



## Pressure Regulator

**Models** 7001 - 7003  
7011 - 7014  
7021 - 7023  
7028 - 7033



7021-7033      7001-7003      7011-7014

### FEATURES

- Lightweight flow-through design for easy installation.
- Unique high velocity design assures consistent pressure for multiple pump or shut-off gun installations.
- All metal wear parts are stainless steel; all elastomers are FPM for durability.
- Adjusting nut allows easy calibrated pressure adjustment.
- Multiple regulators can be installed in parallel to handle larger volumes.
- No external moving parts or springs.

### SPECIFICATIONS

	U.S. Measure	Metric Measure
<b>MODELS 7001, 7002, 7003</b>		
Flow Range .....	0.5-5.0 GPM	(2-19 L/M)
Pressure Range (7001) .....	100-1000 PSI	(7-70 BAR)
(7002) .....	500-2000 PSI	(35-140 BAR)
(7003) .....	1500-3000 PSI	(105-210 BAR)
Inlet/Outlet Port .....	3/8" NPT	(3/8" NPT)
By-Pass Port .....	1/2" NPT	(1/2" NPT)
Weight .....	2.25 lbs.	(1.02 kg)
Dimensions .....	6.25 x 1.5"	(159 x 38 mm)
<b>MODELS 7011, 7012, 7013, 7014</b>		
Flow Range .....	1.0-10.0 GPM	(4-38 L/M)
Pressure Range (7011) .....	100-1000 PSI	(7-70 BAR)
(7012) .....	500-2000 PSI	(35-140 BAR)
(7013) .....	1500-3000 PSI	(105-210 BAR)
(7014) .....	2000-4000 PSI	(140-280 BAR)
Inlet/Outlet Port .....	1/2" NPT	(1/2" NPT)
By-Pass Port .....	3/4" NPT	(3/4" NPT)
Weight .....	3.75 lbs.	(1.70 kg)
Dimensions .....	7.5 x 1.88"	(191 x 48 mm)
<b>MODELS 7021, 7022, 7023</b>		
Flow Range .....	2.5-25.0 GPM	(10-95 L/M)
Pressure Range (7021) .....	100-1000 PSI	(7-70 BAR)
(7022) .....	500-2000 PSI	(35-140 BAR)
(7023) .....	1500-3000 PSI	(105-210 BAR)
Inlet/Outlet Port .....	3/4" NPT	(3/4" NPT)
By-Pass Port .....	1" NPT	(1" NPT)
Weight .....	5.0 lbs.	(2.40 kg)
Dimensions .....	8.5 x 2.25"	(216 x 57 mm)
<b>MODELS 7028, 7031, 7032, 7033</b>		
Flow Range .....	3.5-35 GPM	(13-133 L/M)
Pressure Range (7028) .....	250-800 PSI	(18-55 BAR)
(7031) .....	700-1000 PSI	(7-70 BAR)
(7032) .....	1000-2000 PSI	(70-140 BAR)
(7033) .....	1500-3000 PSI	(105-210 BAR)
Maximum Temperature .....	180°F	(82°C)
Inlet/Outlet Port .....	3/4" NPT	(3/4" NPT)
By-Pass Port .....	1" NPT	(1" NPT)
Weight .....	5.5 lbs.	(2.50 kg)
Dimensions .....	8.5 x 2.25"	(216 x 57 mm)

*"Customer confidence is our greatest asset"*

**SELECTION:** This **Pressure Regulator** is designed for systems with **single or multiple** pumps, solenoid (gate) valves, nozzles, standard or “weep” guns.

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

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

Select a high pressure nozzle sized to provide for both the desired **system flow** and pressure and **regulator by-pass**.

#### CAUTION

A MINIMUM BY-PASS FLOW of 10% of the REGULATOR RATED FLOW CAPACITY is required for proper regulator performance.

When properly set this regulator 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 regulator by-passes all the system flow. Pressure is held in the discharge line [between the pump and gun(s) or solenoid valve(s)] ready for a quick return to high pressure operation.

**INSTALLATION:** This regulator 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 regulator should be at least the size of the regulator ports and flexible, high pressure hose (minimum single wire braid) is required.

This is a flow through design Regulator. The standard **inlet and discharge connections** of this regulator are located at front and rear of the center body with an arrow indicating the direction of flow. The regulator can be mounted directly in the discharge line.

#### CAUTION

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

The **by-pass connection** is on the **bottom** of the regulator 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 10%** is necessary for the regulator to operate properly.

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

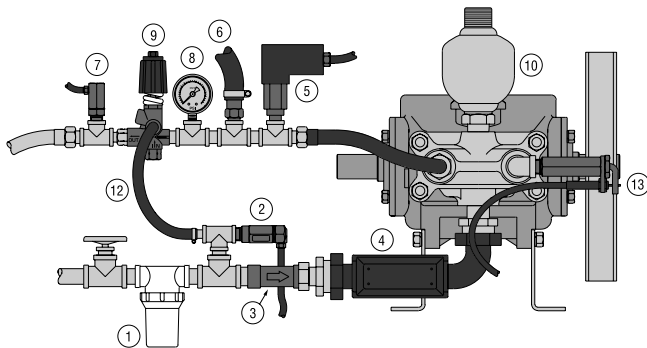
**By-Pass to Reservoir:** Ideally the by-pass line should be directed to a reservoir with at least one baffle between the supply line to the pump (from the reservoir) and the return by-pass line (from the regulator into the reservoir). This baffle minimizes turbulence and air bubbles that could enter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

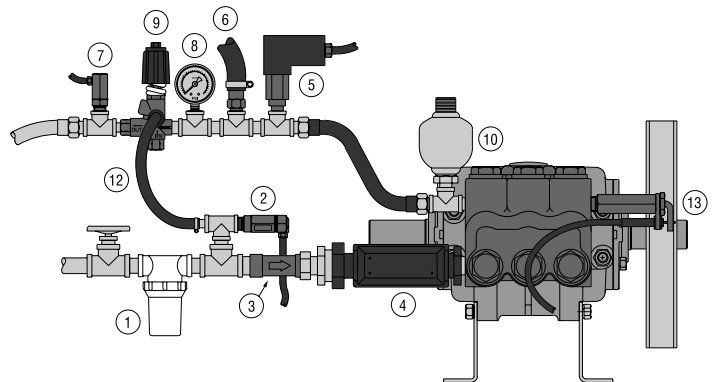
The by-pass line should be **connected to the pump inlet line at a gentle angle of 45° or less and no closer than 10 times the pump inlet port diameter** e.g. 1-1/2" port size = 15" distance from pump inlet port. **Refer to Technical Bulletin 64 for additional information on the size and length of the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

## TYPICAL INSTALLATION

Piston Pump



Plunger Pump



**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).

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

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

**CAUTION**

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

**PRESSURE ADJUSTMENT:** Setting and adjusting the regulator pressure must be done with the system “on”. Start the system with the regulator 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 10% of rated regulator 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 the top adjusting nut. **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 regulator pressure setting to compensate for worn nozzle(s).**

Approximate Pressure Reading at Gauge	Gauge Between Pump/Regulator	Gauge Between Regulator/Gun-Nozz-Valve
System in operation (gun open)	system pressure	system pressure
System in by-pass (gun closed)	system pressure	system pressure

**TROUBLESHOOTING**

Cycling/Chattering	<ul style="list-style-type: none"> <li>● Too little flow for valve specifications.</li> <li>● Air in system, poor connections.</li> <li>● Inlet seals in pump worn.</li> <li>● O-ring in gun worn.</li> </ul>
System will not build up to pressure	<ul style="list-style-type: none"> <li>● Nozzle worn.</li> <li>● Improper nozzle size for system specs.</li> <li>● Foreign material trapped in seat.</li> </ul>
Pressure drop	<ul style="list-style-type: none"> <li>● Nozzles worn.</li> <li>● Piston and seat in regulator worn.</li> <li>● Air in system, poor connections.</li> <li>● Insufficient flow to pump.</li> <li>● Filter clogged. Check and clean regularly.</li> </ul>
Pressure spikes while in by-pass	<ul style="list-style-type: none"> <li>● Minimum by-pass of 10% not present.</li> <li>● Excessive pressure adjustment made for worn nozzle. REPLACE NOZZLE. Reset system pressure.</li> </ul>
Leakage from regulator vent hole	<ul style="list-style-type: none"> <li>● O-ring around piston worn. Replace.</li> <li>● Piston Retainer scored. Replace.</li> </ul>

**WARRANTY**

**90 Day Warranty**

Refer to complete Cat Pump Warranty for further information.

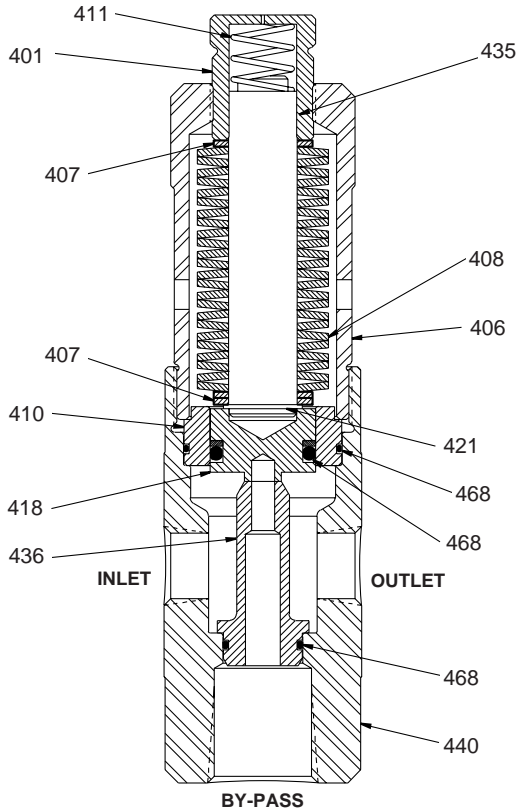
- |   |                               |
|---|-------------------------------|
| 1 Inlet Filter                                | 7 Quick Start Valve           |
| 2 Thermo Valve                                | 8 Pressure Gauge              |
| 3 Inlet Pressure Regulator                    | 9 Pressure 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 Internal By-pass           |
|   | 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.

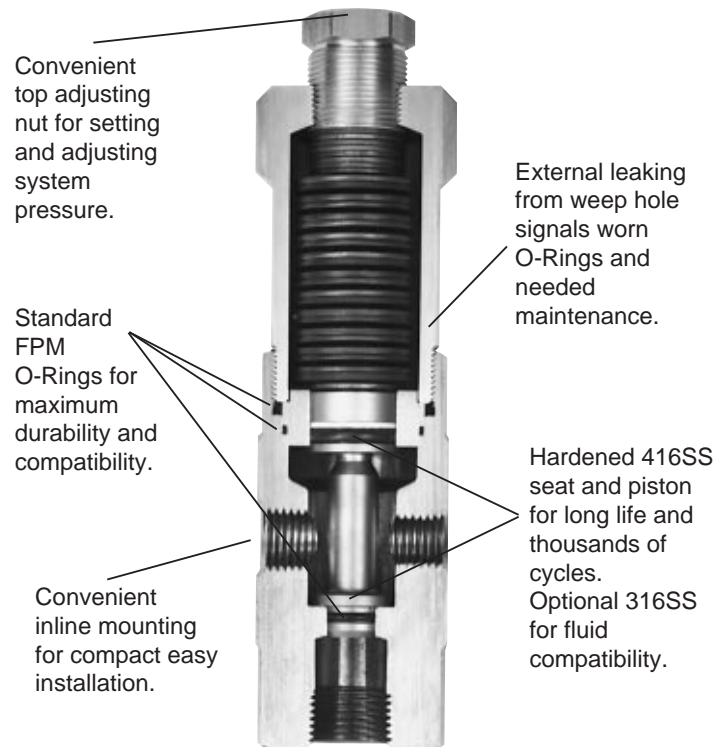
These illustrations show the basic elements for a typical installation of a high pressure piston or plunger pump. **Not all components shown are required for all applications or systems.** Each component presents potential problems that too often are ascribed to a perfectly functioning pump, such as: 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

(Models 7001, 7002, 7003 shown)



## CUTAWAY



## PARTS LIST

Item	Description	MATL	7001	7002	7003	7011	7012	7013	7014	7021	7022	7023	7028	7031	7032	7033
401	Nut, Adjusting	BB	30758	30758	30758	30759	30759	30759	33878	30760	30760	30760	30760	30760	30760	30760
406	Body, Upper	BBNP	—	—	—	—	—	—	—	—	—	—	—	—	—	—
407	Washer	STL	30899 (4)	30899 (6)	30899 (2)	30904 (9)★	30904 (3)★	30904 (2)	30904 (1)	30906 (2)	30906 (2)	30906 (2)	30906 (2)	30906 (2)	30906 (2)	30906 (2)
408	Washer, Spring	STL	30893 (28)	30894 (24)	30894 (24)	30895 (22)	30896 (24)	30896 (24)	30896 (26)	30897 (28)	30898 (26)	30898 (26)	30897 (26)	30897 (28)	30898 (26)	30898 (26)
410	Retainer, Piston	SSS	30873	30873	30874	30875	30875	30876	33874	30877	30877	30878	30877	30877	30877	30878
	Retainer, Piston	SSSS	—	—	—	—	—	—	—	—	—	—	30877	30877	30877	30878
	Retainer, Piston (.100 Optional)	SS	33885	33885	33886	—	—	—	—	33877	33877	—	—	—	—	—
411	Spring, Adj. Nut	S	—	—	—	—	—	—	33879	—	—	—	—	—	—	—
418	Piston, Tapered	SSS	30879	30879	30880	30881	30881	30882	30882	30883	30883	30884	—	—	—	—
	Piston, Tapered	SSSS	—	—	—	—	—	—	—	—	—	—	31071	31071	31071	33866
	Piston (.100 Opt.)	SS	33875	33875	33876	—	—	—	—	33883	33883	—	31071	31071	31071	33866
421	Ring, Retainer	STL	30885	30885	30885	30886	30886	30886	30886	30887	30887	30887	30887	30887	30887	30887
435	Stem, Piston	STL	30888	30888	30888	30889	30889	30889	33880	30892	30892	30892	30892	30892	30892	30892
436	Seat, Tapered	SSS	30870	30870	30870	30871	30871	30871	30871	30872	30872	30872	—	—	—	—
	Seat, Tapered	SSSS	—	—	—	—	—	—	—	—	—	—	31070	31070	31070	31070
	Seat (.100 Opt.)	SS	33871	33871	33871	—	—	—	—	33872	33872	33872	31070	31070	31070	31070
440	Body, Lower	STCP	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Body, Lower (.100 Optional)	SS	—	—	—	—	—	—	—	—	—	—	—	—	—	—
468	Kit, O-Ring	FPM	30771	30771	30775	30777	30777	30781	30796	30783	30783	30787	30783	30783	30783	30787
	Hex Body															
—	Kit, O-Ring	FPM	30770	30772	30774	30776	30778	30780	—	30782	30784	30786	—	—	—	—
	Round Body															

( ) Spring Washers available individually. Quantity shown indicates total per Regulator. Add .100 for 316SS version. ★8 at top, 1 at bottom of spring set, 1 at top, 2 at bottom of spring set.

Material Codes (Not Part of Part Number): BB=Brass FPM=Fluorocarbon (Viton®) BBNP=Brass/Nickel Plated S=304SS SS=316SS  
SSS=416SS SSSS=440SS STCP=Steel/Chrome Plated STL=Steel

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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