

# DATA SHEET

## MODULAR PRESSURE SENSITIVE UNLOADER



**Brass Model: 7850**



Use with Pump Series 3CP or 5CP  
(Except Models 5CP4120, 5CP6120, 5CP6180CSS and 5CP6190)

### FEATURES

- Provides system pressure setting and protection for single pump and non-weep gun installation.
- Built-in by-pass channel for safe low pressure by-pass when gun is shut off.
- Convenient flo-thru screws for easy direct mounting.
- Pressure sensitive feature permits immediate pressure when gun opens.
- Handle permits easy adjustments of pressure.

### SPECIFICATIONS

	U.S.	Metric
Flow Range	0.5 - 6.0 gpm	1.9 - 23 lpm
Pressure Range	100 - 4000 psi	6.9 - 275 bar
Max. Temperature	160° F	71° C
Inlet Port (1)	1/2" NPT(F)	1/2" NPT(F)
Outlet Port (1)	3/8" NPT(M)	3/8" NPT(M)
By-Pass Port	Built-in channel	Built-in channel
Weight	2.21 lbs.	1.00 kg
Dimensions	7.0 x 4.0 x 1.62"	178 x 101.6 x 41 mm

### SELECTION

This is a pressure sensitive regulating unloader. Designed for systems with a single pump, solenoid (gate) valve, nozzle and standard gun. "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.

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

### INSTALLATION

This pressure sensitive regulating unloader mount directly to the side inlet and discharge ports of the 3CP and 5CP plunger pumps. The unloader is held in place by one 1/2" NPT(M) flo-thru screw on the bottom and one 3/8" NPT(M) flo-thru screw at the top.

**Note:** There are two seal washers for each port size. One seal washer is mounted between pump manifold and unloader body and the other is located between unloader body and under the head of the flo-thru screw.

The inlet connection of this unloader has a 1/2" NPT(F) sized port and is located on the bottom. There is an arrow cast into the body indicating the direction of flow. The water supply is connected here.

The discharge connection of this unloader with the chemical injector installed is a 3/8" NPT(M) sized port. An arrow with the word OUT is cast into the body indicating the direction of flow. Without the chemical injector the unloader port size is M18. Plumbing for the spray gun, solenoid (gate) valve or nozzle is connected here.

There is no by-pass connection for this unloader; this unloader has a built-in channel for internal by-pass.

## 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 by-passing all unrequired flow. Squeezing the trigger gun or opening the solenoid (gate) valve will close off the by-pass 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 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 adjusting cap.
  8. Thread locking nut up to adjusting cap and tighten setscrew.

**Note:** Locking nut is not set at the factory.

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

9. If desired system pressure cannot be reached, review TROUBLESHOOTING chart.
10. When servicing existing systems, loosen setscrew and back locking nut away from adjusting cap.
11. 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.

## SERVICING

**CAUTION:** Before commencing with service, shut off drive (electric motor, gas or diesel engine) and turn off water supply to pump. Relieve all discharge line pressure by triggering gun or opening valve in discharge line.

## Disassembly

1. Disconnect inlet and discharge plumbing from unloader.
2. Remove unloader from pump by unthreading inlet and discharge flo-thru screws.
3. Remove black adjusting handle.
4. Loosen M4 set screw on locking nut and turn locking nut in a clockwise direction away from brass adjusting cap.
5. Remove brass adjusting cap by turning in a counterclockwise direction.
6. Remove locking nut.
7. Pull exposed spring and flat spring retainer from unloader body. Examine spring for fatigue or breaks and replace as needed.
8. Using a wrench, unthread piston retainer with o-ring from unloader body. Examine o-ring for cuts or wear and replace as needed.

**Note:** The piston stem and valve/ball assembly will either come out as one assembly when removing the piston retainer or will remain in unloader body.

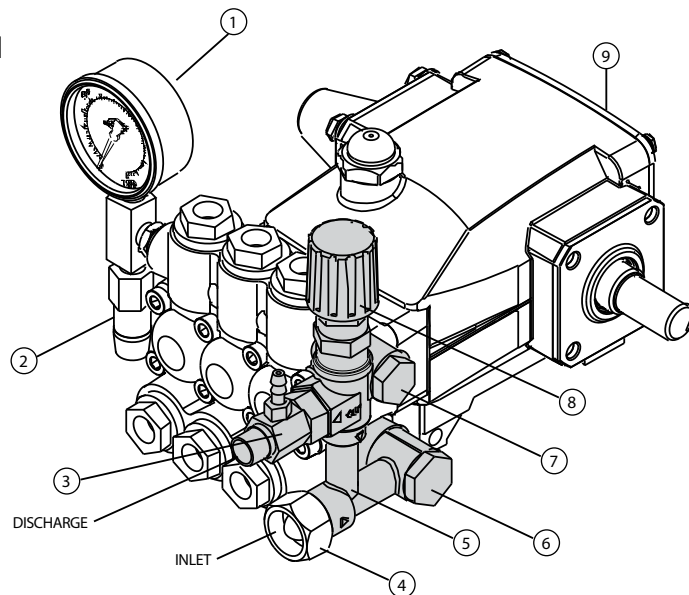
9. Unthread the piston stem from valve/ball assembly by securing valve/ball assembly with pliers and placing screwdriver into slotted head of piston stem. Remove washer and valve retainer with o-rings and back-up-rings.

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

10. Remove seat with attached o-ring from unloader body. Examine seat for grooves, pitting or wear and replace as needed. Examine o-ring for cuts or wear and replace as needed.
11. Unthread chemical injector from unloader body.
12. Remove o-ring, check valve with o-ring and spring. Examine check valve and spring for fatigue and wear and replace as needed. Examine o-rings for cuts or wear and replace as needed.

## TYPICAL PRESSURE CLEANING INSTALLATION 3CP or 5CP Plunger Pump

1. Pressure Gauge
2. Pop-off Valve
3. Fixed Chemical Injector
4. Garden Hose Fitting [3/4" GHF x 1/2" NPT(M)]
5. Pressure Sensitive Regulating Unloader
6. 1/2" NPT(M) Flo-Thru Screw
7. 3/8" NPT(M) Flo-Thru Screw
8. Black Pressure Adjusting Handle
9. Triplex Plunger Pump



## Reassembly

1. Before installing chemical injector, inspect sealing area where the check valve makes contact within the internal body of the unloader for grooves, pitting and wear. If unloader surface is damaged, stop the repair and discard unloader and install complete new unloader onto pump. If not, proceed with step 2.
2. Place spring on end of check valve without o-ring. Install assembly into chemical injector.
3. Apply Loctite® 609 to threads of chemical injector. Thread chemical injector into body of unloader.
4. Lubricate and press seat with o-ring into unloader body.
5. Lubricate and install o-ring over slotted head of piston stem, then position back-up-ring on top of o-ring.
6. Lubricate and install larger o-ring around outside diameter of valve retainer and smaller o-ring on the inside diameter of valve retainer. Install back-up-ring below o-ring on inside diameter of valve retainer.
7. Place washer, then valve retainer with o-rings onto piston stem. Apply Loctite® 242® to threads of piston stem and screw into valve/ball assembly.
8. Insert complete piston stem and valve/ball assembly into unloader chamber with valve/ball assembly facing down and slotted head of piston stem facing up.
9. Apply Loctite® 609 to threads of piston retainer and hand thread into unloader body. Then tighten with wrench.
10. Place flat spring retainer on top of piston stem head and then install spring.
11. Thread locking nut and brass adjusting cap onto retainer.
12. Reinstall M4 set screw, but do not tighten until system pressure is set.
13. Place black adjusting handle over brass adjusting cap.
14. Re-install unloader onto pump by using 3/8" and 1/2" flo-thru screws and seal washers.
15. Reconnect inlet and discharge plumbing to unloader.
16. Proceed to PRESSURE ADJUSTMENT to set system pressure.

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

## 7345 CHEMICAL INJECTOR PERFORMANCE CHART

Unloader Model	Desired Pump Flow	Injector Orifice Size	Maximum Injecting Pressure	Maximum Chemical Draw	Pressure Drop Across Injector at System Pressure (4000 PSI)
7850	3.0	2.1	190 psi	70.0 oz/min	136 psi
7850	3.5	2.1	260 psi	74.2 oz/min	245 psi
7850	4.0	2.1	358 psi	76.8 oz/min	288 psi

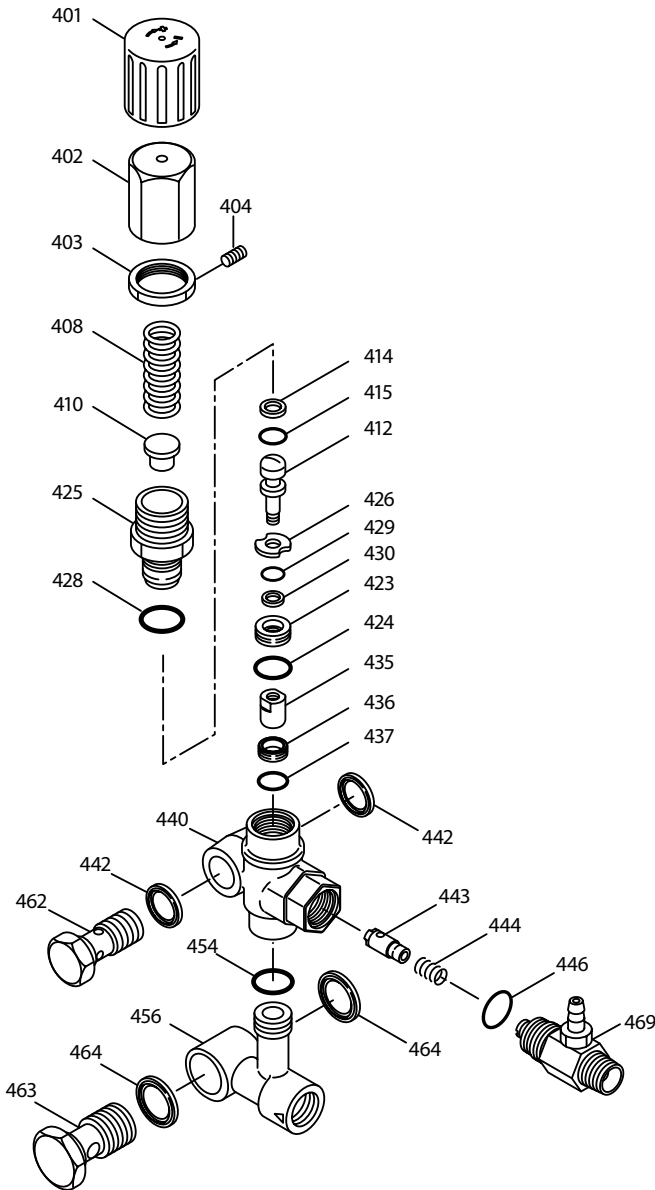
Optimum performance of chemical injector occurs with a 35 ft. high pressure hose and a minimum 3/8" I.D. The type of hose, extended lengths, reduced I.D. and fittings may create back pressures in excess of the low pressure nozzle rating and prevent the injector from drawing chemical. See Hose Friction Loss Chart in Service Manual. **Deduct hose friction loss from above low PSI Nozzle. Consult Cat Pumps for assistance with other options.**

**CAUTION:** Deduct the pressure drop shown in the performance chart from your desired system pressure to arrive at the maximum high pressure nozzle rating. This is essential to avoid over-pressurizing the pump.

## TROUBLE SHOOTING

Unloader cycles	<ul style="list-style-type: none"> <li>• Worn O-Ring or check valve</li> <li>• Fitting leaking downstream</li> <li>• O-Ring in gun worn</li> </ul>
Liquid leaking from bottom	<ul style="list-style-type: none"> <li>• O-Ring for seat or inlet fitting seal washer cut or worn</li> </ul>
Unloader will not come up to pressure	<ul style="list-style-type: none"> <li>• Unloader not properly sized for system</li> <li>• Foreign material in unloader</li> <li>• Piston or retainer o-rings worn or cut</li> <li>• Nozzle worn</li> <li>• Nozzle not properly sized for system</li> </ul>
Extreme pressure spikes	<ul style="list-style-type: none"> <li>• Adjusting cap turned completely into unloader</li> <li>• Restricted by-pass or no by-pass</li> <li>• System flow exceeds unloader rating</li> <li>• Locking nut not properly set</li> </ul>

## EXPLODED VIEW



## PARTS LIST

ITEM	P/N	MATL	DESCRIPTION	QTY
401	49100	NY	Handle, Adjusting (Black)	1
402	49099	BB	Cap, Adjusting	1
403	125521	BB	Nut, Locking (M25x1)	1
404	88953	S	Screw, Set (M4x4)	1
408	45198	ZP	Spring, Pressure	1
410	49101	STZP R	Retainer, Spring	1
412	49103	S	Stem, Piston	1
414	—	PTFE	Back-up-Ring, Piston Stem	1
415	—	NBR	O-Ring, Piston Stem - 90D	1
423	49105	BB	Retainer, Valve	1
424	—	NBR	O-Ring, Valve Retainer - 70D	1
425	49102	BB	Retainer, Piston	1
426	49107	S	Washer	1
428	—	NBR	O-Ring, Piston Retainer - 80D	1
429	—	NBR	O-Ring, Valve Retainer - 70D	1
430	—	D	Back-up-Ring, Valve Retainer	1
435	76108	S	Valve/Ball Assembly	1
436	49257	S	Seat	1
437	—	NBR	O-Ring, Seat - 70D	1
440	—	FBB	Body	1
442	49121	STL	Washer, Seal (3/8")	2
443	49245	BB	Valve, Check w/NBR O-Ring	1
444	117275	S	Spring, Check Valve	1
446	—	NBR	O-Ring, Body - 80D	1
454	—	NBR	O-Ring, Manifold - 70D	1
456	—	BB	Manifold, Lower Body	1
460	126724	BB	Fitting, Discharge [3/8" NPT(F)] Not Shown	1
462	49120	BB	Screw, Flo-Thru [3/8" NPT(M)]	1
463	49117	BB	Screw, Flo-Thru [1/2" NPT(M)]	1
464	49118	STL	Washer, Seal (1/2")	2
468	31708	NBR	Kit, O-Ring (Incls: 414, 415, 424, 428, 429, 430, 437, 446, 454)	1
469	7345	BB	Injector, Chemical Fixed (M18x1)	1

*Italics are optional items.* R Components comply with RoHS Directive.  
 MATERIAL CODES (Not Part of Part Number): BB=Brass D=Acetal  
 FBB=Forged Brass NBR=Medium Nitrile (Buna-N) NY=Nylon  
 PTFE=Pure Polytetrafluoroethylene S=304SS STL=Steel  
 STZP=Steel/Zinc Plated ZP=Zinc Plated

### ⚠ 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/cautions-warnings](http://www.catpumps.com/cautions-warnings) or can be requested directly from Cat Pumps.

### WARRANTY

View the Limited Warranty on-line at [www.catpumps.com/warranty](http://www.catpumps.com/warranty).



### CAT PUMPS

1681 - 94TH LANE N.E. MINNEAPOLIS, MN 55449-4324  
 PHONE (763) 780-5440 — FAX (763) 780-2958  
 e-mail: [techsupport@catpumps.com](mailto:techsupport@catpumps.com)  
[www.catpumps.com](http://www.catpumps.com)