pump and fluid reservoir to rest.
- b. Place the fluid reservoir on the digital scale (816921).
- c. Position the pump below the fluid reservoir so that the pump's inlet is gravity fed.
- d. Connect the fluid reservoir to the "Fluid In" connection point using a 3/8" tubing (816554).
- e. Connect the required length of 1/4" tubing (818462) to the "Fluid Out" connection point using a quick-disconnect (QD) fitting (890083).
- f. Ensure that the ball valve is in the closed (vertical) position.

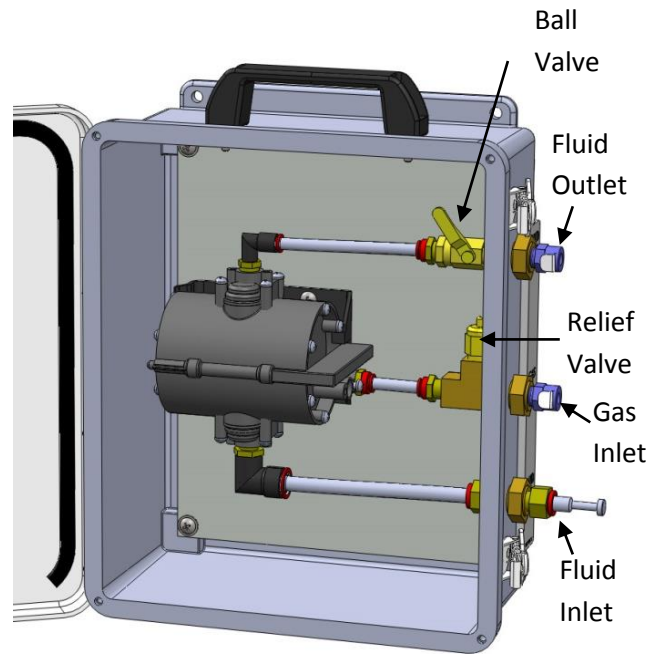


Figure 9: Cablecure pump.

- g. Connect a regulated source of compressed gas to the "Air In" QD on the pump.
 - **DO NOT EXCEED** 60psi or the safe working pressure of the cable system.
- h. Slowly crack open the ball valve to start the flow of fluid.
 - **DO NOT** allow the pump to cycle more than 2 times per second as it can damage the internal diaphragm of the pump.
- i. When fluid is through, disconnect the pump from the injection adapter and allow the pressure to reach ambient on the receiving end.

5. Cleaning and maintenance.

- a. Pump isopropyl alcohol through the system for approximately two minutes.
- b. Drain as much alcohol out of the system as possible by pumping air through the system. Carefully turn the pump upside down to assist with fully draining the pump.
- c. Allow air into the fluid inlet and leave the outlet in a waste container.
- d. Reduce the air inlet pressure and the opening of the ball valve to limit pump speed to no more than twice per second.
- e. Should the diaphragm tear or the pump stop working, replacement pumps (11580-1) are available.

Assembling Dip Tubes/Dryer Caps

1. Applications.

- Preserves the water-reactivity of the silicone fluids used in cable injection by keeping them dry and free of moisture contamination.
- Use with 5gal. (35kg) cans of Cablecure XL, XLe, DMDB, iDMDB.

2. Pressure rating.

- The pressure rating of dip tubes/dryer caps is atmospheric and vacuum only.

3. Limitations.

- Do not use with the Cablecure Pump.
- The dip tube will restrict the flow rate of fluid that feeds into the pump and lead to a longer injection time.

4. Operation.

a. To install:

- Remove and discard the black plastic cap from the pail's closure.
- Insert the brass dip tube into the spout and screw-in the white plastic cap.
- **DO NOT OVERTIGHTEN** since all threads involved are thin plastic.
- Once installed, the dryer cap should not be removed from the pail until all fluid is exhausted.
- Place the fluid pail where the dryer cap will not be broken.

b. To draw XL fluid from the pail:

- Raise a vacuum inside your charge tank and connect the fluid input port to the female QD fitting in the center of the white plastic cap (air will automatically flow through the desiccant bottle).
- The desiccant bottle has a check valve installed and will automatically close to seal the container when not in use.

c. For ease of use, the small bottle containing the blue desiccant can be removed from the unit and mounted remotely using QDs and tubing.

d. Place the bottle some place easy to see and mount securely.

e. The desiccant bottles are disposable. When 3/4 of the drying material has turned pink, it is time to request a replacement. Replacement bottles (p/n 11410) are available from stores.

f. This cap may be left in place while transporting the fluid.



Figure 10: Dryer cap.



Figure 11: Dip-tube dryer cap installed.