

# DATA SHEET

## PRESSURE SENSITIVE REGULATING UNLOADER




**Brass Model: 7581**



### SPECIFICATIONS

	U.S.	Metric
Flow Range	0.5–6.5 gpm	1.9–25 lpm
Pressure Range	230–2300 psi	15.8–158 bar
Maximum Temperature	160° F	71° C
Inlet Port	3/8" NPT(M)	3/8" NPT(M)
By-Pass Port	3/8" NPT(F)	3/8" NPT(F)
Outlet Port	3/8" NPT(M)	3/8" NPT(M)
Weight	14 oz	0.40 kg
Dimensions	3.0 x 1.0 x 4.25"	76 x 25 x 108 mm

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 setting and protection for single gun, non-weep and single pump installation.
- Compact size allows for easy installation.
- Pressure-sensitive feature provides wide range of flows and immediate pressure when gun opens.
- Adjusting cap permits easy adjustments of pressure.

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

### SELECTION

This is a pressure-sensitive regulating unloader, designed for systems with single or multiple pumps, solenoid (gate) valves, nozzles and standard guns. "Weep" guns are not recommended with this unloader.

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

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

**Notice:** Operation below the minimum flow of the unloader causes the unloader to cycle. Operation above the maximum flow of the unloader causes premature unloader wear, cycling and prevents attaining desired system pressure.

### INSTALLATION

This unloader operates properly when mounted in any direction, however, it is preferred to keep the plumbing to a minimum and the hex adjusting cap easily accessible. The best mounting location is directly onto the pump discharge manifold head.

The inlet connection is a  $\frac{3}{8}$ " NPT(M) sized port located on the back side of the unloader. The word INLET is cast into the body indicating the direction of flow through the valve. Liquid from the discharge of the pump goes through this connection.

The discharge connection is a  $\frac{3}{8}$ " NPT(M) sized port located on the front side (hex end). An arrow and the word OUT is cast into the body indicating the direction of flow. Plumbing for spray guns, solenoid (gate) valves or nozzles is connected here.

The bypass connection is a  $\frac{3}{8}$ " NPT(F) sized port located on the bottom. The word BY PASS is cast into the body. Bypass liquid is directed out of this port and can be routed to a reservoir (preferred method), or to a drain or pump inlet.

### OPERATION

This pressure-sensitive regulating unloader holds established system pressure in the discharge line when the trigger gun is closed 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 off the bypass and return to established system pressure without delay.

### PRESSURE ADJUSTMENT

1. Setting and adjusting the unloader pressure must be done with the system "on."
2. Start the system with unloader backed off to the lowest pressure setting (counterclockwise direction).
3. Squeeze the trigger and read the pressure on the gauge at the pump.  
**Note:** Do not read the pressure at the gun or nozzle.
4. If more pressure is desired, release the trigger, turn hex adjusting cap one quarter turn in clockwise direction.
5. Squeeze the trigger and read the pressure.
6. Repeat this process until desired system pressure is attained.
7. Once the desired system pressure is reached, stop turning the hex adjusting cap. Thread locking nut up to adjusting cap.

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

**Notice:** A minimum bypass flow of 5% of the unloader rated flow capacity is required for proper unloader performance. If the entire flow is directed through the nozzle (zero bypass), the "cushioning" feature of the bypass liquid is eliminated and the unloader may malfunction or wear prematurely.

8. If desired system pressure cannot be reached, review TROUBLESHOOTING chart.
9. When servicing existing systems, follow adjustment procedures as stated above for new unloaders.

**Note:** Do not adjust unloader pressure setting to compensate for a worn nozzle. Check the nozzle as part of the regular maintenance and replace if worn.

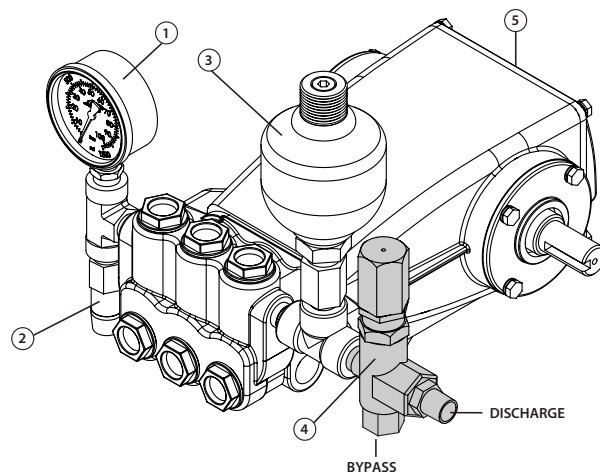
**Note:** A secondary pressure relief device (i.e. pop-off valve) should be used along with this pressure-sensitive regulating unloader. Final adjustment for the relief valve should relieve at 200 psi above the system operating pressure.

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

🔧 See page 4 for Relief Valve conversion.

### TYPICAL UNLOADER INSTALLATION

1. Pressure Gauge
2. Relief Valve  
Shown as a Secondary Relief Valve
3. Pulsation Dampener
4. Pressure Sensitive Regulating Unloader
5. Triplex Plunger Pump



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

### SERVICING

#### Disassembly

1. Disconnect bypass, discharge and inlet plumbing from unloader.
2. Remove unloader from pump.
3. Secure body of unloader in a vise with hex adjusting cap facing up.
4. Remove discharge fitting and O-ring, spring and check valve, with O-ring.
5. Examine check valve, collar and discharge fitting for wear, spring for wear or fatigue, and O-rings for cuts or wear. Replace as needed.

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

6. If supplied with a lock nut, the lock nut does not need to be removed. Turn lock nut down towards unloader body.
7. Remove hex adjusting cap by turning in a counterclockwise direction.
8. Remove spring and spring retainer.
9. Examine spring and spring retainer for scale build up, fatigue or wear and replace as needed.
10. Remove bypass fitting with O-ring from bottom port.
11. Remove seat with O-ring from the male threaded side of bypass fitting.
12. Examine seat for scale build-up, scoring and wear and replace as needed. Examine O-ring for cuts or wear and replace as needed.
13. Removal of piston stem and valve/ball assembly requires the use of a small hex socket and screwdriver. Insert screwdriver from the top and place in slotted head of piston stem. Insert small hex socket into bottom port and secure valve/ball assembly. Unthread by turning in a counterclockwise direction.
14. Examine piston stem and valve/ball assembly for scale build-up, scoring, pitting, and wear and replace as needed. Examine O-rings and backup ring for cuts or wear, and replace as needed.
15. Remove piston retainer with O-rings and backup rings by turning in a counterclockwise direction.
16. Examine piston retainer for wear. Examine O-rings and backup ring for cuts or wear and replace as needed.

#### Reassembly

1. Lubricate and install small body backup ring and then body O-ring into unloader body.
2. Lubricate and install O-ring over threads of piston retainer.
3. Carefully hand thread piston retainer with small diameter hole facing down into unloader body and tighten with a wrench.
4. Lubricate and install O-ring over piston stem head and then backup ring into groove of piston stem.
5. Apply Loctite® 242® to the last few threads of the piston stem.
6. Insert piston stem from the top through the piston retainer until seated.
7. Using the same tools in removing the piston stem and valve/ball assembly, place valve/ball assembly into hex socket tool with ball surface facing down into socket. Place screwdriver tip into piston stem slotted head. Thread piston stem into valve/ball assembly.
8. Place bypass fitting on flat surface with male threads facing up.
9. Lubricate and install O-ring onto seat. Press seat into bypass fitting. Hand thread bypass fitting into lower port of unloader body and tighten with wrench.
10. Lubricate and install O-ring on discharge fitting.
11. Insert spring into discharge fitting, then insert check valve with small step end into spring. Hand thread into unloader body and tighten with wrench.
12. Place spring retainer on top of piston stem.
13. Place spring on to spring retainer.
14. Thread hex adjusting cap onto piston retainer.
15. Remove unloader from vise.
16. Re-install unloader onto pump.
17. Reconnect bypass, discharge and inlet plumbing to unloader.
18. Proceed to PRESSURE ADJUSTMENT.

Loctite® and 242® are registered trademarks of the Henkel Corporation.

### TROUBLESHOOTING

Unloader cycles	<ul style="list-style-type: none"> <li>• Worn O-ring or check valve</li> <li>• Fitting leaking downstream</li> <li>• Air in system, poor connection</li> </ul>	<ul style="list-style-type: none"> <li>• O-ring in gun worn</li> <li>• Insufficient flow through unloader</li> </ul>
Liquid leaking from bottom	<ul style="list-style-type: none"> <li>• O-ring for seat or inlet fitting cut or worn</li> </ul>	<ul style="list-style-type: none"> <li>• O-ring for seat cut or worn</li> </ul>
Liquid leaking from middle	<ul style="list-style-type: none"> <li>• O-ring for piston cut or worn</li> </ul>	<ul style="list-style-type: none"> <li>• O-rings for piston stem cut or worn</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 stem O-rings worn</li> </ul>	<ul style="list-style-type: none"> <li>• Nozzle worn or too large</li> <li>• Insufficient flow to pump</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> </ul>	<ul style="list-style-type: none"> <li>• System flow exceeds unloader rating</li> </ul>
Filtration	<ul style="list-style-type: none"> <li>• Clean filter on regular schedule to avoid cavitation</li> </ul>	

### PRESSURE READING

Approximate Pressure Reading at Gauge	Gauge Between Pump/ Unloader	Gauge Between Unloader/ Gun-Nozzle- Valve
System in Operation (Gun Open)	System Pressure	System Pressure
System in Bypass (all guns, valves closed)	Low Pressure 0–150 psi	System Pressure +200 psi

## PARTS LIST

ITEM	P/N	MATL	DESCRIPTION	QTY.
401	32088	NY	Handle, Adjusting (Black)	1
402	33859	BB	Cap, Hex Adjusting	1
403	31047	BB	Nut, Lock	1
408	32094	STZP R	Spring, Pressure (Silver)	1
410	32819	STZP	Retainer, Spring	1
412	33118	S	Stem, Valve (M5)	1
414	—	PTFE	Backup Ring	1
415	—	NBR	O-Ring, Stem	1
425	39002	BB	Retainer, Valve	1
428	—	NBR	O-Ring, Valve Retainer	1
429	—	PTFE	O-Ring	1
430	—	PTFE	Backup Ring	1
435	34157	S	Valve and Ball Assembly (M5)	1
436	31853	NBR	Seat With O-Ring	1
440	—	FBB	Body	1
441	—	BB	O-Ring, Check Valve	1
442	—	NBR	O-Ring, Bypass Fitting	1
443	33158	BB	Valve, Check	1
444	39065	S	Spring	1
446	—	BB	O-Ring, Discharge Fitting	1
455	32123	BB	Fitting, Bypass [ $\frac{3}{8}$ " NPT(F)]	1
460	32122	BB	Fitting, Discharge [ $\frac{3}{8}$ " NPT(M)]	1
468	33156	NBR	Kit, O-Ring (Includes: 414, 415, 428, 429, 430, 437, 442, 446)	1

*Italics are optional items.*

R Components comply with RoHS Directive.

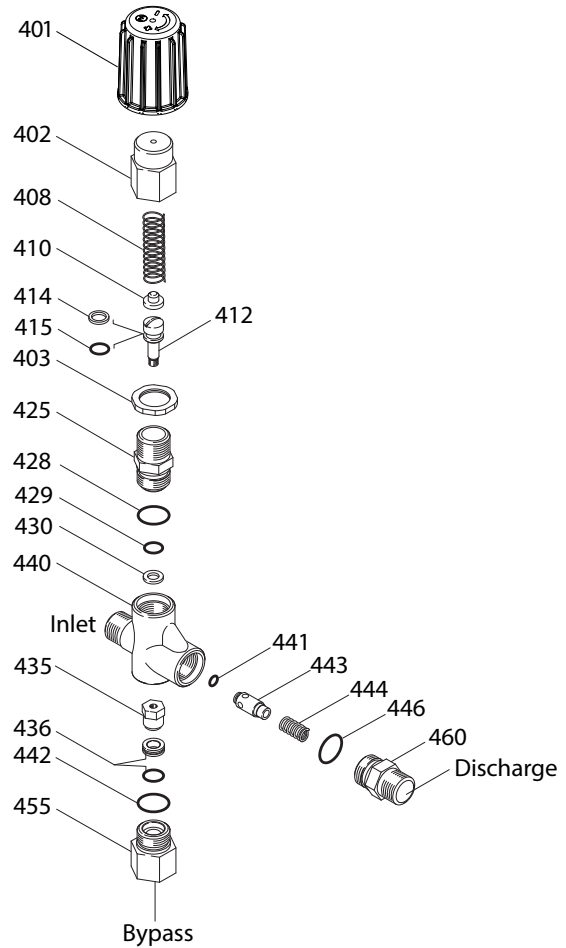
MATERIAL CODES (Not Part of Part Number):

BB=Brass FBB=Forged Brass NBR=Medium Nitrile (Buna-N)

NY=Nylon PTFE=Pure Polytetrafluoroethylene

STZP=Steel/Zinc Plated

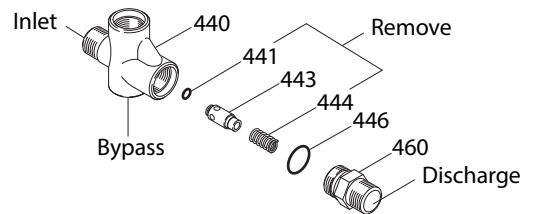
## EXPLODED VIEW



## REGULATING UNLOADER TO RELIEF VALVE CONVERSION

The 7581 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, O-ring and spring.

Unloader PN	Modifications	Converted Relief Valve PN
7581	Remove parts 441, 443, 444	7581.100 (NBR Seals)



### CAUTIONS AND WARNINGS

All high-pressure systems require a primary pressure regulating device (i.e. regulator, unloader) and a secondary pressure relief device (i.e. 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 on-line at [www.catpumps.com/literature/cat-pumps-limited-warranty](http://www.catpumps.com/literature/cat-pumps-limited-warranty)

**CAT PUMPS** 1681 94th Lane N.E., Minneapolis, MN 55449-4324 P: (763) 780-5440 F: (763) 780-2958 E: [techsupport@catpumps.com](mailto:techsupport@catpumps.com) [www.catpumps.com](http://www.catpumps.com)

©2021 Cat Pumps Inc. All rights reserved. All data contained in this document are based on the latest product information available at the time of publication. Cat Pumps reserves the right to make changes at any time without notice.