

SMITH PRECISION PUMPS FOR LIQUEFIED GASES

**CARBON DIOXIDE
ANHYDROUS AMMONIA
FREONS
SULFUR DIOXIDE
NITROUS OXIDE
BUTANE
PROPANE
and similar
LIQUEFIED GASES**

**ALSO OTHER LIQUIDS
OF SAME OR
HIGHER VISCOSITIES
UP TO 100,000 S.S.U.**

CHOICE OF MODELS FOR:

High volume transfer
Bulk transfer • Loading tank trucks
Plant operations • Truck delivery
Circulating systems

ALL MODELS HAVE THESE IMPORTANT ADVANTAGES:

- Precision construction • Efficient performance
- Superior materials for long life
- No periodic maintenance, lubricating, or servicing
- Patented mechanical seal providing leak-free operation



SAFETY FIRST

Smith Precision Pumps are designed for safety. The mechanical seal is the best in the industry, providing leak-free operation for liquefied gases. The pump case is manufactured of the strongest, longest wearing materials available. You know your system is safe with a Smith Precision Pump.

QUALITY

The precision machining in Smith Precision Pumps provides built-in quality. Only the finest materials are used in the production of Smith pumps. Our machinists are craftsmen, our fabrication men are specialists; their skills are reflected in the quality of Smith Precision Pumps. No expense or effort is spared to ensure that exacting Smith specifications are met. The engineering-design is proven and backed by years of experience, all to assure that you have the quality you demand for satisfaction.

ECONOMY

Smith Precision Pumps are economical from all standpoints; initial cost, cost of operation, and cost of repair or replacement. No lubrication or day-to-day servicing of any kind is required. With proper installation in an efficient piping system, Smith Precision Pumps perform consistently under the most exacting conditions, and always at the very lowest over-all cost. The Smith exchange plan available (see back cover) provides an ECONOMICAL means for the replacement of a worn pump by an exchange pump restored to full efficiency.

EFFICIENCY

In the highly competitive liquefied gas industries, efficiency of operation is absolutely essential. Smith Precision Pumps have the fastest delivery rates coupled with longest service life. Efficiency is signified by installations in which Smith pumps transfer hundreds of thousands of gallons, even millions of gallons, without servicing or repair. The reason is simple; Smith Precision Pumps in addition to being built of the finest materials, have a unique design which allows parts to adjust automatically for wear. Top efficiency is thereby maintained for long periods of time.

EASE OF INSTALLATION

Most Smith Precision Pumps have multiple outlets and can be adapted to a number of installation arrangements. Flanges are available, for ease of piping, on many models. No troublesome chain and belt drives or gear reduction motors are required. Motor-driven models are direct-connected to standard speed low-cost electric motors. By a simple change of shaft rotation, most Smith pump models can be used to pump in or out through the same piping.

EXPERIENCE

Smith Precision Products Company has specialized in the manufacture of liquefied gas pumps since 1938. Long experience has enabled us to develop materials of construction particularly suited for liquefied gas service. Our records cover the performance of such pumps in many varied types of installations. We can advise you with certainty whether a Smith Pump is suited to your application.

SMITH PUMPS ARE READILY AVAILABLE

The Smith Precision Products Company has extensive experience with pumps for all the listed liquefied gases, and has developed materials and specifications covering each of them. In addition to these standard pumps, special pumps for the same or other liquefied gases or liquids can also be supplied. Smith Pumps are fitted for the particular liquid specified. Pumps for one service should not be used to pump other fluids. The use of other fluids may cause unsatisfactory performance. Frequently, pumps can be fitted to handle several different liquefied gases and/or liquids if these fluids are specified in advance to Smith Precision Products Company. Prices vary slightly depending upon type of service. Pumps having red labels are for butane, propane, and associated hydrocarbons. Pumps having green labels show the name of the liquid for which the pump was designed.

When ordering or inquiring about either standard or special pumps, please specify the particular liquefied gases or liquids to be handled, the temperature range, pump inlet pressure, and differential pressure required, if known. Our engineering department is set up to assist you with pump selection and proper pump installation, two very important factors in obtaining satisfactory service from a liquefied gas pumping system. See also pages 4, 14, 15.

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for the following liquefied gases:

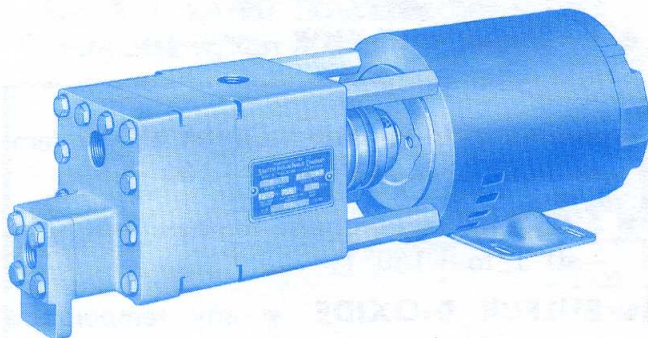
- **CARBON DIOXIDE** refrigerated at -20° F. to $+15^{\circ}$ F.
- **ANHYDROUS AMMONIA** at any temperature from -25° F. to $+100^{\circ}$ F.
- **FREONS**, all numbers, temperatures from -40° F. to $+150^{\circ}$ F.
- **SULFUR DIOXIDE** at any temperature from -15° F. to $+150^{\circ}$ F.
- **NITROUS OXIDE** refrigerated at -40° F. to $+15^{\circ}$ F.
- **BUTANE, PROPANE**, and associated hydrocarbons or mixtures thereof at ambient temperature.

SPECIAL PUMPS CONSTRUCTED FOR SAME OR OTHER LOW VISCOSITY TO HIGH VISCOSITY LIQUIDS, WITHIN THE FOLLOWING GENERAL LIMITATIONS (contact factory for specifics):

Temperature, -150° F. to $+400^{\circ}$ F.
 Inlet pressure, 4 psiA to 1000 psig
 Differential pressure, 800 psi maximum
 Drive speed, 300 to 3600 RPM
 Capacity, 2 to 250 gpm

SMALL CAPACITY SMITH PUMPS

Models SQ-1, SQ-H, SQ-HH, and SQ-HH8 pumps with motor



MODEL SQ-1 PUMP CAPACITIES AT 1800 RPM

5 GPM with vapor return line
4 GPM against 40 psi differential pressure
3 GPM against 75 psi differential pressure

MODEL SQ-H PUMP CAPACITIES AT 1800 RPM

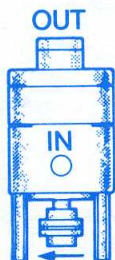
7 GPM with vapor return line
6 GPM against 40 psi differential pressure
5 GPM against 75 psi differential pressure

MODEL SQ-HH PUMP CAPACITIES AT 1800 RPM

13 GPM with vapor return line
11 GPM against 40 psi differential pressure
9 GPM against 75 psi differential pressure

MODEL SQ-HH8 PUMP CAPACITIES AT 1200 RPM

(1800 RPM not recommended)
13 GPM with vapor line return
10 GPM against 40 psi differential pressure
7 GPM against 75 psi differential pressure



Models SQ-1, SQ-H, SQ-HH, and SQ-HH8
3/4-inch inlet and outlet, threaded

WRITE FACTORY FOR DIMENSION DRAWINGS (SPECIFY MODEL).

ADVANTAGES OF SLOW MOTOR SPEEDS

All electric motor-driven pumps listed in this catalog show motors designed to drive the pumps at the maximum allowable shaft speed, which is 1800 RPM except for MC-1 and GC-1 with butane, propane, and associated hydrocarbons. (See catalog CP-3.) The 1800 RPM motor units have the highest efficiency and the lowest costs. However, units driven with either 1200 RPM or 900 RPM motors may be better for certain types of installations. Slow motor speeds have two important advantages:

1. **LONGER WEAR.** Pumps run slower than maximum speed will wear longer than units driven at 1800 RPM. For this reason, we recommend that 1800 RPM motors be used only in intermittent duty applications involving an average of 2 hours per day running time, or in installations where the total running time is expected to be short. Experience has shown that 1200 RPM motors can actually double pump life, as based on the total volume of liquid handled before repairs are required. The 900 RPM motors can triple pump life on the same basis.

2. **QUIETER OPERATION.** Pumps run slower than maximum speed will be quieter. Noise is difficult to describe,

ADVANTAGES:

1. Designed specifically for continuous recirculation service with non-lubricating fluids.
2. Large mechanical seals provide longer wear life in difficult operations.
3. Easy "convertibility" to smaller or larger capacity pump while retaining same external dimensions.
4. No periodic lubrication, adjustment, or other servicing required.

All the Model SQ-series pumps use the heavy-duty patented Smith mechanical seals normally used in the higher capacity units. Their heavier construction permits them to be successfully employed in situations where intermediate capacity between that of the MC-1 and the MC-1044 is required.

Each model has a built-in bypass valve which must be connected with an external line, and is permanently set at 90 psid. Like the MC-1 and GC-1 pumps, the SQ-series units mount directly onto the electric motor. For continuous duty service at slower than rated speeds the SQ-series pumps stand up best to extremes of heat and cold, variable viscosity, and changing work loads. Liquids handled below atmospheric pressures pose no problems as the seal can easily be modified. Foot mounting brackets are available.

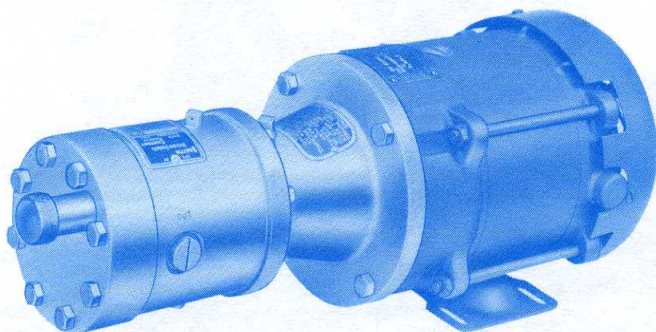
but, in general, a 1200 RPM unit makes half as much noise, and a 900 RPM unit makes one-third as much noise, compared to an 1800 RPM unit.

When slow speed motors are being utilized with a certain model of pump, the volume of liquid pumped is, of course, less than the volume would have been at 1800 RPM. To pump a required volume using a slow speed motor, it is necessary to use a pump with a greater displacement. Examples are given on page 15 of the necessary calculations for determining pump and horsepower requirements at slow motor speeds.

Savings with slow motors and larger pumps may be summarized as follows:

- A. Such units pump at least twice as many gallons of liquid without needing repairs.
- B. Such units cost substantially less than twice the cost of 1800 RPM units.
- C. Such units save "down time" costs as they are "down" less than half as often.

MODEL MC-1 PUMP WITH TOTALLY ENCLOSED MOTOR

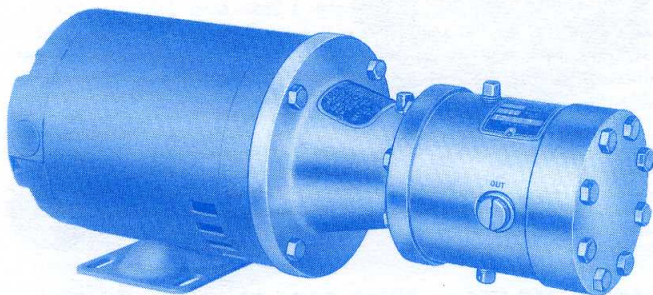


MODEL MC-1 PUMP CAPACITIES AT 1800 RPM

- 5 GPM with vapor return line.
- 4 GPM against 40 psi differential pressure.
- 3 GPM against 75 psi differential pressure.

The Model MC-1 pump mounts directly on the electric motor. Operates in counter-clockwise direction with pump shaft pointing toward observer. Inlet and outlet, $\frac{3}{4}$ -inch threaded. For best results, use $1\frac{1}{4}$ -inch or 1-inch pipe or hose for inlet line, reducing at pump through Smith W-1 ($1\frac{1}{4} \times \frac{3}{4}$) or W-1 ($1 \times \frac{3}{4}$) strainer.

MODEL GC-1 PUMP WITH MOTOR



MODEL GC-1 PUMP CAPACITIES AT 1800 RPM

- 5 GPM with vapor return line.
- 4 GPM against 40 psi differential pressure.
- 3 GPM against 75 psi differential pressure.

The Model GC-1 pump mounts directly on the electric motor. Operates in clockwise direction of rotation with pump shaft pointing toward observer. Inlet and outlet, $\frac{3}{4}$ -inch threaded. For best results, use $1\frac{1}{4}$ -inch or 1-inch pipe or hose for inlet line, reducing at pump through Smith W-1 ($1\frac{1}{4} \times \frac{3}{4}$) or W-1 ($1 \times \frac{3}{4}$) strainer.

ADVANTAGES:

1. Precision construction for high performance and long life.
2. Finest materials used throughout.
3. No periodic lubrication, adjustment, or other servicing required.
4. Highest efficiency of any small pump made.

The Model MC-1 and GC-1 pumps both include the patented Smith mechanical shaft seal. Their precision construction enables highest differential pressures for faster transfer. Model MC-1 and GC-1 pumps are strongly recommended as having the lowest long-run cost where heavy duty and maximum performance are required. The Model MC-1 and GC-1 pumps can both be driven with electric motors. Recommended electric motor is $\frac{1}{2}$ HP at any differential pressure up to 75 psi, when speed is 1800 RPM. Each model has a built-in bypass valve discharging within the pump, and factory set for 100 psi differential pressure.

PARTICULAR ADVANTAGE OF MODEL MC-1:

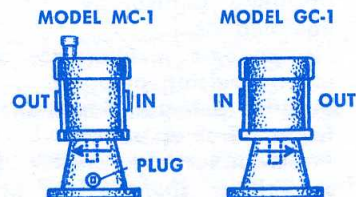
Bypass valve *easily adjustable* in the field, for other differential settings.

PARTICULAR ADVANTAGE OF MODEL GC-1:

- (a) Bypass valve *permanently* set at factory to 100 psi differential pressure to prevent improper adjustment.
- (b) Mechanical shaft seal, exposed only to inlet pressure, lengthens shaft seal life.

MODEL MC-1 or GC-1 WITH FOOT MOUNT

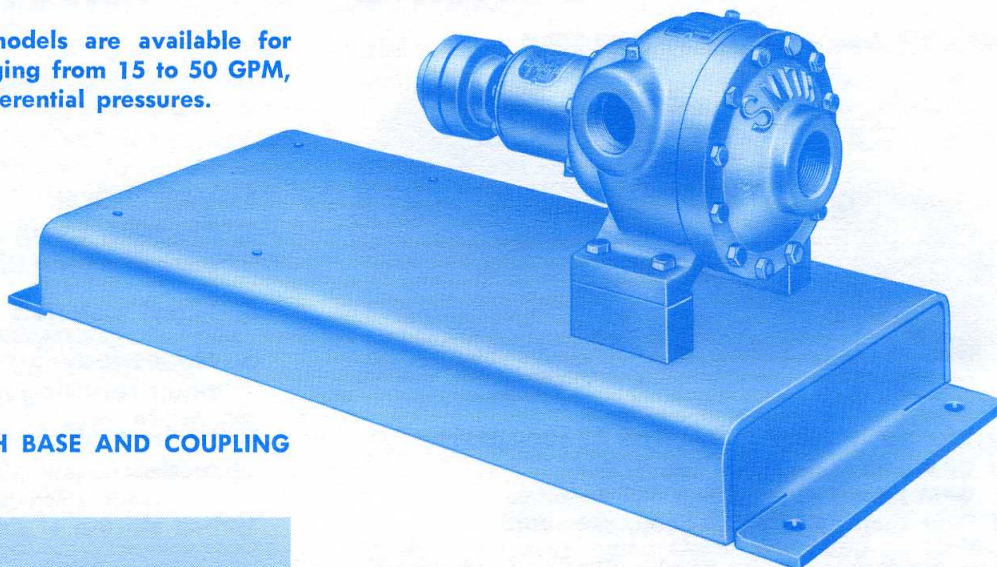
The Model MC-1 or GC-1 pumps are available with a foot-mount bracket, so that these pumps can be mounted on a separate base with non-flange type motor. The foot bracket pump options have all other characteristics identical to the standard models. The convenient foot bracket allows these pumps to be used with motors and bases that the customer may already have. The foot-mount option is available at no extra charge, for Models MC-1 and GC-1. Specify frame size of motor to be used, if base is also to be supplied.



WRITE FACTORY FOR DIMENSION DRAWINGS (SPECIFY MODEL).

MEDIUM CAPACITY SMITH PUMPS

Six Smith Precision Pump models are available for operation with capacities ranging from 15 to 50 GPM, depending on model and differential pressures.



MODEL MC-1044 PUMP WITH BASE AND COUPLING

MODEL MC-1044 has a capacity up to 20 GPM. Has 1½-inch threaded ports at sides, and an alternate 1½-inch threaded port at end.

MODEL MC-1044H has a capacity up to 35 GPM. Has identical mounting dimensions to MC-1044.

MODEL MC-2, a widely used general-purpose pump, has a capacity of up to 50 GPM. Has 2½-inch threaded inlet and outlet port at each side.

MODEL MC-2F is identical to the Model MC-2 in every respect, except that 2-inch steel flanges are provided at the inlet and outlet ports, threaded or for welding.

MODELS ATC-2L and ATC-2R with capacity up to 50 GPM, also have flanges, with a 2½-inch end port and two 2-inch side ports.

MODEL MC-2Q can develop up to 150 psi differential pressure for unusual services, and is equipped with herringbone-type gears for extra-quiet operation. Has 2½-inch threaded inlet and outlet port at each side.

ADVANTAGES:

1. Precision construction for high performance and long life.
2. Highest quality materials throughout.
3. Designed particularly for bulk transfer of liquefied gases.
4. No periodic maintenance or lubricating or other servicing required.
5. Includes patented Smith shaft seal assembly for leak-free operation.
6. Direct-connected to electric motor without use of belt or chain drives or gear reduction boxes.
7. Motor and pump have separate shafts, allowing either unit to be removed as required.

MODEL MC-1044 PUMP CAPACITIES AT 1800 RPM

20 GPM with vapor return line.

17 GPM at 40 psi differential with 1½ HP motor.

14 GPM at 75 psi differential with 2 HP motor.

The Model MC-1044 pump has a transfer capacity of up to 20 GPM with a vapor return line and 1½ HP motor. Recommended for use with a 1½ or 2-inch inlet line. Operates in clockwise or counter-clockwise direction, with proper consideration of inlet and outlet ports (see diagram). Strainer and bypass valve are extra equipment.

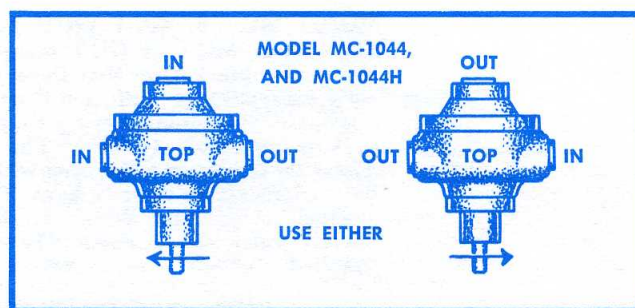
MODEL MC-1044H PUMP CAPACITIES AT 1800 RPM

35 GPM with vapor return line.

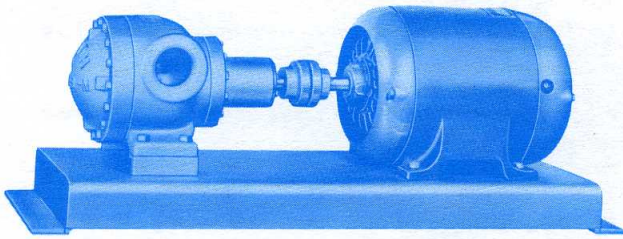
30 GPM at 40 psi differential with 2 HP motor.

25 GPM at 75 psi differential with 3 HP motor.

The Model MC-1044H pump has a transfer capacity up to 35 GPM with vapor return line. Inlet piping should be 2-inch. Operates in clockwise or counter-clockwise direction, with proper consideration of inlet and outlet ports (see diagram). Strainer and bypass valve are extra equipment.



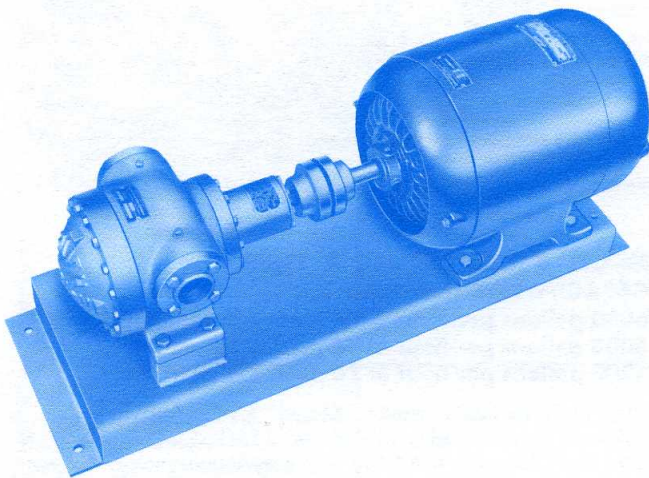
**MODEL MC-2
MODEL MC-2H**



MODEL MC-2 PUMP CAPACITIES AT 1800 RPM
 50 GPM with vapor return line.
 42 GPM at 40 psi differential with 3 HP motor.
 35 GPM at 75 psi differential with 5 HP motor.

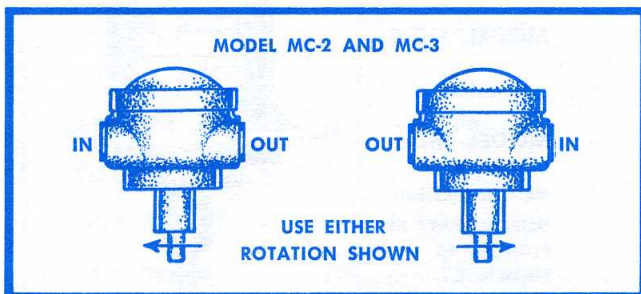
The Model MC-2 pump has a transfer capacity of up to 50 GPM with a vapor return line and 3 HP motor. Has 2½-inch inlet and outlet ports in sides of pump, and rotation is reversible. Strainer and bypass valve are extra equipment. Model MC-2H is available for use with 50 and 25 cycle motors. At 1500 RPM has same capacities as shown above.

MODEL MC-2F

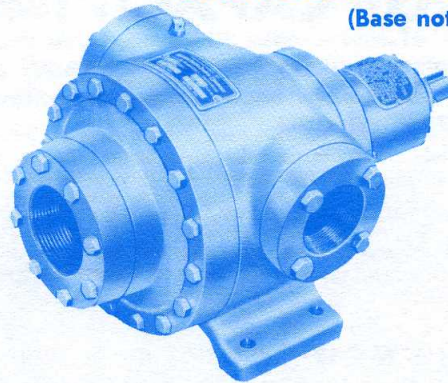


MODEL MC-2F PUMP CAPACITIES AT 1800 RPM
 50 GPM with vapor return line.
 42 GPM with 40 psi differential with 3 HP motor.
 35 GPM at 75 psi differential with 5 HP motor.

Identical with MC-2 in every respect, except that Model MC-2F has steel flanges on both ports, 2-inch threaded or welding types.



**MODEL ATC-2L and ATC-2R PUMP
(Base not shown)**

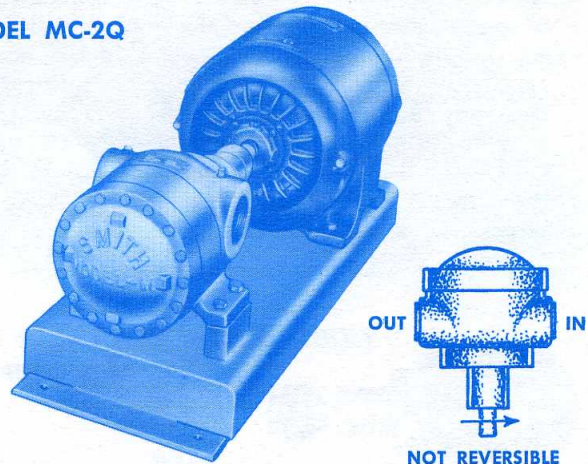


**MODEL ATC-2L, ATC-2R PUMPS
CAPACITIES AT 1800 RPM**

50 GPM with vapor return line.
 42 GPM at 40 psi differential with 3 HP motor.
 35 GPM at 75 psi differential with 5 HP motor.

The Model ATC-2L and ATC-2R pumps are used in services similar to MC-2, with the advantage of having flanges, and an end port available. The ATC-2L and ATC-2R pumps have a 2½-inch flanged end port and two 2-inch flanged side ports. The ATC-2R is designed for clockwise rotation, with shaft pointing toward observer, with inlet port in end cover. The Model ATC-2L is designed for counter-clockwise rotation, similarly viewed, with inlet port in end cover. As the diagrams on page 10 illustrate, other installation arrangements are possible, by reversing shaft rotation. Strainer and bypass valve are extra equipment.

MODEL MC-2Q



MODEL MC-2Q PUMP CAPACITIES AT 1800 RPM

50 GPM with vapor return line.
 42.5 GPM at 50 psi differential with 3 HP motor.
 35 GPM at 100 psi differential with 5 HP motor.
 27.5 GPM at 150 psi differential with 7½ HP motor.

The Model MC-2Q pump is the very finest positive-displacement pump on the market. The MC-2Q can replace many piston pumps, and develops the higher pressures without surges. Recommended for the most difficult jobs. For differential pressures higher than 150 psi, staging of two or more Smith Precision Pumps can be considered. Write our engineering department for details, giving required capacity at maximum differential pressure. Strainer and bypass valve extra equipment. Rotation is clockwise with shaft pointing toward observer. NOT reversible. Has 2½-inch inlet and outlet ports in sides of pump.

WRITE TO FACTORY FOR DIMENSION DRAWINGS OF MEDIUM SIZED PUMPS (SPECIFY MODEL).

LARGE CAPACITY SMITH PUMPS

Four models of Smith Precision Pumps are available for high volume operations, where capacity required is from 70 to 250 GPM.

MODEL MC-3 is recommended as a heavy duty pump with a capacity of up to 100 GPM using a vapor return line. Has 2½-inch threaded ports on sides of pump.

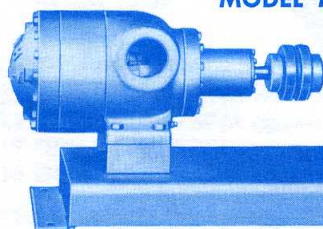
MODELS ATC-3R and ATC-3L are recommended for installations requiring "corner" piping arrangements. Same capacity as MC-3. Equipped with flanges, either threaded or welding types. End port 2½-inch, two side ports, 2-inch.

MODEL MC-4 is recommended when capacities up to 150 GPM are required, using vapor return line. Has 4-inch end port for inlet, and 2½-inch outlet port.

MODEL MC-5 is designed for the very highest capacity requirements up to 200 GPM, using vapor return line. Has 4-inch inlet end port, and 2½-inch outlet port.

CONVERSION OF MODELS

By adding parts, MC-3 and ATC-3 pumps can be converted to MC-4, MC-5 or pumps of equivalent higher capacities, should the need arise. Pumps can be converted economically either in the field or at the factory. Thus, the smaller pump will not become obsolete as business expands. Larger pumps have almost the same mounting dimensions, but may require larger electric motors.



MODEL MC-3 or MC-3H WITH BASE AND COUPLING

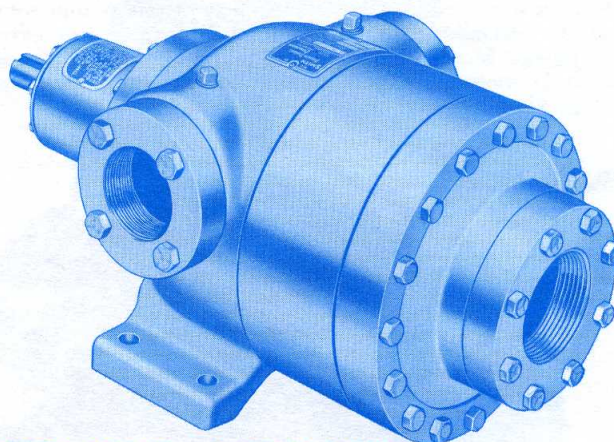
MODEL MC-3 PUMP CAPACITIES AT 1800 RPM
 6000 gallons per hour with vapor return, 5 HP motor.
 5000 gallons per hour at 40 psid, 5 HP motor.
 4200 gallons per hour at 75 psid, 7½ HP motor.

The high capacity Smith Model MC-3 is designed for 3-inch inlet piping, but can be used with 2½-inch inlet pipe, valves, and fittings. Ports located on sides are threaded for 2-inch pipe. Pump is reversible. Bypass valves and strainers are extra equipment. Model MC-3H is available for use with 50 and 25 cycle motors. At 1500 RPM has same capacities as shown above.

ADVANTAGES:

1. Designed particularly for heaviest volume bulk transfer of liquefied gases.
2. Highest quality materials throughout.
3. Precision construction for high performance and long life.
4. Includes patented Smith shaft seal assembly for leak-free operation.
5. No periodic maintenance, lubricating, or other servicing required.
6. Direct connected to electric motor without use of belt or chain drives or gear reduction boxes.
7. Motor and pump have separate shafts, allowing either unit to be removed as required.

MODEL ATC-3R or ATC-3L



MODEL ATC-3R and ATC-3L PUMP CAPACITIES AT 1800 RPM

6000 gallons per hour with vapor return, 5 HP motor.
 5000 gallons per hour at 40 psid, 5 HP motor.
 4200 gallons per hour at 75 psid, 7½ HP motor.

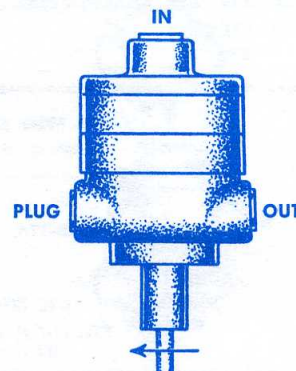
The high capacity Smith Model ATC-3 pumps have a 2½-inch flanged end port and two 2-inch flanged side ports. The steel flanges, available in threaded or welding types, provide an advantage for ease of installation. The Model ATC-3R is designed for clockwise shaft rotation, with shaft pointing at observer. The Model ATC-3L is designed for counterclockwise shaft rotation, similarly viewed. Refer to diagrams on page 10 for alternate installation arrangements when shaft rotation is reversed. Bypass valves and strainers are extra equipment. Can be supplied with base and coupling (not shown).

MODEL MC-4

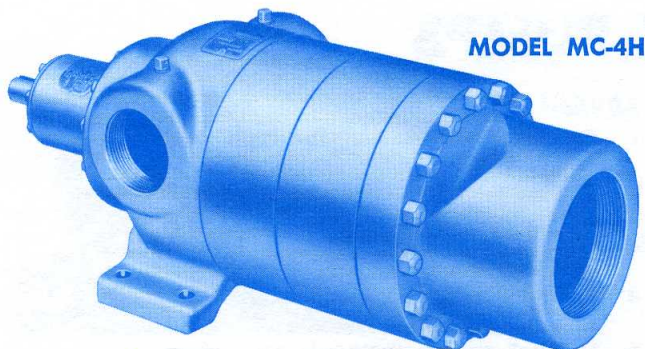
AND

MODEL MC-5

NOT REVERSIBLE
 MUST ALWAYS BE
 PLUGGED AS
 SHOWN



WRITE FACTORY FOR DIMENSION AND INSTALLATION DRAWINGS FOR PARTICULAR MODEL.



MODEL MC-4H

(Base not shown)

**MODEL MC-4 (with 4-inch inlet port)
CAPACITIES AT 1800 RPM**

9000 gallons per hour with vapor return, 7½ HP motor.
7500 gallons per hour at 40 psid, 7½ HP motor.
6300 gallons per hour at 75 psid, 10 HP motor.

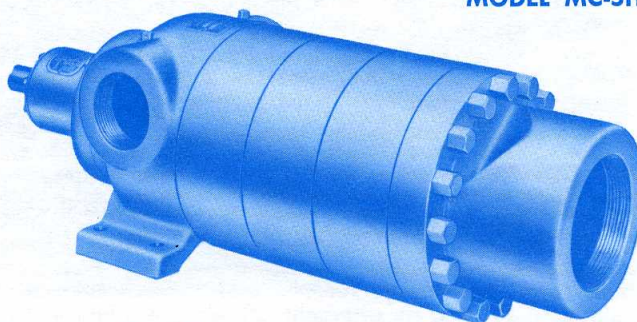
The Model MC-4 pump, with 4-inch inlet port, provides the necessary capacity for fast loading and unloading. Since the pump inlet is through the end cover, pump starvation is minimized. To take advantage of this exclusive feature, the pump must turn counter-clockwise, as viewed with shaft pointing toward observer. The discharge likewise must be taken from the right side port, similarly viewed. Pump is not reversible. Bypass valve and strainer are extra equipment. Model MC-4H is available for use with 50 and 25 cycle motors. At 1500 RPM has same capacities as shown above.

**MODEL MC-5 (with 4-inch inlet port)
CAPACITIES AT 1800 RPM**

12000 gallons per hour with vapor return, 10 HP motor.
10000 gallons per hour at 40 psid, 10 HP motor.
8500 gallons per hour at 75 psid, 15 HP motor.

The Model MC-5 pump with 4-inch port is the highest capacity Smith pump in regular production. Refer to factory for special pumps of still higher capacity. The Model MC-5 must turn counter-clockwise with the shaft pointing toward observer, and the discharge must be taken from the right side port, with the inlet in the end port, as explained for the Model MC-4 pump. Pump is therefore not reversible. Bypass valves and strainers are extra equipment. Model MC-5H is available for use with 50 and 25 cycle motors. At 1500 RPM has same capacities as shown above.

**MODEL MC-5
MODEL MC-5H**



(Base not shown)

TABLE 2. APPROXIMATE WEIGHTS OF SMITH PUMPS AND MOTORS

Model Number	Weight Pump only (Lbs.)	Shipping Wt. Pump only (Lbs.)	Shipping Wt. Pump, base and Coupling (Lbs.)	Shipping Wt. Complete Unit, with Motor (Lbs.)
MC-1, GC-1	20	25	80	75
MC-1044, MC-1044H	50	60	125	200 to 275
MC-2, MC-2F, MC-2H	75	85	170	285 to 350
MC-2Q	100	115	200	315 to 400
MC-3, MC-3H	100	115	200	350 to 400
MC-4, MC-4H	135	150	245	450 to 500
MC-5, MC-5H	170	185	300	550 to 650
ATC-2R, ATC-2L	75	85	170	285 to 350
ATC-3R, ATC-3L	100	115	200	350 to 400
ATC-2RH, ATC-2LH	75	85	—NA—	—NA—
TC-1044H	50	60	—NA—	—NA—
TC-2, TC-2F	100	115	—NA—	—NA—
TC-3, TC-3F	135	150	—NA—	—NA—

SMITH PRECISION TRUCK PUMPS

Four Smith Precision Pump models are available for truck-mounted operation. Smith truck pumps may be mounted in any position, including upside down, or sideways. All truck pumps are provided with multiple outlets, allowing a choice to simplify installation.

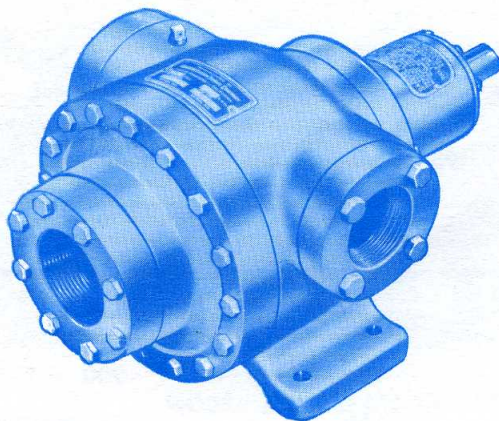
MODELS ATC-2RH and ATC-2LH have a rated transfer capacity of up to 25 GPM with power take-off at 1000 RPM maximum shaft speed.

MODEL TC-1044H has a rated transfer capacity of up to 35 GPM with power take-off at 900 RPM maximum shaft speed.

MODELS TC-2 and TC-2F have a rated transfer capacity of up to 50 GPM with power take-off at 500 RPM maximum shaft speed.

MODELS TC-3 and TC-3F have a rated transfer capacity of up to 100 GPM with power take-off at 500 RPM maximum shaft speed.

MODEL ATC-2RH or ATC-2LH



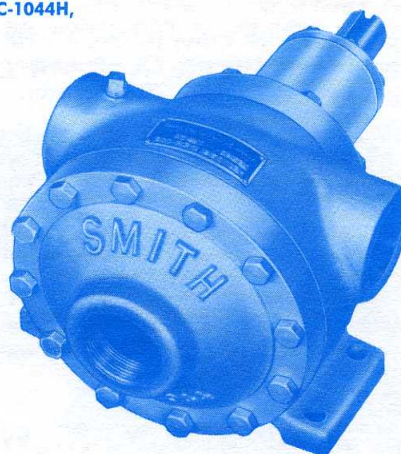
MODEL ATC-2RH and ATC-2LH PUMP
 25 GPM at 1000 RPM with vapor return line
 21 GPM at 1000 RPM against 40 psi differential.
 17 GPM at 1000 RPM against 75 psi differential.
 15 GPM at 1000 RPM against 100 psi differential.

The Model ATC-2RH and ATC-2LH pumps are designed particularly for difficult service. In some cases, the pumps can be run at 500 RPM, resulting in very quiet operation. The use of 2-inch inlet piping, valves, and fittings is recommended.

ADVANTAGES

1. Precision construction for high performance and long life.
2. Designed particularly for truck-mounted operation.
3. No periodic maintenance, lubricating, or other servicing required.
4. Includes patented Smith shaft seal for leak-free operation.
5. Highest quality materials throughout.
6. For direct connection to engine power take-offs at standard speeds.

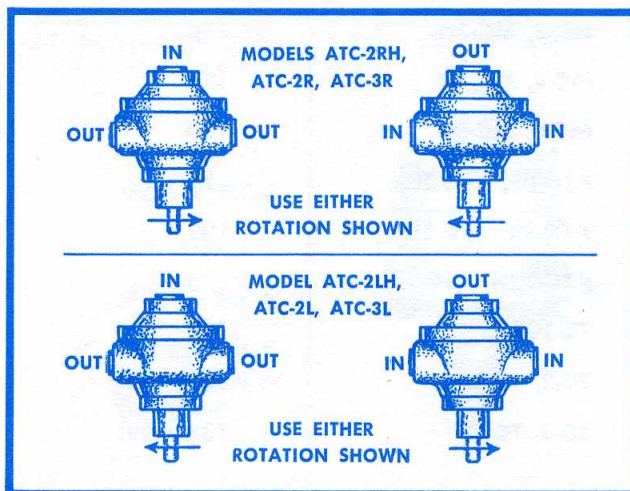
MODEL TC-1044H,



MODEL TC-1044H PUMP

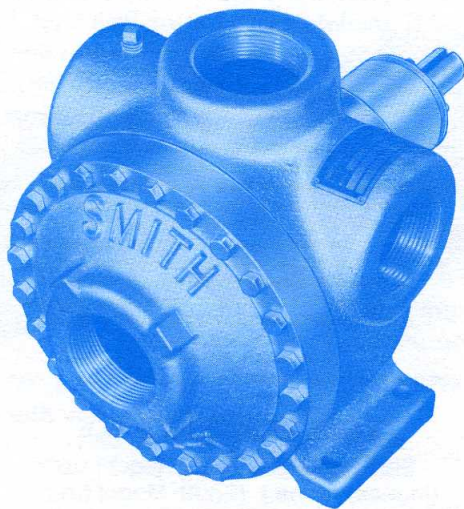
35 GPM at 900 RPM with vapor return line.
 30 GPM at 900 RPM against 40 psi differential.
 25 GPM at 900 RPM against 75 psi differential.

The Model TC-1044H is designed especially for small delivery trucks. The ports are threaded 1½-inch standard pipe size but 2-inch inlet pipe, valves, and fittings should be used. Shaft rotation may be reversed, so that pump may be used for loading or unloading operations in the same piping when a reversing power take-off is used. Small in size and easy to install. Strainer and bypass valve are extra equipment.

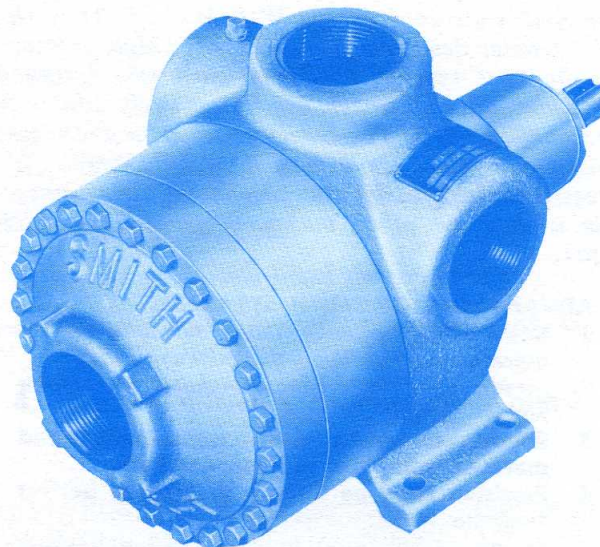


WRITE FACTORY FOR DIMENSION DRAWING (SPECIFY MODEL).

MODEL TC-2



MODEL TC-3



MODEL TC-2 or TC-2F PUMP

**50 GPM at 500 RPM with vapor return line.
42 GPM at 500 RPM against 40 psi differential.
35 GPM at 500 RPM against 75 psi differential.
30 GPM at 500 RPM against 100 psi differential.**

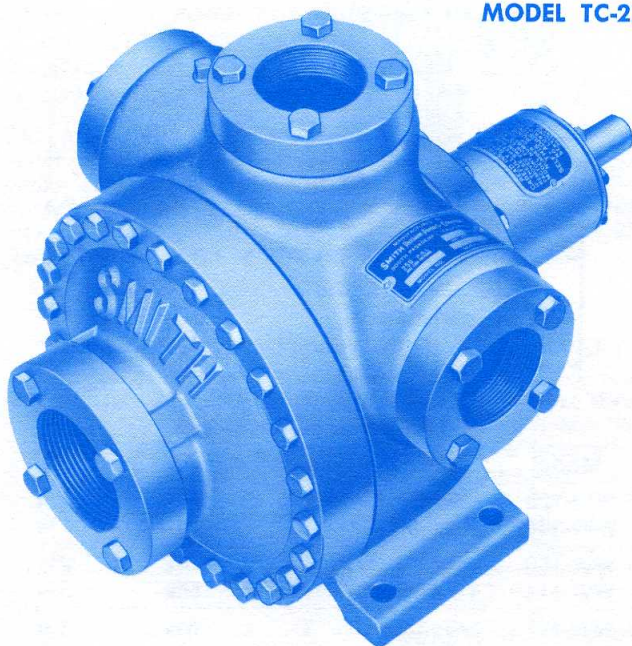
Model TC-2 has both end ports and housing ports threaded for 2½-inch pipe. Model TC-2F is supplied with steel flanges. End port flange is threaded for 2½-inch pipe, housing flanges threaded for 2-inch pipe. Flanges threaded for smaller pipe sizes, or flanges adapted for welding, are also available. Minimum size of inlet piping, valves, and fittings is 2 inches. Suggested inlet piping of 2½-inch size makes delivery faster and service life longer. These Smith pumps are reversible, so that the TC-2 pump can be used for loading or unloading without a manifold, if a reversing power take-off is available. Strainer and bypass valve are extra equipment.

MODEL TC-3 or TC-3F PUMP

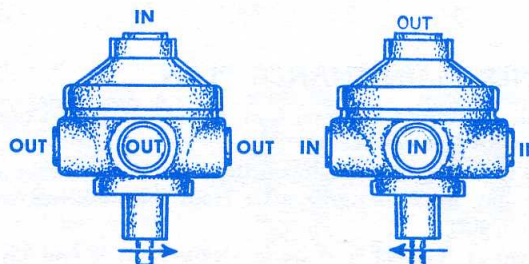
**100 GPM at 500 RPM with vapor return line.
86 GPM at 500 RPM against 40 psi differential.
70 GPM at 500 RPM against 75 psi differential.
60 GPM at 500 RPM against 100 psi differential.**

The Model TC-3 pump has ports threaded 2½ inch. The Model TC-3F is supplied with steel flanges threaded for 2½-inch pipe in the end, and 2-inch pipe in the housing. Welding flanges also available in these sizes. Both models should be used with 3-inch inlet pipe, reducing at pump through Smith W-3 (3x2½) strainer. The TC-3 and TC-3F models of Smith pumps are reversible, so that pumps can be used for loading or unloading, without a manifold, if a reversing power take-off is available. Strainer and bypass valve are extra equipment.

MODEL TC-2F



MODELS TC-1044H, TC-2, TC-2F, TC-3, TC-3F.



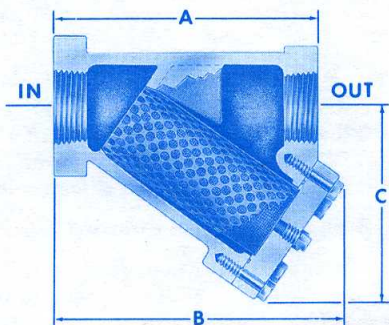
Note: Model TC-1044H (Page 10) does not have top port.

SMITH STRAINERS

The Smith strainer (Type W-1, W-2, W-3) is the only strainer designed particularly for high-pressure liquefied gas service. Ordinary strainers, designed for steam, oil, and water, are not entirely adequate for liquefied gases. The Smith strainer provides less resistance-to-flow, and has a readily removable screen. Strainer body dimensions are interchangeable with some other makes (refer to tabulated data).

ADVANTAGES OF SMITH STRAINERS

1. Construction exceeds latest safety code requirements.
2. Screen easy to replace because of unique Smith design.
3. Reinforced screen mesh, traps more solid material with less resistance-to-flow.
4. Precision cut pipe threads to provide perfect seal, no leakage.
5. O-ring gasket in strainer flange, inexpensive to replace.
6. Flanged opening to strainer screen.
7. Flange made of steel. Easy to open for cleaning.



STRAINER TYPE NO.	PIPE SIZES		DIMENSIONS		
	INLET	OUTLET	A	B	C
W-1	1	3/4	6 3/8	7	4 1/2
W-1	1	1	6 3/8	7	4 1/2
W-1	1 1/4	3/4	6 3/8	7	4 1/2
W-1	1 1/4	1	6 3/8	7	4 1/2
W-1	1 1/4	1 1/4	6 3/8	7	4 1/2
W-2	2	1 1/2	8 3/16	9	6 5/8
W-2	2	2	8 3/16	9	6 5/8
W-3	2 1/2	2 1/2	10 1/4	11 1/4	7 1/2
W-3	3	2 1/2	10 1/4	11 1/4	7 1/2
W-3	3	3	10 1/4	11 1/4	7 1/2

STRAINER MAINTENANCE PLAN

1. Install a strainer between tank liquid outlet and pump inlet, with 40 mesh screen.
2. After initial installation, open the strainer for inspection every day until foreign matter from the tank has been washed out.
3. Thereafter, inspect and clean strainer often enough to assure free flow of liquid to pump.
4. Keep extra screen in stock in case the one in service becomes damaged.
5. Remember, strainer inspection is good pump insurance.

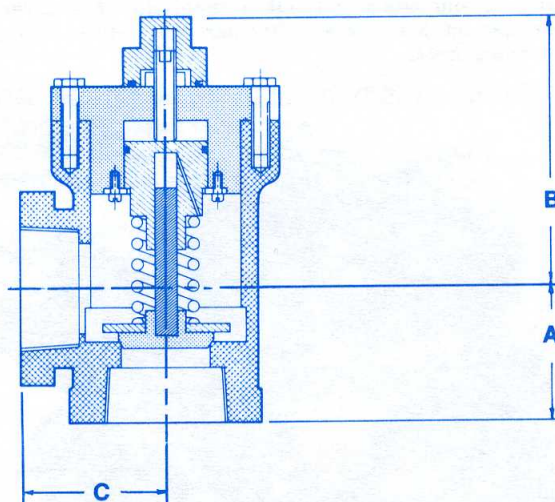
SMITH BYPASS VALVES

The Smith Bypass Valve is our newest product development. All models are chatter-free and house a tough stainless steel spring for maximum service life. The Smith Valve is designed specifically for liquefied gases and overpressure is kept to a minimum at full pump output through the valve. All models are rated 600 wog. U.L. listed valves available with pressure settings from 30 to 125 psid. Higher settings also available. The Smith Bypass Valve is spring loaded and senses differential pressure. It does not house a diaphragm and does not require a separate vapor-phase connection.

VALVE SELECTION TABLE

Model	Size (Inches)	Weight (Lbs.)	Pump Recommended (Smith Model No.)	Flow (GPM)
WW-120	1/2 x 1/2	9	MC-1, Eg-1, Kg-1, SQ-1, SQ-H	5-10
WW-340	3/4 x 3/4	9	EC-H, SQ-HH, SQ-HH8	13-15
WW-100	1 x 1	12	MC-1044, MC-1044H, TC-1044H	20-35
WW-114	1 1/4 x 1 1/4	12	MC-2, ATC-2R, ATC-2L, TC-2, MC-2H	50
WW-112	1 1/2 x 1 1/2	25 1/2	MC-3, ATC-2R, ATC-3L, TC-3, MC-3H	100
WW-200	2 x 2	25 1/2	MC-4, MC-4H	150

ALL VALVES FPT



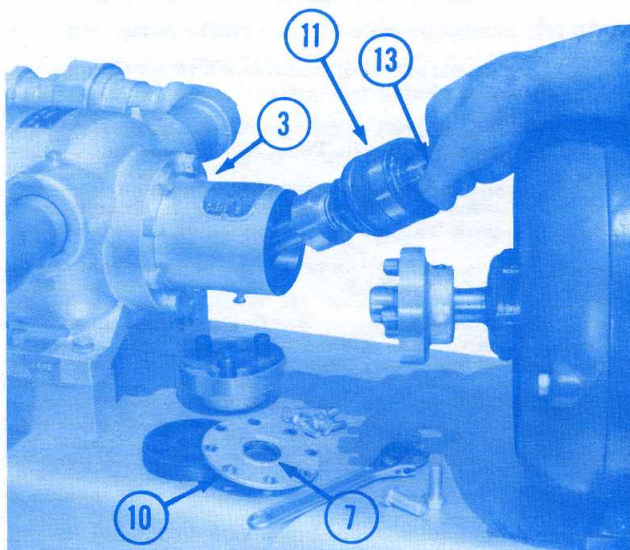
OVERALL DIMENSIONS

Model	Size	A	B	C
WW-120	1/2 x 1/2	1 5/8	5 7/16	1 3/4
WW-340	3/4 x 3/4	1 5/8	5 7/16	1 3/4
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	3	6 1/8	3 1/4
WW-200	2 x 2	3	6 1/8	3 1/4

SPARE PARTS FOR SMITH PUMPS

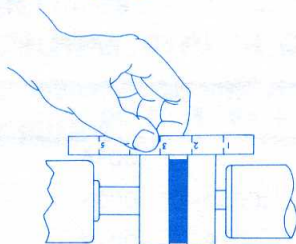
SHAFT SEAL ASSEMBLY

Field experience with thousands of Smith Precision Pumps indicates that the patented Smith shaft seal assembly, in nine cases out of ten, holds up without leaks for the life of the pump. This proven record stands despite the fact that the Smith shaft seal requires no adjustment, lubrication, or other attention of any kind. For the rarely needed replacement, the procedure is simple, and can be done in a few minutes. No special tools are required, and the pump does not even need to be removed from the piping.

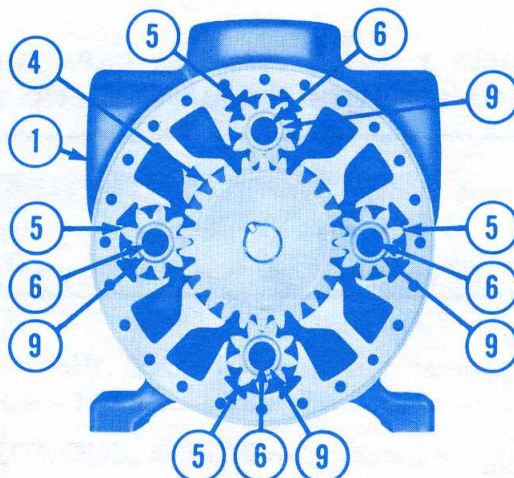


1. First discharge pressure from piping and pump.
2. Remove motor mounting bolts, sliding back motor.
3. Remove eight small screws in bearing retainer plate on pump and remove this plate from housing.
4. Slide out shaft with shaft seal. All seal parts are attached to shaft as a unit.
5. Slide in exchange shaft seal assembly.
6. Replace bearing retainer plate, coupling, and motor, taking care to align couplings as shown in diagram.

On truck-mounted pumps the procedure is similar, except that the universal joint on the pump shaft is disconnected.



The Smith Exchange Plan for pumps (see back cover) is also applicable to shaft seal assemblies. Order an exchange shaft seal assembly, return yours immediately in same package, and receive generous credit allowance. Tape package ends well to prevent loss.



- | | |
|--------------------------------------|--|
| 1. MAIN HOUSING | 10. BEARING RETAINER PLATE |
| 2. GEAR END COVER | 11. SHAFT SEAL ASSEMBLY |
| 3. SHAFT END COVER | 12. SECONDARY GEAR HOUSING |
| 4. SUN (CENTER) GEAR | 13. SHAFT KEY |
| 5. PINION (IDLER) GEARS | 14. SHAFT BUSHING FOR GEAR END COVER |
| 6. PINION (IDLER) GEAR SHAFTS | 15. SHAFT BUSHING FOR SECONDARY GEAR HOUSING |
| 7. OIL SEAL | |
| 8. SHAFT BUSHING FOR MAIN HOUSING | |
| 9. BUSHINGS FOR PINION (IDLER) GEARS | |
- 2, 8, 12, 14, 15 not shown.

GEARS AND OTHER PARTS

Spare components are available for all Smith Precision Pumps, and are economically priced. Report your pump Model Number and Serial Number when ordering. While the number of gears varies with particular models, the accompanying illustration and parts list will aid in the identification of the parts you require. Service Instruction Sheet AL-1, available upon request, contains additional information.

PERIODIC INSPECTION PLAN

The suggested periodic inspection plan involves ordering extra gears. Under the plan pumps are opened before excessive wear has a chance to begin, and gears are replaced if necessary. For models pumping up to 25 GPM, an inspection interval of 250,000 gallons pumped is suggested; for models pumping up to 50 GPM, an inspection interval of 500,000 gallons is suggested. For larger models, 1,000,000 gallons. The periodic inspection plan is particularly useful to customers located in other countries or those with adequate maintenance shops. For many pump owners, the most economical way to handle repairs is to run the pumps until they lose efficiency from longer service, and then order an exchange pump (see back cover for details). Smith Bulletin AL-1, *How to Keep Smith Pumps in Good Repair*, gives full details of the periodic inspection plan.

PERFORMANCE FORMULAE FOR SMITH PUMPS

**TABLE 3. RATED TRANSFER CAPACITIES
FOR USE WITH FORMULAE 1 AND 2**

Model No.	Rated Transfer Capacity (GPM)	Rated Shaft Speed (RPM)
MC-1	5	1800
GC-1	5	1800
SQ-1	5	1800
SQ-H	7	1800
SQ-HH	13	1800
SQ-HH8	13	1200
MC-1044	20	1800
MC-1044H	35	1800
MC-2, MC-2F	50	1800
MC-2Q	50	1800
ATC-2R, ATC-2L	50	1800
ATC-3R, ATC-3L	100	1800
MC-3	100	1800
MC-4	150	1800
MC-5	200	1800
ATC-2RH, ATC-2LH	25	1000
TC-1044H	35	900
TC-2, TC-2F	50	500
TC-3, TC-3F	100	500
MC-2H	50	1500
MC-3H	100	1500
MC-4H	150	1500
MC-5H	200	1500

Rated shaft speeds listed are considered to be maximum speeds and should not be exceeded.

FORMULA 1:

$$Q_d = Q_r \left(\frac{N_d}{N_r} - F_s P_d \right)$$

FORMULA 2:

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

where Q_d = actual pump delivery in U.S. gallons per minute

Q_r = rated transfer capacity in GPM (as given for each model pump in Table 3)

P_d = differential pressure being pumped against, in pounds per square inch

HP = horsepower required to drive pump

N_d = actual speed of pump shaft, in revolutions per minute

N_r = rated speed of pump shaft (as given for each model pump in Table 3)

F_s = slippage factor, a variable depending on the viscosity of the fluid pumped, in accordance with Table 4

USE OF PUMP FORMULAE

The performance formulae for Smith Precision Pumps have a very real advantage over simple performance curves. Such curves apply to pumping capabilities of a NEW pump, in a perfect installation. The Smith formulae are conservative, and are applicable to a pump after considerable service, or in an installation that is somewhat less than perfect. When an installation is properly made, new Smith pumps will actually perform BETTER than indicated by the formulae.

Since the proper installation has a very important bearing on performance of a pump handling liquefied gases, our engineering department will gladly review a proposed piping layout without obligation. The customer is urged to furnish 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.

In any case, the use of the conservative formulae is believed to be realistic and helpful. Pumps that are specified on the basis of the formulae and tables will have a long service life. The formulae, being conservative, can be guaranteed for all model Smith pumps in proper installations, that have been reviewed by our Engineering Department.

TABLE 4. SLIPPAGE FACTORS (F_s) TO BE USED WITH FORMULA NO. 1

	+ 100° F.	+ 80° F.	+ 60° F.	+ 40° F.	+ 20° F.	0° F.	- 20° F.	- 40° F.
Carbon Dioxide, F_s	..	..	..	..	.0036	.0032	.0028	.0024
Anhydrous Ammonia, F_s	.0049	.0045	.0042	.0038	.0033	.0030	.0026	..
Sulfur Dioxide, F_s	.0023	.0021	.0020	.0019	.0018	..	..	..
Butane, F_s	.0033	.0032	.0031	.0028	..	..	..	..
Propane, F_s	.0042	.0040	.0038	.0036	.0034	.0033	.0032	..

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

EXAMPLES OF CALCULATIONS

CONDITIONS:

Liquid—Carbon dioxide

Temperature—0° F.

Differential pressure required—40 psi

Gallons per minute flow rate required—16 GPM

1800 RPM PUMPING UNIT

Qd = 16 GPM (from conditions above)

Qr = Rated transfer capacity of pump required
(solve formula 1 for this item)

Nd = 1800 RPM

Nr = 1800 RPM

Fs = .0032

Pd = differential pressure being pumped against
(from conditions above)

Substitute in formula 1, page 14,

$$16 = Q_r \left(\frac{1800}{1800} - .0032 (40) \right);$$

Qr = 18.4 GPM;
from table 3 on page 14,
MC-1044 would be recommended, as its
Qr (rated transfer capacity) is 20 GPM,
very close to the 18.4 GPM required.

1200 RPM PUMPING UNIT

Qd = 16 GPM (as in previous example)

Qr = rated transfer capacity of pump required
(solve formula 1 for this item)

Nd = 1200 RPM

Nr = 1800 RPM

Fs = .0032 (as per previous example)

Substituting in formula 1, page 14,

$$16 = Q_r \left(\frac{1200}{1800} - .0032 (40) \right);$$

Qr = 29.7 GPM;
from table 3 on page 14, MC-1044H pump
would be recommended, as its Qr (rated
transfer capacity) is 35 GPM, close to the
29.7 GPM required.

900 RPM PUMPING UNIT

Qd = 16 GPM (as in previous examples)

Qr = rated transfer capacity of pump required
(solve formula 1 for this item)

Nd = 900 RPM

Nr = 1800 RPM

Fs = .0032 (as per previous examples)

Substituting in formula 1, page 14,

$$16 = Q_r \left(\frac{900}{1800} - .0032 (40) \right);$$

Qr = 43 GPM;
from table 3 on page 14, MC-2 pump
would be recommended, as its Qr (rated
transfer capacity) is 50 GPM, close to
the 43 GPM required.

HORSEPOWER REQUIREMENTS:

These are determined through the use of formula 2
on page 14. Examples:

(a) FOR 1800 RPM, MC-1044 PUMP,

$$HP = \frac{8.5 (1800) (20)}{1800} \times 10^{-4} (10 + 40)$$

HP = 0.85; suggest 1 HP motor

(b) FOR 1200 RPM, MC-1044H PUMP,

$$HP = \frac{8.5 (1200) (35)}{1800} \times 10^{-4} (10 + 40)$$

HP = 0.99; suggest 1½ HP motor

(c) FOR 900 RPM, MC-2 PUMP,

$$HP = \frac{8.5 (900) (50)}{1800} \times 10^{-4} (10 + 40)$$

HP = 1.06; suggest 1½ HP motor

METRIC SYSTEM CALCULATIONS

Technical data sheets AL-11 and AL-12, available
upon request, provide tabulated data and formulae
for making calculations in the metric system. Write
the Smith Precision Products Engineering Depart-
ment for this information.

GASOLINE ENGINES AVAILABLE

Smith medium and large capacity pumps as well as
truck pumps can be supplied with Wisconsin gaso-
line engines. The connection between pump and
engine is direct through a flexible coupling. Such
units are mounted on a base similar to those used
for Smith motor driven units.

Write factory for price and delivery, stating require-
ments of differential pressure, RPM, and capacity.
Engines can be equipped with starter-generator,
and/or clutch if desired.

REPAIRS AND EXCHANGE POLICIES

EXCHANGE PUMP PLAN

For many pump owners, the most economical and satisfactory way to handle necessary repairs is to run the pumps until they lose efficiency through long wear. Then simply order an exchange pump under the Smith exchange plan. If the need is urgent, phone the factory collect. Give us the model number and serial number from the pump label plate; we will send an exchange pump that will fit perfectly, and that is guaranteed to be in equal-to-new condition.

EXPEDITED SHIPMENT

In a rush, air freight is a good method of shipment. Air shipment will convey the pump to your nearest commercial airport within a day under normal conditions. Provide us your telephone number, and the airport will usually advise you immediately upon arrival of the pump. If you can wait a few days, fast truck service is more economical, and usually truck delivery can be made to your door.

LIBERAL EXCHANGE ALLOWANCE

Under the exchange pump plan, you do not need to be without a pump while factory reconditioning is done. We will provide the factory-reconditioned exchange pump from our stock. When you receive the exchange pump, you simply return your used pump for credit, using the same shipping crate. We recondition your pump, and put it in our exchange stock. You are billed initially for a new pump, and then given a generous credit for the used pump when it is returned promptly. The amount you pay equals the actual reconditioning cost.

EXCHANGE FOR HIGHER CAPACITY PUMP

If your operation requires a higher capacity pump, Smith policy is to allow a one-for-one pump exchange for a higher capacity pump. The exchange charge includes reconditioning your old pump plus the cost of additional parts and assembly for the higher capacity pump. Many cost-conscious pump users have taken advantage of this offer to improve the capabilities of their installations at a bargain price.

MOTOR OR ENGINE REPAIRS

Motor and engine repairs within the warranty period are covered by the guarantee extended by the manufacturer. Should you require repairs under the guarantee, return the motor or engine to the manufacturer's factory, or to his nearest AUTHORIZED repair station. The motor or engine guarantee does not include shipping charges or any other liability. The guarantee is void unless necessary repairs are made at authorized places. Write or wire the manufacturer, using nameplate address, to locate his nearest authorized repair station, or look in the yellow pages of your telephone book. Motors and engines worn out from long service are also best repaired at authorized repair stations.

SMITH PRECISION PRODUCTS COMPANY



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