

# Foam Eductors

## 240 & 241

### Operating & Maintenance Instructions

These instructions are provided to allow safe and efficient use of these products. All personnel expected to use these products should be trained in their use as described in this manual.

#### PRINCIPLES OF EDUCTORS

An eductor is a device that uses the Venturi principle to introduce foam concentrate into the water stream. Water coming in the inlet of the eductor is directed through a tapered section and out through a small orifice (the Venturi) into a larger chamber thus creating a low pressure area within the chamber. A metering valve is attached to an inlet to this chamber and when open allows the higher atmospheric pressure outside the chamber to push the foam concentrate into the chamber. The foam concentrate then mixes with the water coming out the Venturi and the mixture travels out the reverse tapered section in the discharge end of the eductor.

Elkhart eductors are calibrated to operate at 200 psig inlet pressure. This is the pressure that will produce the rated flow (water + foam) and the pressure at which the metering valves are calibrated to deliver the correct amount of foam. The eductors can educt foam concentrate at inlet pressures as low as 100 psig when used with a recommended constant flow nozzle but the foam concentration will be richer. This is because at 100 psig the water flow rate is less but the foam concentrate is still coming in at a rate calibrated for the higher water flow rate at 200 psig. (Once the low pressure is created the difference between it and atmospheric pressure stays fairly constant over a wide range of inlet pressures. Because of this we recommend operating your Elkhart eductor at 200 psig inlet pressure.)

Note: if you are using an automatic nozzle you must always operate your eductor at 200 psig inlet pressure because at lower pressures the nozzle may not flow enough to keep the eductor working.

#### SETTING THE METERING VALVE

The 241-60, 95, 125, 150, & 250 gpm inline and the 240-60, 95, & 125 gpm by-pass eductors have a push & turn removable metering valve with 0, 1/2%, 1%, 3%, & 6% setting selections. The 1/2% & 1% positions are for Class A foams and the 3% & 6% are for Class B foams. These positions will work for most foam concentrates. To set the metering valve push in on the knob as far as it will go and turn it until the pointer on the side of the knob points to the desired percentage on the valves label, (clockwise for lower setting & counter clockwise for higher) and release the knob. Make sure the knob pops back out. The higher the number the farther back out the knob should come. It's ok to give the knob a pull to make sure it has come back out all the way. There are 2 pointers on the knob and 2 sets of numbers on the label to make it easier to set regardless of the position of the valve. Figure 1 shows the valve set for the 0 (positive off) position.

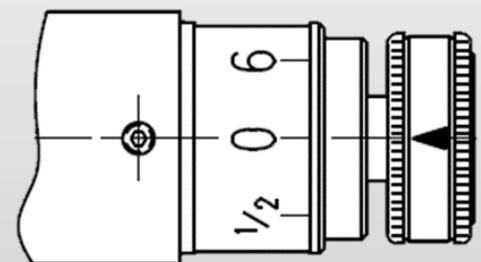


Figure 1

The 241-30 gpm Inline eductor has a removable metering valve that has a Vernier type adjustment and no positive OFF position. The side of the knob stem has 6 lines marked 0 – 6. Each line represents one full turn. A label on the end of the knob has reference marks that allow adjustment in 1/8 turns. When the valve is in the 0 position the line on the knob stem marked 0 is aligned with the top of the hex and the arrow on the label is lined up with a cast arrow on the side of the metering valve body.

FIGURE 2 shows the metering valve set for 1 turn open and FIGURE 3 shows it set for 3-3/8 turns open.

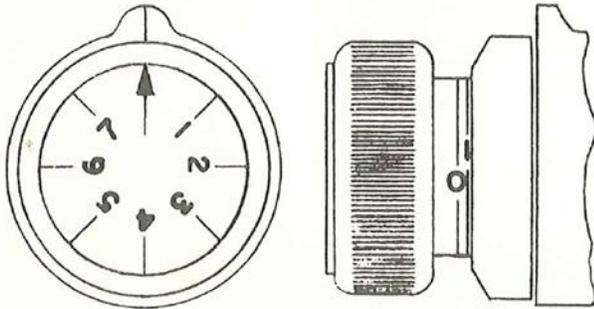


Figure 2

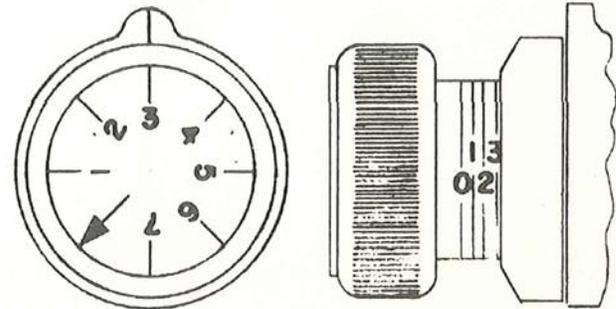


Figure 3

The setting below can be used for most foams

Class A 1/2% = 5/8 of a turn open, Class A 1% = 1-1/4 turns open

Class B 3% = 3-1/2 turns open, Class B 6% = 5-1/4 turns open

## SETUP AND OPERATION

Before using your eductor be sure to consult the Eductor/Nozzle Performance Chart on page 5 to make sure the hose (size and length) and nozzle you will be using on the discharge of the eductor are recommended for use with your model eductor.

- Connect the educator inlet to the trucks discharge.
  - If needed the educator can be attached to hose from the trucks discharge.
- Attach recommended size and length of hose to discharge of educator.
- Attach recommended nozzle to hose.

### To flow foam (models 240 & 241)

- Set foam concentrate container(s) close enough so the eductors pickup wand can be inserted to the bottom of the container(s).
- Set the metering device to the desired percentage position.
- If using a 240 by-pass educator make sure the by-pass valve handle is in the FOAM position (See Figure 4).
- Open discharge valve and charge the hose line slowly.
- With the nozzle fully open raise the discharge pressure to provide 200 psig at the educator inlet.
  - If you are using hose between truck discharge and educator inlet, adjust pressure to allow for hose loss so educator inlet pressure is 200 psig.

- Check to confirm the educator is creating suction by placing the palm of your hand over the end of the wand.
  - If no suction is found consult the common educator problem checklist on the following page.
- When you are ready to apply foam, insert the pick-up wand into the foam container until it contacts the bottom. It will take up to 15 seconds or so before the foam reaches the nozzle.

#### To flow water only (model 240)

- Place the bypass valve handle in the WATER position (see Figure 5).
- Open the discharge valve and charge the line slowly.
- Open the nozzle and raise the discharge pressure slowly to the pressure required.
  - Truck discharge pressure = hose loss + nozzle pressure + the loss through the eductor.
  - Eductor losses when by-pass valve is in WATER position:  
60 gpm = 2 psig ----- 95 gpm = 6 psig ----- 125 gpm = 11 psig.

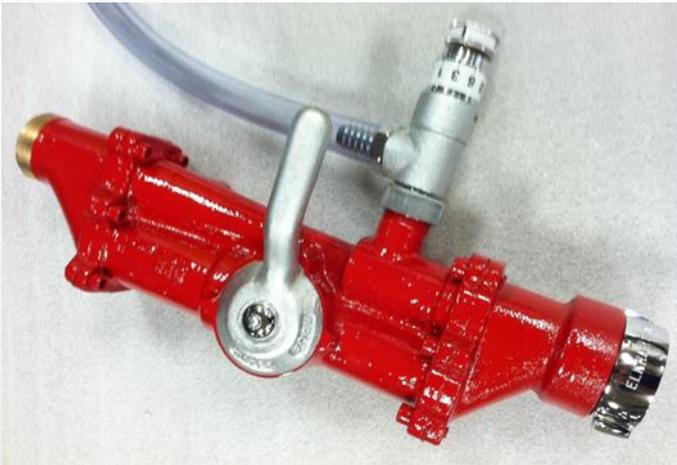


Figure 4 (Foam)

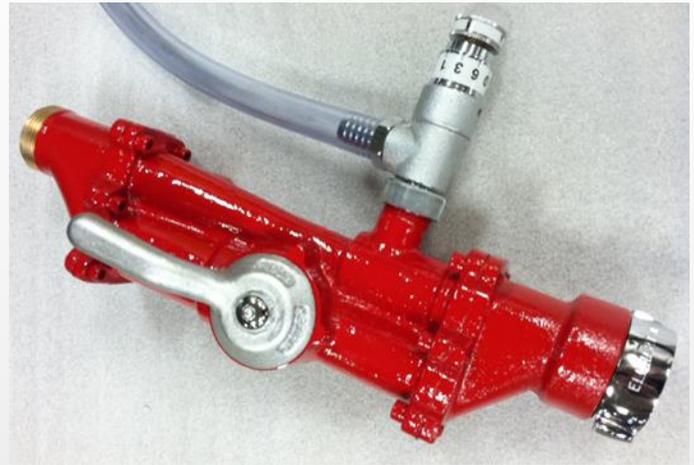


Figure 5 (Water)

## MAINTENANCE

After every use flush the eductors metering valve with fresh clean water.

- When you are done educting foam place the metering valve in the 6% position and replace the foam concentrate with fresh clean water. Educt at least 10-15 gallons of fresh clean water to flush out all of the foam concentrate from the metering valve.
- Visually inspect the educator, metering valve, pick-up hose, and pick-up wand for damage. Repair or replace as needed.

## COMMON EDUCTOR PROBLEM CHECK LIST

Anything that causes excessive back pressure on the downstream side of the eductor can cause the foam pick-up rate of the eductor to slow or stop altogether. Below are some of the common problems.

**MISMATCHED NOZZLE** – The eductor will not perform correctly if the nozzle flow does not match the GPM rating of the eductor with a nozzle pressure of 100 psig or less. Selectable flow nozzles must be in a flow setting that allows the nozzle flow to match the rated GPM of the eductor at a nozzle pressure of 100 psig or less. Best results are when the nozzle flow matches the rated GPM of the eductor at a nozzle pressure from 75-100 psig.

**NOZZLE SHUT-OFF IS NOT FULLY OPEN** – A partially closed shut-off will cause excessive back pressure and cause the eductor to stop picking up foam.

**CLOGGED NOZZLE** – If the nozzle waterway is partially clogged with debris it may not flow enough water causing excessive back pressure. Place the nozzle in its flush position to pass the debris or remove the nozzle and physically remove the debris.

**NOZZLE ELEVATED TOO FAR ABOVE THE EDUCTOR** – The maximum total downstream pressure that an eductor can work properly with is 130 psig. This is the nozzle pressure at the rated flow of the eductor added to the friction loss in the hose between eductor and nozzle. For every foot the nozzle is elevated above the eductor you must add ½ psig to this total. To reduce the total you may choose to use a nozzle that flows the rated flow of the eductor at a lesser pressure like 75 psig or if you are using a selectable flow nozzle place it in the next higher flow position. Either of these can reduce the total downstream pressure but will result in less stream reach due to reduced nozzle pressure. Testing should be done to determine if the reduced stream reach will meet your needs.

**KINK IN THE HOSE LAY BETWEEN EDUCTOR AND NOZZLE** – A kink can cause excessive back pressure and cause the eductor foam pick-up rate to slow or stop.

**HOSE LAY BETWEEN EDUCTOR AND NOZZLE TOO SMALL, TOO LONG, OR DAMAGED** – Using too small or too long of a hose lay can cause excessive back pressure, consult the Eductor/Nozzle performance chart (FIGURE 7) for recommended size and length of hose lay. Sometimes damaged lining in a fire hose can cause excessive back pressure, replace if needed.

**BY-PASS VALVE NOT IN THE FOAM POSITION** – (model 240 only) If the by-pass valve handle is not in the foam position there will be too much back pressure and the eductor will not pick-up foam.

**METERING VALVE CLOSED OR IN THE WRONG POSITION** – Check that the metering valve is in the correct position and if it's a push & turn style pull on the knob to be sure that it has come back out all the way.

**CLOGGED METERING VALVE, PICK-UP HOSE ASSEMBLY, OR STUCK CHECK BALL** – If the metering valve is not flushed properly after every use (see maintenance section) foam concentrate may have dried inside the valve preventing it from working correctly. Remove the metering device from the eductor and remove the pick-up hose/wand assembly. Submerge the valve in hot water (not hot enough to scald) for an hour or so then put the valve in the 6% position. Check that the check valve ball is loose by shaking the valve, if it's loose you should hear it rattle. If it's not loose insert a blunt tool such as the eraser end of a pencil into the pick-up hose nipple to dislodge the ball. Flush warm water through the valve from the hose nipple through to the eductor connection. Repeat soak & flush until valve is cleaned out. You may have to soak & flush the pick-up hose/wand assembly also if it has dried foam in it.

**EDUCTOR/NOZZLE PERFORMANCE CHART**

Eductor Model	Recommended Nozzles For Use With Eductor	Hose Size	Inlet Pressure	Flow Rate <sup>^</sup>		Maximum Hose Lay*	Nozzle Pressure	Effective Reach**	
				GPM	L/Min.				
241-30	SFS-O or SFS-OG (Set @ 30), 4000-02 (30) PSFS-HP, PSFS-HPG & TPSFS-HP (Set @ 30)	1.0"	200 PSI	30	114	100'	100 PSI	74'	
			150 PSI	26	98	100'	75 PSI	63'	
			100 PSI	21	79	100'	49 PSI	57'	
	SM-3F, SM-3FG	1.0"	200 PSI	30	114	100'	95PSI	65'	
			—	—	—	—	—	—	
241-60 or 240-60	SFL-O or SFL-OG (Set @ 60), 4000-10 (60), 4000-13 (60)	1.5"	200 PSI	60	227	300'	100 PSI	87'	
			150 PSI	52	197	300'	75 PSI	77'	
			100 PSI	42	159	300'	49 PSI	65'	
	SM-10F, SM-10FG, SM-10FB	1.5"	200 PSI	60	227	300'	92 PSI	82'	
			—	—	—	—	—	—	
242-95 or 241-95 or 240-95	SFL-O or SFL-OG (Set @ 95), SFL-B or SFL-BG (Set @ 95), SFL-N (95), SFL-GN (95), SFM-HP or SFM-HPG (Set @ 95) SFM-LP or SFM-LPG (Set @ 95) 4000-10 (95), 4000-13 (95)	1.5"	200 PSI	95	360	150'	100 PSI	99'	
			150 PSI	82	310	150'	75 PSI	92'	
			100 PSI	67	254	150'	50 PSI	77'	
		1.75"	200 PSI	95	360	250'	100 PSI	99'	
			150 PSI	82	310	250'	75 PSI	92'	
			100 PSI	67	254	250'	50 PSI	77'	
	SM-10F, SM-10FG, SM-10FB	1.5"	200 PSI	95	360	150'	99 PSI	86'	
			—	—	—	—	—	—	
		1.75"	200 PSI	95	360	250'	99 PSI	86'	
			—	—	—	—	—	—	
	SM-20F, SM-20FG^^	1.5"	200 PSI	95	360	200'	81 PSI	97'	
			—	—	—	—	—	—	
		1.75"	200 PSI	95	360	400'	81 PSI	97'	
—			—	—	—	—	—		
241-125 or 240-125	SFL-O or SFL-OG (Set @ 125), SFL-B or SFL-BG (Set @ 125), SFL-N (125), SFL-GN (125), SFM-HP or SFM-HPG (Set @ 125) SFM-LP or SFM-LPG (Set @ 125) 4000-10 (125), 4000-13 (125)	1.75"	200 PSI	125	473	150'	100 PSI	101'	
			150 PSI	108	409	150'	75 PSI	92'	
			100 PSI	88	333	150'	50 PSI	76'	
		2.0"	200 PSI	125	473	300'	100 PSI	101'	
			150 PSI	108	409	300'	75 PSI	92'	
			100 PSI	88	333	300'	50 PSI	76'	
	SM-20F, SM-20FG^^	1.75"	200 PSI	125	473	200'	87 PSI	96'	
			—	—	—	—	—	—	
		2.0"	200 PSI	125	473	400'	87 PSI	96'	
			—	—	—	—	—	—	
241-150	4000-14 } (150@75) 4000-16 } 4000-17 }	1.75"	200 PSI	150	568	150'	75 PSI	110'	
			150 PSI	130	492	150'	56 PSI	92'	
			100 PSI	106	401	150'	37 PSI	76'	
		SFM-LP or SFM-LPG (Set @ 150)	2.0"	200 PSI	150	568	300'	75 PSI	110'
				150 PSI	130	492	300'	56 PSI	92'
				100 PSI	106	401	300'	37 PSI	76'
	SM-20-FLP SM-20-FGLP^^	1.75"	200 PSI	150	568	150'	75 PSI	110'	
			—	—	—	—	—	—	
		2.0"	200 PSI	150	568	300'	75 PSI	110'	
			—	—	—	—	—	—	
241-250	Any SF Series (Set @ 250) or any 4000-20 Series (250)	2.5"	200 PSI	250	946	200'	100 PSI	120'	
			150 PSI	217	821	200'	75 PSI	105'	
			100 PSI	177	670	150'	50 PSI	83'	
	Any SM-30 Series	2.5"	200 PSI	250	946	200'	91 PSI	124'	
			—	—	—	—	—	—	

\* Maximum hose lay from eductor discharge to nozzle. We recommend that you test your hose to see if this is applicable.

\*\* These figures are with foam solution flowing (rather than plain water) and the nozzle set on straight stream.

<sup>^</sup> Total flow when picking-up 6% foam concentrate through metering valve.

<sup>^^</sup> SM-30F and SM-30FG can also be utilized with these eductors. Flow and reach data will differ.