BULLETIN 501

Section	500
Effective	March 1998
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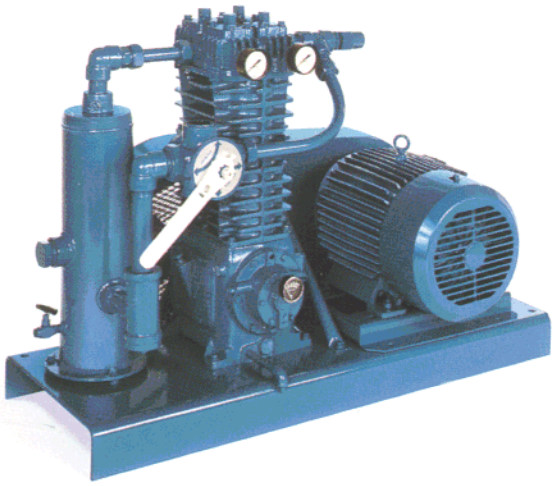
blackmer

POSITIVE DISPLACEMENT PUMPS AND OIL-FREE GAS COMPRESSORS FOR LIQUEFIED GAS APPLICATIONS



BLACKMER LIQUEFIED GAS PUMPS & COMPRESSORS

Guide to Blackmer Liquefied Gas Equipment

PRODUCT	DESCRIPTION / APPLICATION	PAGE
LGF1 LGF1P LGB1 LGB1P	Motor speed pumps for cylinder filling, low volume motor fueling and small vaporizers. Capacities to 15 U.S. gpm (57 lpm).	4 - 5
LGRLF1.25 LGL(F)1.25 LGL1.5	Motor speed pumps for multi-station cylinder filling, motor-fueling, low volume transfer and vaporizers. Capacities to 35 U.S. gpm (132 lpm).	6 - 7
LGLD2 LGLD3 LGLD4	Foot-mounted pumps for bulk plants, terminals, vaporizers, bobtails and transports. Capacities to 300 U.S. gpm (1135 lpm).	8 - 9
TLGLF3 TLGLF4	Flange-mounted pumps for bobtails and transports. Capacities to 300 U.S. gpm (1135 lpm).	10 - 11
LB161 LB361 LB601 LB942	Oil-free gas compressors for liquid transfer and vapor recovery. Capacities to 125 CFM (212 m^3/h).	12 - 15
BV3/4 BV1 BV1 1/4 BV1 1/2 BV2	Bypass valves for in-line system protection. Capacities to 250 U.S. gpm (946 lpm).	16

Blackmer offers a full line of liquefied gas pumps and oil-free gas compressors, designed for maximum performance and reliability. From the smallest cylinder filling operation to the largest, most sophisticated bulk plant/rail car unloading system, you will find Blackmer pumps and compressors operating throughout the world.

Sliding-vane design is ideal for butane, propane, anhydrous ammonia, propellants, refrigerants and similar liquefied gases

Blackmer liquefied gas pumps are widely used for cylinder filling, motor fueling, bulk transfer, vaporizers, and on bobtails and transports.

Utilizing Blackmer's unique sliding-vane design, these positive displacement pumps offer the best combined characteristics of sustained high-level performance, energy efficiency, trouble-free operation, and low maintenance cost.

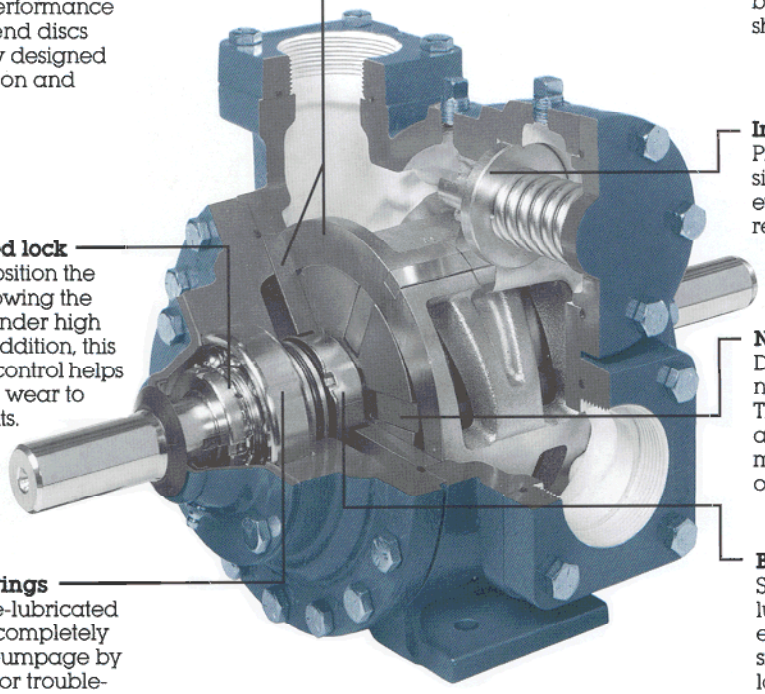
Pump models are available in 1, 1.25, 1.5, 2, 3 and 4-inch port sizes.. All models have ductile iron construction for thermal shock resistance and low friction ball bearings for high efficiency and quiet operation. Other design features include two-piece threaded lock collars that prevent end thrust wear, and a special cavitation suppression liner (1.25 through 4-inch models) for optimum performance. This feature "cushions" the effects of collapsing vapor bubbles within the pump, sharply reducing the noise, vibration, and wear normally caused by entrained vapors.

High performance design features

Replaceable casing liner and end discs Blackmer LGL models can be economically rebuilt for like-new performance with replaceable end discs and liners, specially designed to suppress cavitation and reduce wear.

Two-piece threaded lock collars Precisely position the rotor and shaft, allowing the pump to operate under high inlet pressures. In addition, this positive lock thrust control helps prevent premature wear to internal components.

External ball bearings Low friction grease-lubricated ball bearings are completely isolated from the pumpage by mechanical seals for trouble-free service and long life.



Ductile iron construction All pressure parts are of ductile iron for greater resistance to both thermal and mechanical shock.

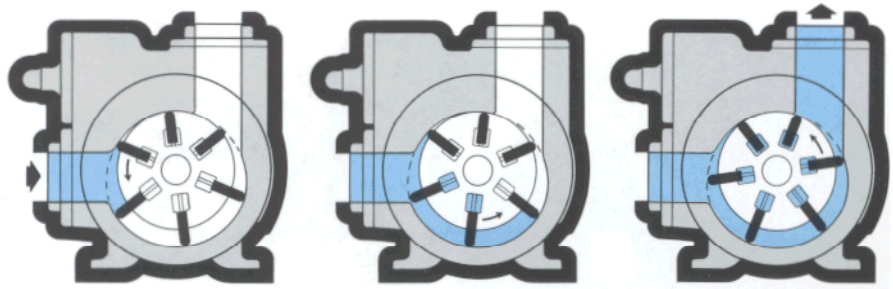
Internal safety relief valve Protects the pump from excessive pressure buildup in the event of an obstructed or closed return line.

Nonmetallic Duravanes Designed to resist wear under non-lubricating conditions. These chemically inert vanes are formulated of a tough resin material for long life and quiet operation.

Blackmer mechanical seals Specially developed for non-lubricating liquids, Blackmer's exclusive component type design is field proven to provide long life and reliable service on a wide range of liquefied gas applications.

DURABILITY / HIGH EFFICIENCY QUIET OPERATION / EASY MAINTENANCE

FIGURE 1. How Blackmer's sliding-vane action works



How Blackmer sliding-vane pumps achieve high efficiency

As shown in Figure 1, Blackmer pumps use a rotor with sliding-vanes which draw the liquid in behind each vane, through the inlet port and into the pumping chamber. As the rotor turns, the liquid is transferred between the vanes to the outlet where it is discharged as the pumping chamber is squeezed down. Each vane provides a positive mechanical push to the liquid before it.

Vane contact with the chamber wall is maintained by three forces: (1) centrifugal force from the rotor's rotation, (2) push rods moving between opposing pairs of vanes, and (3) liquid pressure entering through the vane grooves and acting on the rear of the vanes. Each revolution of a Blackmer pump displaces a constant volume of fluid. Variance in pressure has minimal effect. Energy-wasting turbulence and slippage are minimized and high volumetric efficiency is maintained.

Efficiency means energy savings

The high efficiency of Blackmer pumps means they require less horsepower than other positive displacement pumps. So you spend less on motors initially and less on electricity to operate the pumps after they are installed.

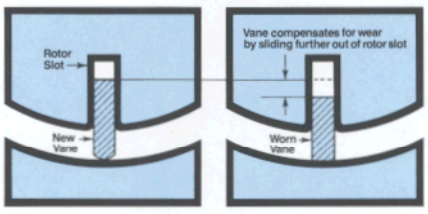
High capacity at lower speeds means reduced wear

The volumetric efficiency of Blackmer pumps saves more than energy. Their inherently low slippage allows them to operate at substantially lower rpm's than other positive displacement pump types, while still delivering equivalent output. These lower operating speeds mean quieter operation, longer service life, and reduced maintenance requirements.

Self-adjusting vanes keep performance high

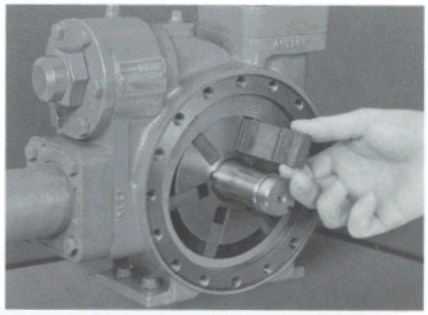
The performance of gear pumps will constantly diminish as wear increases clearances. To compensate for the reduced performance, you must increase the pump speed (which further accelerates pump wear) or put up with reduced capacity until performance drops to a totally unacceptable level. The vanes on a Blackmer pump automatically slide out in their rotor slots to continuously adjust for wear. No more speeding up to compensate and no more putting up with poor performance. Blackmer pumps maintain near-original efficiency and capacity throughout the life of the vanes.

FIGURE 2. How sliding-vanes maintain efficiency



Vane replacement in minutes, easy inspection

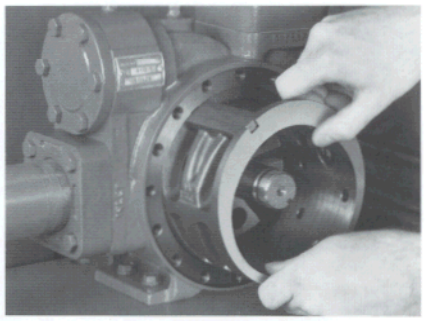
Vane replacement is easy. Simply remove the outboard head assembly, slide out the old vanes, insert the new ones, and reinstall the head. In a matter of minutes, your pump is back in operation. Routine inspection is equally easy. In fact, most maintenance can be done without disconnecting the pump from its piping or drive shaft.



Simple vane replacement requires no special tools.

Replaceable liners economically restore efficiency

Blackmer LGL pumps are equipped with replaceable liners which protect the pump casing and provide the economy of simple replacement, restoring the pump to like-new efficiency. No special tools are required to remove a worn liner and install a new one, and the simple operation can be completed in a few minutes without taking the pump off line.

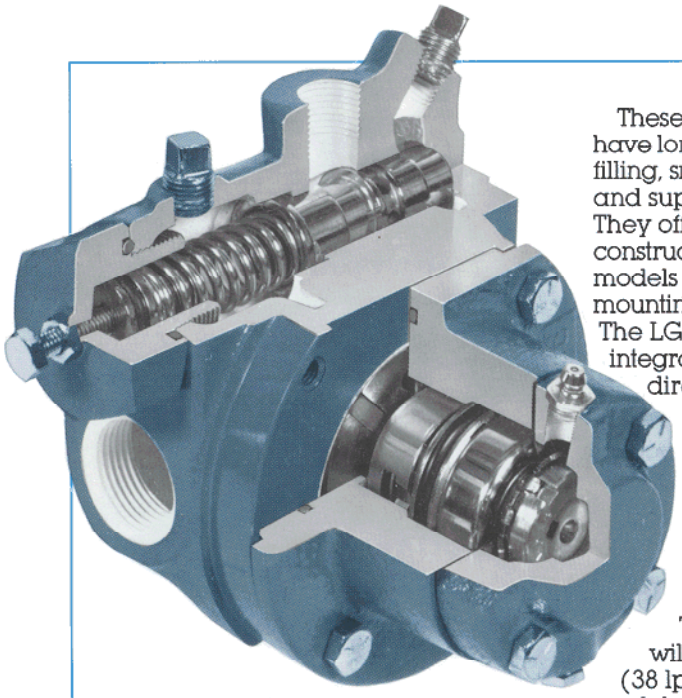


Easily replaceable liner restores efficiency.

Blackmer liquefied gas pumps meet Underwriters' specifications

All pump and valve models described in this bulletin are listed by Underwriters' Laboratories for both LP-gas and anhydrous ammonia service.

LGF1 & LGB1 PUMPS
MOTOR SPEED PUMPS FOR CYLINDER FILLING

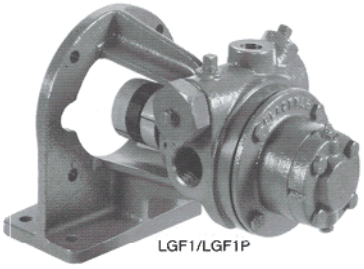


LG1/LG1P
cutaway

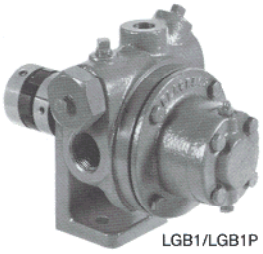
These 1-inch motor speed pumps have long been popular for cylinder filling, small volume motor fueling and supplying small vaporizers. They offer the same heavy-duty construction of larger Blackmer models and are available in two mounting styles and capacity ranges. The LGF1 model is fitted with an integral bracket and coupling for direct flange mounting to a NEMA C-face motor. This bracket also allows the pump body to be rotated to simplify hookup to piping systems. The LGB1 model is equipped with a coupling and bracket for mounting to a conventional base. The LGF1 and LGB1 models will handle up to 10 U.S. gpm (38 lpm). The LGF1P and LGB1P models offer 50% greater capacity and will handle up to 15 U.S. gpm (57 lpm).

All models have 1-inch NPT tapped ports and use an exclusive "combination" valve that acts as both a back-to-tank bypass valve and as an internal safety relief valve. This feature lowers installation costs by eliminating the need for a separate bypass valve. It also assures pressure relief if the back-to-tank bypass line is closed. The valve's unique three-stage operation is shown in Figure 3.

Standard construction materials for these models include Buna-N mechanical seals and Duravanes for handling both LP-gas and anhydrous ammonia. Optional viton fitted mechanical seals and laminate vanes are also available. Maximum differential pressure is 125 psi (862 kPa) for both models.

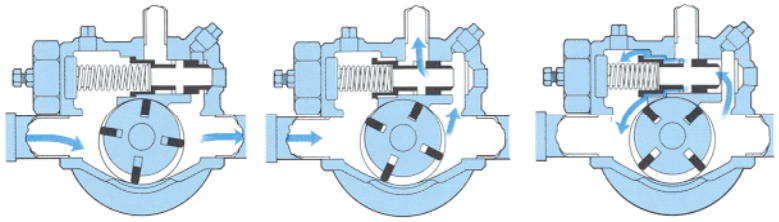


LGF1/LGF1P



LGB1/LGB1P

FIGURE 3. Combination relief/bypass valve

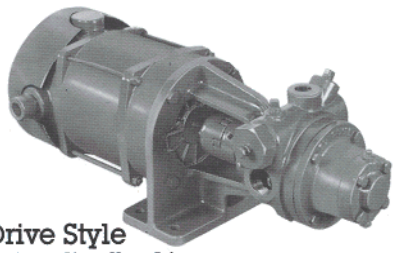


Normal Operation
Valve is completely closed during normal operation with discharge line open.

Back-to-Tank Bypassing
Discharge pressure exceeding the valve setting opens valve to second stage, returning all or part of pump flow back to supply tank.

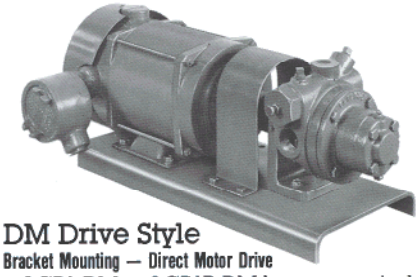
Pressure Relief
If back-to-tank line is closed, valve opens to third stage, passing flow back to inlet side of pump.

ASSEMBLED PUMP UNITS



LGF Drive Style
Flange Mounting — Direct Motor Drive

Standard LGF1 and LGF1P models are supplied with an integral bracket and flexible shaft coupling, ready to accept a NEMA C-face motor. All LGF units are available with or without electric motors. Standard motors furnished by Blackmer for these pumps are explosion-proof, single-phase, 115/230 volt, with automatic reset overload protection. An explosion-proof manual switch is also available for mounting at the motor or remote location.



DM Drive Style
Bracket Mounting — Direct Motor Drive

LGB1-DM or LGB1P-DM base mounted units are available, complete with pump, bracket, coupling and coupling guard, mounted on a common base, ready to accept a standard NEMA motor. All DM units are available with or without electric motors.

SELECTION DATA

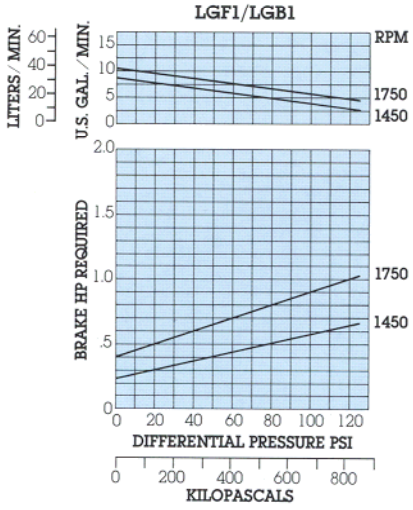
When selecting a standard pump or assembled unit from the table below, check the pump's delivery and brake horsepower requirements in the performance curves. These pumps are rated for continuous duty, although such applications may accelerate pump wear rates, particularly if vaporization occurs in the pump intake line. Pumps used on vaporizers should be mounted with inlet up, and sized for a capacity of at least 150% of the normal peak load to prevent system failure due to sudden pressure drop on start-up. Additional system requirements can be achieved by series or parallel staging.

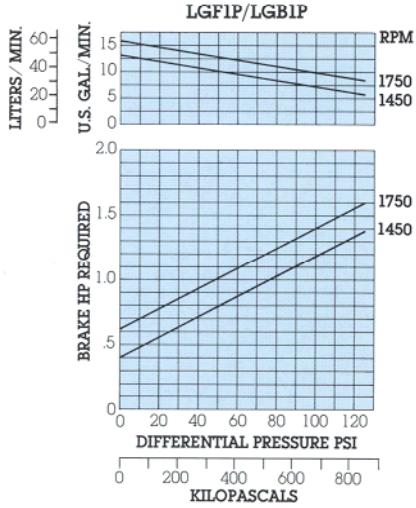
ASSEMBLED PUMP UNITS		PUMP AND MOTOR SPEED RPM	APPROXIMATE DELIVERY OF PROPANE @ DIFFERENTIAL PRESSURES AND PUMP SPEEDS SHOWN[1]				MAXIMUM DIFFERENTIAL PRESSURE		MAXIMUM WORKING PRESSURE[3]		NORMAL TIME TO FILL LP GAS CYLINDERS IN MINUTES		STANDARD MOTOR[2]	MOTOR SIZE FOR MOUNTING ON STANDARD BASE[2]	
MODEL	FACTORY RELIEF VALVE SETTING		50 PSI (345 kPa)		100 PSI (689 kPa)		PSI	kPa	PSI	kPa	20 LB. (9 KG) CYLINDER	100 LB. (45 KG) CYLINDER	HP	MINIMUM FRAME SIZE	MAXIMUM FRAME SIZE
			GPM	LPM	GPM	LPM									
LGF1	105 psi (724 kPa)	1750	8.0	30.3	6.0	22.7	125	862	350	2413	¾	3	1	56C	184C[4]
LGB1-DM	105 psi (724 kPa)	1750	8.0	30.3	6.0	22.7	125	862	350	2413	¾	3	1	56	184
LGF1P	120 psi (827 kPa)	1750	13.0	49.2	10.0	37.9	125	862	350	2413	½	2	1½	56C	184C[4]
LGB1P-DM	120 psi (827 kPa)	1750	13.0	49.2	10.0	37.9	125	862	350	2413	½	2	1½	56	184

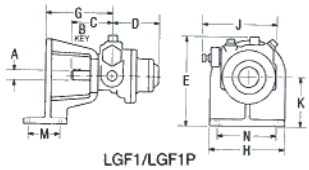
[1] Check the pump's delivery and brake horsepower requirements in the performance curves below. See footnote with the curves which explains the factors that can cause delivery to vary.
[2] Motors may be specified from dimension charts below and Electric Motor Price List No. 190 (explosion-proof manual start switch for 1 & 1½ horsepower single phase motors also available).
[3] Maximum rated working pressure is 350 psi (2413 kPa) for LPG and NH_3 (limited by U.L. and N.F.P.A.58).
[4] Pump flange accepts NEMA C-face motors with 5⅞" bolt circle diameter. Pump flange will not accept 182TC or 184TC frames.

PERFORMANCE CURVES

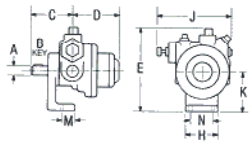
These curves are based on approximate delivery rates when handling propane or anhydrous ammonia at 80°F (26.7°C). Line restrictions such as excess flow valves, elbows, etc., will adversely affect deliveries. For propane at 32°F (0°C), actual delivery will be further reduced to about 80% of nominal. Delivery of butane at 80°F (26.7°C) will be 60% to 70% of these values, and may run as low as 35% to 45% at 32°F (0°C). This loss of delivery is not a pump characteristic but is caused by natural thermodynamic phenomena of liquefied gases.



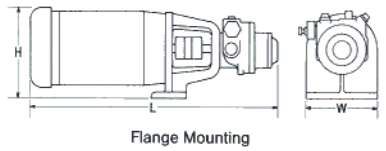




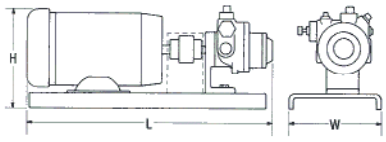
LGF1/LGF1P



LGB1/LGB1P



Flange Mounting



Bracket Mounting

BARE PUMP DIMENSIONS

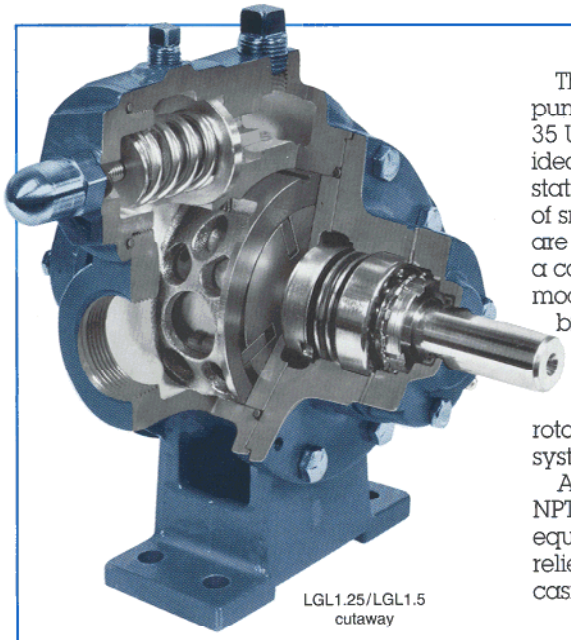
PUMP MODEL		A	B	C	D	E	G	H	J	K	M	N	APPROXIMATE WT. LESS MOTOR	
													LBS.	KG
LGF1 LGF1P	IN.	11/16	3/16	3 11/16	4 3/8	8 3/4	6 3/8	6 5/8	7	4 1/2	2 3/8	5 1/4	32	15
	MM	17	5	94	111	222	162	168	178	114	60	133		
LGB1 LGB1P	IN.	11/16	3/16	3 11/16	4 3/8	7 3/4	—	3	7	3 1/2	15/16	2	19	9
	MM	17	5	94	111	197	—	76	178	89	24	51		

ASSEMBLED PUMP UNIT DIMENSIONS

MODEL	STANDARD 1750 RPM EXPLOSION PROOF 60 Hz MOTOR[1]		DIMENSION IN INCHES[2]			DIMENSION IN MM[2]			APPROXIMATE WT. LESS MOTOR	
	HP	FRAME	L	W	H	L	W	H	LBS.	KG
LGF1	1	56C	24 3/8	7 1/4	9	619	184	229	32	15
LGF1P	1½	56C	25 1/4	7 1/4	9	641	184	229	32	15
LGB1-DM LGB1P-DM	1	56	24 3/4	10 1/2	9 3/4	629	267	248	44	20
	1	143T	23 5/8	10 1/2	9 3/4	600	267	248	44	20
	1½	184	26 7/8	10 1/2	10 3/4	683	267	273	44	20
	1½	145T	24 1/2	10 1/2	9 1/2	623	267	242	44	20
	2	182T	26 7/8	10 1/2	10 3/4	683	267	273	44	20
	2	145T	24 1/2	10 1/2	9 3/4	623	267	248	44	20

[1] See Electric Motor Price List No. 190 for standard motor specifications (enclosure, phase, hertz, voltage, rpm, weight, etc.)
[2] Dimensions are for right hand rotation pumps, less starter, motor eyebolt and conduit box. Refer to catalog dimension sheets for detailed unit drawings.

LGRL1.25, LGL1.25 & LGL1.5 PUMPS



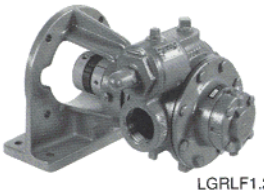
LGL1.25/LGL1.5
cutaway

These durable motor speed pumps offer capacities from 9 to 35 U.S. gpm (34-132 lpm), and are ideal for motor fueling, multiple-station cylinder filling and a variety of small transfer jobs. The LGL models are designed for foot mounting to a common base-plate. The LGLF models are fitted with an integral bracket and coupling for direct flange mounting to a NEMA C-face motor. This bracket also allows the pump body to be rotated to simplify hookup to piping systems.

Available with 1.25 or 1.5-inch NPT tapped ports, all models are equipped with an internal safety relief valve, and a replaceable casing liner and end discs for easy rebuilding of the pumping chamber if ever necessary. The LGRLF1.25-inch model features a special liner which offers lower flow rates than the LGL1.25-inch pump. In addition, these pumps offer easy field inspection and service with their doweled head design, which allows for precise alignment of the pump heads to original factory tolerances.

Standard construction materials for these models include Buna-N mechanical seals and Duravanes for handling both LP-gas and anhydrous ammonia. Optional viton fitted mechanical seals, laminate vanes and a corrosion-resistant relief valve are also available. Maximum differential pressure is 150 psi (1034 kPa) for all models.

LGL1.25/LGL1.5



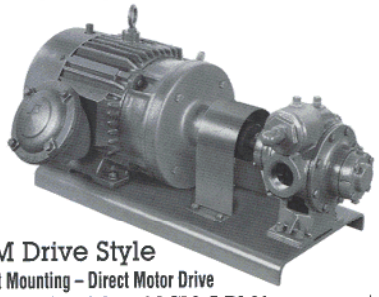
LGRLF1.25/LGLF1.25

ASSEMBLED PUMP UNITS

LGF Drive Style

Flange Mounting – Direct Motor Drive

Standard LGRLF1.25 and LGLF1.25 models are supplied with an integral bracket and a flexible shaft coupling, ready to accept a NEMA C-face motor. All LGF units are available with or without electric motors.

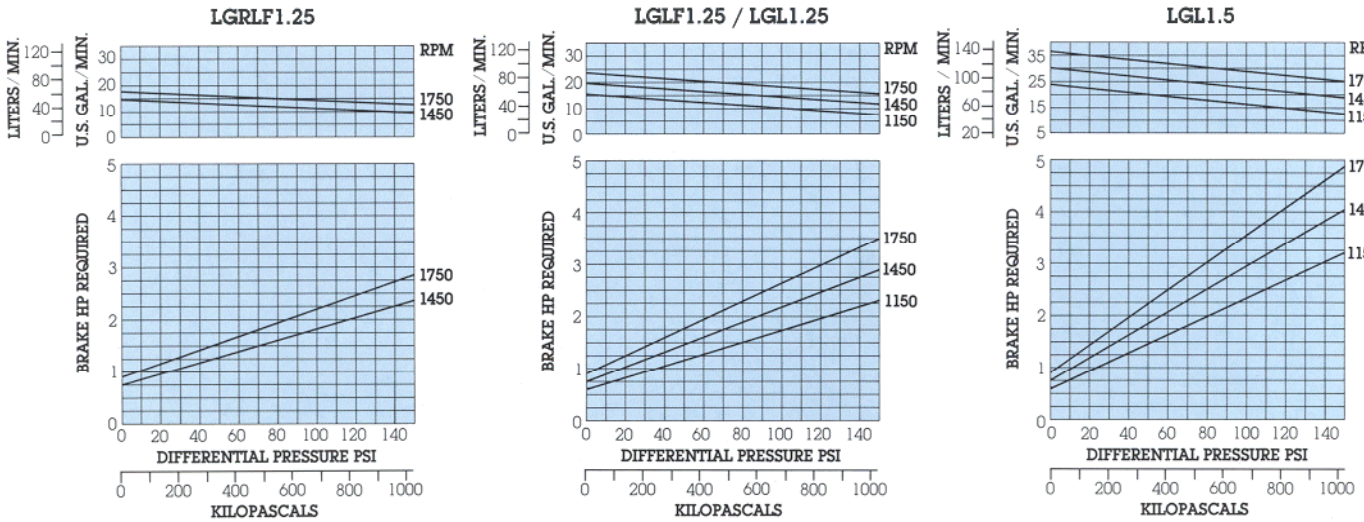


DM Drive Style

Foot Mounting – Direct Motor Drive

LGL1.25-DM and LGL1.5-DM base mounted units are available, complete with pump, coupling and coupling guard, mounted on a common base, ready to accept a standard NEMA motor. All DM units are available with or without electric motors.

PERFORMANCE CURVES



These curves are based on approximate delivery rates when handling propane or anhydrous ammonia at 80°F (26.7°C). Line restrictions such as excess flow valves, elbows, etc., will adversely affect deliveries. For propane at 32°F (0°C), actual delivery will be further reduced to about 80% of nominal. Delivery of butane at 80°F (26.7°C) will be 60% to 70% of these values, and may run as low as 35% to 45% at 32°F (0°C). This loss of delivery is not a pump characteristic but is caused by natural thermodynamic phenomena of liquefied gases.

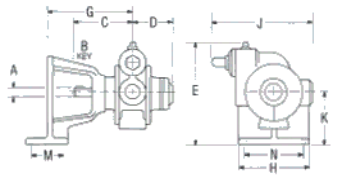
MOTOR SPEED PUMPS FOR MOTOR FUELING AND MULTI-CYLINDER FILLING

SELECTION DATA

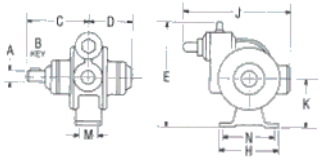
When selecting a standard pump or assembled unit from the table below, check the pump's delivery and brake horsepower requirements in the performance curves. These pumps are rated for continuous duty, although such applications may accelerate pump wear rates, particularly if vaporization occurs in the pump intake line. Pumps used on vaporizers should be mounted with inlet up, and sized for a capacity of at least 150% of the normal peak load to prevent system failure due to sudden pressure drop on start-up. Additional system requirements can be achieved by series or parallel staging.

ASSEMBLED PUMP UNITS		PUMP AND MOTOR SPEED RPM	APPROXIMATE DLIVERY OF PROPANE @ DIFFERENTIAL PRESSURES AND PUMP SPEEDS SHOWN[1]				MAXIMUM DIFFERENTIAL PRESSURE		MAXIMUM WORKING PRESSURE[2]		MOTOR SIZE FOR MOUNTING ON STANDARD BASE[2]	
MODEL	FACTORY RELIEF VALVE SETTING		50 PSI (345 kPa)		100 PSI (689 kPa)		PSI	kPa	PSI	kPa	MINIMUM FRAME SIZE	MAXIMUM FRAME SIZE
			GPM	LPM	GPM	LPM						
LGRLF1.25	150 PSI (1034 kPa)	1750	16.0	60.6	14.0	53.0	150	1034	350	2413	56C	184C[4]
LGLF1.25	150 PSI	1750	21.0	79.5	18.0	68.1	150	1034	350	2413	56C	184C[4]
	(1034 kPa)	1150	13.0	49.2	10.0	37.9	150	1034	350	2413	56C	184C[4]
LGL1.25-DM	150 PSI	1750	21.0	79.5	18.0	68.1	150	1034	350	2413	56	215
	(1034 kPa)	1150	13.0	49.2	10.0	37.9	150	1034	350	2413	56	215
LGL1.5-DM	150 PSI	1750	33.0	124.9	29.0	109.8	150	1034	350	2413	56	215
	(1034 kPa)	1150	20.0	75.7	17.0	64.4	150	1034	350	2413	56	215

[1]Check the pump's delivery and brake horsepower requirements in the performance curves on opposite page. See footnote with the curves which explains the factors that can cause delivery to vary.
[2]Maximum rated working pressure is 350 psi (2413 kPa) for LPG and NH_3 (limited by U.L. and N.F.P.A.58).
[3]Motors may be specified from dimension charts below and Electric Motor Price List No. 190 (explosion proof manual start switch for 1 & 1½ horsepower single phase motors also available).
[4]Pump flange accepts NEMA C-face motors with 5⅞" bolt circle diameter. Pump flange will not accept 182TC or 184TC frames.
Note: Refer to back cover for external bypass valve information.



LGRLF1.25/LGLF1.25



LGL1.25/LGL1.5

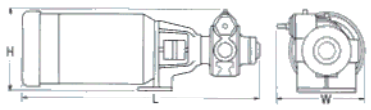
BARE PUMP DIMENSIONS

PUMP MODEL		A	B	C	D	E	G	H	J	K	M	N	APPROXIMATE LESS MOTOR	
													LBS.	KG
LGRLF1.25 LGLF1.25	IN.	⅞	3⁄16	5½	3⅞	9⅛	8 1⁄16	6⅝	9⅛	4½	2⅜	5½	39	18
	MM	22	5	140	98	232	205	168	232	114	60	133		
LGL1.25 LGL1.5	IN.	⅞	3⁄16	5½	3⅞	9⅛	–	5½	9⅛	4½	1⅜	4	30	14
	MM	22	5	140	98	232	–	140	232	114	35	102		

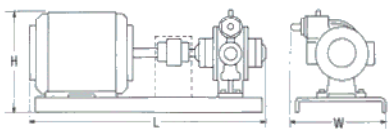
ASSEMBLED PUMP UNIT DIMENSIONS

MODEL	STANDARD 1750 RPM EXPLOSION PROOF 60 Hz MOTOR[1]		DIMENSION IN INCHES[2]			DIMENSION IN MM[2]			APPROXIMATE WT. LESS MOTOR	
	HP	FRAME	L	W	H	L	W	H	LBS.	KG
LGRLF1.25 LGLF1.25	1	56C	25⅝	9¼	9⅛	651	235	232	39	18
	1½	56C	27¾	9¼	9⅛	705	235	232	39	18
	2	184C	27¼	9¼	9⅛	692	235	232	39	18
	2	56C	25⅝	9¼	9⅛	651	235	232	39	18
LGL1.25-DM LGL1.5-DM	1	56	26⅛	10½	11⅛	664	267	283	54	25
	1	143T	24⅞	10½	11⅛	632	267	283	54	25
	1½	184	28⅛	10½	11⅛	715	267	283	54	25
	1½	145T	25¾	10½	11⅛	654	267	283	54	25
	2	182T	28⅛	10½	11⅞	715	267	283	54	25
	2	145T	25¾	10½	11⅛	654	267	283	54	25
	3	215	31	13	12¼	788	331	312	90	41
	3	182T	28⅛	10½	11⅛	715	267	283	54	25
	5	215	31	13	12¼	788	331	312	90	41
	5	184T	28⅛	10½	11⅛	715	267	283	54	25

[1] See Electric Motor Price List No. 190 for standard motor specifications (enclosure, phase, hertz, voltage, rpm, weight, etc.)
[2] Dimensions are for right hand rotation pumps, less starter, motor eyebolt and conduit box. Refer to catalog dimension sheets for detailed unit drawings.



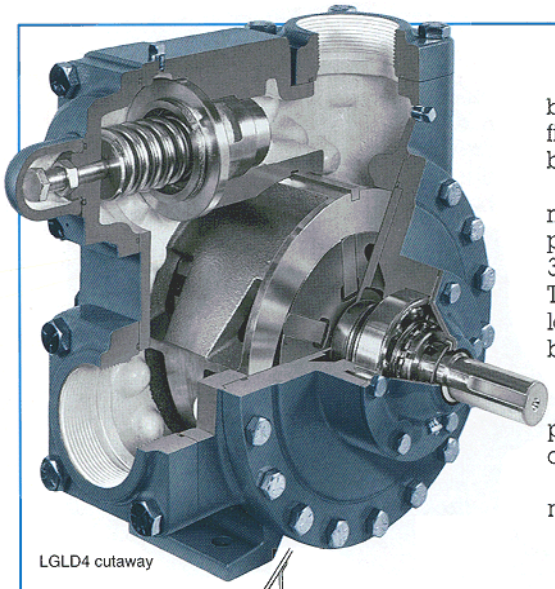
Flange Mounting



Foot Mounting

LGLD2, LGLD3 & LGLD4 PUMPS

MULTI-PURPOSE PUMPS FOR BULK PLANTS TERMINALS AND TRUCK SYSTEMS



LGLD4 cutaway

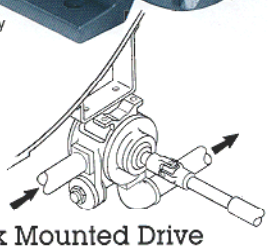
These rugged pumps are ideal for bulk plant service, multiple cylinder filling applications, vaporizers, bobtails and transports.

Single or double-ended drive shaft models are offered in 2, 3 and 4-inch port sizes with capacities ranging from 30 to 300 U.S. gpm (114-1135 lpm). The LGLD2 and LGLD3 models have long been popular for bobtail service because of their double-ended drive shaft arrangement, which allows the pump to be easily positioned for clockwise or counter-clockwise shaft rotation.

All models have an internal safety relief valve, and a replaceable casing liner and end discs for easy rebuilding of the pumping chamber if ever necessary.

Standard construction materials include Buna-N mechanical seals and Duravanes for handling both LP-gas and anhydrous ammonia. Optional viton fitted mechanical seals, laminate vanes and a corrosion-resistant relief valve are also available.

Maximum differential pressure for the 2 and 3-inch models is 150 psi (1034 kPa), and 125 psi (862 kPa) for the 4-inch models. Ports are offered with NPT tapped companion flanges or weld flanges (see companion flange chart on next page.)



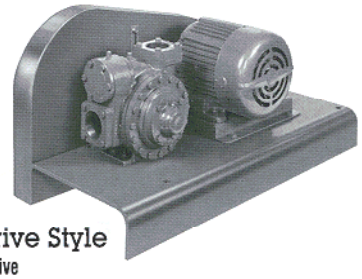
Truck Mounted Drive

Blackmer LGLD2 pumps are often mounted to the chassis of a bobtail, or to a steel pad that is welded to the tank.

The 3 and 4-inch models can be mounted to a transport in a number of different ways, generally near or between the tank landing gear brackets.

Truck mounted pumps are normally driven through a P.T.O. or hydraulic drive system. Refer to Blackmer's Liquefied Gas Handbook-Bulletin 500 for various types of bobtail and transport pump systems.

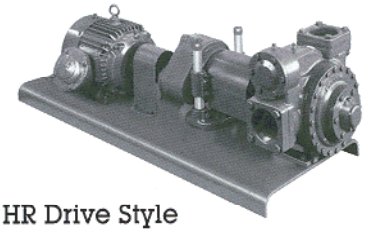
ASSEMBLED PUMP UNITS



VB Drive Style

V-Belt Drive

Standard base mounted VB units are available, complete with pump, hubs, quick disconnect sheaves, high-torque triple V-belts and belt guard, mounted on a common base, ready to accept a standard NEMA motor. All VB units are available with or without motors.

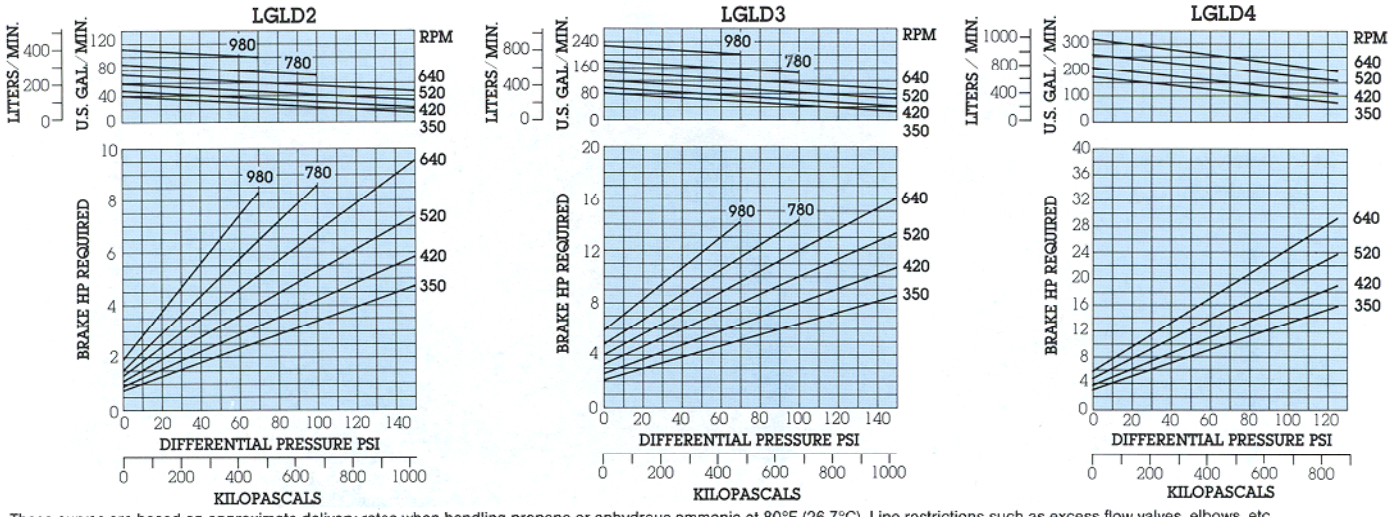


HR Drive Style

Helical Gear Reduction Drive

Standard base mounted HR units are available, complete with pump, Blackmer Helical Gear Reducer, mounting brackets, couplings and coupling guards, mounted on a common base, ready to accept a standard NEMA motor. All HR units are available with or without motors.

PERFORMANCE CURVES



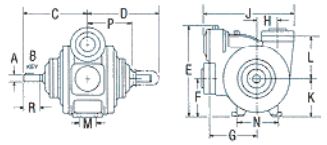
These curves are based on approximate delivery rates when handling propane or anhydrous ammonia at 80°F (26.7°C). Line restrictions such as excess flow valves, elbows, etc., will adversely affect deliveries. For propane at 32°F (0°C), actual delivery will be further reduced to about 80% of nominal. Delivery of butane at 80°F (26.7°C) will be 60% to 70% of these values, and may run as low as 35% to 45% at 32°F (0°C). This loss of delivery is not a pump characteristic but is caused by natural thermodynamic phenomena of liquefied gases.

SELECTION DATA

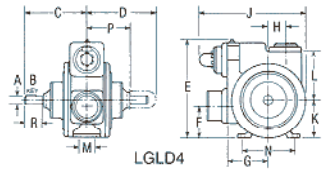
When selecting a pump for truck or transport systems, use the performance curves on the opposite page. For a standard pump or assembled unit, use the table shown. The table shows brake horsepower limitations for the unit's drive and base. Check these limits against the pump brake horsepower requirements, as shown in the curves. For continuous duty applications, it is generally advisable to use pump speeds of 400 rpm or less. Peak shaving plant systems, for example, involve continuous pump duty. Moreover, pumps used in peak shaving plant systems should be sized for a capacity of at least 150% of the normal peak load to prevent system failure due to abnormal vaporization in the intake line.

ASSEMBLED PUMP UNITS		PUMP SPEED RPM (USING 1750 RPM MOTOR)	APPROXIMATE DELIVERY OF PROPANE @ DIFFERENTIAL PRESSURES AND PUMP SPEEDS SHOWN[4]				MAXIMUM DIFFERENTIAL PRESSURE		MAXIMUM WORKING PRESSURE[2]		DRIVE RATING (MAXIMUM HORSEPOWER DRIVE WILL TRANSMIT)[3]			MOTOR SIZE FOR MOUNTING ON STANDARD BASE[4]	
MODEL	FACTORY RELIEF VALVE SETTING		50 PSI (345 kPa)		100 PSI (689 kPa)		PSI	kPa	PSI	kPa	0-3 HOUR DUTY	3-8 HOUR DUTY	8-24 HOUR DUTY	MINIMUM FRAME SIZE	MAXIMUM FRAME SIZE
			GPM	LPM	GPM	LPM									
LGLD2-VB	150 PSI (1034 kPa)	660	67	254	57	216	150	1034	350	2413	9.2	9.2	7.8	184T	213T
		520	50	189	41	155	150	1034	350	2413	6.4	6.4	5.4	182T	184T
		420	40	151	30	114	150	1034	350	2413	4.8	4.8	4.0	182T	184T
		330	30	114	23	87	150	1034	350	2413	3.1	3.1	2.6	182T	182T
LGLD2-HROF	150 PSI (1034 kPa)	640	65	246	55	208	150	1034	350	2413	8.9	7.1	5.7	143T	215T
		520	50	189	41	155	150	1034	350	2413	7.0	5.6	4.5	143T	215T
		420	40	151	30	114	150	1034	350	2413	5.4	4.3	3.4	143T	215T
		350	32	121	24	91	150	1034	350	2413	4.1	3.3	2.6	143T	215T
LGLD3-VB	150 PSI (1034 kPa)	640	133	503	112	424	150	1034	350	2413	12.1	12.1	10.2	215T	254T
		520	108	409	84	318	150	1034	350	2413	8.9	8.9	7.5	213T	215T
		420	80	303	60	227	150	1034	350	2413	7.3	7.2	6.1	213T	215T
		330	59	223	42	159	150	1034	350	2413	5.4	5.4	4.5	184T	184T
LGLD3-HRA	150 PSI (1034 kPa)	640	133	503	112	424	150	1034	350	2413	25.0	25.0	20.0	182T	256T
		520	108	409	84	318	150	1034	350	2413	24.3	19.4	15.5	182T	256T
		420	80	303	60	227	150	1034	350	2413	17.8	14.3	11.4	182T	256T
		350	63	238	45	170	150	1034	350	2413	14.4	11.5	9.2	182T	256T
LGLD4-VB	150 PSI (1034 kPa)	640	270	1022	220	833	125	862	350	2413	26.9	26.9	22.8	254T	284T
		520	220	833	180	681	125	862	350	2413	19.6	19.6	16.6	254T	256T
		420	170	644	130	492	125	862	350	2413	15.8	15.8	13.4	215T	254T
		330	130	492	90	341	125	862	350	2413	11.4	11.4	9.8	213T	215T
LGLD4-HRA	150 PSI (1034 kPa)	640	270	1022	220	833	125	862	350	2413	25.0	25.0	20.0	213T	256T
		520	220	833	180	681	125	862	350	2413	24.3	19.4	15.5	213T	256T
		420	170	644	130	492	125	862	350	2413	17.8	14.3	11.4	213T	256T
		350	138	522	95	360	125	862	350	2413	14.4	11.5	9.2	213T	256T
LGLD4-HRB	150 PSI (1034 kPa)	640	270	1022	220	833	125	862	350	2413	30.0	30.0	26.9	182T	286T
		500	210	795	170	644	125	862	350	2413	30.0	30.0	24.0	182T	286T
		400	160	606	120	454	125	862	350	2413	30.0	24.1	19.3	182T	286T

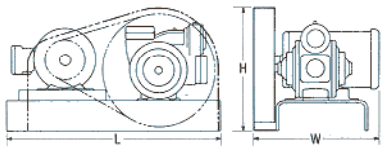
[1]Check the pump's delivery and brake horsepower requirements in the performance curves on opposite page. See footnote with the curves which explains the factors that can cause delivery to vary.
[2]Maximum rated working pressure is 350 psi (2413 kPa) for LPG and NH_3 (limited by U.L. and N.F.P.A.58).
[3]Maximum horsepower that standard drive (V-belt/gearbox and base) will transmit.
[4]Motors may be specified from dimension charts below and Electric Motor Price List No. 190.
Note: Refer to back cover for external bypass valve information.



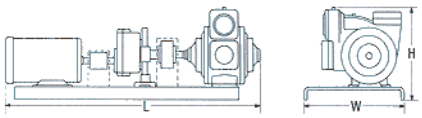
LGLD2/LGLD3



LGLD4



V-Belt Drive



Helical Gear Reduction Drive

COMPANION FLANGES

PUMP MODEL	STANDARD OR OPTIONAL	INTAKE	DISCHARGE
LGLD2	Standard	2" NPT Flange	2" NPT Flange
	Optional	2" weld Flange	2" weld Flange
LGLD3	Standard	3" NPT Flange	3" NPT Flange
	Optional	3" weld Flange	3" weld Flange
LGLD4	Standard	4" weld Flange	3" weld Flange
	Optional	3" NPT Flange	3" NPT Flange
	Optional	3" weld Flange	3" weld Flange
	Optional	4" weld Flange	4" weld Flange

BARE PUMP DIMENSIONS

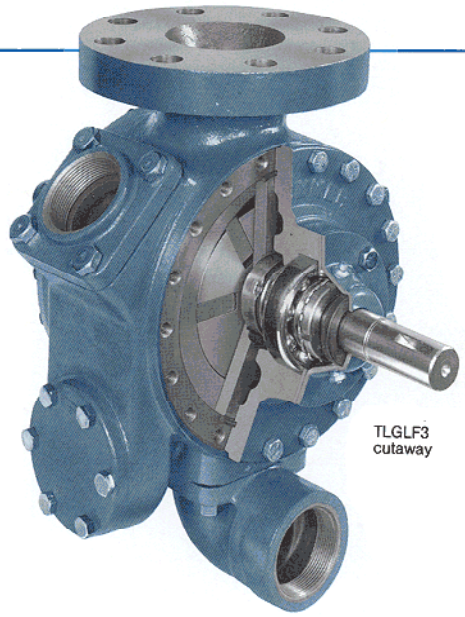
PUMP MODEL		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	APPROX. WT. LESS MOTOR	
																	LBS.	KG
LGLD2	IN.	1⅛	¼	8	8 15/16	10	3¾	4 13/16	2⅜	9¾	4	4⅞	1⅝	5	5 7/16	2¼	85	39
	MM	29	6	203	227	254	95	122	60	248	102	124	41	127	138	57		
LGLD3	IN.	1⅛	¼	9⅝	11⅜	13⅜	5⅜	7	3⅛	13⅜	5⅜	6 5/16	2½	6	6 5/16	2 7/16	160	73
	MM	29	6	245	283	340	137	178	79	340	137	160	64	152	160	62		
LGLD4	IN.	1¼	5/16	9⅝	11 1/16	15 7/16	4⅞	6 9/16	2⅝	16 15/16	5 5/16	7½	2½	8¼	6¾	2¾	250	93
	MM	32	8	245	281	392	124	167	67	430	151	191	64	210	172	70		

ASSEMBLED PUMP UNIT DIMENSIONS

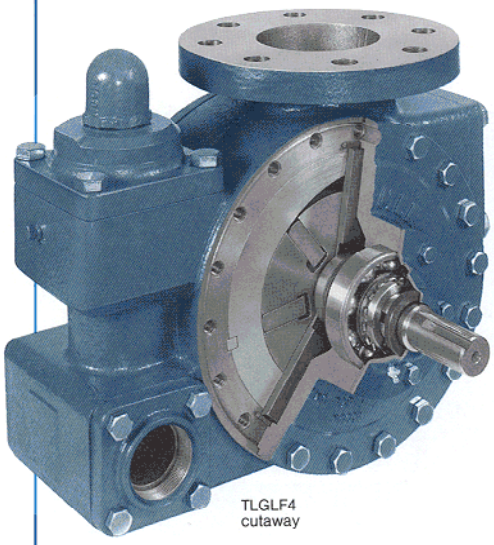
MODEL	STANDARD 1750 RPM EXPLOSION-PROOF 60 Hz MOTOR[1]		DIMENSION IN INCHES[2]			DIMENSION IN MM[2]			APPROX. WT. LESS MOTOR	
	HP	FRAME	L	W	H	L	W	H	LBS.	KG
LGLD2-VB	3	182T	35 3/8	17⅛	15⅞	899	435	403	180	82
	5	184T	35 3/8	17⅛	15⅞	899	435	403	180	82
	7½	213T	35 3/8	20½	17	899	521	432	186	84
LGLD3-VB	5	184T	36⅞	19¾	21½	937	502	546	265	120
	7½	213T	36⅞	21¼	21½	937	537	546	265	120
	10	215T	36⅞	22	21½	937	559	546	265	120
	15	254T	36⅞	25½	21½	937	648	546	305	138
LGLD4-VB	15	254T	41¾	25⅝	21¼	1061	651	540	430	195
	20	256T	41¾	25⅝	21¼	1061	651	540	430	195
	25	284T	41¾	28 9/16	21 11/16	1061	726	551	430	195
LGLD2-HROF	3	182T	38½	14¾	13⅜	978	375	340	175	79
	5	184T	39⅞	14¾	13⅜	1013	375	340	175	79
	7½	213T	47½	17¼	14⅝	1207	438	372	215	98
	10	215T	47½	17¼	14⅝	1207	438	372	215	98
LGLD3-HRA	5	184T	48¾	17¼	16	1238	438	406	315	143
	7½	213T	48¾	17¼	16	1238	438	406	320	145
	10	215T	49⅜	17¼	16	1254	438	406	320	145
	15	254T	53¼	17¼	16	1353	438	406	320	145
	20	256T	55	17¼	16	1397	438	406	320	145
LGLD4-HRA	15	254T	53⅝	20⅜	18⅞	1362	518	479	445	202
	20	256T	55⅛	20⅜	18⅞	1400	518	479	445	202
LGLD4-HRB	15	254T	54⅜	20⅜	19⅜	1381	518	492	550	249
	20	256T	56⅛	20⅜	19⅜	1426	518	492	550	249
	25	284T	58⅛	20⅜	19⅜	1476	518	492	550	249
	30	286T	59⅝	20⅜	19⅜	1515	518	492	550	249

[1] See Electric Motor Price List No. 190 for standard motor specifications (enclosure, phase, hertz, voltage, rpm, weight, etc.)
[2] Dimensions are for right hand rotation pumps, less starter, motor eyebolt and conduit box. Refer to catalog dimension sheets for detailed unit drawings.

TLGLF3 & TLGLF4 PUMPS



TLGLF3
cutaway



TLGLF4
cutaway

Blackmer TLGLF3 and TLGLF4 pumps are designed to flange mount directly to a commercial internal control valve, in combination with the tank of a bobtail or transport. Direct mounting eliminates the need for inlet pipes, shut-off valve and external strainer which can restrict flow and cause vaporization problems. The result is smoother operation and longer pump life.

Both models are equipped with a double-ended drive shaft for clockwise or counterclockwise rotation by simply changing position of the pump. Each model also has an auxiliary intake port which can be used for emergency unloading of another tank or transport. In addition, these pumps have an internal safety relief valve, and a replaceable casing liner and end discs for easy rebuilding of the pumping chamber if ever necessary.

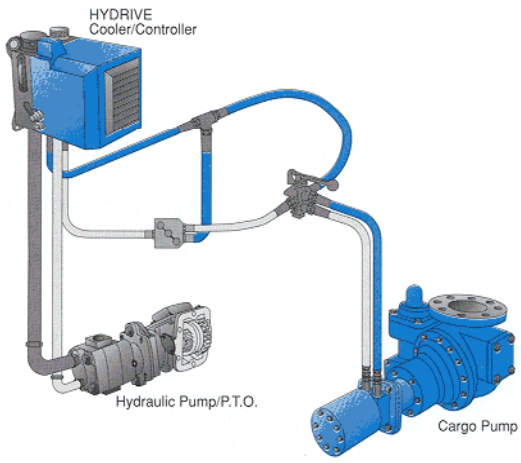
Standard construction materials for both models include Buna-N mechanical seals and Duravanes for handling both LP-gas and anhydrous ammonia. Optional viton-fitted mechanical seals, laminate vanes and a corrosion-resistant relief valve are also available.

The TLGLF3 is widely used on bobtails because of its compact mounting arrangement, with a 3-inch ANSI intake flange, and 2-inch auxiliary intake and discharge ports. Capacities range from 60 to 110 U.S. gpm (227 to 416 lpm).

The TLGLF4 offers maximum output rates, and fast turn-around time for transports. It is designed with a 4-inch ANSI intake flange, a 3-inch auxiliary intake port, and twin 2-inch discharge ports which permit the use of two hoses, if necessary, to reduce pressure loss when unloading into restrictive receiving systems. Capacities range from 200 to 300 U.S. gpm (757-1135 lpm).

Maximum differential pressure for both models is 125 psi (862 kPa).

HYDRAULIC DRIVE PACKAGES



Blackmer two-inch through four-inch pump models are offered with complete factory engineered hydraulic drive packages. Blackmer highly recommends the use of hydraulic drive systems to maximize pump performance and extend equipment life, especially on truck mounted bobtail and transport pumps.

The Blackmer Hydrive cooler/controller forms the heart of a hydraulic drive system, and offers up to 21 horsepower (15.75 kW) of actual heat dissipation. The Hydrive has a compact design with stainless steel construction, and weighs only 48 lbs. (22 kgs.). It protects the system during cold start-up, allows for remote system on/off control, and provides both system cooling and monitoring of oil filtration.

A typical hydraulic drive package includes a P.T.O., hydraulic pump, Hydrive cooler/controller, cargo pump control valve, speed control valve, hydraulic motor, and mounting hardware. Hydraulic motor adapter kits are also available to retrofit existing Blackmer LP-gas pumps for hydraulic drive operation.

FLANGE MOUNTED PUMPS FOR BOBTAILS AND TRANSPORTS

SELECTION DATA

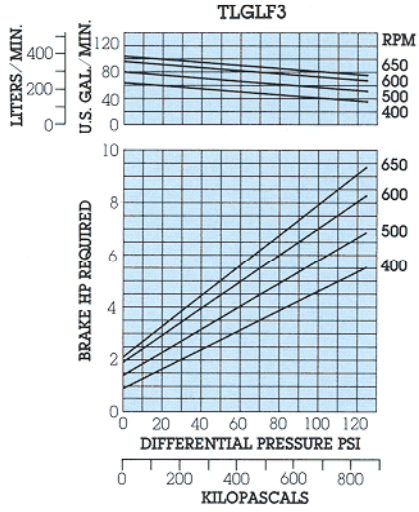
Pump delivery and brake horsepower requirements are listed in the table below for various differential pressures. The same data for all pressures is provided in the performance curves below.

STANDARD PUMP		PUMP SPEED RPM	APPROXIMATE DELIVERY OF PROPANE @ DIFFERENTIAL PRESSURES AND PUMP SPEEDS SHOWN[1]												MAXIMUM DIFFERENTIAL PRESSURE		MAXIMUM WORKING PRESSURE[2]	
			50 PSI (345 kPa)						100 PSI (689 kPa)									
MODEL	FACTORY RELIEF VALVE SETTING		GPM	LPM	BHP	KW	TORQUE FT. LBS.	TORQUE KG/M	GPM	LPM	BHP	KW	TORQUE FT. LBS.	TORQUE KG/M	PSI	kPa	PSI	kPa
TLGLF3	150 psi (1034 kPa)	650	93	352	5.0	3.7	40.4	5.6	81	307	7.9	5.9	63.8	8.8	125	862	350	2413
		600	85	322	4.5	3.4	39.4	5.4	73	276	7.0	5.2	61.3	8.5	125	862	350	2413
		500	70	265	3.6	2.7	37.8	5.2	59	223	5.7	4.3	59.9	8.3	125	862	350	2413
		400	52	197	2.8	2.1	36.8	5.1	40	151	4.5	3.4	59.1	8.2	125	862	350	2413
TLGLF4	150 psi (1034 kPa)	650	280	1060	15.5	11.6	125.2	17.3	245	927	25.0	18.6	201.9	27.9	125	862	350	2413
		600	260	984	14.3	10.7	125.1	17.3	220	833	23.0	17.2	201.3	27.8	125	862	350	2413
		500	210	795	11.9	8.9	125.0	17.3	170	644	19.0	14.2	199.5	27.6	125	862	350	2413
		400	160	606	9.5	7.1	124.7	17.2	120	454	15.2	11.3	199.5	27.6	125	862	350	2413

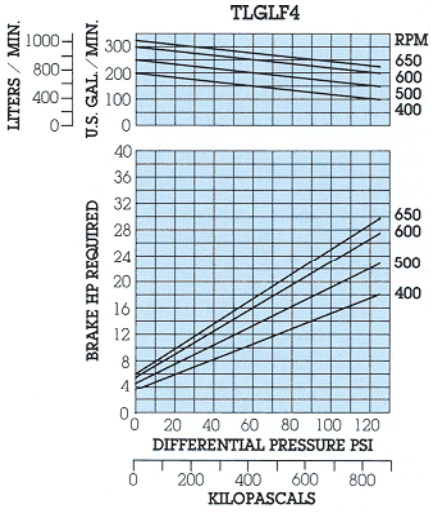
[1]Check the pump's delivery and brake horsepower requirements in the performance curves below. See footnote with the curves which explains the factors that can cause delivery to vary.
[2]Maximum rated working pressure is 350 psi (2413 kPa) for LPG and NH_3 (limited by U.L. and N.F.P.A.58).
Note: Refer to back cover for external bypass valve information.

PERFORMANCE CURVES

TLGLF3



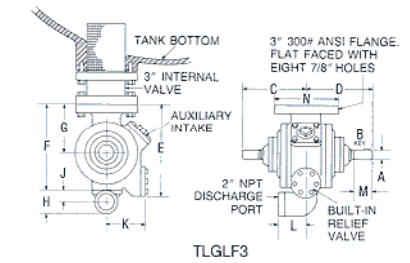
TLGLF4



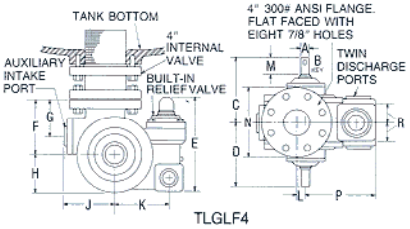
These curves are based on approximate delivery rates when handling propane or anhydrous ammonia at 80°F (26.7°C). Line restrictions such as excess flow valves, elbows, etc., will adversely affect deliveries. For propane at 32°F (0°C), actual delivery will be further reduced to about 80% of nominal. Delivery of butane at 80°F (26.7°C) will be 60% to 70% of these values, and may run as low as 35% to 45% at 32°F (0°C). This loss of delivery is not a pump characteristic but is caused by natural thermodynamic phenomena of liquefied gases.

COMPANION FLANGES AND FLANGED ELBOWS

PUMP MODEL	STANDARD OR OPTIONAL	DISCHARGE	AUXILIARY INTAKE	INTAKE
TLGLF3	Standard	2" NPT Flanged Elbow	2" NPT Flange	3" 300 lb. ANSI Mounting Flange
	Optional	2" NPT Flanged Elbow	2" NPT Flanged Elbow	
	Optional	2" Weld Flanged Elbow	2" Weld Flange	
	Optional	2" Weld Flanged Elbow	2" Weld Flanged Elbow	
TLGLF4	Standard	Twin 2" NPT Flanges	Blanking Flange	4" 300 lb. ANSI Mounting Flange
	Optional	Twin 2" NPT Flanges	3" NPT Flange	
	Optional	Twin 2" Weld Flanges	3" Weld Flange	
	Optional	Twin 2" Weld Flanges	Blanking Flange	
	Optional	Twin 2" Weld Flanges	4" Weld Flange	



TLGLF3



TLGLF4

BARE PUMP DIMENSIONS

PUMP MODEL		A	B	C	D	E	F	G	APPROXIMATE WT. LBS.	APPROXIMATE WT. KG
TLGLF3	IN.	1 1/8	1/4	8 3/4	8 3/4	12 9/16	11 3/4	6 3/4	140	64
	MM	29	6	222	222	319	299	172		
		H	J	K	L	M	N			
	IN.	3 3/16	1 5/8	5 3/4	3 7/8	2 1/4	8 1/4			
	MM	81	41	146	98	57	210			

PUMP MODEL		A	B	C	D	E	F	G	H	APPROXIMATE WT. LBS.	APPROXIMATE WT. KG
TLGLF4	IN.	1 1/4	5/16	9 5/8	9 5/8	13 7/8	8	5 3/8	5 7/8	220	100
	MM	32	8	245	245	352	203	137	149		
		J	K	L	M	N	P	R			
	IN.	7 3/16	7 3/4	1 1/4	2 5/8	10 1/8	10 1/8	2 7/8			
	MM	182	197	32	67	257	257	73			

LB161, LB361, LB601 & LB942 COMPRESSORS

Blackmer oil-free gas compressors deliver high efficiency in handling propane, butane, anhydrous ammonia and other liquefied gases. They are ideal for rail car unloading and vapor recovery applications. These single-stage, reciprocating compressors are designed to give maximum performance and reliability under the most severe service conditions. All pressure parts are of ductile iron construction for greater resistance to both thermal and mechanical shock. They are designed for ease of maintenance, with all components readily accessible.

Models are available with capacities from 7 to 125 CFM (11.9 to 212 m^3/h) with working pressure up to 425 psia (2931 kPa).

Gas compressors for liquid transfer

Many liquid transfer applications can be handled more efficiently with a gas compressor than a liquid pump. They include unloading of transports and pressure vessels where system piping restricts flow and may cause a pump to cavitate; unloading of LP-gas from rail cars, and other installations that require an initial lift to the liquid.

How liquid transfer is accomplished

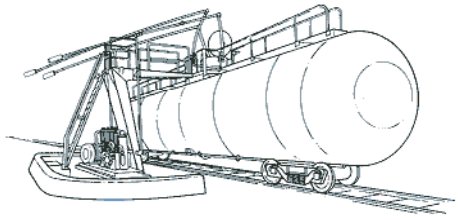
When transferring liquid, a compressor creates a slight pressure differential between the vessel being unloaded and the receiving tank. The suction stroke of the compressor piston draws in vapor and decreases the receiving tank pressure. The discharge stroke moves a measured volume of vapor at a higher pressure into the supply tank where it displaces an equal volume of liquid through a separate line into the receiving tank. Generally, the liquid flow rate will be 5 to 6 U.S. gpm for each cubic foot (ft^3) of piston displacement (670-775 liters per cubic meter [m^3]).

Gas compressors for vapor recovery

When the liquid transfer phase has been completed, a significant amount of product (vapor and liquid) is left in the tank car (often 3% or more of the tank's capacity). Recovery of product with a compressor is a simple operation, where a compressor can quickly pay for itself.

How vapor recovery is accomplished

Vapor recovery is accomplished with the use of a four-way valve. By rotating the valve handle ninety degrees, gas flow is reversed and the vapor pressure within the supply vessel is reduced. At this point, remaining liquid vaporizes and is quickly recovered. As the tank pressure is drawn down further, remaining vapors are also recovered to an economical level. Recovered vapor is discharged into the liquid area of the receiving tank and then condensed back into a liquid state.



Tank car vapor recovery system

PROPANE VAPOR RECOVERY

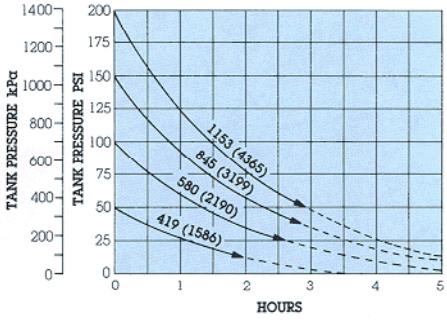
The chart and graph illustrate typical volumes of liquid that may be recovered at various pressures and operating times, based on a 33,000 U.S. water gallon capacity (124,915 lts.) tank car — using a Blackmer LB361 gas compressor with 36 CFM (60.3 m^3/h piston displacement).

For example, when the liquid transfer phase of unloading is completed, the vapor pressure reads 150 psig (1034 kPa gauge). At this condition, there would be approximately 1315 U.S. gallons (4978 lts.) of LP-gas in vapor form remaining in the tank car. Of this amount, 845 U.S. gallons (3199 lts.) can be economically recovered in less than three hours.

BEGINNING TANK PRESSURE		TOTAL PRODUCT[1] (IN VAPOR FORM)		ECONOMICALLY RECOVERABLE PRODUCT[2]	
PSIG	kPa	U.S. GALS.	LITERS	U.S. GALS.	LITERS
200	1379	1650	6246	1153	4365
175	1207	1485	5621	969	3668
150	1034	1315	4978	845	3199
125	862	1137	4304	713	2699
100	689	953	3607	580	2196
75	517	760	2877	441	1669
50	345	561	2124	419	1586

[1] Physical properties are based on NFPA #58 data for commercial propane. Vapor pressure 205 psig (1413 kPa) @ 100°F (37.8°C).
[2] Economically recoverable product is based on reduction of tank pressure to 25% of original value. Residual liquid not included.
Note: A different size tank will have a proportional relationship to the values shown above. For example, a 10,000 U.S. gallon (27,850 lts.) tank would represent 30.3% of the values given.

VOLUME RECOVERED FROM 33,000 U.S. GALLON TANK (124,915 LITERS)



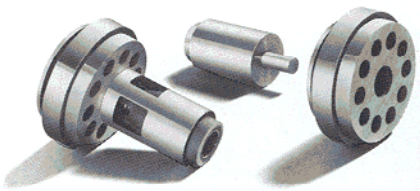
Overall efficiency of plant piping may improve or detrimentally affect compressor performance.

All figures are approximate and rounded off for easy reading.

Additional information for liquefied gases other than propane is available; consult your Blackmer representative.

OIL-FREE GAS COMPRESSORS FOR LIQUID TRANSFER AND VAPOR RECOVERY

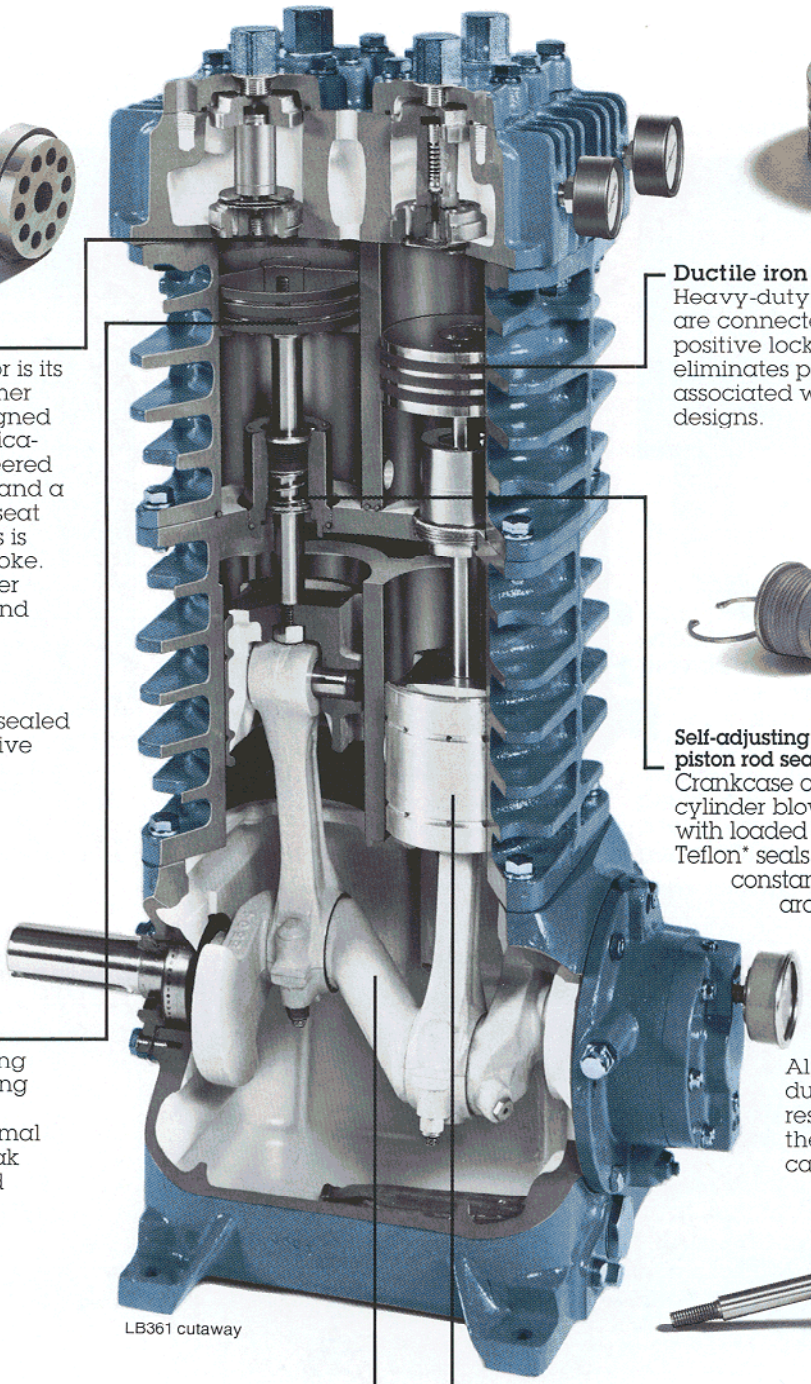
DESIGN FEATURES



High efficiency valves move more gas volume
The heart of any compressor is its valve assembly and Blackmer valves are specifically designed for non-lubricated gas applications. With precisely engineered clearances, spring tension, and a special finish, these valves seat more positively so more gas is moved with each piston stroke. Blackmer valves offer greater strength, quiet operation, and long life.

O-Ring seals - head and cylinder
The head and cylinder are sealed with O-rings to ensure positive sealing under all operating conditions.

Pressure assisted piston rings for positive seating
Constructed of self-lubricating Teflon*, Blackmer's special ring design provides maximum sealing efficiency with minimal friction wear. The result: peak performance and extended compressor service life.



LB361 cutaway

Ductile iron pistons
Heavy-duty ductile iron pistons are connected with a single positive locking nut which eliminates potential problems associated with more complex designs.

Self-adjusting piston rod seals
Crankcase oil contamination and cylinder blow-by is prevented with loaded fiberglass-filled Teflon* seals which maintain a constant sealing pressure around the piston rods.

Ductile iron construction
All pressure parts are of ductile iron for greater resistance to both thermal and mechanical shock.

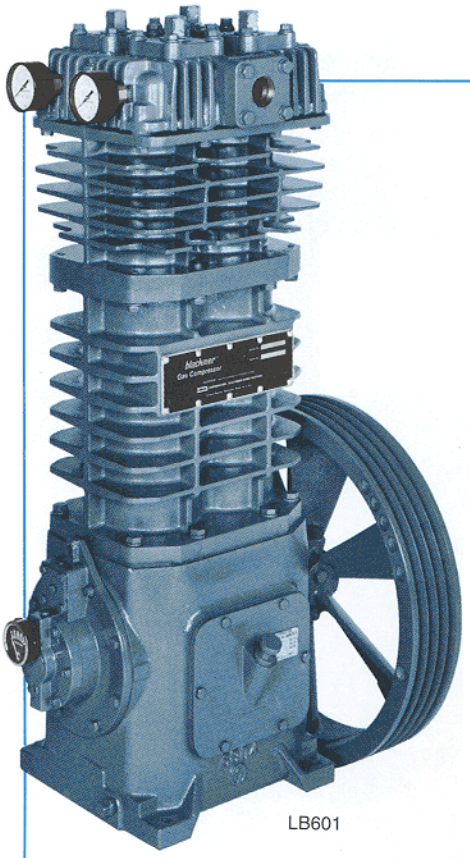
Heavy-duty crankshaft
The ductile iron crankshaft is precision ground with integral counterweights for smooth, quiet operation. Rifle drilling ensures positive oil distribution to the wrist pin and connecting rod bearings.

Pressure lubricated crankcase
A rotary oil pump provides positive oil distribution to all running gear components for long life and minimal wear.

Wear-resistant crosshead assemblies
Designed with special machined lube channels and porting for maximum lubrication and wear resistance.

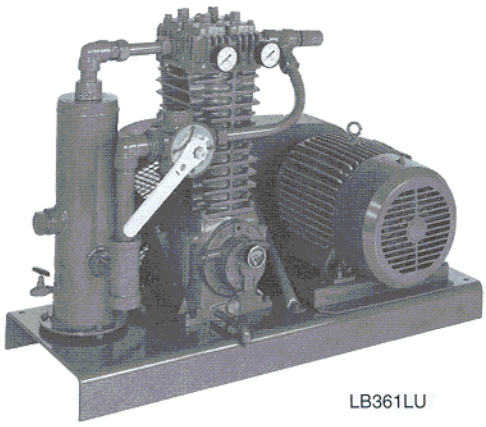
*Trademark of E.I. Du Pont de Nemours and Company

COMPRESSOR SELECTION DATA



LB601

To select a compressor that best fits your application requirements, use the charts shown. The data provided is based on approximate delivery rates when handling propane or anydrous ammonia. Actual capacities will depend upon line restrictions, size and length of piping. Horsepower requirements for both liquid transfer and vapor recovery applications are based on moderate climatic conditions.



LB361LU

ENGINEERING SPECIFICATIONS

	COMPRESSOR MODEL			
	LB161 LB162	LB361 LB362	LB601 LB602	LB942
Bore - Inches (mm)	3.0 (76.2)	4.0 (101.6)	4.625 (117.4	4.625* (117.4)
Stroke – Inches (mm)	2.5 (63.5)	3.0 (76.2)	4.0 (101.6)	4.0 (101.6)
Piston Displacement CFM (m^3/h)				
@ 100 rpm	2.0 (3.4)	4.3 (7.3)	7.7 (13.1)	14.9 (25.38)
@ 825 rpm	16.5 (28.0)	35.5 (60.3)	63.5 (107.9)	123 (209)
Compressor Speed				
Minimum rpm	350	350	350	350
Maximum rpm	825	825	825	835
Maximum Working Pressure – psia (kPa)	350 (2413)	350 (2413)	350 (2413)	425 (2931)
Maximum Brake Horsepower (kw)	7.5 (6)	15 (11)	30 (22)	50 (37)
Max. Discharge Temperature °F (°C)	350 (177)	350 (177)	350 (177)	350 (177)
Max. Compression Ratio[1]				
Continuous Duty[2]	5	5	5	5
Intermittent Duty[2]	9	9	9	9

*Double acting
[1] Compression Ratio defined as absolute discharge pressure divided by absolute inlet pressure.
[2] Compression Ratios are limited by discharge temperature. High compression ratios can create excessive heat, i.e., over 350°F (117°C). The duty cycle must provide for adequate cooling time between periods of operation to prevent excessive operating temperature.

COMPRESSOR SELECTION DATA: PROPANE AND ANHYDROUS AMMONIA

MODEL	SPEED	APPROXIMATE LIQUID TRANSFER DELIVERY[1]		PISTON DISPLACEMENT		DRIVER SIZE[2]		PIPE DIAMETER[3]			
								VAPOR		LIQUID	
	RPM	U.S. GPM	LPM	CFM	M^3/H	HP	KW	IN.	MM	IN.	MM
LB161 LB162	425*	49	186	8.5	14.4	3	2	1	25	2	50
	560	65	246	11.2	19.0	5	4				
	715*	83	314	14.3	24.3	5	4	1¼	32		
	780	90	341	15.6	26.5	7.5	6				
	825*	95	360	16.5	28.0	7.5	6				
LB361 LB362	495*	123	466	21.3	36.2	7.5	6			2½	65
	540	134	507	23.2	39.5	10	7				
	650*	161	609	28.0	47.5	10	7	1½ - 2	38 - 50	3	80
	780	194	734	33.5	57.0	15	11				
	825*	205	776	35.5	60.3	15	11				
LB601 LB602	550	245	927	42.4	72.0	15	11	2 - 2½	50 - 65	4	100
	640	285	1079	49.3	83.7	20	15				
	735*	327	1238	56.6	96.2	20	15				
	790*	351	1329	60.8	103.4	25	19				
LB942	470	400	1514	70	119	25	19	3 - 4	76 - 102	6	152
	565	480	1817	84	143	30	22				
	750	640	2422	112	190	40	30				
	825	700	2650	123	209	50	37				

*Maximum rpm for each respective motor horsepower.
[1] Delivery will depend on proper system design, pipe sizing and valve capacity.
[2] Horsepower is for liquid transfer and vapor recovery in moderate climates. For liquid transfer without vapor recovery, horsepower will be lower. For severe climates, contact your Blackmer representative for horsepower required.
[3] Use next larger pipe size if piping exceeds 100 feet (30 meters).

STANDARD COMPRESSOR PACKAGES

Blackmer offers a variety of factory assembled compressor packages to fit most application requirements. Standard base mounted units are available in the following styles:

CO - COMPRESSOR ONLY
Includes basic compressor with flywheel.

B - BASE MOUNTED UNIT
Includes compressor, pressure gauges, formed steel base, V-belt drive with belt guard and adjustable motor base, less motor.

E - EXTENDED SHAFT
Includes compressor with flywheel and extended crankshaft.

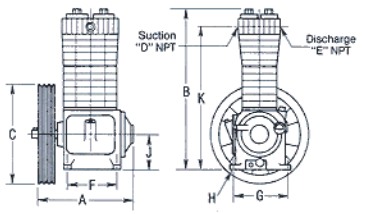
TU - TRANSFER UNIT
Includes compressor, pressure gauges, formed steel base, liquid trap assembly with a mechanical float, V-belt drive with belt guard and adjustable motor base, less motor.

TC - TRANSFER UNIT
Includes compressor, pressure gauges, formed steel base, ASME code stamped liquid trap assembly (complete with relief valve and a NEMA 7 electric float switch for Propane service), V-belt drive with belt guard and ajustable motor slide base.

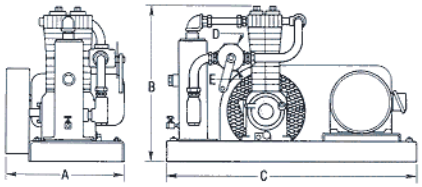
LU - LIQUID TRANSFER/VAPOR RECOVERY UNIT
Includes compressor, pressure gauges, formed steel base, liquid trap assembly with a mechanical float, inlet strainer, interconnecting piping, 4-way valve, V-belt drive with belt guard and adjustable motor base, less motor.

LC - LIQUID TRANSFER/VAPOR RECOVERY UNIT
Includes compressor, pressure gauges, steel base, ASME code stamped liquid trap assembly (complete with relief valve and a NEMA 7 electric float switch for Propane service), inlet strainer, interconnecting piping, 4-way valve, V-belt drive with belt guard and adjustable motor base, less motor.

All Compressor models are available with or without motors or accessories. Special engine drives, control panels and custom emergency evacuation units can be furnished on a special order basis.

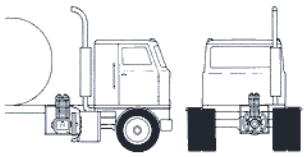


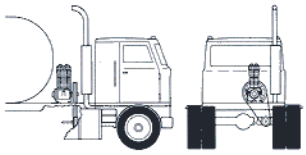
Compressor Only-CO



Unit Assembly-LU

Blackmer compressors can also be mounted on transports with direct drive or V-belt drive as shown below.


Direct Drive


V-Belt Drive

MULTIPLE SEAL OPTIONS

For applications that require maximum leakage control, double piston rod seals and a distance piece chamber are available for all Blackmer LB compressors.

Blackmer also offers a line of single and two-stage industrial gas compressors with double or triple piston rod seals and air or water cooling. Consult your Blackmer representative for more information and specifications.

OPTIONAL ACCESSORIES

Motors: Standard voltage and sizes in stock.

Motor slide rails: Offer easy adjustment for standard motor frame sizes.

Engines: Diesel, propane or gasoline fueled engines available.

Liquid traps: Available with a mechanical float or electric float switch, or both. ASME construction also available.

Vapor strainer assembly: Features a 30-mesh replaceable stainless steel screen and ductile iron body.

Four-way valve: With handle and easy-to-read flow direction indicator. Ductile iron construction.

Pressure gauges: Standard ¼-inch NPT liquid-filled for head mounting.

Extended crankshaft: For direct drive mounting, or V-belt drive applications.

Base plates: Formed steel or fabricated skid type.

Belt guards: Heavy-duty 14-gauge steel, stainless steel or non-sparking aluminum construction.

BARE COMPRESSOR DIMENSIONS

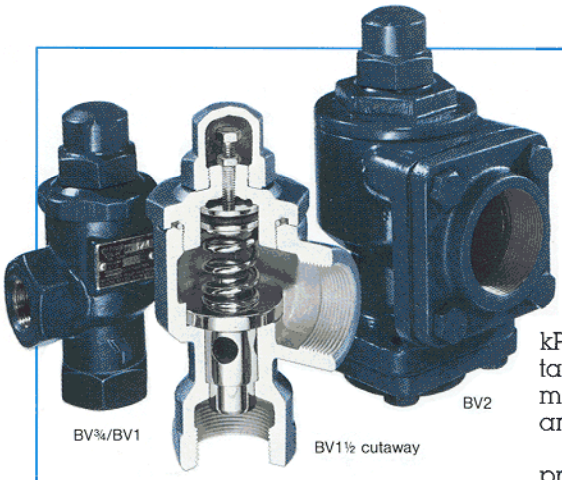
MODEL		A	B*	C	D	E	F	G	H	J	K*
LB161 LB162	IN.	16½	26	16	¾	¾	7½	7⅜	13/32	5⅜	23 7/16
	MM	419	660	406	19	19	191	187	10	137	595
LB361 LB362	IN.	18½	29⅞	16	1¼	1¼	9⅛	9⅜	½	5⅜	26 3/16
	MM	470	759	406	32	32	232	238	13	149	665
LB601 LB602	IN.	20½	40¾	19½	1½	1½	10¼	10¾	9/16	8¼	37
	MM	521	1035	495	38	38	260	273	14	210	940
LB942	IN.	22¾	45¼	21¼	2" ANSI 300#	2" ANSI 300#	10½	12	9/16	8¼	37⅝
	MM	578	1149	540			267	305	14	210	956

BASE MOUNTED UNIT DIMENSIONS

MODEL		A	B*	C	D	E
LB161 LB162	IN.	20	31	42	1	1
	MM	508	787	1067	25	25
LB361 LB362	IN.	23	34	48	1¼	1¼
	MM	584	864	1219	32	32
LB601 LB602	IN.	25	44¾	52	1¼	1¼
	MM	635	1137	1321	32	32
LB942	IN.	32	65	80	2	2
	MM	813	1651	2032	51	51

*Consult factory for height dimension on models LB162/LB362/LB602.

BYPASS VALVES
PRECISE, ON-LINE PRESSURE PROTECTION



SELECTION GUIDE

Model BV¾ (ports are ¾-inch NPT tapped)
Model BV1 (ports are 1-inch NPT tapped)

These models are commonly used for cylinder-filling systems. Either valve can be used with 1¼ or 1½-inch Blackmer pump models.

Model BV1¼ (ports are 1¼-inch NPT tapped)
Model BV1½ (ports are 1½-inch NPT tapped)

These models are normally used for bobtail trucks and smaller bulk plant systems. Either valve can be used with 2 or 3-inch Blackmer pump models.

Model BV2 (ports have 2-inch NPT companion flanges)

The BV2 model is widely used for transports or larger bulk plant systems. It is recommended for use with 3 and 4-inch Blackmer pump models.

TECHNICAL ASSISTANCE

In some applications, selecting the right pump or compressor may require more detailed information than can be presented in this bulletin. Your Blackmer representative can help you find the correct equipment to ensure the best performance possible for your specific application.

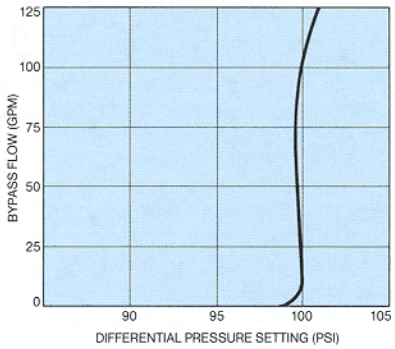
If you have a unique gas or fluid handling problem, please contact Blackmer's **Liquefied and Compressed Gas Equipment Group** at the telephone or fax number listed below.

Blackmer differential bypass valves are designed to protect pumps and system components from excessive pressure damage, and no LP-gas pump installation is complete without one. Blackmer offers five different models that provide full-flow pressure control to 250 U.S. gpm (946 lpm) at 120 psid (827 kPa). Installation is easy with NPT tapped ports in sizes from ¾" to 2". All models are suitable for both LP-gas and anhydrous ammonia service.

In operation, Blackmer valves provide exceptionally close pressure control, even under widely varying bypass flow conditions. The performance curve in Figure 4 below shows how a Blackmer valve maintains a virtually constant pressure of 100 psi (689 kPa) even as the volume being bypassed rises from 10 gpm to 100 gpm (38-378 lpm). Although the curve is that of a BV1½" valve, the precision it demonstrates is typical of any Blackmer valve.

Blackmer bypass valves have no small, easily plugged, sensing passages; and with only two moving parts, their operation is simple and reliable. They open precisely at the preset spring pressure, and they close smoothly and quietly, thanks to a patented dash-pot design. As shown in Figure 5, a small chamber in the valve stem fills with liquid when the valve opens. This liquid then provides a hydraulic cushion preventing the valve from slamming shut if pressure is suddenly released. It also minimizes chatter and valve seat wear when pressures hover around the critical limit.

FIGURE 4. Bypass volume/ pressure curve BV1½

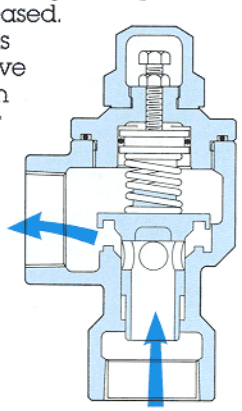


Maximum flow-through valve

MODEL	MAXIMUM RATED FLOW*—GPM (LPM) @			
	20 PSI (138 kPa)	50 PSI (345 kPa)	80 PSI (552 kPa)	120 PSI (827 kPa)
BV¾ BV1	25 (95)	40 (151)	50 (189)	60 (227)
BV1¼ BV1½	60 (227)	80 (303)	100 (379)	125 (473)
BV2	150 (568)	180 (681)	220 (833)	250 (946)

*Normal maximum bypass flow rates without significantly exceeding the set pressure limit.

FIGURE 5. Bypass valve operation



Dash-pot chamber cushions closing of valve.

blackmer

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