

# DATA SHEET

## PRESSURE-SENSITIVE REGULATING UNLOADER




Brass Model: **9950**



| SPECIFICATIONS         | U.S. Measure         | Metric Measure        |
|------------------------|----------------------|-----------------------|
| Flow Range             | 50–120 gpm           | 189–450 lpm           |
| Pressure Range         | 290–2900 psi         | 20–200 bar            |
| Maximum Temperature    | 140° F               | 60° C                 |
| Inlet Port (Back)      | 1¼" BSPP(F)          | 1¼" BSPP(F)           |
| Discharge Port (Front) | 1¼" BSPP(F)          | 1¼" BSPP(F)           |
| Bypass Port (Bottom)   | 1½" BSPP(F)          | 1½" BSPP(F)           |
| Weight                 | 13.12 lbs            | 5.95 kg               |
| Dimensions             | 12.51 x 6.66 x 2.50" | 318 x 169.5 x 63.5 mm |

**Note:** Use only at above specifications to ensure proper unloader life and performance.

 This Pressure-Sensitive Regulating Unloader can be converted to a Secondary Relief Valve. See page 4 for Relief Valve conversion.

### FEATURES

- Provides system pressure control and protection for single or multiple gun applications.
- Maintains full system pressure while running in bypass with minimal load on pump.
- Adjusting nut allows for easily-calibrated pressure adjustment.
- Flow-through design facilitates easy installation.
- Mounting studs can be used for remote positioning.

## Read all CAUTIONS and WARNINGS before commencing service or operation of any high-pressure system

### SELECTION

This pressure-sensitive regulating unloader is designed for systems with single or multiple pumps, solenoid (gate) valves, nozzles, and shut-off or weep guns.

**Note:** For multiple-pump systems, it is best to use a pressure regulator, not a pressure-sensitive regulating unloader.

This unloader should meet both the desired system flow (combined nozzle flow rate requirement) and the desired system pressure.

**NOTICE** Operation below the minimum rated flow of the unloader causes the unloader to cycle. Operation above the maximum rated flow of the unloader causes cycling and premature wear, preventing achieving the desired system pressure.

### INSTALLATION

This unloader operates properly when mounted in any direction. However, keeping the plumbing to a minimum and the pressure adjuster easily accessible is preferred. The ideal mounting location is directly on the pump's discharge manifold.

The inlet connection is a 1¼" BSPP(F) port located on the backside. There is an arrow and the word IN marked on the body, indicating the direction of flow. Liquid from the discharge of the pump goes into this connection.

The discharge connection is a 1¼" BSPP(F) port located on the front side (hex end). There is an arrow and the word OUT marked on the body, indicating the direction of flow. Plumbing to the spray guns, solenoid (gate) valves or nozzles connect here.

The bypass connection is a 1½" BSPP(F) port located on the bottom. There is an arrow and the word BY-PASS marked on the body, indicating the direction of flow. Bypass liquid is directed out of this port and can be routed to a reservoir (preferred method), drain or pump inlet.

### OPERATION

This unloader holds established system pressure in the discharge line when the trigger gun or solenoid (gate) valve is closed, or the nozzle is clogged, thus bypassing all unrequired flow. Squeezing the trigger gun or opening the solenoid (gate) valve will close the bypass and return to established system pressure.

### PRESSURE ADJUSTMENT

**Note:** Pressure is not set at the factory.

1. Setting and adjusting the unloader pressure must be done while the system is running.
2. Start the system with unloader backed off to the lowest pressure setting (counterclockwise direction).
3. Increase the unloader pressure setting by turning the pressure adjuster clockwise.
4. Squeeze the trigger and read the pressure on the gauge at the pump.

**Note:** Do not read the pressure at the gun or nozzle.

5. If more pressure is desired, release the trigger, turn pressure adjuster one quarter turn in clockwise direction.
6. Squeeze the trigger and read the pressure.
7. Repeat this process until desired system pressure is reached.
8. If desired system pressure cannot be reached, review TROUBLESHOOTING chart.

**NOTICE** A secondary pressure safety relief device (e.g. pop-off valve, relief valve) should be used along with this pressure-sensitive regulating unloader. Final adjustment for the secondary relief valve should be approximately 200 psi above the system operating pressure.

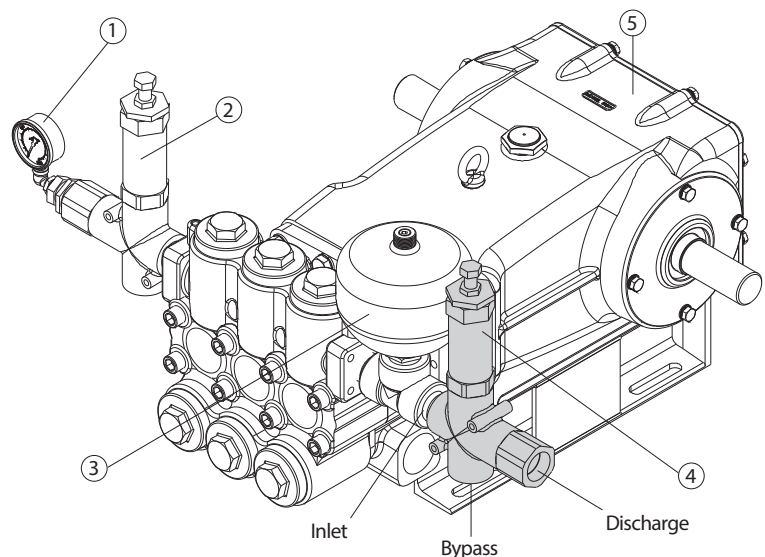
**Note:** A minimum of 5% of the flow through the unloader should bypass for proper regulator performance. If the entire unloader flow pumps through the nozzle (zero-bypass), the valve can easily be set for pressure higher than the desired pressure, causing a malfunction or premature wear

**Note:** By removing the check valve and spring, this unloader can function as a secondary relief valve.

🔧 See page 4 for Relief Valve conversion.

### TYPICAL UNLOADER INSTALLATION

1. Pressure Gauge
2. Relief Valve  
(Secondary Pressure Relief Device)
3. Pulsation Dampener
4. **Pressure-Sensitive Regulating Unloader**  
(Primary Pressure Regulating Device)
5. Triplex Plunger Pump



## SERVICING

### Disassembly

1. Disconnect bypass and discharge plumbing from unloader.
2. Remove unloader from pump.
3. Secure unloader in a vise. Use a wrench to remove brass spring retainer.
4. Remove upper spring retainer and spring from upper body. Examine spring for fatigue or breaks and replace as needed.
5. Using the same wrench, unthread upper body from lower body. Remove upper body and lower spring retainer.
6. Remove piston stem and valve assembly which includes the upper and lower piston retainers from lower body. Seat will remain in lower body.
7. Secure valve with pliers on flat surfaces and then place an M10 allen wrench into hex head of piston stem. Remove valve from piston stem.

**CAUTION** Exercise extreme caution to avoid contact and damage to the tapered surface of the valve.

8. Place piston stem with hex hole down on work surface.
9. Remove lower piston retainer with O-rings and backup ring. Examine outside diameter O-ring and inside diameter O-ring with backup ring for cuts or wear and replace as needed.
10. Remove upper piston retainer with O-rings and backup ring. Examine outside diameter O-ring and inside diameter O-ring with backup ring for cuts or wear and replace as needed.
11. Examine large and small outside diameter surfaces of the piston stem for scratches or nicks and replace as needed.
12. Examine seat in lower body for scoring or wear and replace as needed.
13. Remove discharge fitting with O-ring, spring, check valve and O-ring. Examine check valve and spring for fatigue and wear and replace as needed. Examine O-rings for cuts or wear and replace as needed.

**Note:** While the discharge fitting is removed, inspect sealing area for grooves, pitting and wear. Where the check valve makes contact within the internal body of the unloader. If damage is found, stop the repair and replace with complete new unloader. If not, proceed with reassembly.

### Reassembly

1. Place spring inside check valve. Lubricate and install O-ring on outside diameter of check valve. Install check valve assembly into discharge port of lower body of unloader.
2. Apply Loctite® 242® to threads of discharge fitting. Thread discharge fitting into body of unloader.
3. Lubricate and install O-ring onto seat. Press seat into unloader lower body.
4. Place piston stem with hex hole down on work surface.
5. Lubricate and install small O-ring inside upper piston retainer, then place backup ring on top of O-ring. Lubricate and install larger O-ring around the outside diameter of upper piston retainer.
6. Place upper piston retainer with backup ring facing downwards over piston stem.
7. Install backup ring inside lower piston retainer, then lubricate and install O-ring on top of backup ring. Lubricate and install larger O-ring around outside diameter of lower piston retainer.
8. Place lower piston retainer with O-ring facing down over piston stem and press against the upper piston retainer.
9. Apply Loctite® 242® to threads of piston stem and screw valve onto piston stem.
10. Lower complete piston stem and valve assembly into unloader chamber with valve facing down and hex head of piston stem facing up. Press until piston stem head is below lower body surface.
11. Thread upper body into lower body.
12. Place lower spring retainer with stainless steel ball down and small diameter guide facing up into the upper body.
13. Install spring onto lower spring retainer.
14. Place upper spring retainer on top of spring with small diameter guide facing down.
15. Thread on spring retainer to upper body. Do not tighten pressure adjuster at this time.
16. Re-install unloader onto pump.
17. Reconnect bypass and discharge plumbing to unloader.
18. To set system pressure as an unloader or relief valve see PRESSURE ADJUSTMENT.

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## TROUBLESHOOTING

|                                       |  |
|---------------------------------------|--|
| Unloader cycles                       | <ul style="list-style-type: none"> <li>• Check valve O-ring is worn out</li> <li>• Fitting leaking downstream</li> <li>• Worn O-ring inside gun</li> <li>• Insufficient flow through unloader</li> </ul>   |
| Liquid leaking from bottom            | <ul style="list-style-type: none"> <li>• Seat or inlet fitting O-ring is cut or worn</li> </ul>  |
| Liquid leaking from middle            | <ul style="list-style-type: none"> <li>• Piston O-ring is worn or cut</li> </ul>   |
| Unloader will not come up to pressure | <ul style="list-style-type: none"> <li>• Not properly sized for system pressure</li> <li>• Foreign material in unloader</li> <li>• Piston O-rings worn</li> <li>• Nozzle worn or too large</li> <li>• Pressure adjuster is not properly set</li> </ul> |
| Extreme pressure spikes               | <ul style="list-style-type: none"> <li>• Adjusting handle turned completely into unloader</li> <li>• Restricted bypass or no bypass</li> <li>• System flow exceeds unloader rating</li> </ul>  |

## PARTS LIST

| ITEM | P/N   | MATL  | DESCRIPTION   | QTY |
|------|-------|-------|---|-----|
| 402  | —     | S     | Adjuster, Pressure (M16 x 54)                                     | 1   |
| 403  | —     | S     | Nut, Hex Locking (M16)  | 1   |
| 407  | —     | BB    | Retainer, Spring  | 1   |
| 408  | 76220 | STL R | Spring  | 1   |
| 409  | —     | BB    | Retainer, Spring, Upper   | 1   |
| 410  | —     | BB    | Retainer, Spring, Lower   | 1   |
| 412  | 76425 | S     | Stem, Piston  | 1   |
| 414  | —     | PTFE  | Backup Ring, Piston Stem  | 1   |
| 415  | —     | NBR   | O-Ring, Piston Stem   | 1   |
| 417  | 76550 | SSS   | Ball  | 1   |
| 423  | —     | BB    | Retainer, Upper Piston  | 1   |
| 424  | —     | NBR   | O-Ring, Upper Piston Retainer-85D                                 | 1   |
| 425  | —     | BB    | Body, Upper   | 1   |
| 427  | —     | BB    | Retainer, Lower Piston  | 1   |
| 429  | —     | NBR   | O-Ring, Piston Stem   | 1   |
| 430  | —     | PTFE  | Backup Ring, Piston Stem  | 1   |
| 431  | —     | NBR   | O-Ring, Lower Piston Retainer-85D                                 | 1   |
| 435  | 76190 | SSS   | Valve   | 1   |
| 436  | 76455 | SSS   | Seat  | 1   |
| 437  | —     | NBR   | O-Ring, Seat-85D  | 1   |
| 440  | —     | BB    | Body, Lower   | 1   |
| 443  | 76311 | BB    | Valve, Check with O-Ring  | 1   |
| 444  | 76230 | SS    | Spring, Check Valve   | 1   |
| 446  | —     | NBR   | O-Ring, Discharge Fitting-85D                                     | 1   |
| 460  | —     | BB    | Fitting, Discharge (1/4" BSPP[F])                                 | 1   |
| 468  | 31889 | NBR   | Kit, O-Ring<br>(Includes: 414, 415, 424, 429, 430, 431, 437, 446) | 1   |

*Italics are optional items.*

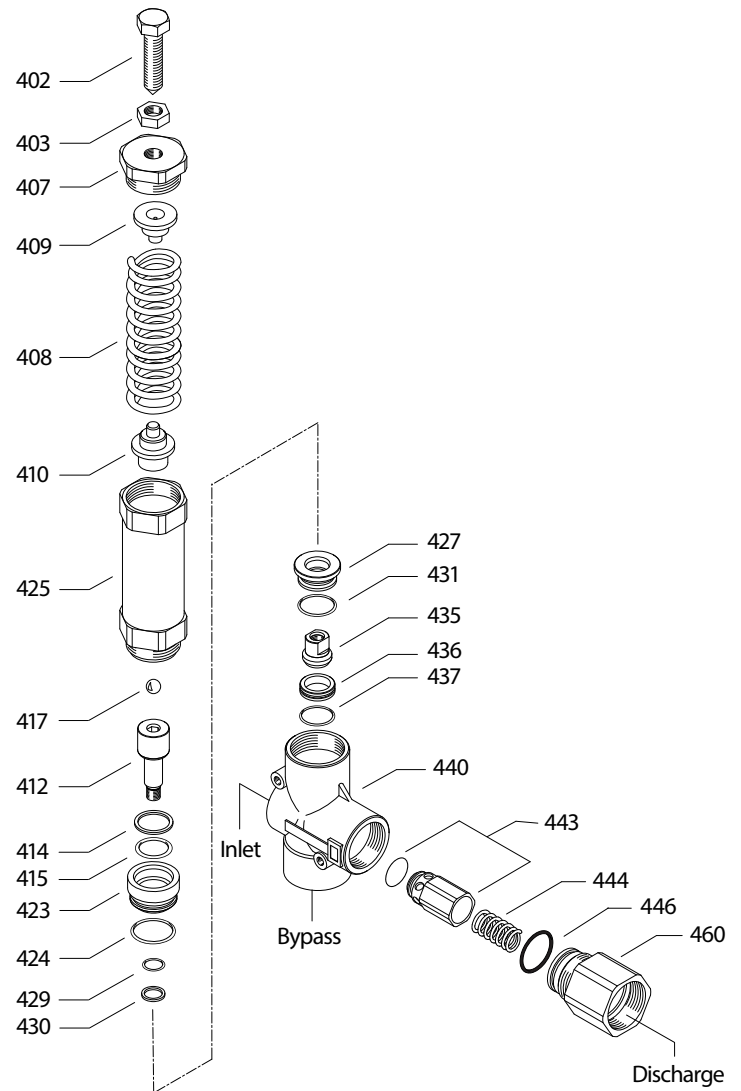
R Components comply with RoHS Directive.

MATERIAL CODES (Not Part of Part Number):

BB=Brass NBR=Medium Nitrile (Buna-N) S=304SS SS=316SS

SSS=416SS STL=Steel PTFE=Polytetrafluoroethylene

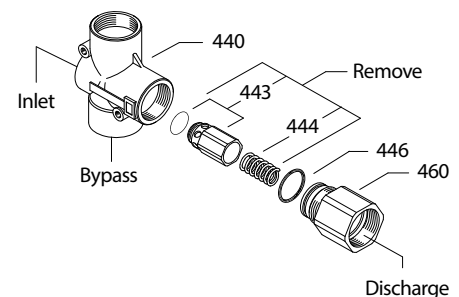
## EXPLODED VIEW



### REGULATING UNLOADER TO RELIEF VALVE CONVERSION

The 9950 Pressure-Sensitive Regulating Unloader is typically used as a primary pressure regulating device. It can be converted to a Relief Valve to be used as a secondary pressure relief device by removing the discharge check valve with O-ring, and spring.

| Unloader PN | Modifications            | Converted Relief Valve PN |
|-------------|--------------------------|---------------------------|
| 9950        | Remove parts<br>443, 444 | 9950.100 (NBR Seals)      |



### CAUTIONS AND WARNINGS

All high-pressure systems require a primary pressure regulating device (e.g. regulator, unloader) and a secondary pressure relief device (e.g. pop-off valve, relief valve). Failure to install such relief devices could result in personal injury or damage to pump or property. Cat Pumps does not assume any liability or responsibility for the operation of a customer's high-pressure system.

Read all CAUTIONS and WARNINGS before commencing service or operation of any high-pressure system. The CAUTIONS and WARNINGS are included in each Service Manual and with each Accessory Data sheet. CAUTIONS and WARNINGS can also be viewed online at [www.catpumps.com/dynamic-literature/cautions-and-warnings](http://www.catpumps.com/dynamic-literature/cautions-and-warnings) or can be requested directly from Cat Pumps.

### WARRANTY

View the Limited Warranty online at [www.catpumps.com/literature/cat-pumps-limited-warranty](http://www.catpumps.com/literature/cat-pumps-limited-warranty)