



**Pressure Sensitive  
Multiple Gun  
Regulating Unloader**

**Model 7590**

**FEATURES**

- Maintains full system pressure while running in by-pass without full load on pump.
- Offers pump protection against pressure fluctuations and system changes.
- Minimum pressure fluctuations with alternating use of multiple guns.
- Easy external pressure adjustment with locking nut to prevent over pressure.
- Lightweight flow through design for compact installation.

**SPECIFICATIONS**

	U.S. Measure	Metric Measure
Flow Range.....	10-52 GPM	(38-200 L/M)
Pressure Range .....	400-2175 PSI	(30-150 BAR)
Inlet Port (Flush Back) .....	1" NPTF	(1" NPTF)
Outlet Port (Extended Front) .....	1" NPTF	(1" NPTF)
By-Pass Port (Flush Bottom) .....	1" NPTF	(1" NPTF)
Max. Operating Temperature .....	194°F	(90°C)
Dimensions .....	8.50" x 5.15" x 1.77"	(216 x 131 x 45 mm)
Weight .....	7.69 lbs.	(1.31 Kg)

*“Customer confidence is our greatest asset”*

**SELECTION:** This is a pressure sensitive **regulating unloader**. It is designed for systems with **single or multiple pumps, solenoid (gate) valves, nozzles, standard or “weep” guns.**

This unloader maintains established system pressure even when only one of several guns (nozzles) or solenoid (gate) valves is open or a nozzle is clogged, by-passing the unrequired flow. It returns to established system pressure without delay upon squeezing the trigger gun(s) or opening the solenoid (gate) valve(s).

Select the specific model of unloader to meet both the desired system flow (combined nozzle flow rate requirement) and the desired system pressure.

**CAUTION**

When operating multiple guns, be certain to establish a minimum of 10 GPM per gun to avoid cycling of the unloader.

Exercise caution when matching the system requirements to the unloader flow capacity and pressure rating. Operation below the minimum flow of the unloader causes the unloader to cycle. Operation beyond the rated unloader flow causes premature valve wear, unloader cycling and prevents attaining desired system pressure.

Select a high pressure nozzle sized to provide for both the desired **system flow** and pressure and **unloader by-pass**. A **MINIMUM BY-PASS FLOW** of 5% of the **UNLOADER RATED FLOW CAPACITY** is required for proper unloader performance.

When properly set, this unloader protects the pump from pressure extremes associated with obstructions in the discharge line, while maintaining the established system pressure. When no flow is required by the system, the unloader by-passes all the system flow and relieves the load on the pump. Pressure is held in the discharge line [between the unloader and gun(s) or solenoid valve(s)] ready for a quick return to high pressure operation.

**INSTALLATION:** This unloader operates properly when mounted in any direction, however, it is preferred to keep the plumbing to a minimum and the adjusting nut easily accessible. The best location is directly on the pump discharge manifold head. Plumbing to and from the unloader should be at least the size of the unloader ports and flexible, high pressure hose (minimum single wire braid) is required.

This is a flow through design unloader. The standard **inlet connection** of this unloader is located at the **back**. This unloader can be mounted directly in the discharge line.

The **by-pass connection** is on the **bottom** of the unloader and can be plumbed in one of the following methods. Note that prolonged by-pass can result in significant heat build-up and frequent by-pass can result in premature wear to the valve. A **MINIMUM BY-PASS OF 5%** is necessary for the unloader to operate properly.

**CAUTION**

If the entire output is directed through the unloader (zero by-pass) the “cushioning” feature of the by-pass fluid is eliminated and the unloader can malfunction or wear prematurely.

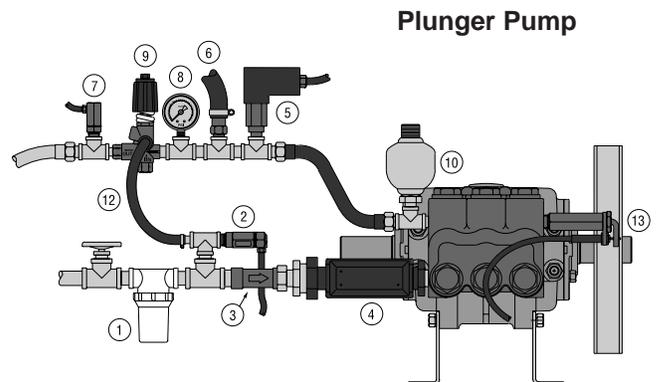
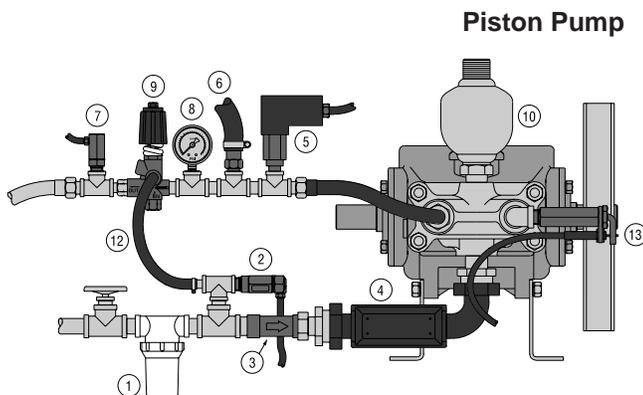
Check the amount of by-pass by disconnecting the by-pass line and measuring the flow into a graduated container.

**By-Pass to Reservoir:** Ideally the by-pass line should be directed to a reservoir with at least one baffle between the supply line to the pump (from the reservoir) and the return by-pass line (from the unloader into the reservoir). This baffle minimizes turbulence and air bubbles that could enter the pump inlet feed line. **The reservoir capacity should be 6 to 10 times the rated system flow per minute.**

**By-Pass to Pump Inlet:** Although not recommended, by-pass fluid can be returned to the inlet line of the pump or directly to a pump inlet port (**systems up to 10 GPM**). When using this method an *Inlet Pressure Regulator* should be installed on the inlet line to avoid excessive inlet pressure. Be certain the *Inlet Pressure Regulator* is **between** the pump inlet and the by-pass line connection. When using this method, a *Thermo Valve* should be installed in the by-pass line to protect the pump from temperature build-up and premature seal failure.

The by-pass line should be **connected to the pump inlet line at a gentle angle of 45° or less and no closer than 10 times the pump inlet port diameter** e.g. 1-1/2" port size = 15" distance from pump inlet port. **Refer to Technical Bulletin 64 for additional information on the size and length of the by-pass line.**

**TYPICAL INSTALLATION**



**By-Pass to Drain:** If the by-pass is limited and infrequent, the by-pass can easily drain to an unpressurized drain line (to the ground).

The **outlet connection** is located at the **front** of the unloader and marked with an arrow. Plumbing for the spray gun(s), nozzle(s) or solenoid valve(s) should be connected in line from this discharge port.

It is recommended that a secondary protective device such as a *CAT PUMP Pop-Off Valve* be installed to assure pump protection should the unloader malfunction. Refer to Troubleshooting for more information on malfunction of unloader.

Preferred mounting of the *Prrrrr-o-lator* (pulsation dampener) is directly **on the Discharge Manifold Head**. When using an *Inlet Pressure Regulator*, mount the *Prrrrr-o-lator* **downstream from the unloader** to assure optimum performance of the regulator.

**CAUTION**

Oversizing the *Prrrrr-o-lator* may cause delayed response from the unloader.

**PRESSURE ADJUSTMENT:** Setting and adjusting the unloader pressure must be done with the system "on". Start the system with the unloader backed off to the **lowest pressure** setting. Squeeze the trigger and read the pressure on the gauge at the pump. If more pressure is desired, release the trigger, turn adjusting nut one quarter turn, squeeze the trigger and read the pressure. Repeat this process until desired pressure is attained. Pressure fluctuation from this established system pressure is minimal with the opening of each additional gun.

Monitor the by-pass flow at each adjustment. If the by-pass flow, with all guns or valves open, drops below 5% of rated unloader flow, STOP ADJUSTMENT. The nozzle(s) selection is improperly sized to achieve the desired system pressure.

Proceed by accepting the attained pressure OR selecting a smaller or fewer nozzles OR increasing the pump RPM providing you stay within specifications OR selecting a larger pump or dual pumps.

Once the desired system pressure is reached, stop adjusting and set the top locking nut to hold the system pressure. **Do not read the pressure at the gun or nozzle for setting system pressure.** Check the nozzle(s) as part of regular maintenance and replace if worn. **Do not adjust unloader pressure setting to compensate for worn nozzle.**

- |   |                               |
|---|-------------------------------|
| 1 Inlet Filter                                | 7 Quick Start Valve           |
| 2 Thermo Valve                                | 8 Pressure Gauge              |
| 3 Inlet Pressure Regulator                    | 9 Pressure Regulator/Unloader |
| 4 C. A.T. Tube<br>(Captive Acceleration Tube) | 10 Pulsation Dampener★        |
| 5 Pressure Switch                             | 11 Chemical Injector          |
| 6 Pop-Off Valve                               | 12 By-pass Hose               |
|   | 13 Throttle Controller        |

★ Preferred mounting of Pulsation Dampener [Prrrrr-O-Lator] is directly on the discharge manifold of the pump. The preferred mounting of the by-pass hose [when returning to the inlet] is before the Pressure Reducing Valve. If this is not possible, then mount the Prrrrr-O-Lator after the Pressure Unloading Valve to prevent pressure spikes to the pump inlet.

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 by-pass (all guns, valves closed)	low pressure 0-150 PSI	system pressure +200 PSI

**TROUBLESHOOTING**

Unloader cycles	<ul style="list-style-type: none"> <li>● Check for leak downstream of unloader.</li> <li>● Worn O-ring or check valve.</li> <li>● Air in system, poor connection.</li> <li>● O-ring in gun worn.</li> <li>● Insufficient flow through unloader.</li> </ul>
Fluid leaking from bottom fitting	<ul style="list-style-type: none"> <li>● O-ring for fitting cut or worn.</li> <li>● O-ring for seat cut or worn.</li> </ul>
Fluid leaking from middle	<ul style="list-style-type: none"> <li>● O-ring for piston worn or cut.</li> <li>● O-rings for piston stem 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. Clean filter.</li> <li>● Piston stem o-rings worn.</li> <li>● Nozzle worn.</li> <li>● Insufficient flow to pump.</li> </ul>
Extreme pressure spikes	<ul style="list-style-type: none"> <li>● Adjusting nut turned completely into unloader.</li> <li>● Restricted by-pass or no by-pass.</li> <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>

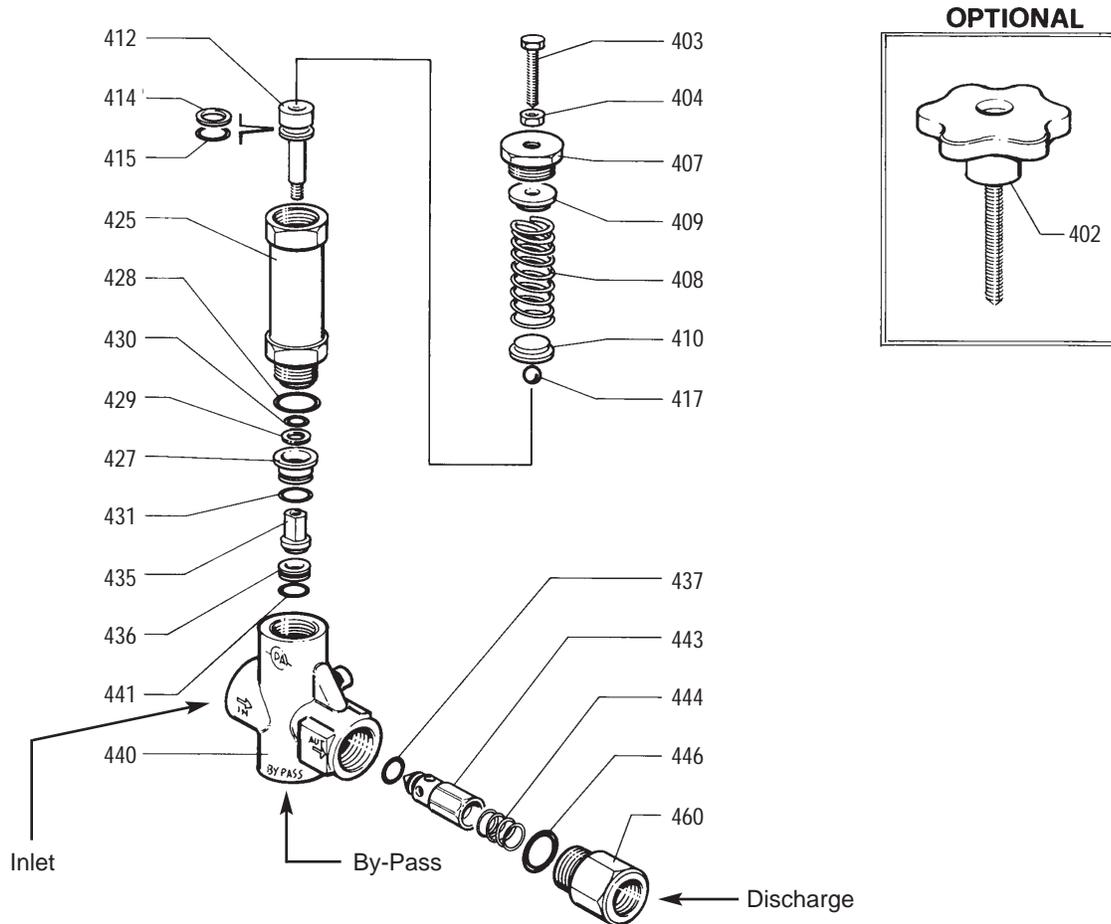
**WARRANTY**

**90 Day Warranty**

Refer to complete Cat Pump Warranty for further information.

These illustrations show the basic elements for a typical installation of a high pressure piston or plunger pump. **Not all components shown are required for all applications or systems.** Each component presents potential problems that too often are ascribed to a perfectly functioning pump, such as: a clogged strainer, a partially closed shut-off valve, a faulty gauge, or a malfunctioning regulator/unloader. Proper system installation, routine lubrication, monitoring and maintenance of components are your basic guarantees of optimum pump performance. CAT PUMPS does not assume any liability or responsibility for the design or operation of a customer's high pressure system.

## EXPLODED VIEW



## PARTS LIST

ITEM	PN	MATL	DESCRIPTION	QTY	ITEM	PN	MATL	DESCRIPTION	QTY
402	33089	—	Handle, Adjusting	1	429	39064	NBR	O-Ring, Valve	1
403	39061	STZP	Screw, Adjusting (M10x42)	1	430	33595	PTFE	Back-up-Ring, Valve	1
404	32838	STZP	Nut, Hex Locking (M10)	1	431	33578	NBR	O-Ring, Piston Retainer	1
407	39062	BB	Cap, Retainer	1	435	32774	S	Valve	1
408	39016	STL	Spring (Silver)	1	436	32775	S	Seat	1
409	32781	BB	Guide, Spring, Upper	1	437	33584	NBR	O-Ring, Check Valve	1
410	32778	BB	Guide, Spring, Lower	1	440	—	BB	Body, Lower	1
412	32776	S	Piston	1	441	32926	NBR	O-Ring, Seat	1
414	39063	PTFE	Back-up-Ring, Piston	1	443	32779	BB	Valve, Check	1
415	33581	NBR	O-Ring, Piston	1	444	32782	S	Spring	1
417	31075	S	Ball	1	446	33579	NBR	O-Ring, Discharge Fitting	1
425	—	BB	Body, Upper	1	460	32780	BB	Fitting, Discharge (1" NPTF)	1
427	32777	BB	Retainer, Piston	1	468	32773	NBR	Kit, O-Ring	1
428	33579	NBR	O-Ring, Piston Retainer	2				(Incls: 414, 415, 428, 429, 430, 431, 437, 441)	

*Italics are optional items.*

MATERIAL CODES (Not Part of Part Number): BB=Brass NBR=Medium Nitrile (Buna-N)  
PTFE=Polytetrafluoroethylene (Teflon®) S=304SS STL=Steel STZP=Steel/Zinc Plated

Products described hereon are covered by one or more of the following U.S. patents 3558244, 3652188, 3809508, 3920356, 3930756 and 5035580

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### World Headquarters

#### CAT PUMPS

1681 - 94th Lane N.E. Minneapolis, MN 55449-4324

Phone (612) 780-5440 — FAX (612) 780-2958

e-mail: sales@catpumps.com

www.catpumps.com

### International Inquiries

FAX (612) 785-4443

e-mail: intlsales@catpumps.com



The Pump with "Nine Lives"

### CAT PUMPS (U.K.) LTD.

1 Fleet Business Park, Sandy Lane, Church Crookham, Fleet

Hampshire GU13 0BF, England

Phone Fleet 44 1252-622031 — Fax 44 1252-626655

### N.V. CAT PUMPS INTERNATIONAL S.A.

Heveldekens 6A, 2550 Kontich, Belgium

Phone 32-3-450.71.50 — Fax 32-3-450.71.51

e-mail: cpi@catpumps.be

### CAT PUMPS DEUTSCHLAND GmbH

Buchwiese 2, D-65510 Idstein, Germany

Phone 49 6126-93030 — Fax 49 6126-930333

e-mail: catpumps@t-online.de