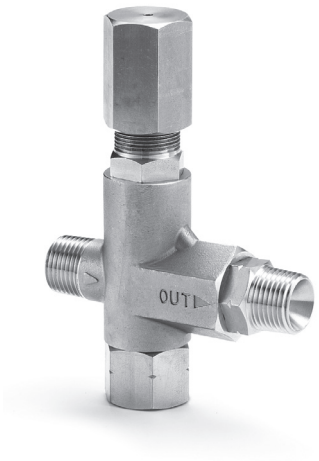
DATA SHEET

PRESSURE-SENSITIVE REGULATING UNLOADER

The Pumps with Nine Lives

Stainless Steel Model: **7501**



SPECIFICATIONS	U.S.	Metric
Flow Range	0.5–6.0 gpm	1.89–23.0 lpm
Pressure Range	100–2000 psi	6.9–138 bar
Maximum Temperatures:		
Standard Buna O-Rings	180° F	82° C
Optional FPM O-Rings	240° F	116° C
Inlet Port	⅜" NPT(M)	⅜" NPT(M)
Bypass Port	⅜" NPT(F)	⅜" NPT(F)
Outlet Port	⅜" NPT(M)	⅜" NPT(M)
Weight	13.6 oz	0.38 kg
Dimensions	3.0 x .94 x 4.23"	77 x 24 x 107 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 setting and protection for single gun (non-weep) and single pump installation.
- Remove check valve to use as a primary pressure control valve.
- 316SS construction for compatibility and corrosion resistance.
- Compact size with optional ports for easy installation.
- Pressure sensitive feature permits wide range of flows and immediate pressure when gun opens.
- Adjusting cap permits easy adjustments of pressure.

ALTERNATIVE O-RING CONFIGURATION

MATERIAL	SUFFIX CODE	MAXIMUM TEMPERATURE	
NBR	—	140° F	(60° C)
FPM	.0110	240° F	(115° C)

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, standard or weep guns.

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 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, 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 ⅜" NPT(M) sized port located on the back side of the unloader. An arrow 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 ⅜" 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 ⅜" NPT(F) sized port located on the bottom. Bypass liquid is directed out of this port and can be routed to a reservoir (preferred method), or to a drain or to the pump inlet.

OPERATION

This pressure-sensitive regulating unloader holds established system pressure in the discharge line when the trigger gun is closed, 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 flow to established system pressure without delay.

PRESSURE ADJUSTMENT

Setting the Primary Pressure Regulating Device

Note: Pressure is not set at the factory

1. Setting and adjusting the unloader pressure must be done with the system 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 hex adjusting cap 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 hex adjusting cap one quarter turn in clockwise direction.
6. Squeeze the trigger and read the pressure.
7. Repeat this process until desired system pressure is attained.
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.

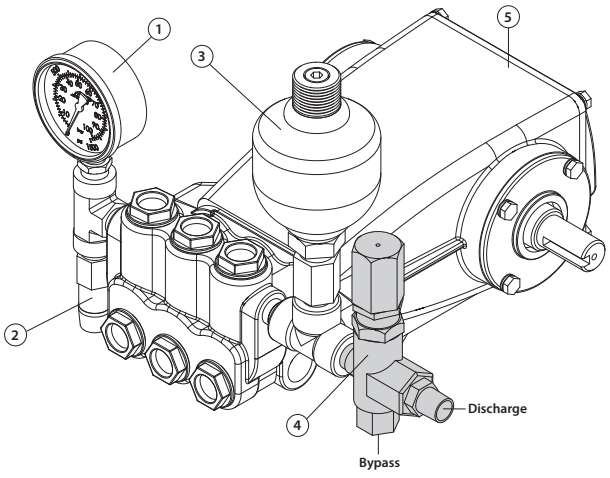
Note: A minimum of 5% of the flow-through the unloader should bypass for proper unloader performance. If the entire unloader flow pumps through the nozzle (zero-bypass), the valve may mistakenly be set for pressure higher than the desired pressure, causing a malfunction or premature wear.

Note: By removing the check valve and spring, this unloader can function as a primary pressure regulator.

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.

TYPICAL UNLOADER INSTALLATION

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



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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, check valve and O-ring.
5. Examine check valve and discharge fitting for wear, spring for wear or fatigue and O-rings for cuts or wear and 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. Remove hex adjusting cap by turning in a counterclockwise direction.
7. Remove spring and spring retainer.
8. Examine spring and spring retainer for scale build up, fatigue or wear and replace as needed.
9. Remove bypass fitting with O-ring from bottom port.
10. Remove seat with O-ring from the male threaded side of bypass fitting.
11. Examine seat for scale build up, scoring and wear and replace as needed. Examine O-ring for cuts or wear and replace as needed.
12. 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.
13. Examine piston stem and valve/ball assembly for scale build up, scoring, pitting and wear. Replace as needed. Examine O-rings and backup ring for cuts or wear and replace as needed.
14. Remove piston retainer with O-rings and backup rings by turning in a counterclockwise direction.
15. 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 filling, 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. Refer to PRESSURE ADJUSTMENT SECTION.

TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	SOLUTION
Unloader Cycling	• Unloader check valve or O-ring is worn	• Replace check valve or O-ring
	• Hose fittings are leaking downstream	• Tighten or replace fittings
	• Gun O-ring is worn and leaking	• Replace O-ring in gun
Leaking from bottom	• Seat O-ring or bypass fitting O-ring cut or worn	• Replace O-ring on seat or fitting
Adjusting unloader does not increase pressure:	• Piston or retainer O-rings worn or cut	• Replace piston or retainer O-ring
	• High-pressure nozzle is worn	• Replace nozzle
	• Adjusting cap turned completely in	• Back-off adjusting cap and reset
Extreme pressure spikes:	• Restricted bypass or no bypass	• Clean out or resize bypass line

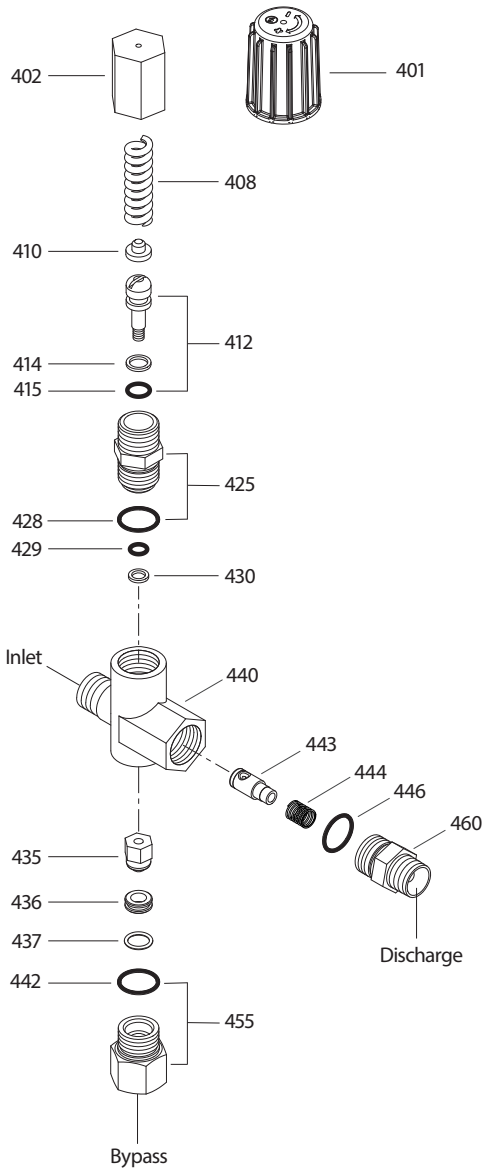
PARTS LIST

ITEM	P/N	MATL	DESCRIPTION	QTY
401	*32088*	*NY*	*Handle, Black*	*1*
402	546144	SS	Cap, Hex Adjusting	1
408	32094	STZP R	Spring, Pressure	1
410	546146	SS	Retainer, Spring	1
412	546149	SS	Stem, Piston with Backup Ring and NBR O-Ring	1
414	—	PTFE	Backup Ring, Piston Stem	1
415	—	NBR	O-Ring, Piston Stem	1
425	546147	SS	Retainer, Piston with NBR O-Ring	1
428	—	NBR	O-Ring, Piston Retainer	1
429	—	NBR	O-Ring, Stem	1
430	—	PTFE	Backup Ring, Body	1
435	546151	SSCC	Valve and Ball Assembly	1
436	546154	SS	Seat	1
437	—	NBR	O-Ring, Seat	1
440	—	SS	Body	1
442	—	NBR	O-Ring, Bypass Fitting	1
443	546158	SS	Valve, Check with NBR O-Ring	1
444	546160	SS	Spring, Check Valve	1
446	—	NBR	O-Ring, Discharge Fitting	1
455	546976	SS	Fitting, Bypass with O-Ring (⅜" NPT[F])	1
460	546979	SS	Fitting, Discharge (⅜" NPT[M])	1
468	*32097*	*NBR*	*Kit, O-Ring (Includes: 414, 415, 428–430, 437, 442, 446)*	*1*
	31627	*FPM*	*Kit, O-Ring (Includes: 414, 415, 428–430, 437, 442, 446)*	*1*

Italics are optional items.

R Components comply with RoHS Directive. MATERIAL CODES (Not Part of Part Number):
EPDM=Ethylene Propylene Diene Monomer FPM=Fluorocarbon
NBR=Medium Nitrile (Buna-N) NY=Nylon PTFE=Pure Polytetrafluoroethylene
SSCC=316SS/Ceramic SS=316SS STZP=Steel/Zinc Plated

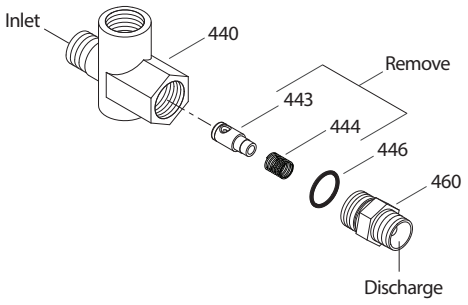
EXPLODED VIEW



REGULATING UNLOADER TO RELIEF VALVE CONVERSION

The 7501 Pressure-Sensitive Regulating Unloader is typically used as a primary pressure regulating device. They 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	
7501	Remove parts 443, 444	7501.100 (NBR Seals)	7501.1110 (FPM 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 or can be requested directly from Cat Pumps.

WARRANTY

View the Limited Warranty online at www.catpumps.com/literature/cat-pumps-limited-warranty

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