

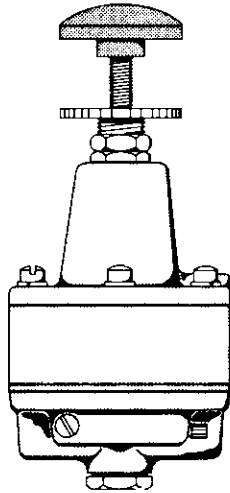


SERVICE INSTRUCTIONS

MODEL 40L

LIQUID LEVEL REGULATOR

SD40L
Issue: 4
Date: 10/79



GENERAL DESCRIPTION

The Model Series 40L Nullmatic Liquid Level Regulator is used to control liquid level in non-pressurized vessels. It provides a purge flow to a dip tube and, in turn, modulates a control valve for liquid level control.

The Regulator has an output range of 15-3 psig. Therefore, its output will decrease for an increase in water level. The level change (throttling range) required to produce a full-scale output change is determined by the size of the restriction screw.

The Regulator operates on the null-balance principle of operation. This holds the output pressure constant, regardless of wide changes in flow or in supply pressure. The regulator is actually a self-contained pressure controller.

GENERAL SPECIFICATIONS

Supply Pressure.....	Normal — 25 psig Minimum — 8 psi above maximum output Maximum — 30 psig
Max. Input Pressure.....	120" H ₂ O
Normal Input Range.....	0 to 120" H ₂ O
Adjustable Output Range..	3 to 15 psig (Direct-acting to clockwise adjustment of the adjusting screw)
Operation Output Range...	15 to 3 psig (Reverse-acting to the input)
Ambient Temp. Limits.....	- 40°F to + 180°F

REGULATOR OPERATION

Refer to Figure 1.

The adjusting screw is used to set the regulated output pressure. It loads the range spring, which in turn, positions the upper diaphragm assembly in relation to the nozzle.

The nozzle is supplied with pilot air from the air supply via the restriction (the size of the restriction determines the throttling range of the regulator). Clockwise turning of the adjusting screw, via the range spring, moves the top diaphragm assembly closer to the nozzle, restricting pilot air flow. This causes an increased pilot air pressure on top of the exhaust diaphragm assembly.

The exhaust diaphragm assembly operates the valve plunger in response to changes in pilot air pressure. An increase in pilot air pressure forces the plunger downward, increasing the regulated output pressure.

Refer to Figure 2.

Regulator operation is reverse-acting. The liquid level varies within the vertical run of the dip tube, along with the level in the vessel. This head of liquid provides the input to the regulator. Pilot air flows through the dip tube into the vessel. An increase in the level offers an increased resistance to the flow of pilot air, causing the pilot air pressure to build-up. This forces the upper diaphragm away from the nozzle, decreasing the regulated output. Thus, the output of the regulator is reverse-acting with respect to the liquid level in the vessel.

IMPORTANT

The purpose of the restriction tube is to provide an alternate path for pilot air flow. During some conditions, when the pilot air pressure is insufficient to balance the force of the range spring, the top diaphragm assembly may block the pilot air flow from the nozzle.

INSTALLATION

MOUNTING DIMENSIONS

Overall dimensions are shown in Figure 3.

PNEUMATIC CONNECTIONS

Refer to Figure 2.

1. All pipe connections are 1/4" N.P.T.
2. A 3/4" pipe is recommended for the dip tube and its connecting line to the regulator (a 3/4" by 1/2" reducing fitting will be required to adapt the dip tube to the regulator connection). The total length of the line should be 10 feet or more to obtain maximum stability of operation. If 3/4" pipe cannot be used for the dip tube, a smaller pipe may be used, but a 100 cubic inch or larger volume chamber should be connected between the regulator and the dip tube line to prevent output fluctuation.

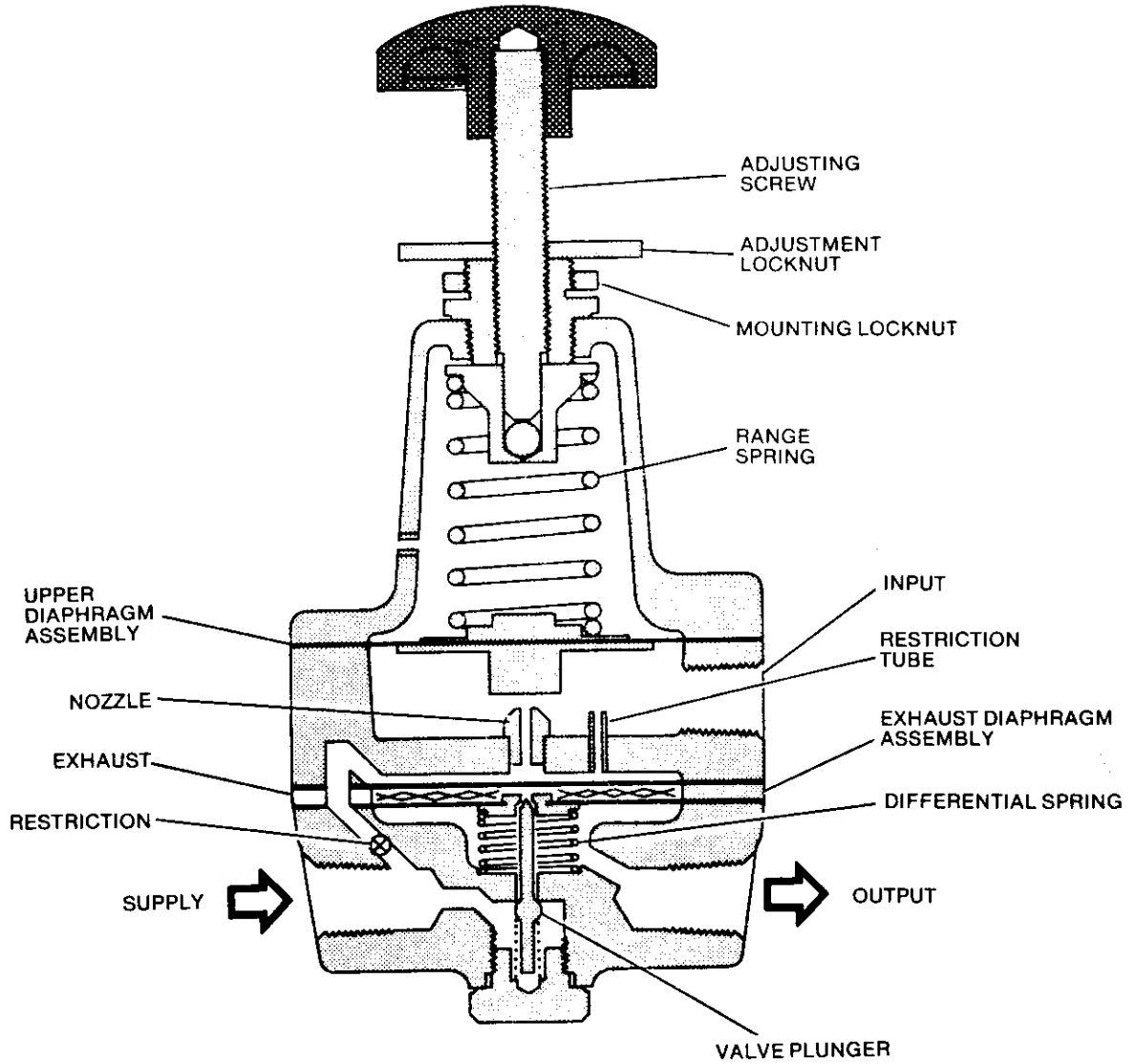
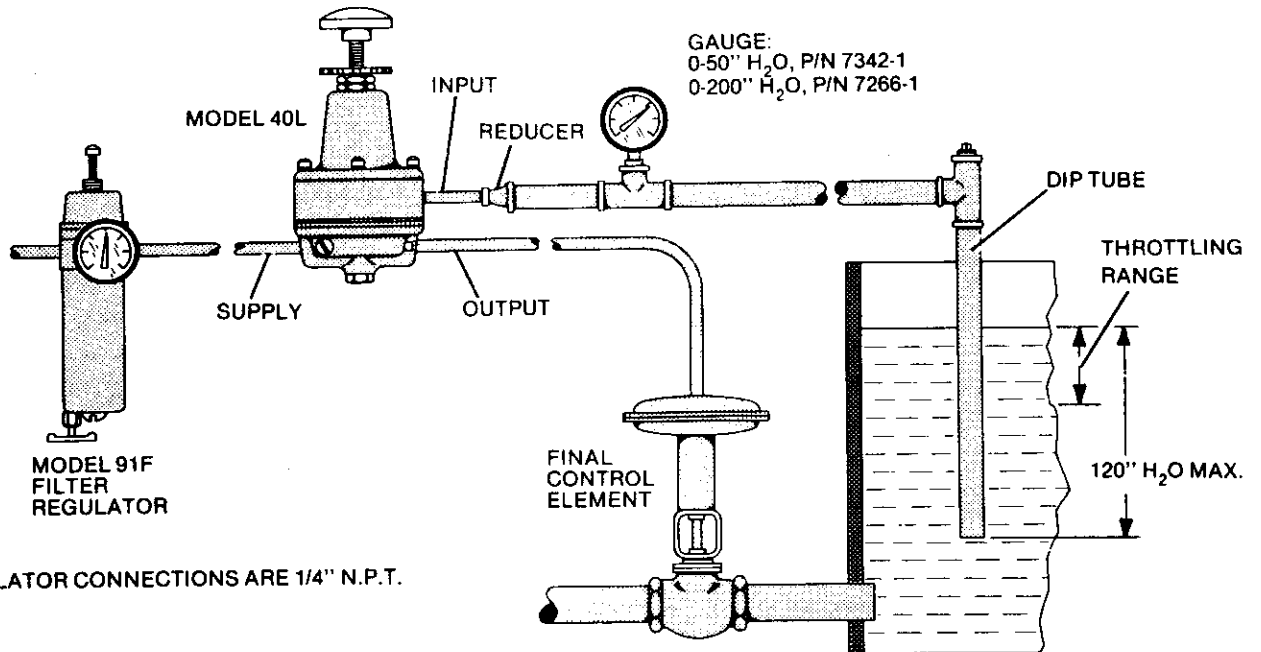


FIGURE 1 Schematic



NOTE:
ALL REGULATOR CONNECTIONS ARE 1/4" N.P.T.

FIGURE 2 Liquid Level System

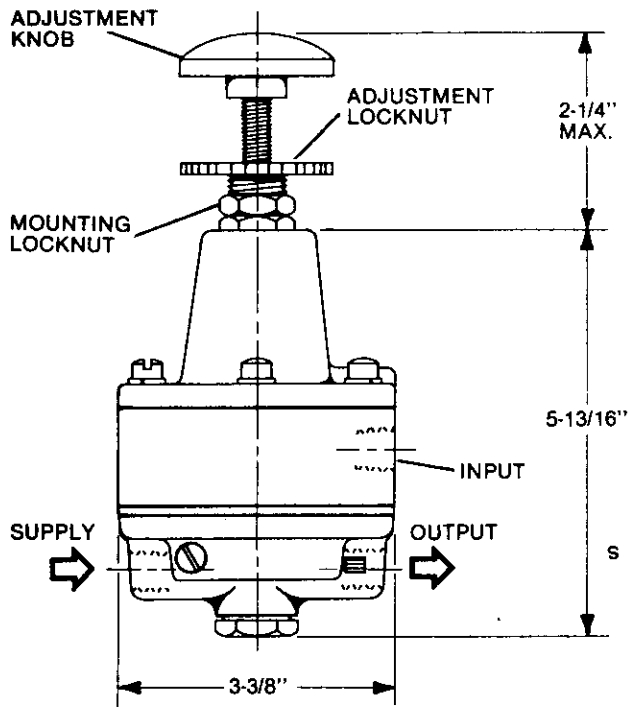


FIGURE 3 Installation

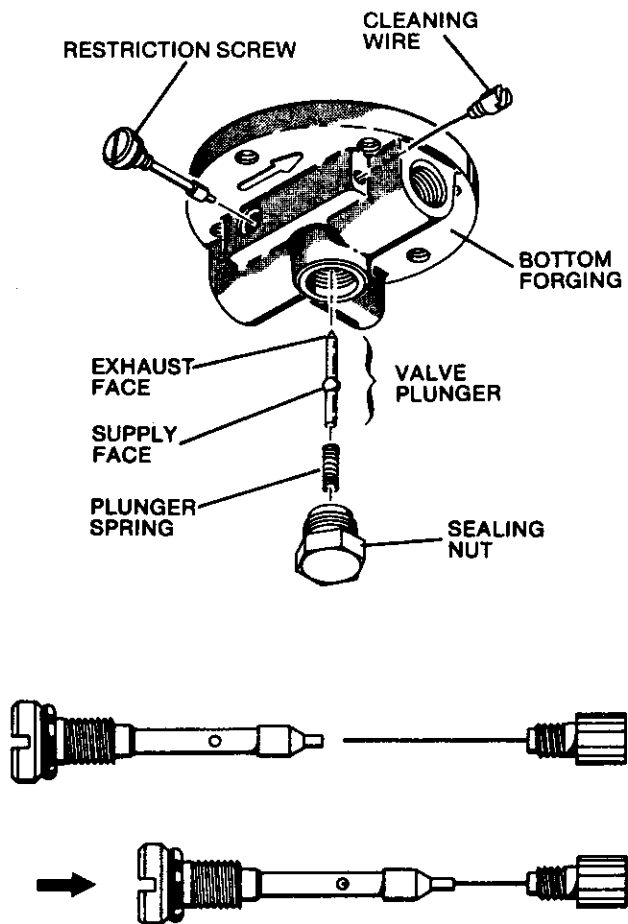


FIGURE 4 Cleaning

- Use pipe sealant sparingly, and then only on the male threads. A non-hardening sealant is strongly recommended.

Caution

Pressure in excess of 100 psig in the output or supply connection may cause damage.

Pressure in excess of 30 psig in the input connection may cause damage.

SUPPLY AIR REQUIREMENTS

The regulator should be connected to a source of clean, dry, oil-free instrument air. Failure to do so will increase the possibility of a malfunction or deviation from the specified performance.

The requirements for a high quality instrument air supply can be found in the Instrument Society of America's "Quality Standard for Instrument Air", (ISA-S7.3).

MAINTENANCE

PREVENTATIVE MAINTENANCE

A clean, dry, oil-free instrument air should be used. Providing an instrument air filter for the supply air system will prevent most difficulties arising from a dirty air supply. See SUPPLY AIR REQUIREMENTS.

SERVICING

Lubrication

An occasional application of light grease to the adjusting screw threads and the screw-end socket will facilitate easy turning of the adjusting screw. No other lubrication is required or recommended.

CLEANING (See Figure 4)

Restriction Screw

To clean the restriction screw, turn off the supply air and remove the restriction screw from the bottom forging. Remove the knurled cleaning wire and run it through the orifice at the tip of the restriction screw. In stubborn cases, the screw can be soaked in solvent to dissolve the blockage. Examine the "O" ring for damage and cleanliness.

Valve Plunger

To clean the valve plunger and its supply and exhaust seats, it must be removed from the regulator. Turn off the supply air and remove the retaining nut on the bottom forging. The valve plunger and spring will drop out when this nut is removed. If necessary, use a non-abrasive solvent to clean the valve plunger. The supply and exhaust seats in the bottom forging must also be clean. The supply seat is readily accessible, the exhaust seat can be reached by using a tobacco pipe cleaner. Here again, use a non-abrasive solvent.

DISASSEMBLY

Before disassembling, back off the adjustment knob to relieve spring tension. Also, make a diagonal mark across all mating parts to provide easier alignment of parts during reassembly. Refer to the parts list, remove the body screws and disassemble the regulator.

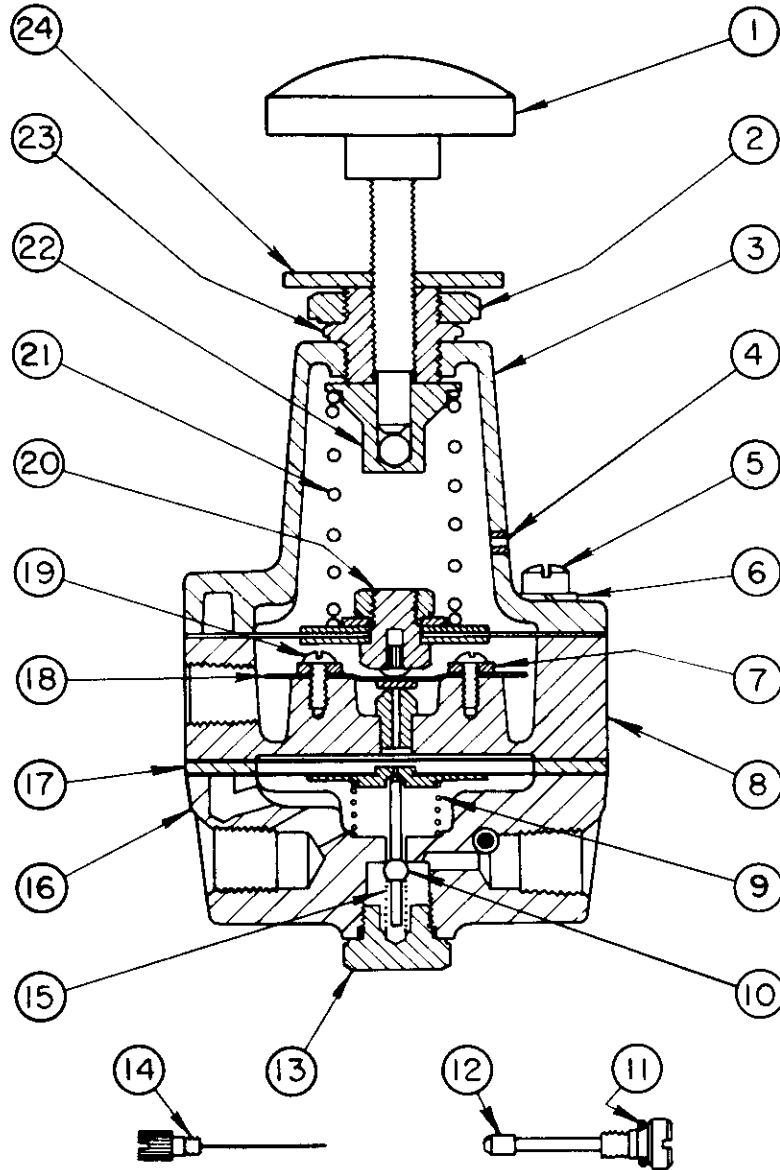
ASSEMBLY

The exhaust diaphragm assembly must be positioned so that the exhaust slot is over the supply connection. Refer to the parts list and re-assemble the regulator.

TROUBLE ANALYSIS

SYMPTOM	CAUSE	REMEDY
No output	No supply air	Turn on supply air.
	Clogged restriction screw .	Remove and clean.
Output cannot be increased to full value.	Supply air setting too low.	Raise to recommended value.
	Valve plunger being held open on exhaust seat by a chip (pipe dope, teflon tape, thread shaving, pipe scale, etc.) Usually detected by a heavy exhaust.	Remove valve plunger and clean its seats.
Sluggish output response to increased setting.	Output flow exceeding specifications or excessive for supply air setting.	Raise supply pressure and/or consult factory.
Output at full value, or more, and cannot be decreased.	Regulator piped backwards. Detected by an excessively heavy exhaust.	Re-pipe the regulator. Direction of flow is indicated by arrow on bottom forging.
	Loose restriction screw.	Tighten securely.
	External exhaust port blocked.	Remove obstruction.
	Internal exhaust port clogged.	Remove valve plunger and clean exhaust seat port.
Output cannot be decreased to minimum value.	Supply pressure too high.	Reduce to recommended value.
	Loose restriction screw.	Tighten securely.
	Valve plunger being held open on supply seat by a chip (pipe dope, teflon tape, thread shaving, pipe scale, etc.)	Remove valve plunger and clean its seats.
	Damaged supply seat.	Install new bottom forging.

PARTS LIST
MOORE LIQUID - LEVEL REGULATOR - MODEL 40L



Item No.	Part No.	Description	Req'd.	Item No.	Part No.	Description	Req'd.
1	1447-22	Adjusting Knob Assy.	1	*12d	10792-20	Restriction Screw (6" H ₂ O) (.020" Dia.)	1
2	3603-14	Mounting Nut	1	*12e	10792-22	Restriction Screw (8" H ₂ O) (.022" Dia.)	1
3	2155-13	Top Casting	1	*13	2155-6	Retaining Nut	1
4	2258-3	Vent Hole Plug	1	*14	1518-4	Cleaning Wire Assy.	1
5	Screw	1/4-20 x 1-3/4" Lg. Fil Hd. S.S.	6	*15	2155-7	Valve Spring	1
6	Lockwasher	1/4" S.S.	6	16	2155-112	Bottom Forging	1
*7		#6 Flatwasher	2	*17	1447-3	Exhaust Diaphragm Assy.	1
8	2258-2	Center Housing Assy.	1	18	1447-11	Nozzle Seat Assy.	1
*9	1518-5	Differential Spring (Black)	1	*19	Screw	#4-40 x 3/8" Lg. Pan. Hd. Thd. Cutting	2
*10	2155-3	Valve Plunger Assy.	1	*20	2932-10	Top Diaphragm Assy.	1
*11	2938-154	"O" Ring (Included in Item 12)	1	21	2155-67	Adjusting Spring	1
*12a	10792-14	Restriction Screw (2" H ₂ O) (.014" Dia.)	1	22	1447-24	Spring Seat Assy.	1
*12b	10792-16	Restriction Screw (3" H ₂ O) (.016" Dia.)	1	23	2155-165	Bushing	1
*12c	10792-18	Restriction Screw (4" H ₂ O) (.018" Dia.)	1	24a	1447-41	Locknut (Thumb Wheel)	1
				24b	3603-5	Locknut (Wrench)	1

* Recommended On -Hand Spare Parts. Always Specify Range, Serial No., or Other Nameplate Information When Ordering Spare Parts.