

# Triro Pump Range

TRIPLE SCREW PUMPS

T-Range

C-Range

E-Range

H-Range



With decades of experience in designing and manufacturing rotary positive displacement pumps, SPX's Plenty Pumps have built an excellent reputation for reliable pumping equipment for the marine, oil processing, petrochemical processing, power generation, defence, 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.

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](http://www.spx.com).

## Triro Pump Range

### triple screw pumps

#### THE TRIRO PRINCIPLE

The TRIRO pump is of the positive displacement axial flow screw type with only three moving parts - a power rotor and two idler rotors. These three rotors (hence the brand name TRIRO) have accurately machined precisely intermeshing threads which enfold the liquid being pumped and act as seals in relation to each other and to the pump body or sleeve in which they rotate.

Designed for pumping oils the Triro pump has an axial pulse free flow and silent operation for sensitive forced lubrication, seal oil circulation and oil firing systems. Pumps are available in 17 frame sizes with various pitch angles and lengths offering a wide flow and pressure range.

Units are available from a low cost cast iron pedestal mounted version to high pressure steel cased pumps for API 614 systems. Pumps are also available in the popular tank top mounting arrangement for space saving on lube oil consoles, and vertical deck mounting for marine and other space saving transfer duties

#### PUMP FEATURES & USER BENEFITS

##### **silent running**

Environmentally acceptable for site operators

##### **pulse free flow**

Ensures no emulsification of liquid, ideal for shear sensitive liquids

##### **vibration free**

No costly foundations required nor transmitted vibration through system to downstream equipment

##### **compact design**

Lower capital cost and space saving installation

##### **large range of frame sizes**

Wide flow range with close matching to required capacity

##### **high operational speed**

No intermediate speed reducers required, can run directly from high speed power take-off e.g. gearboxes

##### **high volumetric efficiency**

Low running costs

##### **low npsH required**

High static lifts can be achieved with no cavitation

##### **designs to api, din, etc.**

Most international and client specifications can be accommodated

##### **custom designs**

To meet specific client requirements or dimensions

## Typical product applications



### LIQUIDS

Tirol pumps can be used on any clean lubricating liquid chemically compatible with the materials of construction.

- Lubricating Oil
- Hydraulic Oil
- Orimulsion
- Distillate Fuel Oil
- Residual Fuel Oil
- Crude Oil
- Grease
- Bitumen / Asphalt
- Viscose
- Fats
- Plasticizers
- Printing Inks

The lower viscosity limit is 2 cSt (gas oil at ambient temperature). This limit ensures that there is sufficient film strength for hydrodynamic support

The upper viscosity limit of 1750 cSt is determined by the operating limit of the standard mechanical seals used. At reduced speed and with alternative mechanical seal, viscosities up to 5000 cSt can be accommodated.

The Triro range is designed for medium pressure high flow applications on clean liquids.

#### **Forced Lubrication**

major rotating machine bearings

#### **Seal Oil Circulation**

compressor labyrinth seals

#### **Fuel Oil Firing**

boilers, kilns etc



#### **Lube Oil Transfer**

#### **Fuel Oil Transfer**

#### **Orimulsion Transfer and Firing**



#### **Scavenging**

#### **Fuel Oil Pumping and Heating Sets**

#### **Duplex Pump and Filter Sets**



#### **Rail/Road Car Loading and Unloading**

#### **Hydraulic Power Packs**

#### **Watertight Door Operation**



#### **Elevator / Lift Pumps**

#### **Variable Pitch Propeller Control**

#### **Bitumen Production and Loading**

#### **Fats Transfer**

#### **Viscose Production**

## The Triro principle of operation

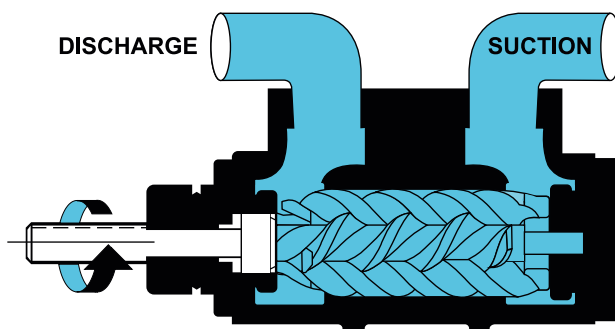
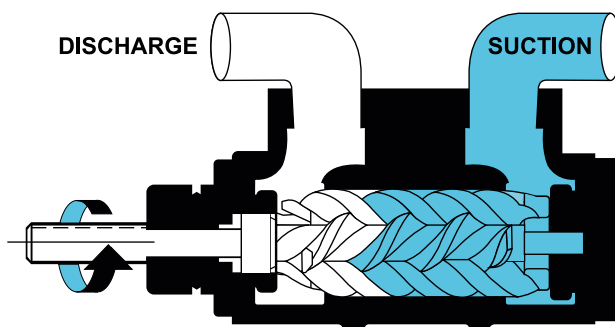
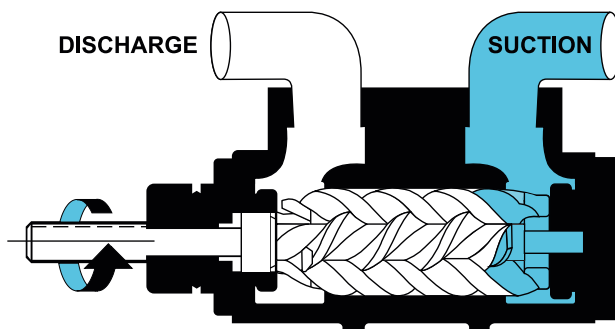
The Triro pump is of the positive displacement axial flow screw type with only three moving parts - a power rotor and two idler rotors. These three rotors have accurately machined precisely intermeshing threads which enfold the liquid being pumped and act as seals in relation to each other and to the pump body or sleeve in which they rotate.

The power rotor is connected directly to the the prime mover (electric motor, diesel engine, steam turbine etc) and as it rotates, the idlers turn due to the action of the pumped liquid. This action is in effect, that of a piston moving continuously in one direction, producing a smooth uniform flow without pulsations.

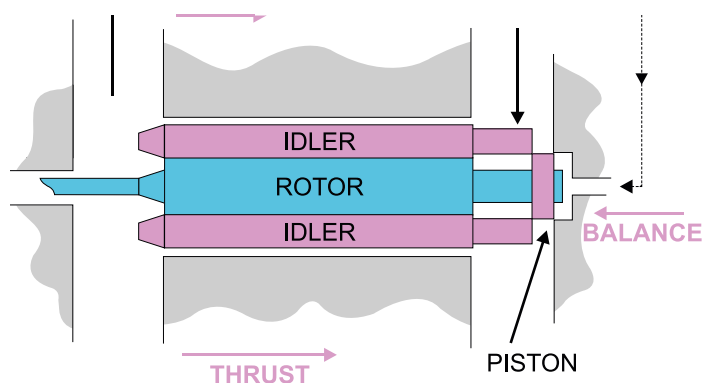
As the idlers perform no work, no gears are required to transmit power between the screws. As radial forces on the idlers are taken up by the surrounding cylindrical surfaces, no other bearings are required. Axial forces on the screwset caused by the pressure differential between inlet and outlet, are balanced hydraulically within the pump.

The chamber formed between two adjacent threads and the bore is known as a 'closure'. It is the closure which contains the liquid as it moves through the pump. As the screwset rotates, the unfolding closures in the suction chamber creates a low pressure (partial vacuum) area into which liquid is forced to flow by the pressure differential between this low pressure area and and the absolute pressure on the liquid at the pump inlet. At the discharge end, the folding closures force the liquid into the discharge pipe against the natural resistance (known as discharge pressure) created by the static head and discharge pipe system frictional losses.

The discharge, or back pressure forces a certain portion of liquid to pass back along the internal clearances from discharge to suction. This is a characteristic of all rotary positive displacement pumps. The very fine working clearances of a Triro pump reduces this 'leakage' or 'slip' to a minimum, thus maximising volumetric efficiency.



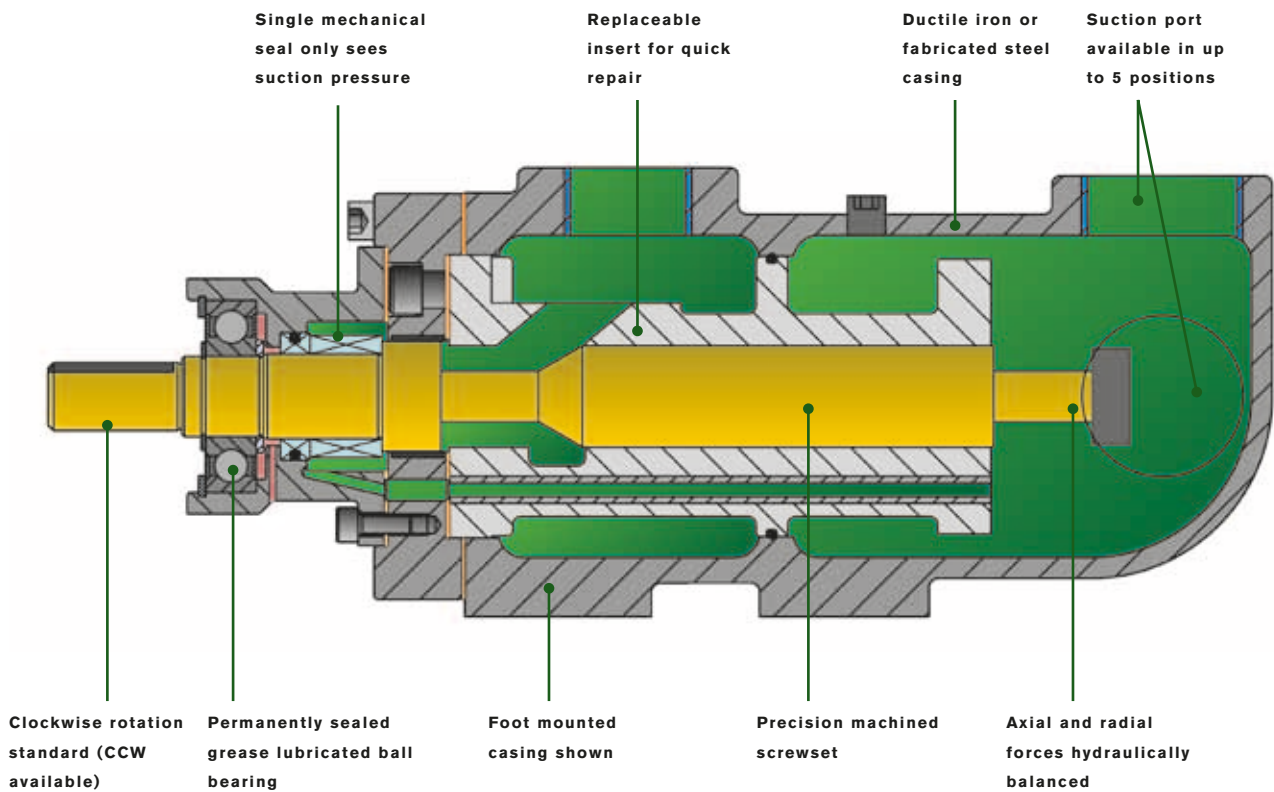
Triro flow principle



Push - Balance = Small residual thrust to avoid shuttling  $\leftrightarrow$  under varying loads

Hydraulic balance

## Typical sectional arrangement of the Triro (C-Range) and casing.



## TRIRO Series - Marine

January 2010 saw the implementation of the EU directive 2005/33/EC on Emissions from Shipping in European Coastal Waters and Ports. Plenty Mirrlees TRIRO pumps have for many years successfully served the marketplace in pumping the Heavy Fuel Oils that powered the world's shipping. With the requirements to use fuels that have an extremely low sulphur content, the marine gas oils of tomorrow have brought considerable challenges to pump manufacturers.

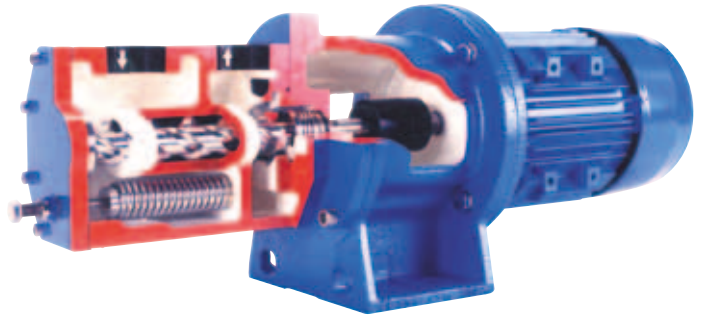
After extensive research and development SPX Plenty brand pumps have been installed on vessels belonging to the major shipping companies of the world. Our Marine TRIRO Pump, not only handles the low viscosities of the industry's current fuels DMA, DMB & DMX but is built and tested to operate with sulphur contents as low as the requirements demand in a future generation of fuel.



## T-Range

### OPERATING PARAMETERS

CAPACITY	<b>0.2 TO 68.0 M<sup>3</sup>/HR</b>	<b>1 TO 300 USGM</b>
DISCHARGE PRESSURE	<b>UP TO 20.0 BAR</b>	<b>UP TO 290 PSI</b>
SUCTION PRESSURE	<b>UP TO 2.5 BAR</b>	<b>UP TO 35 PSI</b>
VISCOSITY	<b>2 TO 1750 CST</b>	<b>33 TO 8100 SSU</b>
TEMPERATURE	<b>-20 TO +200°C</b>	<b>-4 TO +390°F</b>



This range is designed as a low cost general industrial pump unit for clean liquids. It is constructed in high grade cast iron and features mechanical seal and integral relief valve as standard.

Smaller T-Range pumps are generally available ex stock with the larger units available on very short leads times.

Free standing horizontal, vertical and tank top mounted units are available, close coupled to electric motors

### API 676 and other specifications

- Pumps from all our ranges can be supplied in accordance with the requirements of API 676. Other international pump standards or client specifications can be accommodated.

### Turbomechanical Specifications

- Pumps from all our ranges can be supplied to meet most turbomechanical specifications and applications including API 614 and API610 (where relevant to PD pumps).

## C-Range

### OPERATING PARAMETERS

CAPACITY	<b>0.6 TO 68.0 M<sup>3</sup>/HR</b>	<b>3 TO 300 USGM</b>
DISCHARGE PRESSURE	<b>UP TO 50.0 BAR</b>	<b>UP TO 725 PSI</b>
SUCTION PRESSURE	<b>TO MEET MOST REQUIREMENTS</b>	
VISCOSITY	<b>2 TO 1750 CST</b>	<b>33 TO 8100 SSU</b>
TEMPERATURE	<b>-20 TO +200°C</b>	<b>-4 TO +390°F</b>



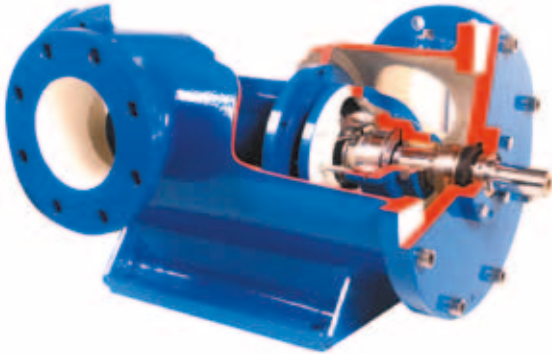
This range is designed for medium pressure applications on clean liquids. It is produced as a cartridge design. The cartridge has an aluminium alloy or SG iron construction and features mechanical seal and optional integral relief valve as standard. The cartridge doubles as a renewable sleeve and can be inserted into a fabricated steel casing to meet the requirements of API specifications. Custom casing designs can be accommodated to meet client dimensions and specifications.

This range can be manufactured in accordance with most oil company and turbomechanical specifications including API676 / 614 / 610 (where relevant to PD pumps).

Horizontal free standing , base mounted and tank top mounted units are available, close coupled to electric motors.

# E-Range

## OPERATING PARAMETERS



CAPACITY	<b>0.6 TO 750.0 M<sup>3</sup>/HR</b>	<b>3 TO 3300 USGM</b>
DISCHARGE PRESSURE	<b>UP TO 50.0 BAR</b>	<b>UP TO 725 PSI</b>
SUCTION PRESSURE	<b>TO MEET MOST REQUIREMENTS</b>	
VISCOSITY	<b>2 TO 1750 CST</b>	<b>33 TO 8100 SSU</b>
TEMPERATURE	<b>-20 TO +200°C</b>	<b>-4 TO +390°F</b>

This range is designed for medium pressure, high flow applications on clean liquids. It is constructed with a renewable sleeve and fabricated steel casing and features mechanical seal and optional integral relief valve as standard. Custom casing designs can be accommodated to meet client dimensions and specifications.

This range can be manufactured in accordance with most oil company and turbomechanical specifications including API676 / 614 / 610 (where relevant to PD pumps).

Horizontal base mounted, vertical free standing and tank top mounted units are available, close coupled to electric motors.



# H-Range

## OPERATING PARAMETERS

CAPACITY	<b>0.6 TO 87.0 M<sup>3</sup>/HR</b>	<b>3 TO 380 USGM</b>
DISCHARGE PRESSURE	<b>UP TO 138.0 BAR</b>	<b>UP TO 2000 PSI</b>
SUCTION PRESSURE	<b>TO MEET MOST REQUIREMENTS</b>	
VISCOSITY	<b>2 TO 1750 CST</b>	<b>33 TO 8100 SSU</b>
TEMPERATURE	<b>-20 TO +200°C</b>	<b>-4 TO +390°F</b>

This range is designed for high pressure applications on clean liquids. It is constructed with a renewable sleeve and fabricated steel casing and features mechanical seal and optional integral relief valve as standard. Custom casing designs can be accommodated to meet client dimensions and specifications.

This range can be manufactured in accordance with most oil company and turbomechanical specifications including API 676 / 614 / 610 (where relevant to PD pumps).

Horizontal free standing , base mounted and tank top mounted units are available, close coupled to electric motors.

### Non standard pumps

- Triro T, C, E and H-Ranges can be factory modified for special applications and higher viscosities.

### Unitisation

- Pumps can be supplied bareshaft or assembled with driver in various arrangements including vertical, tanktop, pedestal and base-plate options, with spacer or non-spacer couplings and non spark guards.

# Triro Pump Range

Triple Screw Pumps



## Global locations

### AMERICAS

#### SPX FLOW TECHNOLOGY

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E: [plentypumps@spx.com](mailto:plentypumps@spx.com)

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