

Pressure Sensitive Regulating Unloader

Model

7655

Use with Pump Models
5DX and 5CP

Model

7659

With Quick Start Valve
and Thermo Valve

7655

7659

FEATURES

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

SPECIFICATIONS

	U.S. Measure	Metric Measure
Flow Range	2.0-5.0 GPM	(7.6-19 L/M)
Pressure Range	700-3200 PSI	(50-220 BAR)
Maximum Temperature	160°F	(71°C)
Inlet Port	1/2" NPTF	(1/2" NPTF)
Discharge Port.....	3/8" NPTF	(3/8" NPTF)
By-pass Port.....	Built-in channel	(Built-in channel)
Weight	21.4 oz.	(0.67 kg)
Dimensions		
7655.....	3.25" x 1.5" x 6.37"	(76 x 38 x 162 mm)
7659.....	4.37" x 2.87" x 6.37"	(111 x 73 x 162 mm)

“Customer confidence is our greatest asset”

SELECTION: This is a pressure sensitive **regulating unloader**. It is designed for systems with a **single pump**, solenoid (gate) valve, nozzle, and standard gun. **“Weep” guns are not recommended with this unloader.**

This 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, by-passing the unrequired flow. It returns to established system pressure without delay upon squeezing the trigger gun or opening the solenoid (gate) valve.

NOTE: For **multiple pump** systems, it is best to use a pressure regulator not an unloader.

The unloader should 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 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**.

CAUTION

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 or solenoid valve) ready for a quick return to high pressure operation.

INSTALLATION: This modular unloader mounts directly to the side discharge and inlet ports of the 5CP and 5DX pump models.

The standard **inlet connection** of this unloader is at the **bottom**.

The **by-pass connection** is at the **bottom** of the unloader and connects directly to the pump inlet. 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. A *Thermo Valve* can be installed by removing the standard flow-thru screw at bottom of unloader and threading in the special flow-thru Thermo Valve. This will help to protect the pump from excessive temperature build-up and premature seal failure.

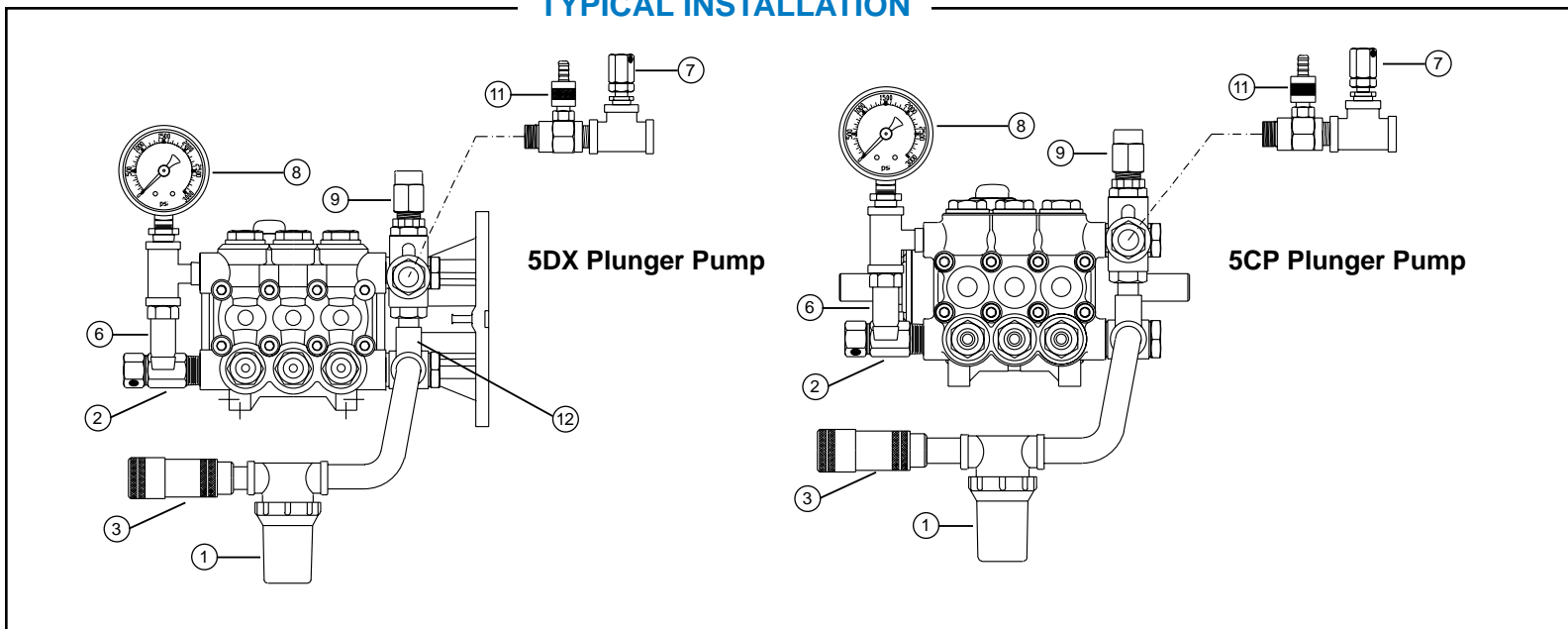
CAUTION

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.

The **outlet connection** is located at the **top** of the unloader and marked “OUT”. Plumbing for the spray gun, nozzle or solenoid valve should be connected from this discharge port.

A *Quick Start Valve* can also be mounted in the top flow-thru screw position to relieve discharge line pressure during initial start up in gas engine installations reducing start up power requirements.

TYPICAL INSTALLATION



It is recommended that a secondary protective device such as the *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.

Proceed by accepting the attained pressure OR selecting a smaller nozzle OR increasing the pump RPM providing you stay within specifications.

Once the desired system pressure is reached, stop adjusting. **Do not read the pressure at the gun or nozzle for setting system pressure.** Check the nozzle as part of regular maintenance and replace if worn. **Do not adjust unloader pressure setting to compensate for a worn nozzle.**

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 (gun closed)	low pressure 0-150 PSI	system pressure +200 PSI

TROUBLESHOOTING

- | | |
|---------------------------------------|---|
| Unloader cycles | <ul style="list-style-type: none"> ● Worn O-ring or check valve ● Fitting leaking downstream ● O-ring in gun worn |
| Fluid leaking from bottom | <ul style="list-style-type: none"> ● O-ring for seat or inlet fitting seal washer cut or worn |
| Unloader will not come up to pressure | <ul style="list-style-type: none"> ● Not properly sized for system pressure ● Foreign material in unloader ● Valve stem o-rings worn or cut ● Nozzle worn |
| Extreme pressure spikes | <ul style="list-style-type: none"> ● Adjusting nut turned completely into unloader ● Restricted by-pass or no by-pass ● System flow exceeds unloader rating |

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
(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.

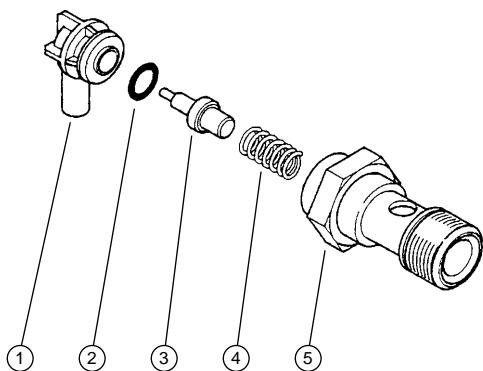
These illustrations show the basic elements for a typical installation of a high pressure piston or plunger pump. **Not all components shown are required for all applications or systems.** Each component presents potential problems that too often are ascribed to a perfectly functioning pump, such as: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

Thermo Valve Model 33920

[Standard with 7659 Unloader]
[Optional with 7655 Unloader]

Specifications	U.S. Measure	Metric Measure
Flow.....	2.0-5.0 GPM	(7.6-19 L/M)
Pressure.....	145 PSI	(10 BAR)
Max. (Bleed) Temperature ...	140°F	(60°C)
Inlet Port.....	1/2" NPT	(1/2" NPT)
Weight.....	5 oz.	(0.15 kg)
Dimensions	2.61" x 1.5" x 1.06"	(66.5 x 38 x 27 mm)

EXPLODED VIEW



PARTS LIST

ITEM	P/N	MATL	DESCRIPTION	QTY.
1	33921	NY	Bleed Port	1
2	33929	NBR	O-Ring	1
3	33936	CU	Power Pill	1
4	33938	S	Spring	1
5	33896	BB	Screw, Flow-Thru (1/2" NPT)	1

MATERIAL CODES (Not Part of Part Number): BB=Brass CU=Copper
NBR=Medium Nitrile (Buna-N) NY=Nylon S=304SS

SELECTION: The Flow-Thru Thermo Valve is a simple device designed for direct mounting on to the 7655 unloader. Remove standard Flow-Thru Screw at **bottom** of 7655 unloader and thread in Flow-Thru Thermo Valve.

INSTALLATION: Exercise caution when installing the Thermo Valve not to exceed the maximum inlet pressure of the valve or the pump.

OPERATION: As the system fluid is recirculated during the by-pass cycle, the temperature will increase. Frequent or prolonged by-pass can result in extremely high temperature build up. These high temperatures cause premature failure of seals and packings. Installing the Thermo Valve protects the pump against these excessive temperatures.

The power pill in the Thermo Valve detects the temperature rise in the fluid and compresses the spring, opening the bleed port and dumping a portion of the over-heated fluid.

Because of the unique design of the Thermo Valve, it will not bleed fluid during a pressure spike from the regulator or unloader. It completely seats and shuts off the flow.

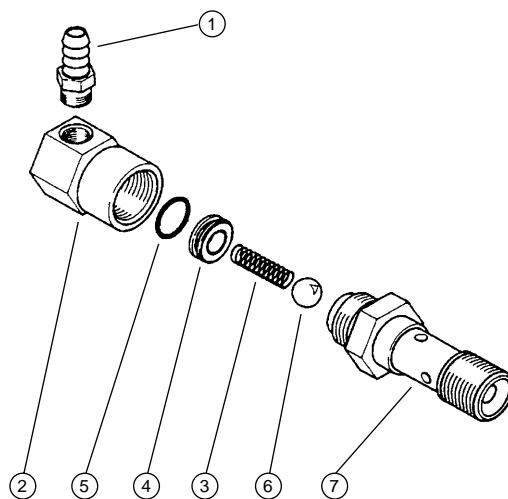
THE THERMO VALVE MUST BE INSTALLED WITH A PRESSURIZED PUMP INLET.

Quick Start Valve Model 7102

[Standard with 7659 Unloader]
[Optional with 7655 Unloader]

Specifications	U.S. Measure	Metric Measure
Flow.....	2.0-5.0 GPM	(7.6-19 L/M)
Pressure.....	700-3200 PSI	(50-220 BAR)
Maximum Temperature	160°F	(71°C)
Unloader Port.....	3/8" NPT	(3/8" NPT)
Barb Size.....	1/4"	(1/4")
Weight.....	5 oz.	(0.15 kg)
Dimensions	3.1" x 1.62" x .86"	(79 x 41 x 22 mm)

EXPLODED VIEW



PARTS LIST

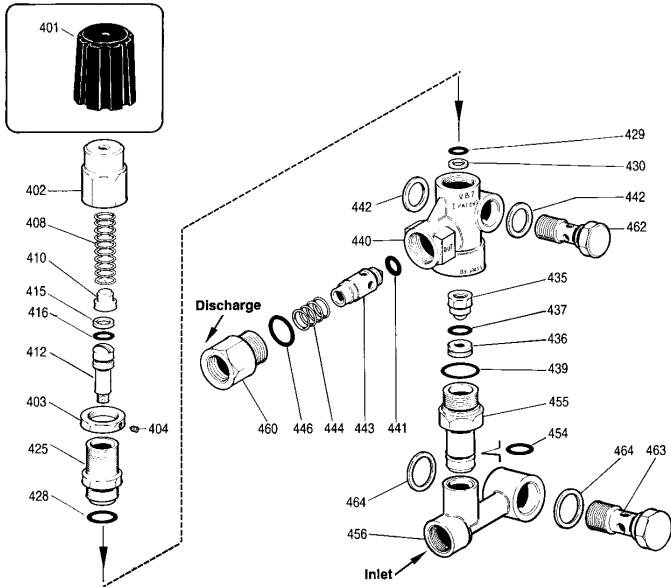
ITEM	P/N	MATL	DESCRIPTION	QTY.
1	33922	BB	Barb, Hose (1/4")	1
2	—	BB	Body	1
3	33925	S	Spring	1
4	31205	S	Seat, w/O-Ring	1
5	32008	NBR	O-Ring, Seat	1
6	32289	S	Ball, Seat	1
7	33897	BB	Screw, Flow-Thru (3/8" NPT)	1

MATERIAL CODES (Not Part of Part Number):
BB=Brass NBR=Medium Nitrile (Buna-N) S=304SS

INSTALLATION: Typically the Quick Start Valve is installed **after a pressure lock-up style unloader**. With this modular unloader it is compact and built-in. Remove the standard Flow-Thru Screw from the **top** of the 7655 unloader and replace with the Flow-Thru Quick Start Valve.

OPERATION: Before start-up connect a small hose to the barb and route back to the inlet or drain to the floor. Upon start-up the Quick Start Valve registers the line pressure. The seat is forced off the valve and allows a small amount of fluid to be bled off permitting the unit to start up **without a load**.

UNLOADER EXPLODED VIEW



PARTS LIST

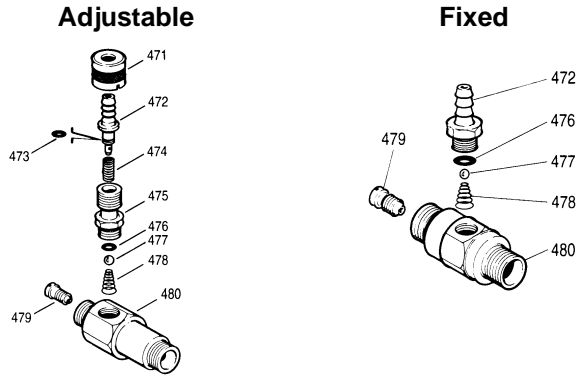
ITEM	P/N	MATL	DESCRIPTION	QTY
401	32088	NY	Black Cap	1
402	33859	BB	Cap, Hex Adjusting	1
403	33857	BB	Nut, Locking (M18x1)	1
404	33061	STZP	Screw, Set (M4x4)	1
408	33294	STZP	Spring, White	1
410	32819	STZP	Spring, Guide	1
412	33860	S	Stem, Valve	1
415	33276	PTFE	Back-up-Ring, Stem	1
416	—	NBR	O-Ring, Stem	1
425	33861	BB	Retainer, Piston	1
428	33043	NBR	O-Ring, Retainer	1
429	—	NBR	O-Ring, Stem	2
430	33278	PTFE	Back-up-Ring, Piston	1
435	33853	SSS	Valve and Ball Assembly (M6)	1
436	33806	NBR	Seat w/O-Ring	1
437	32008	NBR	O-Ring, Seat	1
439	33044	NBR	O-Ring, By-pass Fitting - 85	2
440	—	BB	Valve Body	1
441	32851	NBR	O-Ring, Flow Balancer	1
442	33856	STL	Washer, Seal (3/8")	2
443	33852	BB	Valve, Check	1
444	33843	S	Spring, Valve Check	1
446	33043	NBR	O-Ring, Discharge Fitting	1
454	—	FPM	O-Ring, By-pass Fitting	1
455	33863	BB	By-pass Fitting	1
456	33850	BB	By-pass Manifold (1/2" NPT)	1
460	33855	BB	Discharge Fitting (3/8" NPTF)	1
462	33892	BB	Screw, Flow-thru (3/8" NPT)	1
463	33894	BB	Screw, Flow-thru (1/2" NPT)	1
464	33854	STL	Washer, Seal (1/2")	2
468	33098	NBR	Kit, O-Ring	1

Incls: 415,416,428,429,430,437,439,441,446, 454)

Italics are optional items.

MATERIAL CODES (Not Part of Part Number): BB=Brass NBR=Medium Nitrile (Buna-N) NY=Nylon PTFE=Polytetrafluoroethylene (Teflon®) S=304SS SSS=416SS STL=Steel STZP=Steel/Zinc Plated

CHEMICAL INJECTORS EXPLODED VIEW



PARTS LIST

ITEM	P/N	MATL	DESCRIPTION	MODEL USED	QTY
471	32940	BB	Collar, Adjustment	7223, 7224	1
472	32941	BB	Barb, Adjustable	7223, 7224	1
—	39907	—	Barb, Fixed	7233, 7234	1
473	33503	NBR	O-Ring, Hose Barb	All models	1
474	33500	S	Spring	All Models	1
475	—	BBNY	Ball Seat Retainer	7223, 7224	1
476	33504	FPM	O-Ring, Retainer	All Models	1
477	34620	SS	Ball	All Models	1
478	33501	SS	Spring, Tapered	All Models	1
479	32373	S	Injector Orifice (2.1 mm)	7223, 7233	1
—	32374	S	Injector Orifice (2.3 mm)	7224, 7234	1
480	—	BB	Body-Unloader Mount	—	1
481	33481	BBNY	Adjustable Barb Assembly (Incls: 471,472,473,474,475,476,477,478)	7223, 7224	1
—	33480	BB	Fixed Barb Assembly (Incls: 472,476,477,478)	7233, 7234	1
513	33490	NY	Kit, Chemical Metering	7233, 7234	—

Italics are optional items.

MATERIAL CODES (Not Part of Part Number): BB=Brass FPM=Fluorocarbon (Viton®) NBR=Medium Nitrile (Buna-N) NY=Nylon S=304SS SS=316SS

Adjustable CHEMICAL INJECTORS

Specifications	U.S. Measure		Metric Measure	
	MODEL 7223	MODEL 7224	MODEL 7223	MODEL 7224
Flow	3.0-4.0 GPM	(11.4-15 L/M)	4.0-5.0 GPM	(15-19 L/M)
Nozzle Orifice	2.1 mm	(2.1 mm)	2.3 mm	(2.3 mm)
Hose Barb - Ext.	1/4"	(1/4")	1/4"	(1/4")
Inlet Port	M22x1.5	(M22x1.5)	M22x1.5	(M22x1.5)
Discharge Port.....	3/8" NPTM	(3/8" NPTM)	3/8" NPTM	(3/8" NPTM)
Weight	6.3 oz.	(0.18 kg)	6.3 oz.	(0.18 kg)
Dimensions.....	2.0x1.0x3.0"	(50x25x76 mm)	2.25x1.0x2.63"	(57x25x67 mm)

Fixed CHEMICAL INJECTORS

Specifications	U.S. Measure		Metric Measure	
	MODEL 7233	MODEL 7234	MODEL 7233	MODEL 7234
Flow	3.0-4.0 GPM	(11.4-15 L/M)	4.0-5.0 GPM	(15-19 L/M)
Nozzle Orifice	2.1 mm	(2.1 mm)	2.3 mm	(2.3 mm)
Hose Barb - Ext.	1/4"	(1/4")	1/4"	(1/4")
Hose Barb - Int.	8/32 UNCF	(8/32 UNCF)	8/32 UNCF	(8/32 UNCF)
Inlet Port	M22x1.5	(M22x1.5)	M22x1.5	(M22x1.5)
Discharge Port.....	3/8" NPTM	(3/8" NPTM)	3/8" NPTM	(3/8" NPTM)
Weight	6.3 oz.	(0.18 kg)	6.3 oz.	(0.18 kg)
Dimensions.....	2.0x1.0x3.0"	(50x25x76 mm)	2.25x1.0x2.63"	(57x25x67 mm)

CHEMICAL INJECTOR PERFORMANCE CHART

Desired Pump Flow	Orifice Size	Injector Model	Lo-Pressure Nozzle (Maximum injecting pressure less hose friction loss)		Hi-Press Nozzle "Deduction" (Press drop across Inj.)	
			Max. Chem. Draw (0 PSI) (Downstream)	Hi-Press Nozzle "Deduction" (Press drop across Inj.)	Hi-Press Nozzle "Deduction" (Press drop across Inj.)	Hi-Press Nozzle "Deduction" (Press drop across Inj.)
3.5	2.1 mm	7223, 7233	300 PSI	50 oz/min	200 PSI	200 PSI
3.5	2.3 mm	7224, 7234	185 PSI	56 oz/min	175 PSI	175 PSI
4.0	2.1 mm	7223, 7233	375 PSI	54 oz/min	250 PSI	250 PSI
4.0	2.3 mm	7224, 7234	225 PSI	50 oz/min	225 PSI	225 PSI

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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