

TWINRO

TWIN SCREW PUMPS

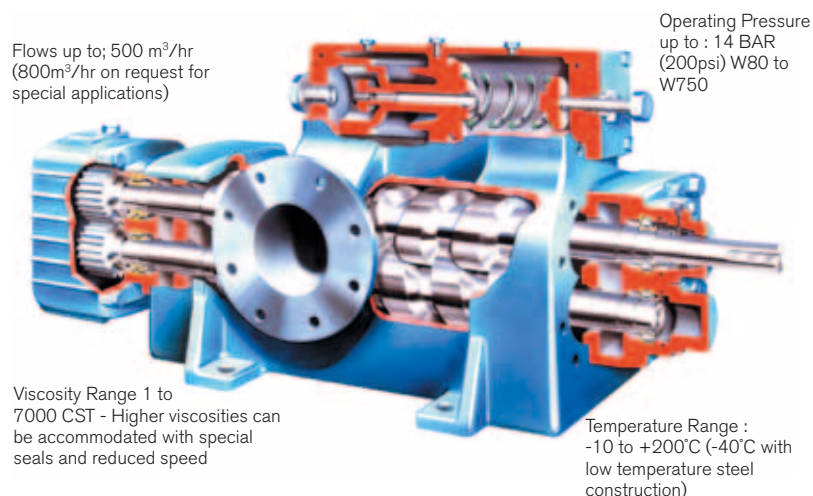


TWINRO

Twin Screw Pumps

With decades of experience in designing and manufacturing rotary positive displacement pumps, SPX's Plenty Mirrlees Pumps have built an excellent reputation for reliable pumping equipment for the marine, oil processing, petrochemical processing, power generation, defense, sugar and general industries. With Plenty Mirrlees Pumps, SPX has a solution for most pumping applications with a range that includes two screw (TWINRO), three screw (TRIRO) and our 2000 series vane pumps incorporating the unique variable flow feature.

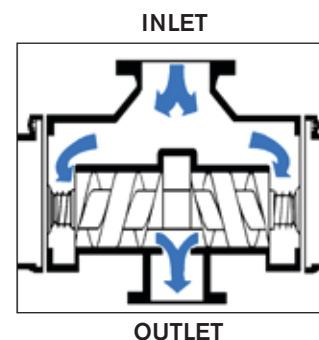
Plenty Mirrlees Twinro 'W' Series pumps from SPX are positive displacement, rotary twin screw pumps designed for bulk transfer of liquids. The Twinro series is available in five frame sizes with a selection of different pitch screwsets to match system flow requirements at 50Hz or 60Hz direct electric motor speeds. Pumps may also be driven at other speeds from diesel engines or other prime movers. The material and design options available enable the pump to be offered for most bulk liquid transfer duties across many industries. In particular, the pumps are used extensively in bulk loading and unloading duties in the Oil, Marine, Power Generation and Chemical industries.



Based in Charlotte, North Carolina, SPX Corporation (NYSE: SPW) is a global Fortune 500 multi-industry manufacturing leader. The company's highly-specialized, engineered products and technologies serve customers in three primary strategic growth markets: infrastructure, process solutions, and diagnostic systems. Many of SPX's innovative solutions are playing a role in helping to meet rising global demand, particularly in emerging markets, for electricity, processed foods and beverages and vehicle services. The company's products include thermal heat transfer equipment for power plants; power transformers for utility companies; process equipment for the food & beverage industry; and diagnostic tools and equipment for the vehicle service industry. For more information, please visit www.spx.com.

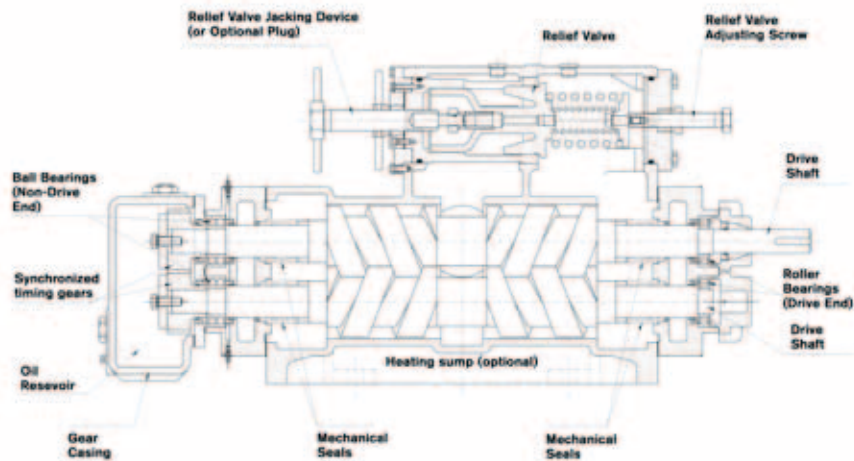
DESIGN AND CONSTRUCTION

Designed around cast body and cover shapes (W750 fabricated steel casing), the Twinro pump offers a low cost unit with minimum material requirements. The pumping element consists of two contra rotating shafts from which right hand and left hand epicycloid screw shapes are accurately machined. The screwset conveys the fluid being pumped from each end and out through the center. The screw shafts are carried in roller bearings at the drive end and ball bearings at the non drive (gearcase) end. The driven (lower) screw is synchronised from the driving (upper) screw by a pair of hardened and ground timing gears.



- **Outboard Bearing Pumps:** (for non lubricating liquids) are equipped with four mechanical seals keeping the bearings and timing gears external from the pumped liquid. Drive end roller bearings are grease packed, sealed for life. An oil bath is provided at the non drive end for splash lubrication of the timing gears and ball bearings.

THEORY OF OPERATION:



- **Inboard Bearing Pumps:** (for lubricating liquids) are provided with one mechanical seal on the drive shaft only. The liquid being pumped lubricates the bearing and timing gears.
- **Relief Valve Design Operation:** The valve is of the disc type with an attached dashpot and spring. Under normal operation a very small proportion of liquid from the pump discharge leaks past the clearances between the skirt and cylinder (Fig 1). To prevent pressure building up the liquid drains back to suction through orifice 'O'. Under pressure build up, the relief valve starts to open against the spring, exposing slot 'S' to discharge pressure (Fig 2). This allows the pressure to enter area 'A' and quickly complete the opening of the relief valve to fully bypass the flow. When the pressure drops, the spring pushes the disc back on the seat forcing the liquid in area 'A' back through slot 'S'. When the slot 'S' is completely blanked off by the cylinder wall, all the liquid is constrained to flow back through orifice 'O'. This constraint has a dampening effect which prevents the relief valve slamming onto its seat.
- **Rapid Opening, Controlled Damped Closing**

Fig. 1

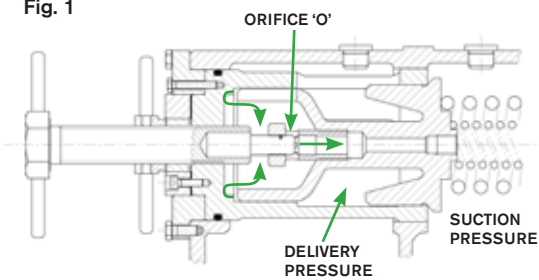
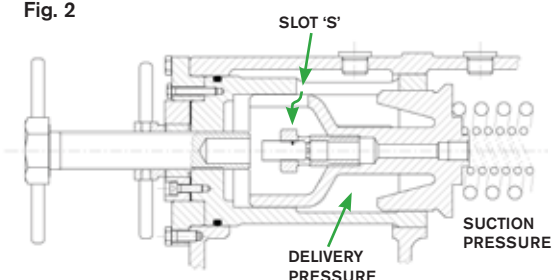


Fig. 2



Liquids Pumped

Pumps constructed from stock materials (iron and steel) are commonly used for:

- Lubricating Oils
- Fuel Oils (residual and distillate)
- Petroleum Liquids
- Bitumens/Asphalts
- Solvents
- Vegetable Oils
- Glue, Varnish, Resins, Paints, Polymers

Custom built pumps - typically in stainless steels or bronze are used for applications with milk corrosion effect:

- Palm Oils
- Fatty Acids
- Water (fresh or sea)
- Some Acids

Typical product applications

Any bulk transfer of liquid - such as:

Rail/Road Car Unloading/Loading



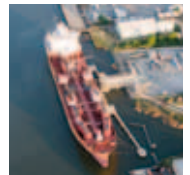
Tank to Tank Transfer / Tank to Process Transfer (and process to tank transfer)



Ships Bunkering



Ships Liquid Cargo Pumping



Bilge and Ballast Pumping



Distribution in Liquid Marketing Terminals



Pipeline and Process Flow Requirements



PRODUCT BENEFITS AND FEATURES



Custom Designed Vertical Twin Screw Pump



Standard design horizontal Twin Screw Pump



Numerous Twinro pumps installed at a fuel oil terminal in the UAE

- **Accurate screw profile (High volumetric efficiency)** Low running cost
- **No contact between intermeshing screws** Can handle lubricating or non lubricating liquids. Very low wear.
- **Double suction. End suction / center discharge, on screwset. (Screwset in hydraulic balance)** Smooth axial pulse free flow
Low vibration > environmentally friendly
Low noise
- **Choice of screwset pitch angle** Wide flow range
- **Individual pitch selection** For precise flow rate matching
- **Standard seal chamber (to DIN L₁N or L₁K with spacer)** Customer choice of mechanical seal and seal type for plant standardization
- **Full flow relief valve. Dashpot design (Rapid opening, damped closing)** No destructive pressure surges. Added safety. Smooth operation. Lower power
Single Row Sealed Ball Bearing
- **Relief valve jacking device** (Elastomer Bellows or Positive Drive)
- **Fully machined one piece fabricated baseplate** Optimum strength. Minimum distortion. Accurate coupling alignment maintained
- **Drip rim and grout facility** Ease of installation. Maintenance flexibility
- **Heating sump (for oil or steam)** Maintains hot liquid at required temperature. Prevents cold start damage
- **Liquid weir in suction port chamber** Maintains wetted screwset for dry start
- **Option of seal face lubrication for dry running start** Reduce risk of seal face heat damage on dry running start
- **Dry start and stop running (limited time)** To enable full unloading and loading cycles to take place
- **Self priming** Can evacuate air from suction lines
- **Screw form and shaft, one piece construction** Maximum accuracy. Minimum deflection from high discharge pressure

CONSTRUCTION FEATURES - STANDARD CONSTRUCTION (SC) AND SPECIAL ORDERS (SO)

- **Casing and Covers** SC: Cast Iron/Cast Steel
SO: S.G. Iron/Stainless Steel
- **Mounting Orientation** SC: Horizontal Foot Mounted
SO: Vertical Free Standing
- **Screwset** SC: Carbon Steel
SO: Stainless Steel
- **Relief Valve** SC: Integral with Pump
SO: Blanked off (for System Relief Valve)
Relief Valve Jacking Device
- **Baseplate** SC: Fabricated Steel
SO: Drip Rim Drain and Grout facility on steel base
- **Coupling** SC: Flexible 140mm Spacer Type
SO: Flexible 180mm Spacer Type
Non-Spacer
- **Coupling Guard** SC: Aluminum
SO: Steel/Brass
- **Paint Finish** SC: Standard Industrial System
SO: Two pack epoxy or other systems for hostile and offshore environments
- **Testing** SC: Standard Works
Pressure and Performance Tests
SO: Witnessed Tests
Noise and Vibration Tests
NPSH Test, Custom Tests
Plotted Test Curves

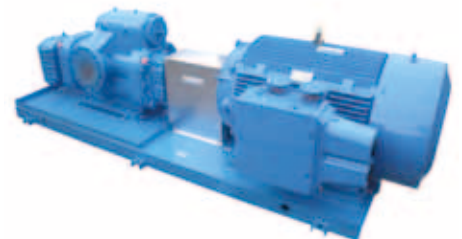
Customer/project specific options available upon request



Complete customised pump unit for an oil refinery in India



Used for tank to tank transfer in an oil storage terminal



Twinro pump for rail car loading and unloading

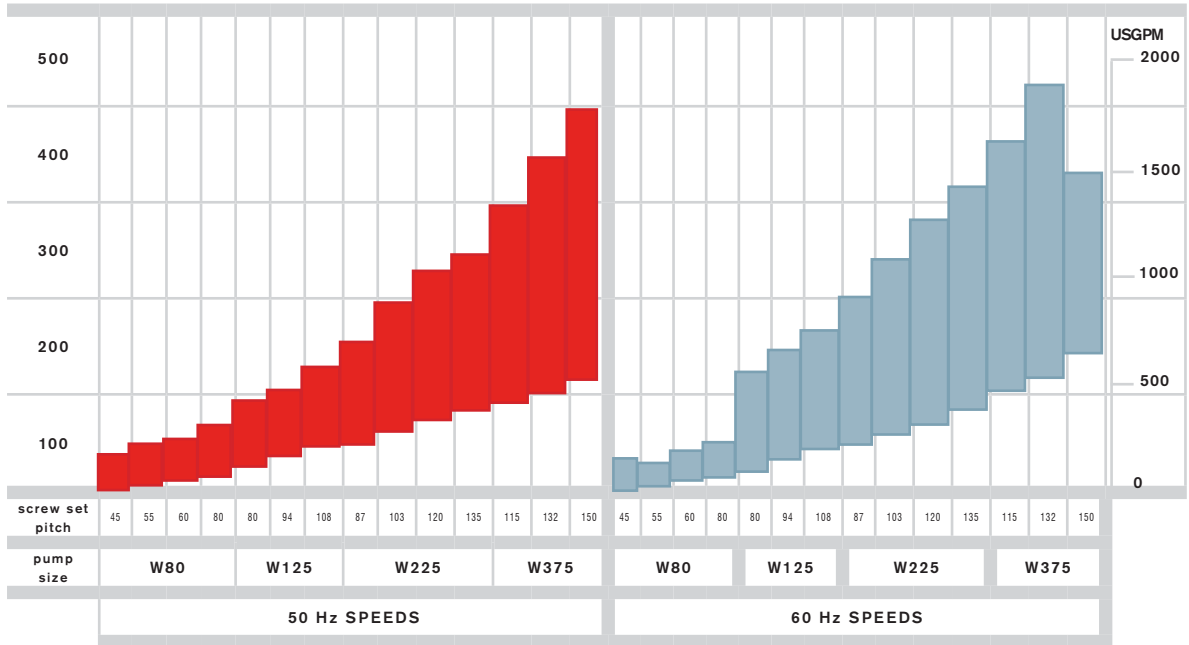
- **Relief Valve Jacking Device:** As an option, Twinro pumps can be fitted with a jacking device to manually lift the relief valve off its seat. This has the operational advantage of being able to circulate pumped liquid around the pump to aid extreme discharge or suction conditions. The device has proved extremely useful in aiding cold start conditions where the liquid in the discharge line is below normal pumping temperature. Another useful application is the partial circulation of discharge liquid back to suction to aid high suction lift applications at the end of barge or tank emptying.
- **Operation of the jacking device does not alter pre-set relief valve spring pressure**



Large flow Twinro for ship loading / unloading

Technical Data - Flow Range

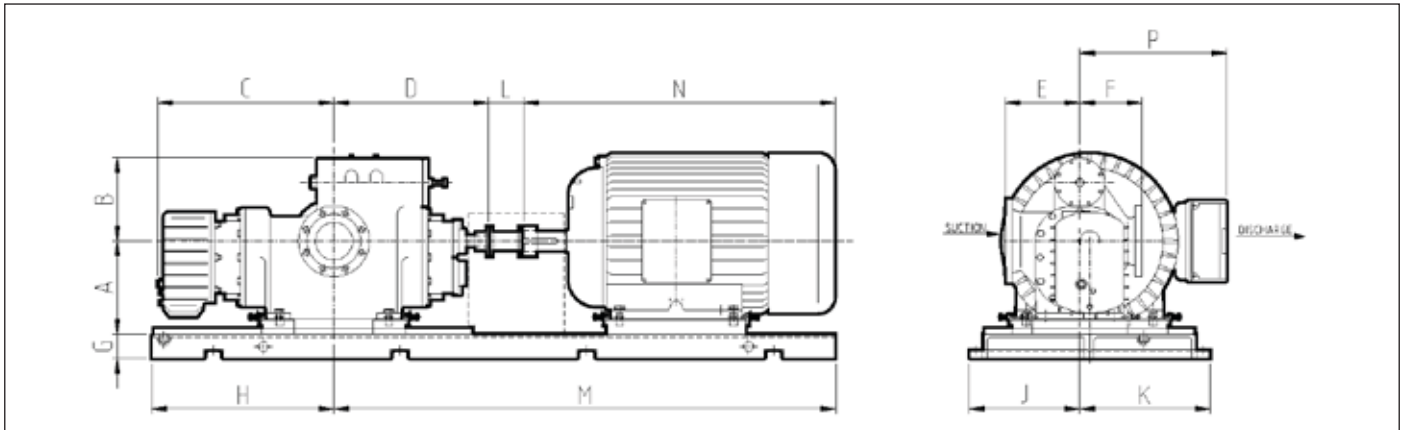
Pump frame size is nominal design flow in m³/hr e.g. W80 is nominally an 80m³/hr pump



Technical Data

(Approximate Dimensions)

	W80	W125	W225	W375	STANDARD FLANGES ARE TO ANSI DIMENSIONS IRON - ANSI 125FF, STEEL - ANSI 150RF DIN PN16 FLANGES ARE ALSO AVAILABLE
SUCTION	4"	6"	8"	10"	
DISCHARGE	4"	6"	8"	8"	



Pumps can be constructed with suction left (as shown) or suction right, to suit installation

Approximate dimensions (mm). DO NOT USE for installation purposes

PUMP SIZE	PUMP ONLY						UNIT					*ELECTRIC MOTOR			
	A	B	C	D	E	F	G	H	J	K	L	FRAME	M	N	P
W80	230	260	510	490	195	165	100	550	185	245	140	100L	1080	394	266
												250L	1430	947	520
W125	290	290	570	555	230	200	100	625	400	460	140	132M	1190	505	319
												280S	1590	1032	543
W225	370	345	709	621	300	250	100	775	380	480	140	160L	1440	650	356
												315M	1940	1253	585
W375	415	386	767	739	348	298	100	775	380	480	140	180L	1640	710	393
												315M	1940	1253	595

* Dimensions are given for the smallest and largest motor sizes for each pump



Global locations

USA

SPX FLOW TECHNOLOGY

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 United States of America
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SPX EUROPE

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 Glasgow, G52 4JN, UK
 +44 141 883 0314

APAC

SPX ASIA PACIFIC

25 International Business Park
 #03-03/12 German Centre
 Singapore 609916
 +65-6568 1570

SPX FOOD+BEVERAGE develops and implements processing technologies and other measures to help companies manage critical issues in food and beverage processing.

SPX POWER+ENERGY offers solutions for building and updating energy infrastructure, as well as for processes ranging from fuel extraction to electricity distribution.

SPX VEHICLE+TRANSIT devises products and technologies for the service and repair of automobiles and recreational vehicles, rail, heavy equipment, marine craft and mass transit.

SPX INDUSTRIAL PROCESSES creates equipment and technologies to help customers transform materials efficiently, safely and with low downtime or environmental impact.

SPX INFRASTRUCTURE serves the many market sectors involved in building and ensuring the reliability of the infrastructure, ranging from utilities to communications and broadcast.

SPX FLOW TECHNOLOGY

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