Blackmer®

S SERIES
Triple Screw Pumps

Where Innovation Flows

PSG®
a DOVER company

blackmer.com

Triple Screw Pump SERIES

A Safer, Greener, More Cost-Effective Pumping Solution

Blackmer, part of PSG®, a Dover company, is a leading global provider of innovative, high-quality industrial twin-screw, triple-screw and multi-phase pumps for the safe and efficient transfer of liquids.

Blackmer is proud to offer the S Series. This durable screw pump line is perfectly suited to applications with the Process, Energy, Transport and Marine markets. Blackmer S Series pumps offer a wide range of highly customizable pumps and systems for the world's most demanding applications.

Our world-class distributor network ensures that you will have access to the pump you need when you need it. We are devoted to your business's success servicing your needs with world-class products, delivery and best of class expertise. Put us to the test today and contact your local distributor at blackmer.com

S Series Pumps are Ideally Suited For...

- Chemicals
- Adhesives
- Food and beverage
- Soap
- Petrochemicals
- Polymers
- Crude oil
- Asphalt
- Diesel
- Lube oil
- Kerosene
- Oilfields
- Residuals
- Bulk transfer
- Loading/unloading
- Terminals
- Shipping

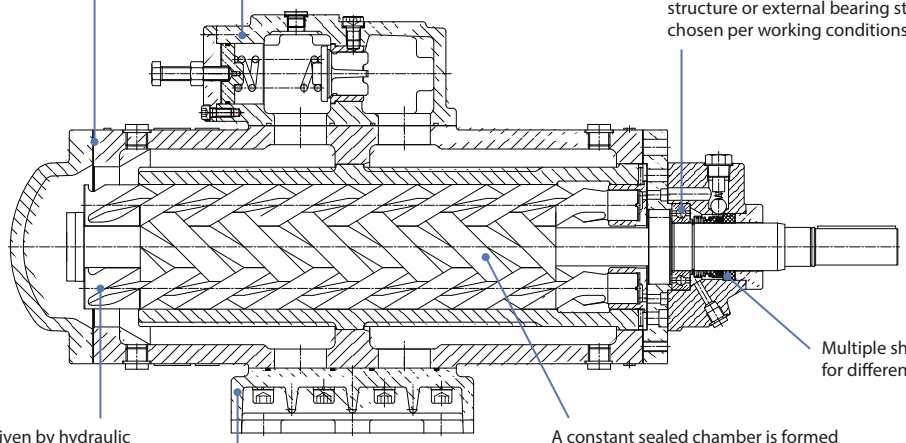
How it Works

The S Series Triple-Screw Pump manufactured by Blackmer is a type of positive displacement rotatory pump for handling clear, lubricating liquid without solid content. The internal structure of the Triple-Screw Pump includes a male drive spindle, two female secondary spindles and the case that holds the three screws. The sealed chamber moving at a uniform speed is formed between the case and the three rotating screws along the axial direction. During the male drive screw rotation, liquid moves in the sealed chamber along the axial direction continuously and smoothly from suction to discharge.

Uniquely constructed pressure relief valve on the pump body. In instances where the discharge pressure is higher than the working pressure, part of the media may flow back to the inlet of the pump for overload protection. Meanwhile, the pump can be started at full pressure, thereby reducing the startup torque.

Jacketed pump body is available for various temperature and media needs.

The axial force of the drive is equalized by the balance piston; minimal residue axial force is placed on the rollers (secondary shafts) allowing for a maximized shaft life. Internal bearing structure or external bearing structure can be chosen per working conditions.



Multiple shaft seals are available for different media.

Secondary screws are driven by hydraulic forces. Torque from the friction of the media is transferred and applied on the surface of secondary screws; therefore, no wearing occurs on the surface. The axial forces on the secondary screws are balanced by the low-tension from the balance sleeves.

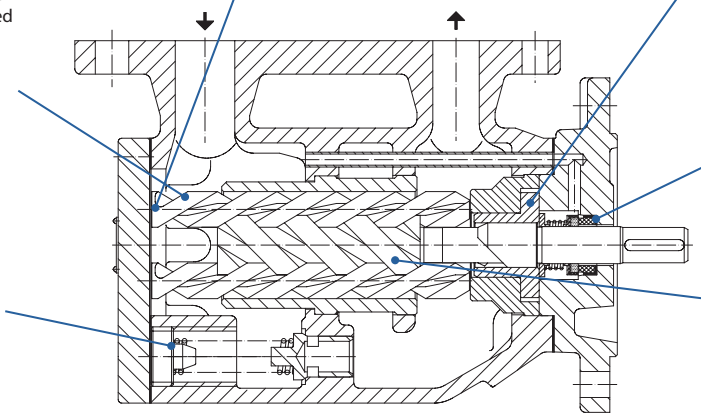
Multiple installation modes are available, including horizontal, flanged, vertical, submerged, hang-up, etc.

A constant sealed chamber is formed between the teeth of the drive and secondary screws to move the liquid to the discharge port with consistent speed. Therefore, there is no pulsation during transportation and no propulsion since the sealed chamber remains volumetrically constant.

Secondary screws are driven by hydraulic forces. Torque from the friction of the media is transferred and applied on the surface of secondary screws; therefore, no wearing occurs on the surface.

The axial forces on the secondary screws are applied to back cover.

The balancing piston balances the axial force on the surface of the drive screw.



The sealing chamber contains mechanical seals. The sealing chamber is connected to suction chamber via reflex hole; therefore, the mechanical seal is not affected by the discharge pressure.

The internal pressure valve for over-load protection ensures system safety.

A constant sealed chamber is formed between the teeth of the drive and secondary screws to move the liquid to the discharge port with consistent speed. Therefore, there is no pulsation during transportation and no propulsion since the sealed chamber remains volumetrically constant.

MARKETS SERVED

PROCESS

Blackmer's attention to detail, quality assurance procedures, and expertise in the chemical process market, ensures your success. Our application experts can assist in your toughest applications to ensure maximum efficiency and Mean Time Between Repair (MTBR).

Typical Applications Handled:

- Chemical
- Adhesives
- Food and beverage
- Petrochemicals
- Polymers

ENERGY

Blackmer's knowledge and proven success in the power generation, oil & gas industries have instilled confidence in users worldwide. Consult our experts at Blackmer today, to ensure your success in the energy market.

Typical Applications Handled:

- Crude oil
- Asphalt
- Kerosene
- Oil field
- Residuals
- Electric generation

TRANSPORT

Whether it's tankers, railcars, or terminals, Blackmer's solutions offer top-notch reliability in the transport industry. Keep your products moving with one of our application engineer's today.

Typical Applications Handled:

- Bulk transfer
- Loading / unloading
- Terminals
- Shipping

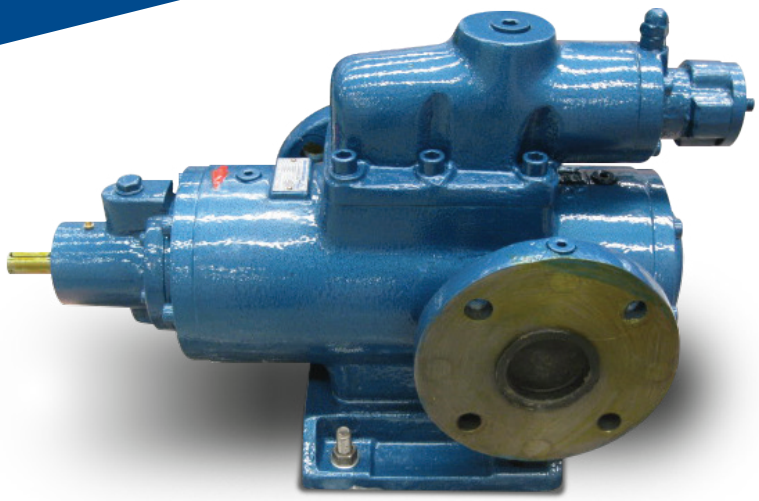
MARINE

Blackmer is here with proven success, to support the marine and shipbuilding industries. With a wide range of compatibility, the safe, swift and reliable transfer of marine fluids is a core function of Blackmer pumps.

Typical Applications Handled:

- Shipbuilding
- Diesel
- Lube oil

Garrison Shipping Co.
CBK Power Generation
Aiden Chemical Co.
Salem Food & Beverages
LB Storage Terminal
North Shore Oil & Gas



MODEL SELECTION

A. User-Provided Parameters

- Working temperature of the media, T
- Viscosity at working temperature, v
- Suction pressure (or vacuum), P1
- Discharge pressure, P2
- Working flow, Q
- Installation mode
- Any other supporting requirements

B. Notes for Model Selection

- Select proper structure based on the features of the media being pumped.
- Select proper speed based on the viscosity of the media. If media viscosity is > 760 mm^2/s, please contact company for assistance.
- Select the model based on the flow and pressure from the Series Triple-Screw Pump performance data sheet.
- Check and identify the NPSHr value from the cavitation redundancy sheet based on the pump specification, speed and viscosity. It should be ensured that the NPSHr < NPSHa (cavitation redundancy of the inlet piping). Otherwise, a pump with one size larger or lower speed should be selected.
- After selecting the pump specification, identify the shaft power (N·m) from the performance chart. When selecting mating motors, N·m >= K x N.
- Please refer to the table below for the value of K.

N (kW)	N <= 5	5 < N <= 10	10 < N <= 50	N > 50
K	1.25	1.2	1.15	1.1

NOTE: The data in the table are subject to revision without prior notice.

Triple Screw Pumps

	Capacity		Diff. Pressure		Viscosity	Max. Temp.	
Series	L/min	gpm	bar	psi	mm^2/s (cSt)	°C	°F
3N	10-5,300	2.6-1,400	up to 40	up to 580	3-5,000	280	536
3M	10-2,200	2.6-581	up to 100	up to 1450	3-5,000	280	536
3PF	2-130	0.5-34	up to 40	up to 580	3-750	150	302

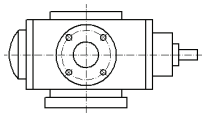
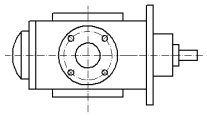
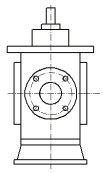
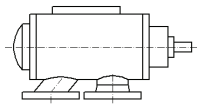
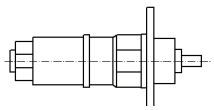
3X H 210 R 46 E 6.7 Y – W23

- W23 – Materials code
- Y – Pump casing heating type
- 6.7 – Seal type
- E – Structural feature
- 46 – Helix angle of the drive spindle
- R – Thread orientation of the drive spindle
- 210 – Size code
- H – Installation code
- 3X – Series code

Performance Data

Series	Key Features	Flow Rate L/min (gpm)	Max. Discharge Pressure Bar (psig)	Viscosity (mm^2/s)	Operating Temperature °C (°F)
3M	High pressure, single suction, axial hydraulic balance	10 – 2,200 (2.6 – 581)	100 (1450)	3-5,000	≤ 280 (536)
3N	Low pressure, single suction, axial hydraulic balance	10 – 5,300 (2.6 – 1,400)	40 (580)	3-5,000	≤ 280 (536)

Installation Mode

Installation mode	H	F	S	G	E
Description	Foot installation	Flange installation	Vertical installation	Horizontal U installation	Barrel-type pump unit
Illustration					

*Flanged connections can be provided upon request; applicable for small pumps only.

Specification and Helix Angle

The pump specification code is determined based on a pump running at 1,450 r/min, with helix angle of 46 degrees. There are 14 specification codes for 3N pumps in total.

Specification Code	40	80	120	210	280	440	660	940	1300	1700	2200	2900	3600	5300
Helix Angle (degrees)	38	36	42	40	43	40	40	42	38	42	42	40	46	46
	46	42	46	46	46	46	44	46	42	46	46	46		
	54	46	54	54	54	52	46	50	46					
		54				54	51	54	54					
							54							

Blackmer reserves the right to change the data in the table without prior notice.

Drive Screw Orientation

View from the drive end: R stands for clockwise; L stands for counter clockwise.

Structural Feature

Code	Structure	Applications
U	Internal bearing, multiple seal types	Media with good lubricity, working temperature below 150°C (302°F)
K	External bearing, packing seal	Media with poor lubricity, high viscosity, working temperature below ≤280°C (536°F)
E	External bearing, mechanical seal, with greasing port on bearing	Media with poor lubricity, working temperature 80-150°C (176 - 302°F)
D	External bearing, mechanical seal, without greasing port on bearing	Media with poor lubricity, working temperature below 80 °C (176°F)

Seal Type

Code	Description	Application
2	Packing seal	U and K structures
3	Double oil seal	U structure
4	Triple oil seal	U structure
6.7	Mechanical seal	E, D and U structure
12.1	Mechanical seal	U, D and E structure

Pump Body Heating Type

Code	Structure
[blank]	Standard pump body for handling lubricating liquid with good fluidity
Y	Welded pump casing with heating jacket, using steam or other hot fluid as heating media
E	Electrical heating

Materials

	Code	Casing			Liner		
		GB	DIN	ANSI	GB	DIN	ANSI
3M	W3	QT400-18	GGG-40	60-40-18 F32800	ZL109	-	A03360/A03361
	W12	20G	HII	1018	ZL109	-	A03360/A03361
	W13	20G	HII	1018	ZQSn5-5-5	G-CUSN5ZNPB 2.1096.01	C83600
	W23	QT400-18	GGG-40	60-40-18 F32800	ZQSn5-5-5	G-CUSN5ZNPB 2.1096.01	C83600
3N	W1	HT250	GG 25	Class 35B	QT450-10	GGG-45	65-45-12
	W2	HT250	GG 25	Class 35B	ZL109	-	A03360/A03361
	W3	QT400-18	GGG-40	60-40-18 F32800	ZL109	-	A03360/A03361
	W5	QT400-18	GGG-40	60-40-18 F32800	QT450-10	GGG-45	65-45-12
	W21	HT250	GG 25	Class 35B	ZQSn5-5-5	G-CUSN5ZNPB 2.1096.01	C83600
	W23	QT400-18	GGG-40	60-40-18 F32800	ZQSn5-5-5	G-CUSN5ZNPB 2.1096.01	C83600

APPLICATIONS

- Petrochemical industry: handling various light, heavy fuel oils, lubricating oils and waste oils
- Machinery industry: transporting lubricating oils; cooling recycling pump and hydraulic pump
- Ship building industry: for transporting, boosting, fuel jetting and marine hydraulic pumps
- Chemical industry: handling oil paints, greases, wax, glue, resin and other emulsions
- Storage industry: loading and unloading and transfer pump in tank farms; loading and unloading pump at dock
- Power industry: oil pump, lubricating oil pump for hydraulic power stations; ignition oil pump for furnace at fire power plants
- Steel industry: oil station for hot rolling, cold rolling, plat production lines; lubricating oil pump for hydraulic station
- Paper industry: lubricating oil pump for paper maker

FEATURES AND BENEFITS

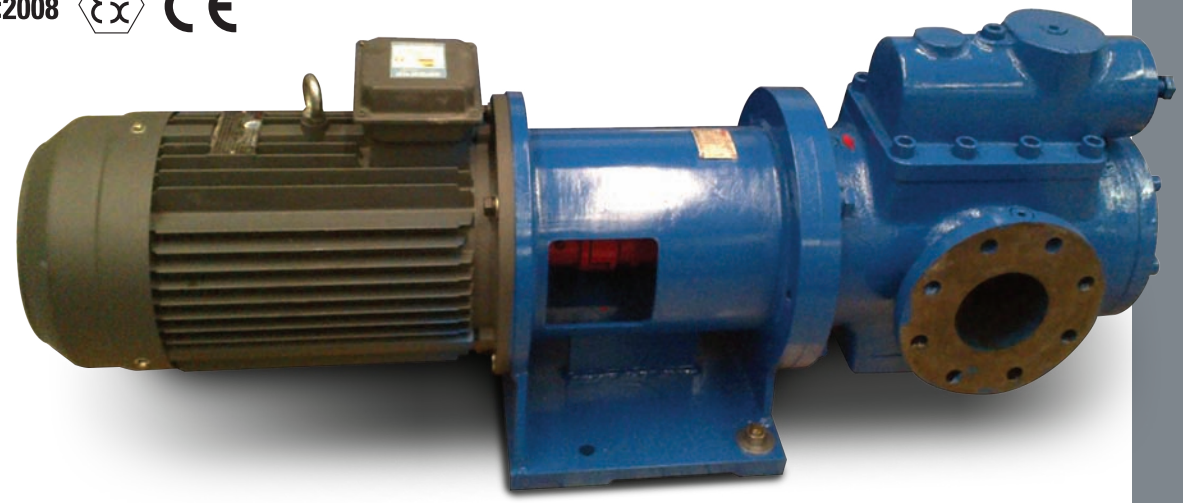
- Low pressure fluctuation, stable flow
- Strong self-priming capability, reverse rotation, high efficiency
- Low noise and vibration
- Compact construction and size for ease of install and maintenance

TECHNICAL DATA

- Pump casing: Cast iron/ductile iron/cast steel/cast stainless steel
- Shaft: Alloy steel/ stainless steel
- Screws: Ductile iron/alloy steel/stainless steel
- Stuffing box: Grey cast iron
- Casings constructions to select:
  - Side inlet, Side outlet

CERTIFICATIONS & ASSOCIATIONS

CCS ISO 9001:2008 Ex CE



3PF 20 R 38 G 10 F -W2

- -W2 — Material code
- F — With filter
- 10 — Seal type
- G — Code for bearings → G = sliding bearing; U = antifriction bearing
- 38 — Helix angle of the drive spindle
- R — Thread orientation of the drive spindle → R = right-hand; L = left-hand
- 20 — Size code → The theoretical flow rate at 1450 rpm with rising angle of 46 degree
- 3PF — Series code

Materials

	Code	Casing			Liner		
		GB	DIN	ANSI	GB	DIN	ANSI
3PF	W1	HT250	GG 25	Class 35B	QT450-10	GGG-45 0.7045	65-45-12
	W2	HT250	GG 25	Class 35B	ZL109	-	A03360/A03361
	W3	QT400-18	GGG-40	60-40-18 F32800	ZL109	-	A03360/A03361
	W5	QT400-18	GGG-40	60-40-18 F32800	QT450-10	GGG-45 0.7045	65-45-12
	W21	HT250	GG 25	Class 35B	ZQSn5-5-5	G-CUSN5ZNPB 2.1096.01	C83600
	W23	QT400-18	GGG-40	60-40-18 F32800	ZQSn5-5-5	G-CUSN5ZNPB 2.1096.01	C83600

APPLICATIONS

- Transportation and boost pump in fuel system, fuel pump for fuel furnace
- Transportation and dispensing pump in oil delivery system
- Lubricating oil pump in industrial applications
- Hydraulic pump in hydraulic transmitting system

FEATURES AND BENEFITS

- Low pressure fluctuation, stable flow
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TECHNICAL DATA

- Pump casing: Cast iron/ductile iron/cast steel/cast stainless steel
- Shaft: Alloy steel/ stainless steel
- Screws: Ductile iron/alloy steel/stainless steel
- Casings constructions to select:
  - Top inlet
  - Top outlet

CERTIFICATIONS & ASSOCIATIONS

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PSG® Grand Rapids
1809 Century Avenue SW
Grand Rapids, MI 49503-1530 USA
T: +1 (616) 241-1611
F: +1 (616) 241-3752
blackmer.com