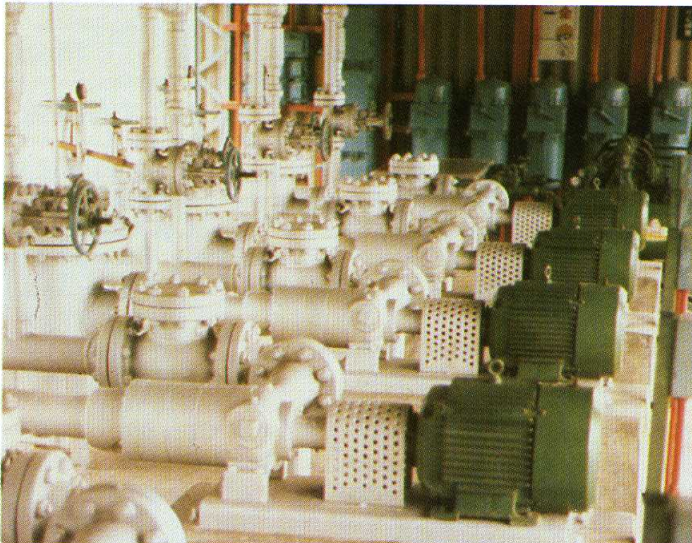
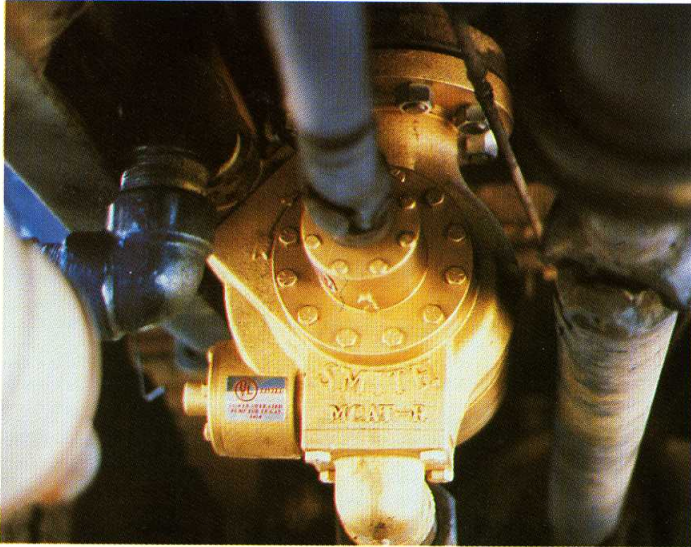




# POSITIVE DISPLACEMENT PUMPS FOR LIQUEFIED GASES





# SMITH PUMPS for Liquefied Gas

**GEAR SET EASY TO MAINTAIN**  
without disturbing the mechanical shaft seal the gear set can easily be replaced. All pipework remains in place.

**BALANCED GEAR CONFIGURATION**  
minimizes gear tooth contact and eliminates constant casing contact. Allows for higher differential pressures.

**CONVERSION TO LARGER CAPACITY PUMP** with the addition of 1-3 secondary gear housings, each with 50 GPM capacity, bulk transfer pumps can easily be converted to higher capacity.

**SUPERSEAL MECHANICAL SHAFT SEAL ASSEMBLY**, built as a kit onto the pump shaft — your assurance that the seal has been tested before and after assembly into the pump. All replacement mechanical shaft seal assemblies are dynamically liquid tested before shipment.

**CARBON GRAPHITE JOURNAL BEARINGS** designed to withstand vapor conditions associated with liquefied gases, support the entire length of the pump shaft to maximize smooth, efficient operation.

**NO SERVICE BALL BEARING** with no load design, permits the use of radial contact ball bearing, requiring no periodic greasing or servicing of any kind.

ALL Smith pump rated capacities can be obtained by direct coupling connection to standard motors, eliminating maintenance problems associated with belt-driven units.

Smith Precision Products Company offers a full line of positive displacement pumps for liquefied gas transfer. Designed for safety and high performance, Smith pumps are unequaled in installations ranging from small capacity cylinder filling to large capacity bulk loading or unloading facilities. Smith Precision Products Company has been designing and manufacturing liquefied gas pumps since 1938 and has introduced many innovative designs now standard on most liquefied gas pumps.

## POSITIVE DISPLACEMENT GEAR DESIGN LENDS TO HIGHEST EFFICIENCY

Smith pumps utilize a high efficiency gear set designed for high performance, minimal slippage, and ease of maintenance. The unique design allows for balanced internal loading which greatly increases pump life expectancy. Smith pumps are widely used for applications including cylinder filling, automotive fueling, bulk transfer, vaporizers, high pressure burners and truck applications.

Standard base type models are available in ¾, 1, 1½, 2½, and 4-inch port sizes. Options include threaded housing ports or threaded and/or weld flanges. Smith pumps utilize a 3-piece mechanical shaft seal designed as an integral part of the pump shaft. This unique feature allows the actual seal ring to rotate at ½ the shaft speed, greatly increasing seal life. Also, should mechanical seal replacement ever be necessary in the field, service personnel won't be fumbling around with loose seal components. The Smith mechanical seal is received as a factory-tested, assembled unit that cannot be taken apart. Another feature of all Smith pumps include an ease of maintenance design that allows the gear set to be replaced WITHOUT taking the mechanical shaft seal apart.

ALL PUMPS AND BYPASS RELIEF VALVES shown in this catalog are listed with the Underwriters Laboratories and are manufactured and tested to U.L.-51.

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# DESIGN FEATURES

Figure 1: Balanced loading

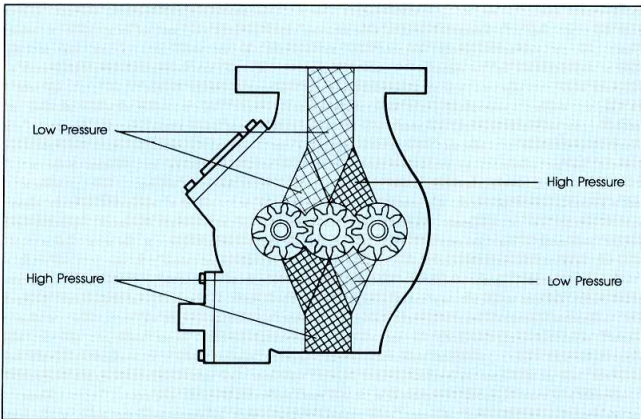
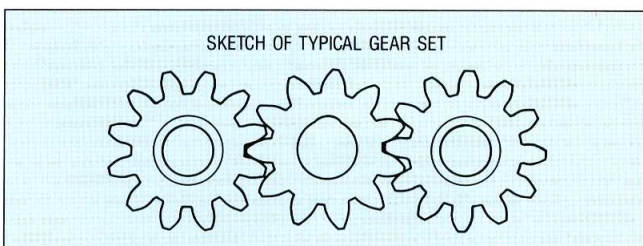


Figure 1 above shows a simplified schematic of a typical Smith pump. Unlike vane-type pumps, Smith pumps are designed for balanced loading. That is, as the pump develops pressure, there is no increased loading on the gear set to force it into the pump casing. With a vane-type pump, as the differential pressure increases, this added force pushes the vanes into the liner and/or end discs with greater force, further increasing wear.

## NO SLIDING CONTACT

The gear set in a typical Smith pump never contacts the pump casing. The design is such that the balanced loading allows the gear set to “float.” This means no sliding wear typical in a vane-type pump that depends on CONSTANT vane to liner contact to develop pressure. This CONSTANT contact accelerates vane wear and in cases where debris is present, further accentuates the problem due to debris embedment in the vane itself. In a typical Smith bulk transfer pump, each drive gear tooth only contacts its mating idler gear tooth *once* per ten revolutions. And, as the gear set begins to wear on the *leading* edge of the gear tooth profile, it does not affect the capability of the pump to build pressure, as this is determined by the *trailing* edge of the gear tooth profile — which is never in contact with its mating gear.

Figure 2: Gear set maintains efficiency

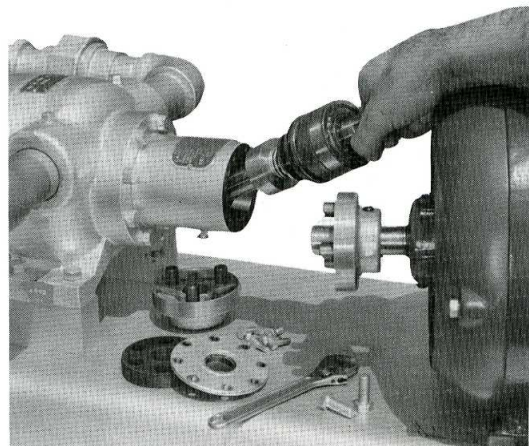


Minimal contact increases performance over the long haul



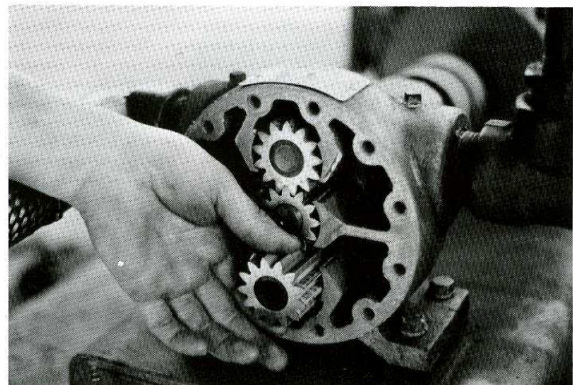
State-of-the-art mechanical shaft seal assembly

Smith Precision Products designs and manufactures the most state-of-the-art mechanical shaft seal assembly available in the world. The mechanical seal is built onto the pump shaft to facilitate factory testing. As a replacement part, the entire mechanical shaft seal assembly is shipped as tested and installed by service personnel in the “as tested” state. The “SUPERSEAL” incorporates a highly engineered thermoplastic seal ring that continually seats itself and rotates at  $\frac{1}{2}$  shaft speed, further increasing seal life.



Simple removal: no loose parts

To replace the mechanical shaft seal in a Smith pump, the gear set does not have to be disturbed. Likewise, to replace a gear set, the mechanical shaft seal remains intact.

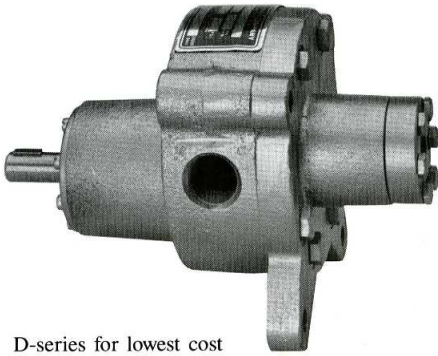


Easily replaceable gear set without disturbing mechanical shaft seal or piping

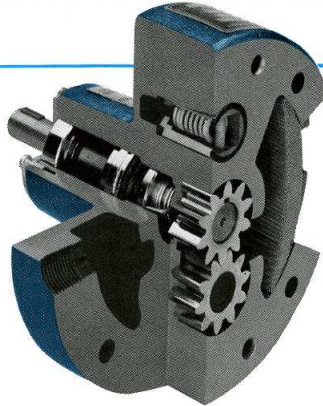


# SMALL CAPACITY PUMPS

## FOR CYLINDERS, AUTOMOTIVE, FORKLIFT, AND



D-series for lowest cost



E-series for internal or back to tank bypass



MC- and GC-series for toughest installations or continuous duty service

### D-SERIES

Each D-series pump comes complete with a back to tank bypass valve and built-in strainer. Without disturbing the piping, the gear set and strainer screen can be serviced. Likewise, should the mechanical shaft seal assembly require replacement, the gear set does not have to be removed from the pump. Each D-series pump uses a BUILT-IN bypass valve cartridge set at 90 psid. Pump bypass must be piped back to the supply tank. Designed for direct motor mount to 56C-frame electric motor. Foot mount available.

### E-SERIES

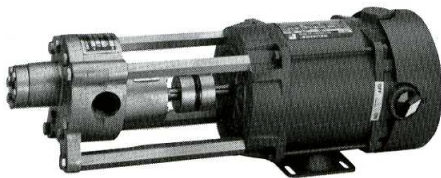
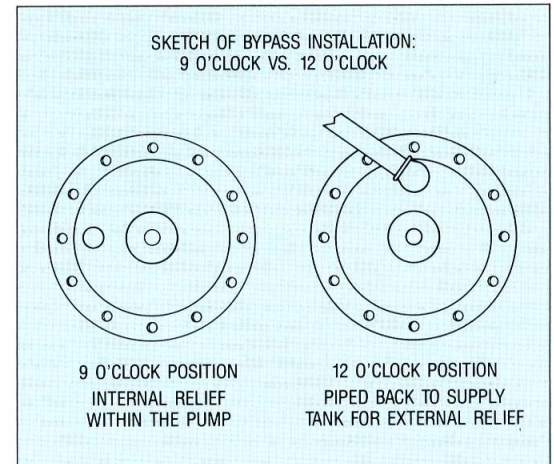
Each E-series pump comes complete with an internal/external bypass valve and built-in strainer. Affords the flexibility of either using the pump bypass valve to relieve within the pump in cases where it is necessary or with a simple rotation of the pump cover, the internal bypass valve can be used as an external bypass valve with the use of a return line back

to the supply tank (see figure 3). The bypass valve cartridge is set to crack at 90 psid. Designed for direct motor mount to 56C-frame electric motor or to internal combustion engine for portable transfer applications. Replacement parts for E-series are interchangeable with D-series. Foot mount available.

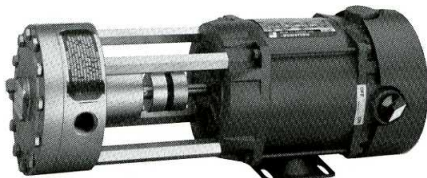
### MC- AND GC-SERIES

Each MC- or GC-series pump utilizes the balanced 3-gear set unique to Smith pumps. The internal porting and superior construction enable these pumps to handle continuous duty service applications and pump against high differential pressure. The MC-series features an adjustable internal bypass valve. The GC-series features a permanently set internal bypass valve at 90 psid. The GC-series pump can be used in conjunction with an internal combustion engine for portable transfer applications. Both MC- and GC-series are designed for direct motor mount to 56C-frame electric motor. Foot mount available.

Figure 3: E-series bypass alternatives



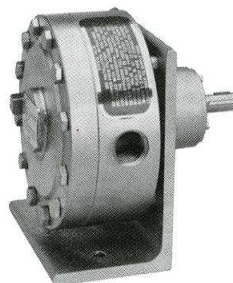
D-series: Direct motor mount DW-IZ, DW-HZ



E-series: Direct motor mount EG-IZ, EC-HZ



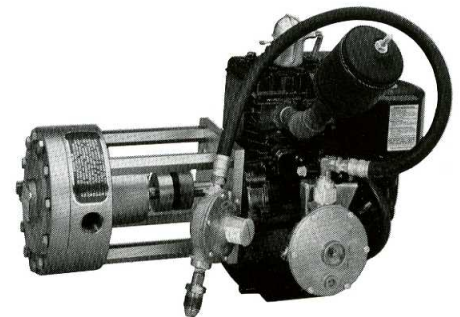
MC- and GC-series: Direct motor mount



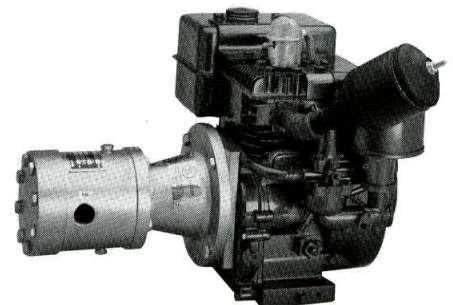
E-series: Foot mount



MC- and GC-series: Foot mount



E-series mounted to gasoline or LP-gas engine



GC-series mounted to gasoline or LP-gas engine



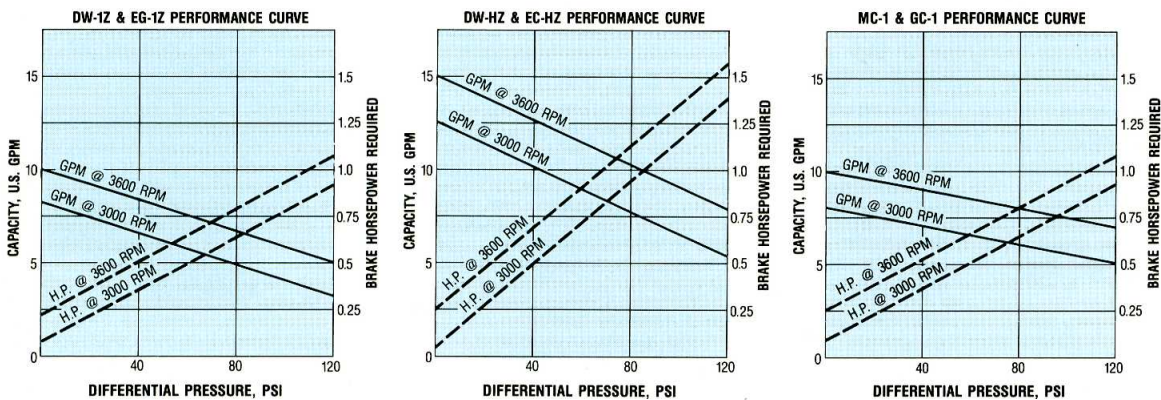
# TANK EVACUATION

## PUMP SELECTION

PUMPS ONLY		AVERAGE DELIVERY RATE IN GALLONS PER MINUTE <sup>1</sup>		INTERNAL BYPASS RELIEF VALVE SETTING	MAXIMUM DIFFERENTIAL PRESSURE <sup>2</sup>	INLET / OUTLET SIZE: FEMALE THREADED	MOTOR <sup>3</sup>	PUMP ROTATION AS LOOKING AT PUMP SHAFT-END
MODEL	MOTOR SPEED (RPM)	40 PSID, 3600 RPM	75 PSID, 3600 RPM	PSI	PSI	INCHES	H.P.	
DW-1Z, EG-1Z	3600	8½	7	90	125	¾	1	CW
DW-HZ, EC-HZ	3600	13½	12	90	125	1	1½	CW
MC-1, GC-1	3600	9	8	MC-1: ADJUSTABLE GC-1: 90	125	¾	1	MC-1: CCW GC-1: CW

1. Rated capacities for DW-1Z, EG-1Z are 10 GPM. For DW-HZ, EC-HZ: 15 GPM. For MC-1, GC-1: 10 GPM. These are capacities at 0 PSID and 3600 RPM. Capacities may vary depending on temperature or line restrictions. 2. Maximum differential pressure limited to 125 PSID as outlined in U.L.-51 standard. 3. If used with engine, 3 H.P. required.

## PERFORMANCE CURVES<sup>4</sup>

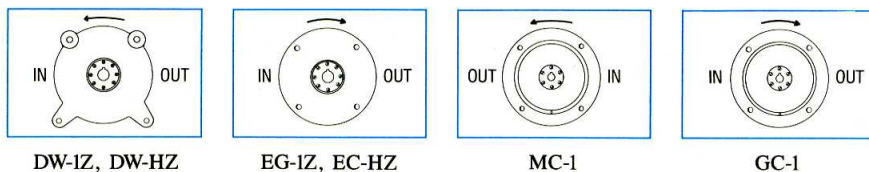


4. Performance curves based on delivery rates of propane at 75°F. Delivery rates will be reduced by approximately 15% at temperatures approaching 32°F. For exact capacity and horsepower, use empirical formulae provided under engineering data on the last page.

## ADDITIONAL DATA

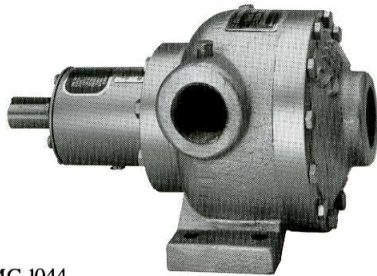
MODEL	LENGTH OF TIME TO FILL LP-GAS CYLINDERS		WEIGHT PUMP ONLY	WEIGHT WITH MOTOR
	20 LB.	100 LB.	LBS.	LBS.
DW-1Z, EG-1Z	LESS THAN 1 MINUTE	3-4 MINUTES	22, 25	60, 77
DW-HZ, EC-HZ	LESS THAN 1 MINUTE	3-4 MINUTES	22, 25	67, 92
MC-1, GC-1	LESS THAN 1 MINUTE	3-4 MINUTES	20, 20	73, 73

## DIRECTION OF ROTATION

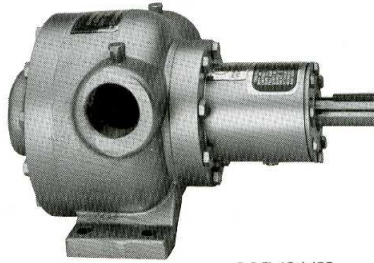


# MEDIUM CAPACITY PUMPS

## FOR MULTIPLE CYLINDER FILLING AND SMALL



MC-1044  
20 GPM



MC-1044H  
35 GPM



MC-2, MC-2H  
50 GPM

### MC-1044

The model MC-1044 pump incorporates the balanced 3-gear design to maximize efficiency and minimize slippage. All Smith medium capacity pumps are reversible (except MC-2Q) with proper consideration of inlet and outlet ports. The MC-1044 can fill up to three 100 lb. cylinders in 4 minutes using a manifold arrangement. As with all Smith pumps, no periodic maintenance or lubrication is required. Since the pump loading is balanced and no heavy rotor is utilized, the mechanical shaft seal ball bearing sees minimal work. It is sealed for life and does not require periodic greasing.

### MC-1044H

The model MC-1044H incorporates all the advantages of the model MC-1044 but with increased capacity. The model MC-1044H can fill up to four 100 lb. cylinders in 4 minutes using a manifold arrangement. Both the MC-1044 and MC-1044H are available with 1½" NPT tapped inlet and outlet ports and are reversible.

### MC-2

The model MC-2 has long been known as the workhorse of small bulk plant installations. The model MC-2 has 2½" NPT tapped inlet ports and is reversible. It is suitable for loading delivery trucks at a rate of 45-50 GPM. Fills up to five 100 lb. cylinders on a manifold in 4 minutes. Can be fitted with steel flanges, 2" threaded or weld type.

### MC-2Q

The model MC-2Q is the finest positive displacement pump on the market. The MC-2Q can replace many piston-type pumps and develops higher pressures without surges. Recommended for differential pressures in excess of 125 PSID. The model MC-2Q utilizes the 3-gear principle with the drive gear and idler gears of herringbone design. The herringbone design lends to quiet operation and maximum efficiency. The model MC-2Q has 2½" NPT tapped inlet and outlet ports and is NOT reversible. Available with a 3" NPT tapped inlet port as an option.

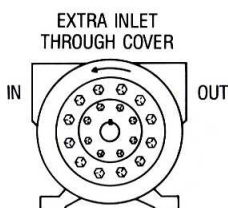


MC-2Q

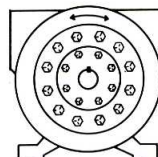
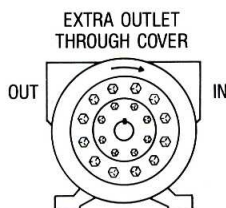
### MC-2H

The model MC-2H is identical to the model MC-2 except the MC-2H has the same capacity of the MC-2 but at lower drive speeds. At 1500 RPM motor speed, the MC-2H will deliver the same capacity as the MC-2 at 1800 RPM. This makes the MC-2H ideal for overseas, 50 cycle current where maximum motor speed is 1500 RPM.

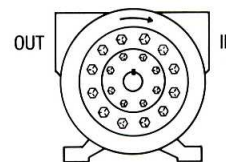
### DIRECTION OF ROTATION



MC-1044, MC-1044H  
REVERSIBLE



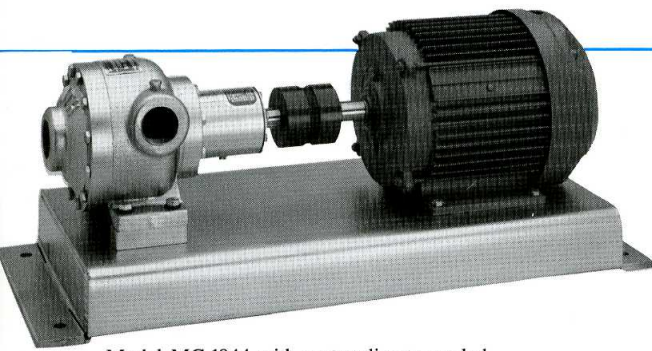
MC-2, MC-2H  
REVERSIBLE



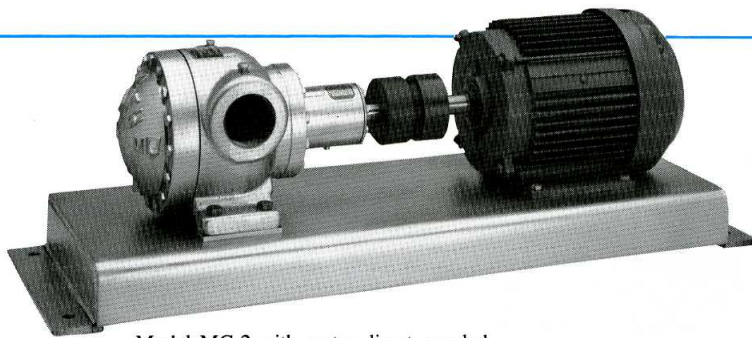
MC-2Q  
NOT REVERSIBLE



# BULK PLANT INSTALLATIONS



Model MC-1044 with motor direct coupled



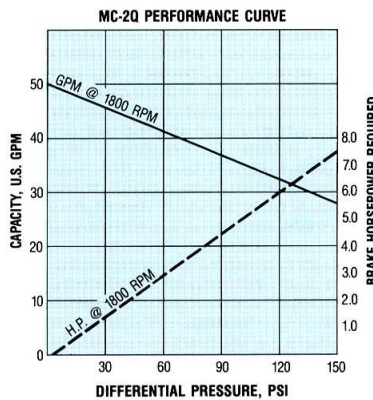
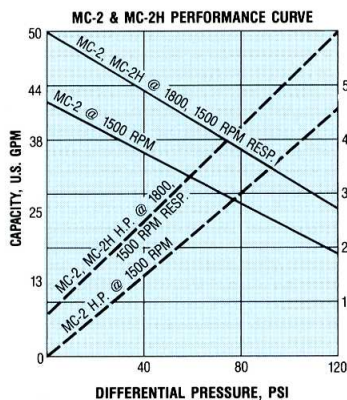
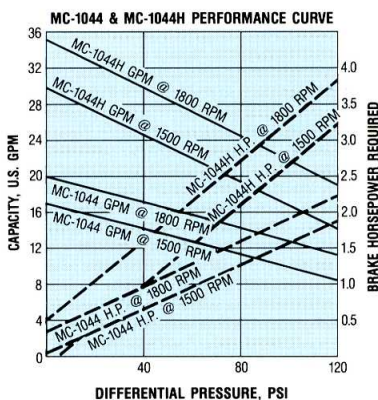
Model MC-2 with motor direct coupled

## PUMP SELECTION

PUMPS ONLY	AVERAGE DELIVERY RATE IN GALLONS PER MINUTE <sup>1</sup>		MAXIMUM DIFFERENTIAL PRESSURE <sup>2</sup>	INLET / OUTLET SIZE: FEMALE THREADED	MOTOR <sup>3</sup>	PUMP ROTATION AS LOOKING AT PUMP SHAFT-END
	40 PSID, 1800 RPM	75 PSID, 1800 RPM				
MC-1044	17	14	125	1½	1½ H.P. TO 40 PSID 2 H.P. OVER 75 PSID	REVERSIBLE
MC-1044H	30	25	125	1½	2 H.P. TO 40 PSID 3 H.P. OVER 75 PSID	REVERSIBLE
MC-2	42	35	125	2½	3 H.P. TO 40 PSID 5 H.P. OVER 75 PSID	REVERSIBLE
MC-2H	42 @ 1500 RPM	35 @ 1500 RPM	125	2½	3 H.P. TO 40 PSID 5 H.P. OVER 75 PSID	REVERSIBLE
MC-2Q	45	28 @ 150 PSID	150	2½	5 H.P. TO 100 PSID 7½ H.P. TO 150 PSID	CW

1. Rated capacities as follows: MC-1044: 20 GPM; MC-1044H: 35 GPM; MC-2: 50 GPM; MC-2H: 50 GPM at 1500 RPM; MC-2Q: 50 GPM.
2. Maximum differential pressure limited to 125 PSID as outlined in U.L.-51 standard.
3. See pump rotation diagrams on preceding page for rotation vs. inlet/outlet piping.

## PERFORMANCE CURVES<sup>4</sup>



4. Performance curves based on delivery rates of propane at 75°F. Delivery rates will be reduced by approximately 15% at temperatures approaching 32°F. For exact capacity and horsepower, use empirical formulae provided under engineering data on the last page.

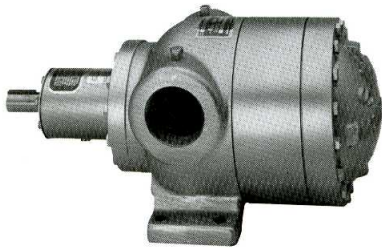
## ADDITIONAL DATA

MODEL	WEIGHT, PUMP ONLY	WEIGHT, PUMP WITH BASE COUPLING AND MOTOR†
MC-1044	45 LBS.	190-230 LBS.
MC-1044H	45 LBS.	190-265 LBS.
MC-2	75 LBS.	260-330 LBS.
MC-2H	78 LBS.	260-330 LBS.
MC-2Q	100 LBS.	285-420 LBS.

† Contact our SHIPPING GROUP for exact weights on specific pump/motor combinations.



# LARGE CAPACITY PUMPS FOR BULK PLANT USE



MC-3, MC-3H  
100 GPM



MC-4, MC-4H  
150 GPM



MC-5, MC-5H  
200 GPM

## MC-3, MC-3H

The most popular bulk transfer pump. Utilizes the balanced 3-gear design. Is recommended as a heavy duty bulk plant pump with a capacity up to 100 GPM. Inlet and outlet ports are conveniently located on the sides of the pump to minimize restrictions caused by fittings such as elbows. MC-3H model delivers the same capacity as the MC-3 but at 1500 RPM. Both models available with flanges, either threaded or weld type. Is reversible.

## MC-4, MC-4H

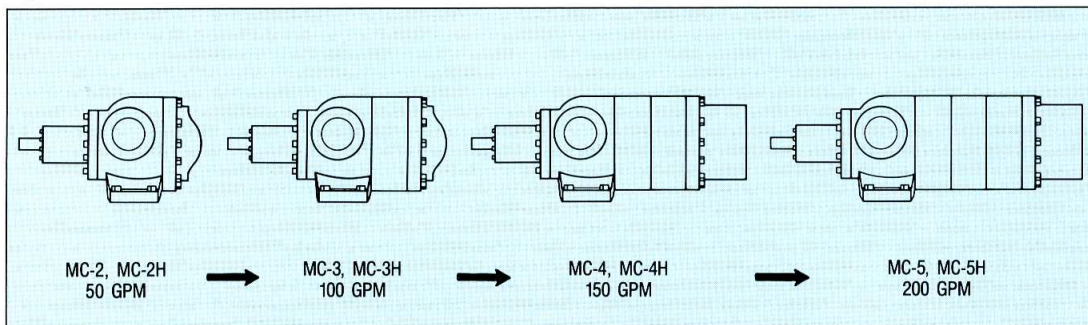
The same basic pump as the MC-3, MC-3H models but with an extra secondary housing to boost capacity (see figure 4). Comes standard with a 4" NPT tapped inlet and 2½" NPT

tapped outlet. Available with flanges, either threaded or weld type. MC-4H model delivers the same capacity as the MC-4 but at 1500 RPM. Not reversible.

## MC-5, MC-5H

This is the highest capacity Smith pump in regular production. Utilizes 3 secondary housings to boost capacity to 200 GPM. Optional large capacity gear set is available to increase rated capacity to 250 GPM (see option "L" on page 12). Comes standard with 4" NPT tapped inlet and 2½" NPT tapped outlet. Available with same flange arrangement as MC-4, MC-4H models. MC-5H model delivers the same capacity as the MC-5 but at 1500 RPM. Not reversible.

Figure 4:



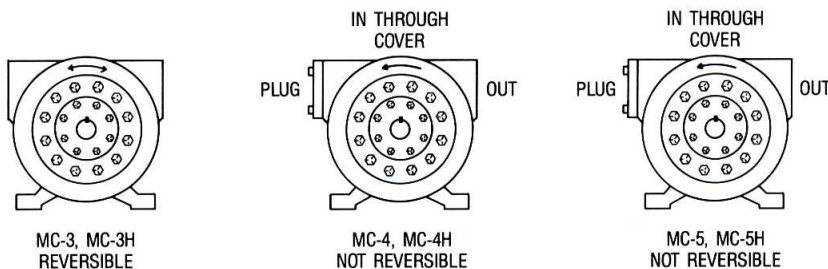
Modular design allows for simple conversion to higher capacity pump

## CONVERSION OF MODELS

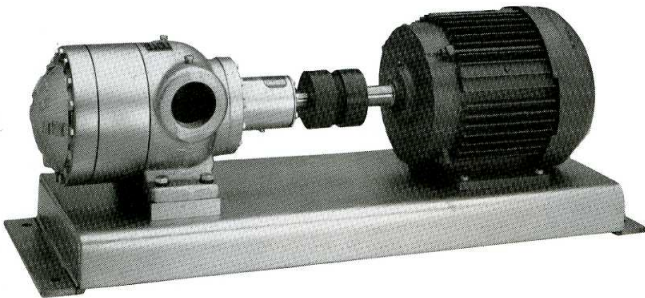
By adding an appropriate number of secondary gear housings and mechanical shaft seal assembly, the MC-2, MC-3, or MC-4 models can be converted to a higher capacity type. The

conversion is simple and can easily be accomplished in the field. Thus a smaller capacity pump will not become obsolete as more volume is required (see figure 4).

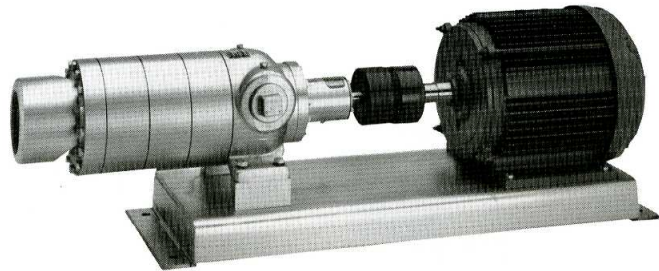
## DIRECTION OF ROTATION







Model MC-3 with motor direct coupled



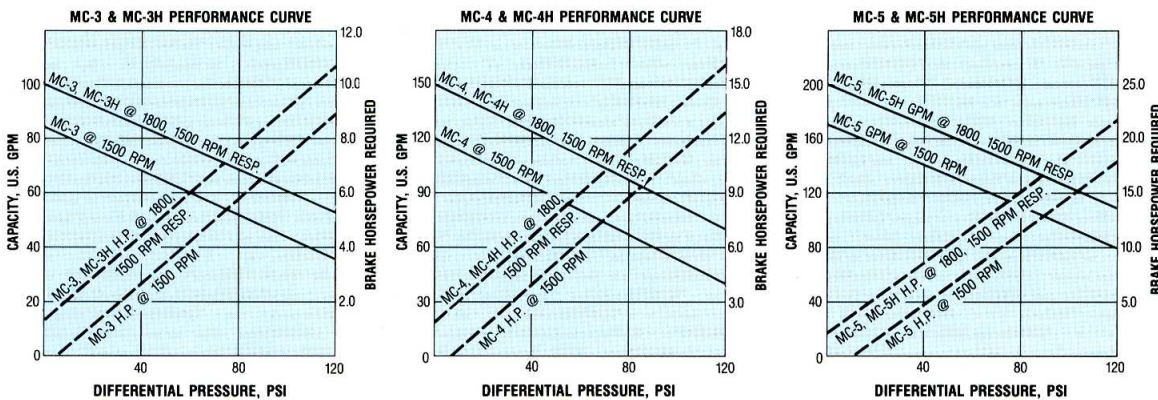
Model MC-5 with motor direct coupled

## PUMP SELECTION

PUMPS ONLY	AVERAGE DELIVERY RATE IN GALLONS PER MINUTE <sup>1</sup>		MAXIMUM DIFFERENTIAL PRESSURE <sup>2</sup>	INLET / OUTLET SIZE: FEMALE THREADED	MOTOR <sup>3</sup>	PUMP ROTATION AS LOOKING AT PUMP SHAFT-END
	40 PSID, 1800 RPM	75 PSID, 1800 RPM				
MC-3	84	70	125	2½"	5 H.P. TO 40 PSID 7½ H.P. OVER 75 PSID	REVERSIBLE
MC-3H	84 @ 1500 RPM	70 @ 1500 RPM	125	2½"	SAME AS ABOVE	REVERSIBLE
MC-4	125	105	125	4" INLET 2½" OUTLET	7½ H.P. TO 40 PSID 10 H.P. OVER 75 PSID	CCW
MC-4H	125 @ 1500 RPM	105 @ 1500 RPM	125	4" INLET 2½" OUTLET	SAME AS ABOVE	CCW
MC-5	167	142	125	4" INLET 2½" OUTLET	10 H.P. TO 40 PSID 15 H.P. OVER 75 PSID	CCW
MC-5H	167 @ 1500 RPM	142 @ 1500 RPM	125	4" INLET 2½" OUTLET	SAME AS ABOVE	CCW

1. Rated capacities as follows: MC-3, MC-3H: 100 GPM; MC-4, MC-4H: 150 GPM; MC-5, MC-5H: 200 GPM.
2. Maximum differential pressure limited to 125 PSID as outlined in U.L.-51 standard.
3. See pump rotation diagrams on preceding page for rotation vs. inlet/outlet piping.

## PERFORMANCE CURVES<sup>4</sup>



4. Performance curves based on delivery rates of propane at 75°F. Delivery rates will be reduced by approximately 15% at temperatures approaching 32°F. For exact capacity and horsepower, use empirical formulae provided under engineering data on the last page.

## ADDITIONAL DATA

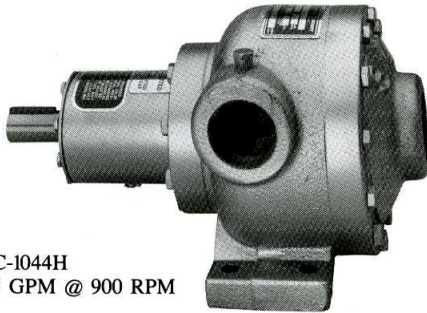
MODEL	WEIGHT, PUMP ONLY	WEIGHT, PUMP WITH BASE COUPLING AND MOTOR†
MC-3, MC-3H	95 LBS.	300-400 LBS.
MC-4, MC-4H	135 LBS.	380-470 LBS.
MC-5, MC-5H	170 LBS.	465-530 LBS.

† Contact our SHIPPING GROUP for exact weights on specific pump/motor combinations.

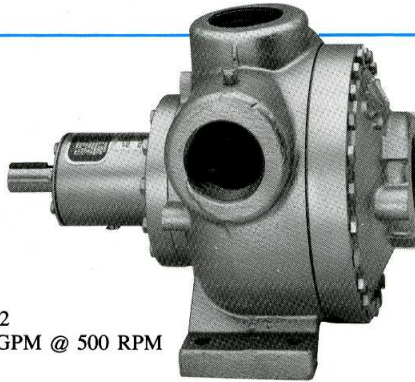


# TRUCK PUMPS

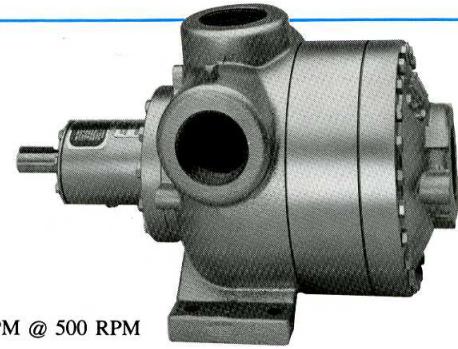
## FOOT MOUNT AND FLANGE MOUNT



TC-1044H  
35 GPM @ 900 RPM

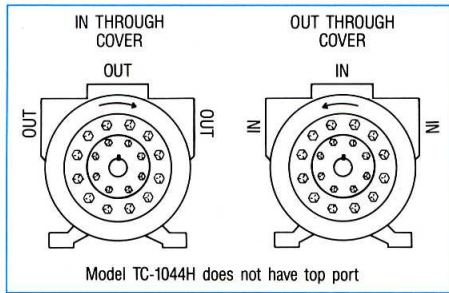


TC-2  
50 GPM @ 500 RPM



TC-3  
100 GPM @ 500 RPM

### ROTATION



### MULTIPLE PORTS FOR EASE OF PIPING

Three basic foot mount models of truck pumps are available. These models can be mounted in any position, including upside-down or sideways. Are provided with multiple outlets allowing a choice to simplify installation. All foot mount truck pumps utilize a 5-piece gear arrangement to intensify efficiency at lower drive speeds and are reversible if a reversible power take-off is used.

### TC-1044H

The model TC-1044H is designed especially for small delivery trucks that fill cylinders, trailer bottles, and sometimes larger consumer tanks. Inlet and outlet ports are 1½" NPT tapped. Utilizes a single mechanical shaft seal for maximum safety and ease of maintenance.

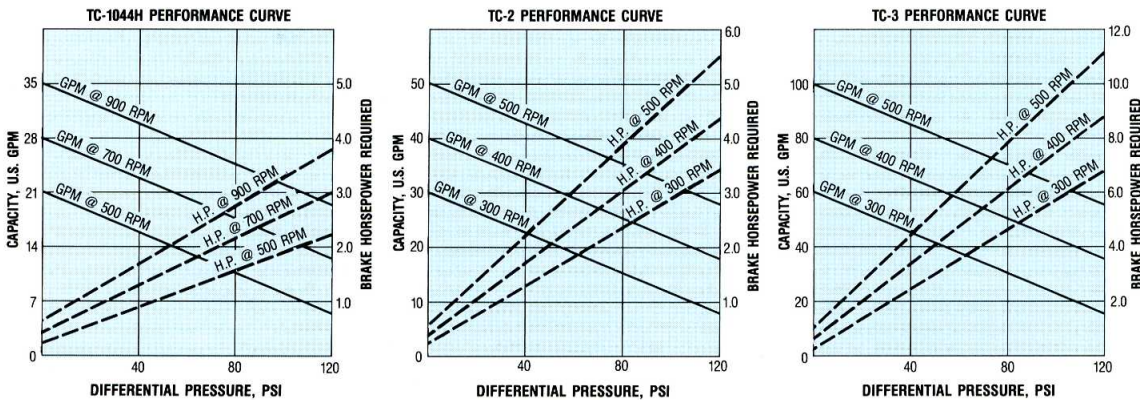
### TC-2

The model TC-2 is similar to the model TC-1044H but has greater capacity at higher differential pressures. Is reversible and utilizes a single mechanical shaft seal assembly. Also utilizes a 5-piece gear arrangement for maximum efficiency at high differential pressures. Inlet and outlet ports are 2½" NPT tapped. A flange option is available utilizing steel threaded weld-type flange, 2".

### TC-3

The model TC-3 is for maximum capacity high flow delivery trucks that utilize a 2" meter. Same basic design as the TC-2 model but with an additional secondary housing. Utilizes a 5-piece gear design and is reversible. Inlet and outlet ports are 2½" NPT tapped. A flange option is also available incorporating steel threaded or weld-type flanges, 2".

### PERFORMANCE CURVES<sup>4</sup>



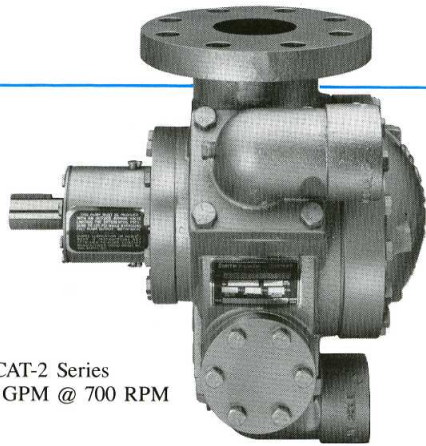
4. Performance curves based on delivery rates of propane at 75°F. Delivery rates will be reduced by approximately 15% at temperatures approaching 32°F. For exact capacity and horsepower, use empirical formulae provided under engineering data on the last page.

### PUMP SELECTION

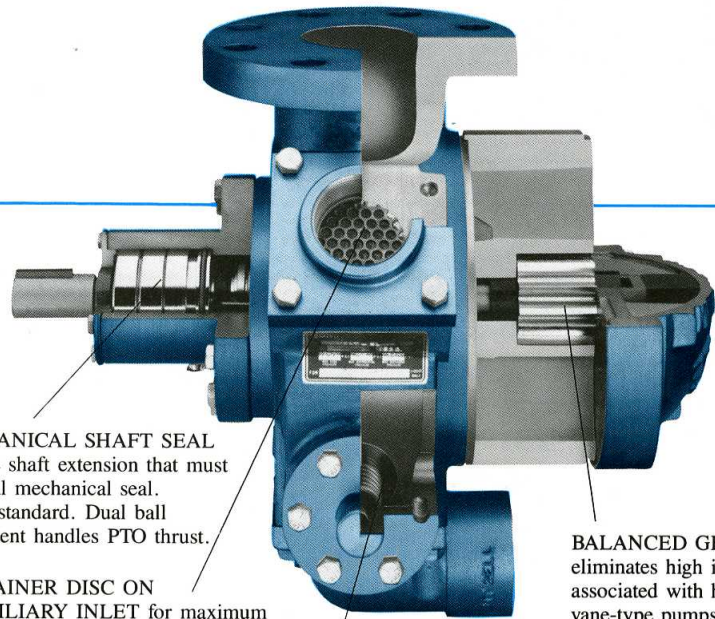
PUMPS ONLY	AVERAGE DELIVERY RATE IN GALLONS PER MINUTE <sup>1</sup>		MAXIMUM DIFFERENTIAL PRESSURE <sup>2</sup>	INLET/OUTLET SIZE, FEMALE THREADED	PUMP WEIGHT	ROTATION <sup>3</sup>
	40 PSID	75 PSID				
MODEL			PSI	INCHES	POUNDS	
TC-1044H	30 GPM, 900 RPM	25 GPM, 900 RPM	125	1½	50	REVERSIBLE
TC-2	42 GPM, 500 RPM	35 GPM, 500 RPM	125	2½	100	REVERSIBLE
TC-3	86 GPM, 500 RPM	70 GPM, 500 RPM	125	2½	135	REVERSIBLE

1. Rated capacities as follows: TC-1044H: 35 GPM; TC-2: 50 GPM; TC-3: 100 GPM.  
2. Maximum differential pressure limited to 125 PSID as outlined in U.L.-51 standard.  
3. See pump rotation diagrams for rotation vs. inlet/outlet piping.





MCAT-2 Series  
42 GPM @ 700 RPM



MCAT-3 Series  
85 GPM @  
700 RPM

SINGLE MECHANICAL SHAFT SEAL eliminates double shaft extension that must have an additional mechanical seal. SUPERSEAL is standard. Dual ball bearing arrangement handles PTO thrust.

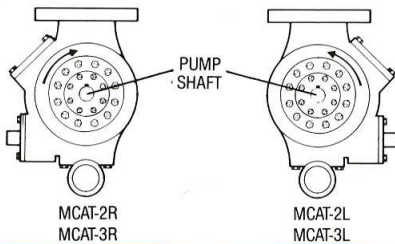
STRAINER DISC ON AUXILIARY INLET for maximum pump protection should the auxiliary inlet be used for self-loading.

BUILT-IN BYPASS RELIEF VALVE designed with stainless steel spring to minimize overpressure.

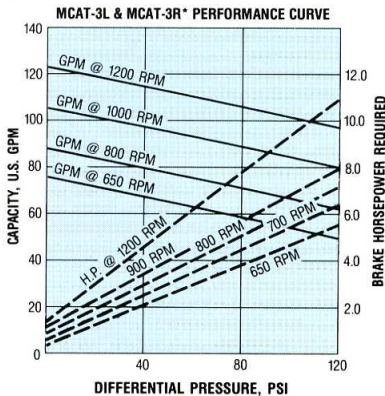
BALANCED GEAR SET eliminates high inertia associated with heavy rotored vane-type pumps. Ensures smooth, non-pulsating flow and maximizes useful life of universal joints on PTO. Gear set can easily be replaced WITHOUT disturbing the mechanical shaft seal.

## ROTATION

LOOKING FROM CAB-SIDE



## PERFORMANCE CURVES<sup>4</sup>



\*NOTE: Models MCAT-2L, MCAT-2R will deliver one-half the values shown.

4. Performance curves based on delivery rates of propane at 75°F. Delivery rates will be reduced by approximately 15% at temperatures approaching 32°F. For exact capacity and horsepower, use empirical formulae provided under engineering data on the last page.

## PUMP SELECTION

PUMPS ONLY	AVERAGE DELIVERY RATE IN GALLONS PER MINUTE @ 700 RPM <sup>1</sup>		MAXIMUM DIFFERENTIAL PRESSURE <sup>2</sup>	OUTLET SIZE <sup>3</sup>	PUMP WEIGHT
	40 PSID	75 PSID			
MODEL	40 PSID	75 PSID	PSI	INCHES	POUNDS
MCAT-2R, 2L	39	35	125	2" NPT FEMALE THREADED 90° ELBOW	108
MCAT-3R, 3L	78	70	125	"	137

## NO OVERSPEEDING DAMAGE

All Smith MCAT-series 3" flange mount truck pumps are designed for 1200 RPM maximum shaft speed and deliver comparably to other makes at 650 RPM PTO speed. This means damage associated with over-revving is eliminated and will allow for faster fuel deliveries where larger meters can be utilized.

## SINGLE MECHANICAL SEAL

The MCAT-series utilizes a SINGLE mechanical shaft seal instead of two that double shaft extended type pumps provide.

## HEAVY DUTY OPTIONS STANDARD

All MCAT-series pumps incorporate the heavy duty NSSA option (see option page in this catalog) as standard equipment. Aircraft quality steel gear sets and Tungsten Carbide idler gear shafts allow for maximum efficiency at higher differential pressures.

## BALANCED LOADING

Unlike vane pumps that are unbalanced, especially at higher differential pressures, all MCAT-series pumps feature balanced internal porting that greatly enhances pump life.

## EASE OF MAINTENANCE

All MCAT-series pumps feature the patented SUPERSEAL mechanical shaft seal assembly that does not have to be removed from the pump in the event the gear set needs to be replaced; no loose seal components to worry about.

## STRAINER DISC ON AUXILIARY INLET

All MCAT-series pumps incorporate a reinforced 30-mesh strainer disc on the auxiliary inlet should the pump ever be used to self load.

## OVERSIZED INTERNAL BYPASS RELIEF VALVE

All MCAT-series pumps are designed for minimal overpressure should the internal bypass relief valve ever open. Bypass valve porting is oversized to minimize damage due to cavitation. Internal relief valve is set at 150 psid and as such, an external bypass valve is required by the Underwriters Laboratories.

## OPTIONAL FLANGES

All MCAT-series pumps are provided with two 90° threaded elbows for the discharge and auxiliary inlet. Optional flanges includes a blind flange for the auxiliary inlet, threaded or weld type flanges, 2" NPT, for the discharge or auxiliary inlet.

1. Rated capacity for MCAT-3L, 3R is 85 GPM @ 700 RPM. Rated capacity for MCAT-2L, 2R is 42 GPM @ 700 RPM.
2. Maximum differential pressure limited to 125 PSID as outlined in U.L.-51 standard.
3. Optional flanges available; threaded or weld type, 2" NPT, for the discharge or auxiliary inlet.



# OPTIONS

## NSSA OPTION

The NSSA option is recommended when a pump must be operated on a continuous duty basis OR when the differential pressure requirement is over 125 PSI on a continual duty basis. The NSSA option can be specified for normal pump duty as well. In these applications, a 3-fold increase in pump life would be expected. Included in the NSSA option is a gear set fabricated from an aircraft quality steel, and idler gear shafts made from Tungsten Carbide. The NSSA option is automatically included in the MCAT-series 3-inch flange mount truck pumps as standard equipment. Not available for D-series or E-series pumps.

## NS OPTION

The NS option is identical to the NSSA option BUT does not include the upgraded Tungsten Carbide idler gear shafts. The NS option is recommended for systems where higher than normal differential pressures may be encountered on an intermittent basis.

## SUPERSEAL OPTION

The SUPERSEAL option is provided as standard equipment on all D-series, E-series, and MCAT-series pumps. The SUPERSEAL utilizes a thermoplastic seal ring that continually seats itself EVEN in conditions of high vapor concentrations. Because of the unique shaft seal assembly design, the seal ring actually rotates at one-half shaft speed, greatly increasing productive seal life.

All Smith mechanical shaft seal assemblies are dynamically tested in an external testing apparatus at the factory and are shipped in the as tested state. All seal components are preassembled onto the pump shaft for ease of replacement in the pump should it ever be necessary.

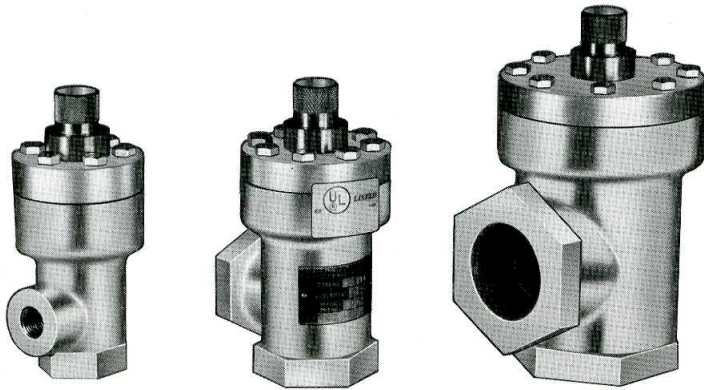
## “L” OPTION

Specify the “L” option for increased pump capacity. Available for models MC-1044, MC-1044H, MC-2, MC-3, MC-4, and MC-5, the “L” option will boost capacity by 25% at the same rated motor speed.



# ACCESSORIES

## BYPASS VALVES for pressure control



WW-series bypass valves

Smith differential bypass valves offer the ultimate in simplicity and utilize superior materials for longest life.

The Smith bypass valve is CHATTERFREE due to the unique guide-piston design. The guide-piston is manufactured from STAINLESS STEEL for tough applications and to minimize corrosion damage. The spring is also STAINLESS STEEL and is designed for an infinite number of cycles.

All Smith bypass valves incorporate a unique flow plate to evenly dissipate flow when the valve opens. This eliminates chatter and minimizes overpressure even at higher flow rates. The valve is designed for continuous flow applications as well and can be used to meter flow if desired.

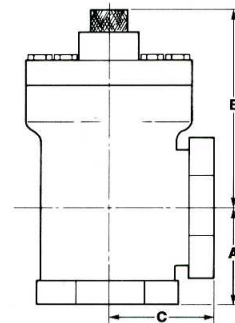
Underwriters Laboratories requires that all pumps except models DW-1Z, EG-1Z, DW-HZ, EC-HZ, MC-1, and GC-1 be fitted with external bypass relief valves set no higher than 125 PSID.

## VALVE SELECTION

MODEL	SIZE	PUMP RECOMMENDED	FLOW (GPM)
WW-120	1/2 x 1/2	DW-1Z, EG-1Z, MC-1, GC-1	5-10
WW-340	3/4 x 3/4	DW-HZ, EC-HZ	10-15
WW-100	1 x 1	MC-1044, MC-1044H, TC-1044H	20-35
WW-114	1 1/4 x 1 1/4	MC-2, MCAT-2, MC-2H, TC-2	35-50
WW-112	1 1/2 x 1 1/2	MC-3, MCAT-3, MC-3H, TC-3	50-100
WW-200	2 x 2	MC-4, MC-4H	100-150
WW-212	2 1/2 x 2 1/2	MC-5, MC-5H	150-250

## DIMENSIONS

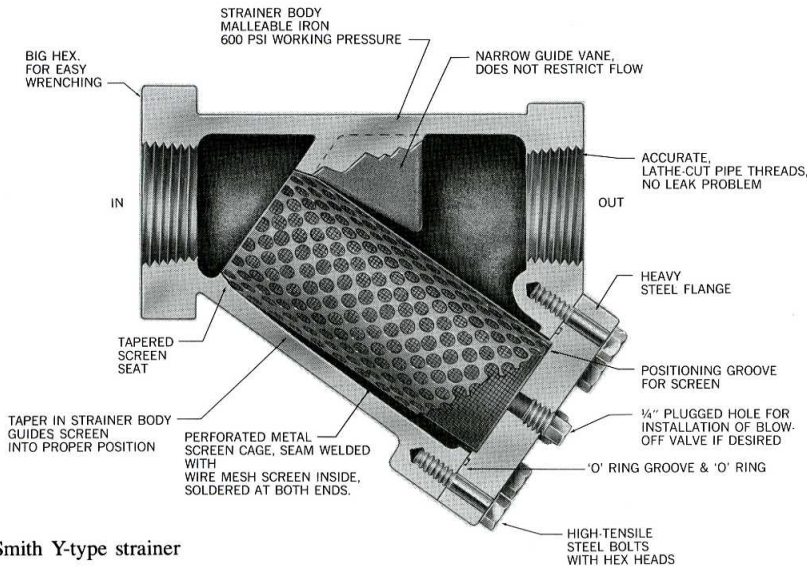
MODEL	SIZE	A	B	C
WW-120	1/2 x 1/2	1-5/8	5-7/16	1 1/4
WW-340	3/4 x 3/4	1-5/8	5-7/16	1 1/4
WW-100	1 x 1	1-7/8	5-5/8	2-5/8
WW-114	1 1/4 x 1 1/4	1-7/8	5-5/8	2-5/8
WW-112	1 1/2 x 1 1/2	1-7/8	5-5/8	2-5/8
WW-200	2 x 2	3	6-1/8	3 1/4
WW-212	2 1/2 x 2 1/2	3	6-1/8	3 1/4





# ACCESSORIES

## Y-TYPE STRAINERS for pump protection



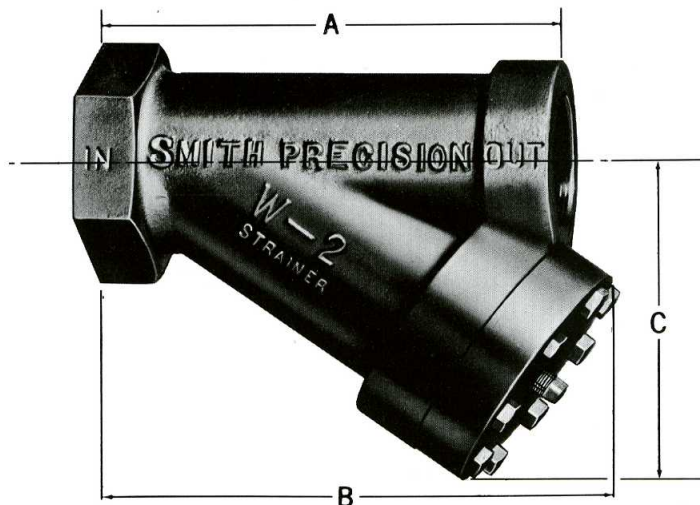
Smith Y-type strainer

All Smith Y-type strainers utilize ductile iron construction with working pressure of 600 WOG, test pressure 2000 PSI. Reducing sizes (3 x 2½, 2 x 1½, etc.) are available which eliminate steel bushing or extra fitting in the pipeline. This results in greater safety and less expense. The screen is easy to replace due to exclusive narrow guide vane and taper in the strainer body. The screen slides into position properly, preventing breakage or buckling which otherwise could allow foreign matter to pass through without user's knowledge. All screens used are reinforced mesh that have less than half the resistance-to-flow of other types made of perforated metal. All pipe threads in the strainer body are lathe-cut so as to seal perfectly, and all Smith strainers are tested against leakage at the factory before shipment.

Strainer screens are available in either BRASS 40-MESH or 300-SERIES STAINLESS STEEL 80-MESH.

### STRAINER SELECTION

STRAINER TYPE NO.	PIPE SIZES		A	B	C
	IN	OUT			
W-1	1"	¾"	6 ⅜	7	4 ½
W-1	1"	1"	6 ⅜	7	4 ½
W-1	1 ¼"	¾"	6 ⅜	7	4 ½
W-1	1 ¼"	1"	6 ⅜	7	4 ½
W-1	1 ¼"	1 ¼"	6 ⅜	7	4 ½
W-2	2"	1 ½"	8 ⅜	9	6 ⅝
W-2	2"	2"	8 ⅜	9	6 ⅝
W-3	2 ½"	2 ½"	10 ¼	11 ¼	7 ½
W-3	3"	2 ½"	10 ¼	11 ¼	7 ½
W-3	3"	3"	10 ¼	11 ¼	7 ½





# ENGINEERING DATA

## PERFORMANCE FORMULA

### USE OF PUMP FORMULAE

The performance formulae for Smith pumps have a very real advantage over simple performance curves. Such curves as provided in this bulletin are accurate as they are viewed. The performance formulae, however, give a very accurate representation of pump characteristics as variables, such as pump slippage, are taken into account. Since the proper installation has a very important bearing on performance of a pump handling liquefied gases, our Engineering Group will gladly review a proposed piping layout without obligation. Supply us with a complete drawing or sketch, together with a list of material showing make, size, and type of all valves and fittings in both intake and discharge lines. The review will be made with due regard for all applicable engineering principles.

#### Formula 1:

$$Q_d = Q_r \left[ \frac{N_d}{N_r} - F_s P_d \right]$$

#### Formula 2:

$$HP = \left[ \frac{8.5(N_d Q_r)}{N_r} \times 10^{-4} \right] \times [10 + P_d]$$

Where  $Q_d$  = Actual pump delivery in U.S. gallons per minute

$Q_r$  = Rated transfer capacity in GPM (from Table A)

$P_d$  = Differential pressure being pumped against, in PSI

HP = Horsepower required

$N_d$  = Actual speed pump driven at, in RPM

$N_r$  = Rated speed of pump (from Table A)

$F_s$  = Slippage factor, a viscosity variable found in Table B

**TABLE A: Rated Transfer Capacities**

MODEL	RATED CAPACITY (GPM)	RATED SPEED (RPM)
EG-1Z, DW-1Z	10	3600
EC-HZ, DW-HZ	15	3600
MC-1, GC-1	10	3600
MC-1044	20	1800
MC-1044H	35	1800
TC-1044H	35	900
MC-2	50	1800
MC-2H	50	1500
MC-3	100	1800
MC-3H	100	1500
TC-3	100	500
MC-4	150	1800
MC-4H	150	1500
MC-5	200	1800
MC-5H	200	1500

**TABLE B: Slippage Factor,  $F_s$**

	+100°F	+80°F	+60°F	+40°F	+20°F	0°F	-20°F	-40°F
Butane	.0033	.0032	.0031	.0028				
Propane	.0042	.0040	.0038	.0036	.0034	.0033	.0032	
Anhydrous Ammonia	.0049	.0045	.0042	.0038	.0033	.0030	.0026	

NOTE: Slippage factors for other liquefied gases and liquids will be provided if the value of the viscosity at working temperature is supplied.



## EXCHANGE PLAN

At any time, you may EXCHANGE your Smith pump for a guaranteed equal to new factory reconditioned pump. See your nearest Smith Pump distributor or contact the factory for details.

The EXCHANGE PLAN affords us a constant influx of used pumps returning from the field. Many product improvements have been initiated as the result of a careful analysis of wear associated damage for the installation the pump was used in. All exchange pumps are shipped with the latest design and/or product improvements and carry the same warranty as a new pump. Mechanical shaft seal assemblies can also be exchanged.

## LITERATURE

Well over 100 separate literature sheets are available encompassing a wide selection of topics. Ask for sheet AL-P that lists literature available that is free of charge.

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