Industrial Gear Pumps

Tapflo's Gear pumps are well suited for the transfer of viscous and semi-viscous fluids for the following industries & applications:

- Hydrocarbon Transfer, Loading, Unloading & Metering such as Fuel Oils, Gas Oils & Diesel Fuels & Bio-Diesels
- Small Scale Hot Oil Circulation Systems
- Dye, Paint & Pigment Production & Transfer
- Tar, Bitumen & Asphalt Production & Transfer
- Resin & Polymer Transfer
- Adhesives & Fillers
- Viscose & Semi-Viscose Lubricating Fluid Production & Transfer

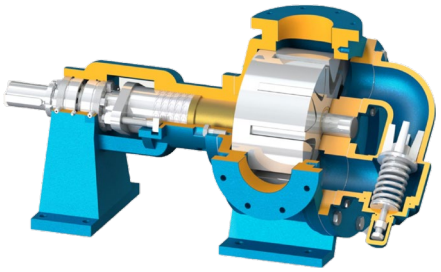
Thanks to our broad and extensive experience as well as hi-tech R&D facilities, we are able to produce bespoke systems and pumps to specifically match customer requirements in a range of materials and sizes. All manufacturing is CE Certified & in accordance with ISO 9001 standards.

Gear Pumps are classified as Rotary Positive Displacement Pumps and are characterised by the following features & benefits:

- Accurate & pulseless flow at high differential pressures
- Ability to pump fluids too viscous for centrifugal pumps
- Higher differential pressures than centrifugal pumps
- High mechanical efficiency across different pressures and varying flow
- Efficient suction lift applications
- Ability to operate at different points on their curves as flow is proportional to rotational speed and pressure is dependent on the installed motor power
- Bi-Directional pumping action
- Suitable for Safe Area & ATEX Rated / Hazardous applications

Industrial Internal Eccentric Gear Pumps Ranges:

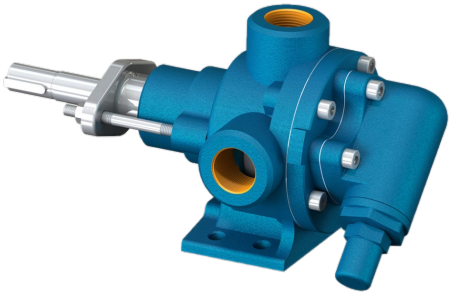
Product Group	Specifications & Material Options	
Internal Eccentric Gear Pumps	Connection Sizes	3/8" – 8"
	Capacity Range	0.1 – 250 m^3/hr
	Pressure Range	1 – 15 Bar
	Temperature Range	up to 200°C
	Speed Range	20 – 1720 rpm
	Viscosity Range	20 – 55'000 cPs
	Pump Body & Cover	Cast Iron Spheroidal Cast Iron Cast Steel Stainless Steel AISI 304/316
	Gears	Spheroidal Cast Iron Cast Steel Stainless Steel AISI 304/316 CrNi Stainless Steel
	Bearings	SnBz12 Bronze Carbon Graphite Silicon Carbide Hard Metal Coated Steel
	Sealing	Soft Seal / Packed Gland Rotatherm Seal Lip Seal Mechanical Seal Cartridge Type Mechanical Seal



Sizes Available:

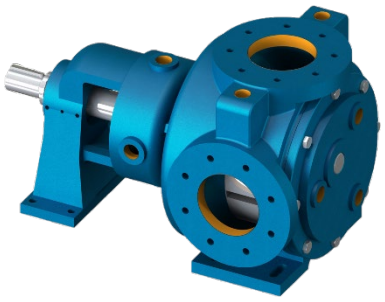
Model	Max Flow, m³/hr	Max Pressure, Bar	Viscosity Range, cSt	Max Speed, rpm	Max Temperature, °C
Bareshaft Units with In-Line Connections for Low Flow & Low Viscosity Fluids & High Pressures					
YMK ¾	0,4	15	10 - 1.650	1400	100
YMK ½	0,8	15	10 - 1.650	1400	100
YMK 1	2	10	10 - 1.650	1400	120
YMK 1½	5,7	12	10 - 1.650	1400	200
YMKU 1½	6,7	12	10 - 1.650	1400	200
YMK 2	9	12	10 - 1.650	1400	200
Bareshaft Units with 90° Connections for Higher Viscosity Fluids & Medium Pressures					
YP 1	3	7	10 - 55.000	1400	100
YP 1½	5,5	7	10 - 55.000	1400	100
Heavy Duty Bareshaft Units for Higher Viscosity Fluids, Flows & Pressures					
YK 1	3	14	10 - 55.000	1400	200
YK 1½	6	14	10 - 55.000	1400	200
YKU 1½	7	14	10 - 55.000	1400	200
YKF 200	15	14	10 - 55.000	900	200
YKKF 2	11,6	14	10 - 55.000	500	200
YKF 2	15	14	10 - 55.000	500	200

YKF 2½	25,5	14	10 - 55.000	500	200
YKUF 2½	32	14	10 - 55.000	420	200
YKF 3	32	14	10 - 55.000	420	200
YKBF 3	55	14	10 - 55.000	400	200
YKF 4	55	14	10 - 55.000	400	200
YKYF 400	90	14	10 - 55.000	400	200
YKBF 4	120	14	10 - 55.000	400	200
YKF 5	110	9	10 - 55.000	280	200
YKF 6	135	9	10 - 55.000	350	200
YKF 8	200	9	10 - 55.000	220	200
Close Coupled Units for Low to Medium Viscosity Fluids & Pressures					
YMB 1	3	10	10- 1.650	1400	70
YMB 1½	5,7	10	10- 1.650	1400	70
YMBF 2	15	5	10- 5.500	500	70
YMBF 2½	23	5	10- 5.500	450	70
YMBUF 2½	32	5	10- 5.500	400	70
YMBF 3	32	5	10- 5.500	400	70



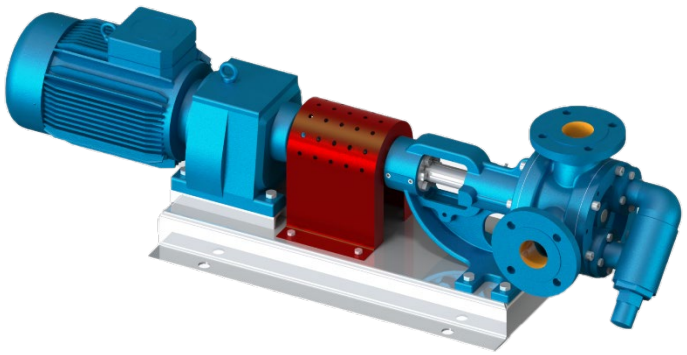
YP1 w/ Relief Valve

YMK(U) 1½" w/ Relief Valve



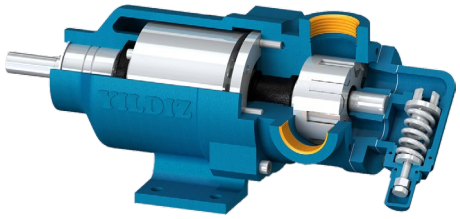
YKF 6" w/ Heating Jacket

YMBF 2" w/ Relief Valve



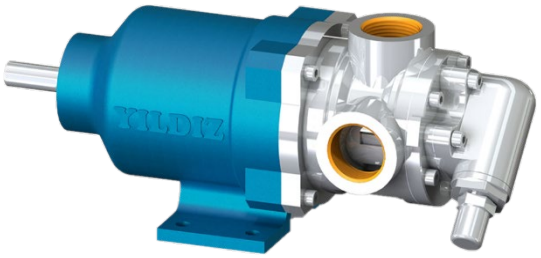
YKF 2" w/ Relief Valve

Product Group	Specifications & Material Options	
Mag Drive Internal Eccentric Gear Pumps	Connection Sizes	1½" – 2½"
	Capacity Range	0.1– 55 m³/hr
	Pressure Range	1– 12 Bar
	Temperature Range	up to 250ºC
	Speed Range	20 – 1500 rpm
	Viscosity Range	20 – 5000 cPs
	Pump Body & Cover	Cast Iron Spheroidal Cast Iron Cast Steel Stainless Steel AISI 304/316
	Gears	Spheroidal Cast Iron Cast Steel Stainless Steel AISI 304/316 CrNi Stainless Steel SnBz12 Bronze
	Bearings	Carbon Graphite Silicon Carbide Hard Metal Coated Steel
	Sealing	Sealless Mag Dive



Sizes Available:

Model	Max Flow, m³/hr	Max Pressure, Bar	Viscosity Range, cSt	Max Speed, rpm	Max Temperature, ºC
YMG 1½	5,7	12	10– 5.500	1400	250
YMGF 2	15	12	10– 5.500	500	250
YMGF 2½	25,5	12	10– 5.500	500	250
YMGUF 2½	32	12	10– 5.500	500	250
YMGF 3	32	12	10– 5.500	500	250
YMGBF 3	55	12	10– 5.500	500	150



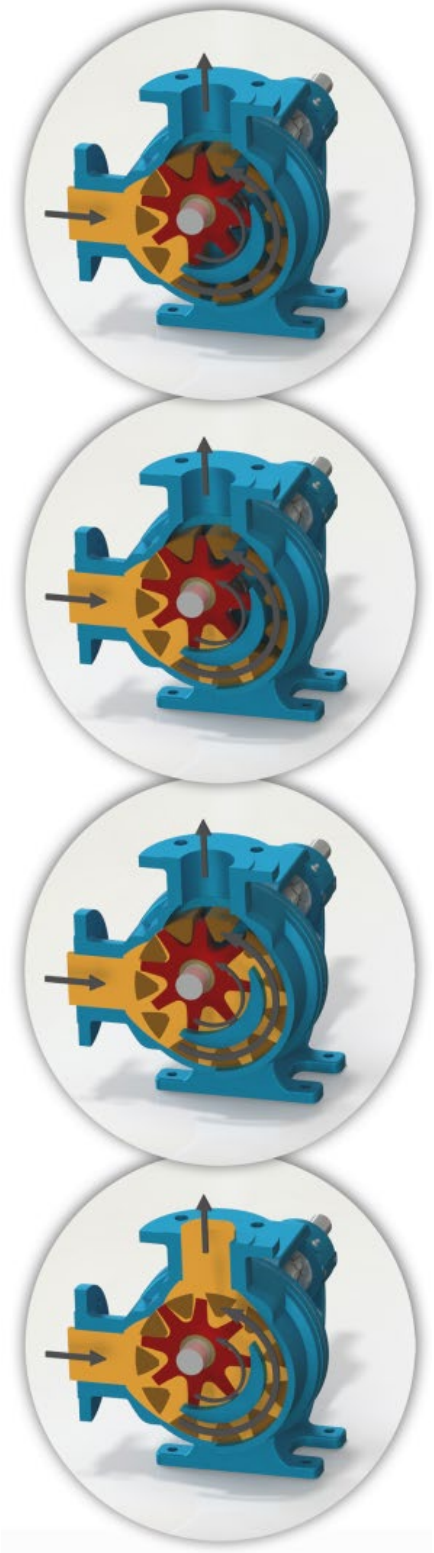
YMG 1½" w/ Relief Valve

YMGF 2½" w/ Heating Jacket

Internal Eccentric Gear Pump Operating Principle:

The simple "gear within gear" principle of Internal Eccentric Gear Pumps means that there are only 2 moving components within the process medium. The positive displacement of which is achieved by the filling of the cavities between the teeth of both the rotary and idler gears located in the pump head. With each revolution, a fixed volume of fluid, enters the casing through the suction port, filling the space between the teeth of the gears. The crescent within the pump head then

separates the fluid as the idler gear turns on the pump shaft. The following 4 images demonstrate this operation in more detail.



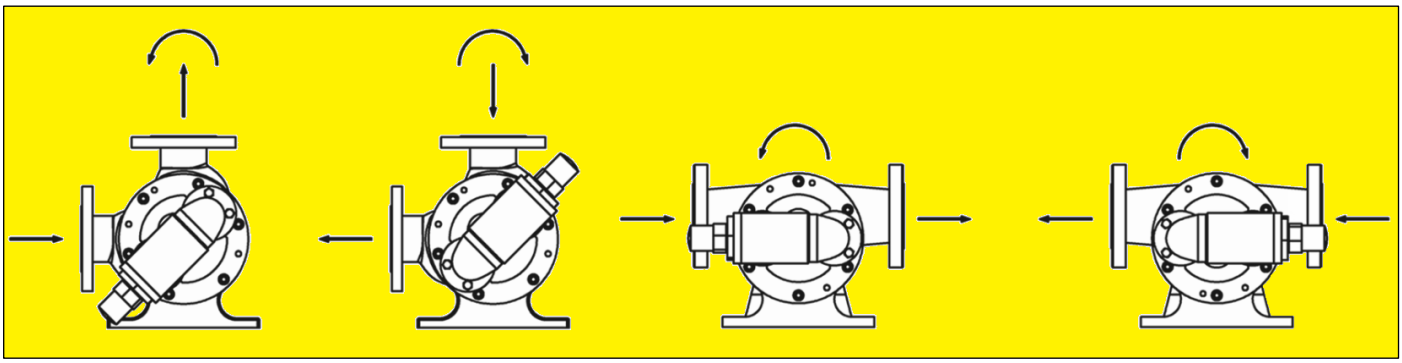
Fluid entering the pump: The orange coloured section in the image represents the process medium as it is entering the pump suction port, pump casing & filling the cavities between the Idler Gear (Red) & Rotary Gear (Brown). The 3 arrows indicate the direction of fluid passage through the pump and rotational direction of the gears.

Fluid filling the cavities & split of flow: As the fluid progresses through the pump head and fills the cavities between the gears it is also separated by the crescent shape in the pump head, which acts as a seal preventing back flow between the suction & discharge ports

Pump almost flooded: As the fluid fully fills the casing all cavities between the gears are completely filled in the form of locked pockets of fluid to guarantee absolute volume control and enable the pump to deliver a fixed volume per revolution.

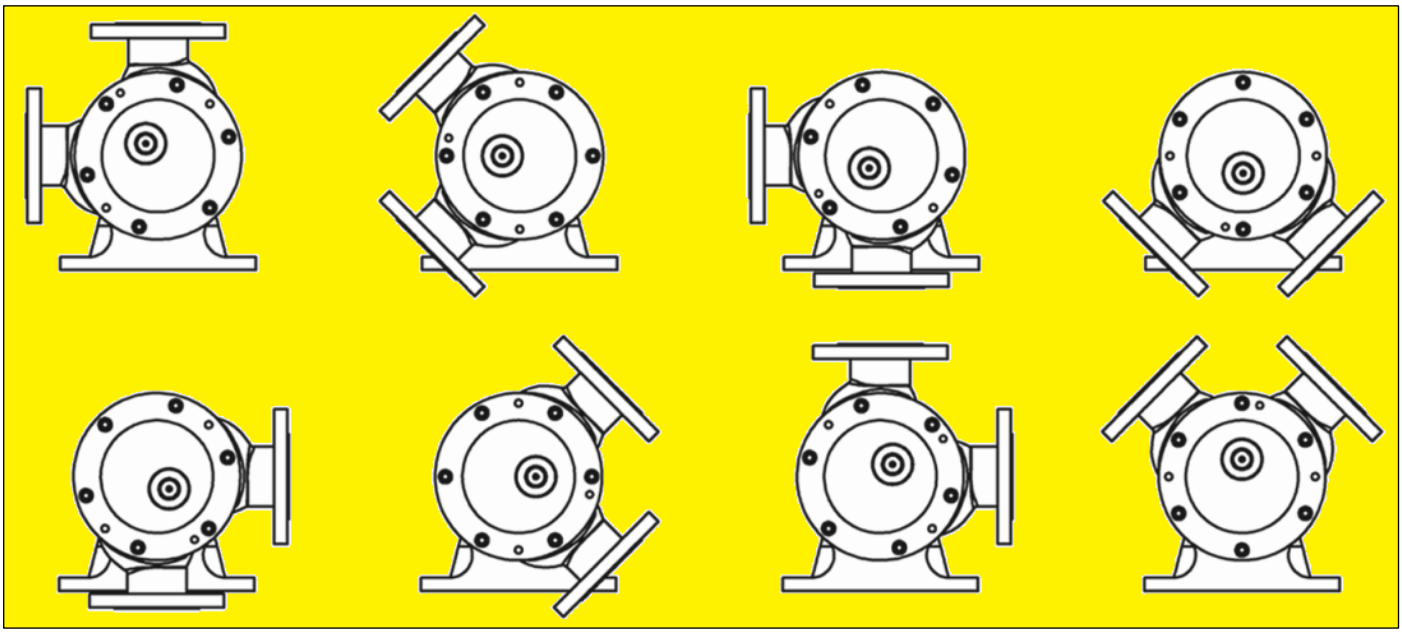
Pump is flooded & stats to discharge the process medium under pressure: Once the pump is fully flooded, the rotor and idler gears mesh together and form a liquid seal which is equidistant between the pump ports which then enables the fluid to exit the discharge of the pump under pressure. The delivery pressure is dependent on the installed power of the motor.

Internal Eccentric Gear Pump Direction of Rotation:



Internal Eccentric Gear Pumps are generally supplied in a clockwise direction of rotation (when viewed from the drive end) meaning that the inlet is therefore at the left hand side (when looking at the pump head) and delivering out of the top. An easy way to tell which side the suction port is set up on is to look at which direction the pressure relief valve on the pump is facing. The end cap of the pressure relief valve must always point to the suction port, otherwise it will not function! The direction of rotation can be changed by switching the position of the pressure relief valve and wiring the motor to turn in the opposite.

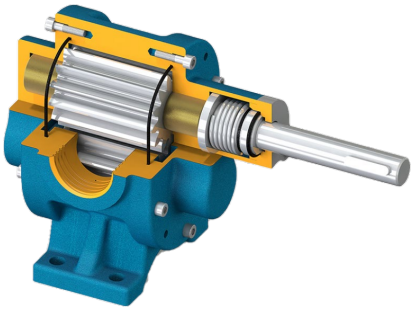
Internal Eccentric Gear Pump Flange Positioning:



Pump casings can be turned through 8 different orientations to enable easy installation into numerous different pipework systems. Make sure that the pressure relief valve is pointing to the suction though!

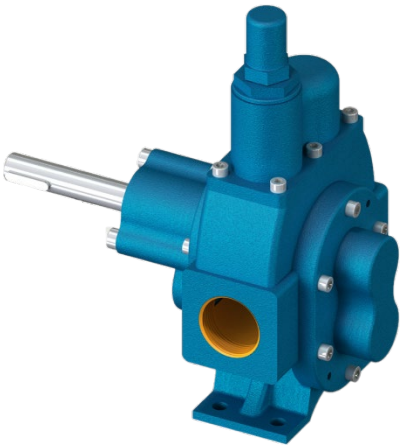
Industrial Modular External Gear Pumps Ranges:

Product Group	Specifications & Material Options	
Modular External Gear Pumps	Connection Sizes	¾" – 2"
	Capacity Range	1 – 7 m^3/hr
	Pressure Range	1 – 30 Bar
	Temperature Range	up to 100°C
	Speed Range	50 – 1500 rpm
	Viscosity Range	20 – 550 cPs
	Pump Body & Cover	Cast Iron Cast Steel Stainless Steel AISI 304/316
	Gears	Steel Stainless Steel AISI 304/316 SnBz12 Bronze
	Bearings	Carbon Graphite Ina Bushing Bearings
	Sealing	Soft Seal / Packed Gland Lip Seal Mechanical Seal

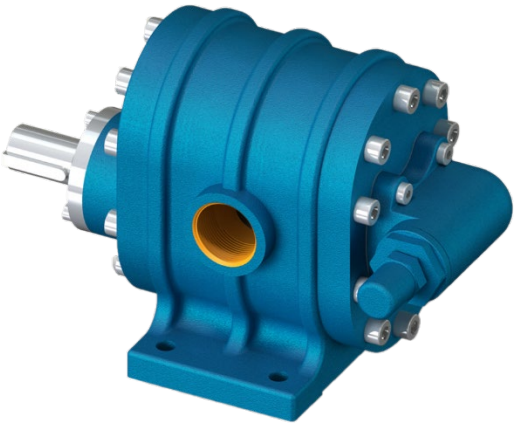


Sizes Available:

Model	Max Flow, m^3/hr	Max Pressure, Bar	Viscosity Range, cSt	Max Speed, rpm	Max Temperature, °C
YMD ¾	1,4	30	10 – 550	1500	100
YMD 1	2,5	30	10 – 550	1500	100
YMD 1½	7,7	30	10 – 550	1500	100
YMDY 1	3	12	10 – 550	1500	70
YMDY 2	7	12	10 – 550	1500	70



YMDY 1" w/ Relief Valve

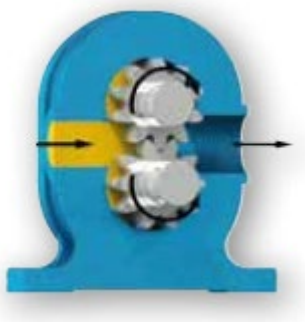


YMD 1½" w/ Relief Valve

Modular External Gear Pump Operating Principle:

Similar in operation to the Internal Eccentric Gear Pump, again with only 2 moving components within the process medium. The positive displacement of which is achieved by the filling of the cavities between the teeth of both gears located in the pump head.With each revolution, a fixed volume of fluid, enters the casing through the suction port, filling the space between the teeth of the gears. The process medium is then carried around the periphery or external areas of the gears until the casing is fullyilled with the fluid and pushed out of the pump outlet under pressure. No fluid passes between the gears.

Below is a summary of this process:

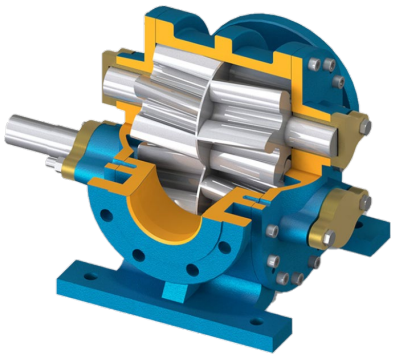


Fluid entering the pump: The yellow coloured section in the image represents the process medium as it is entering the pump suction port, pump casing & filling the cavities between Gears. The 3 arrows indicate the direction of fluid passage through the pump and rotational direction of the gears.

Fluid filling the cavities between the teeth of the gears & casing: As the fluid progresses through the pump head and fills the cavities between the gears i is carried around the outside of the gears filling the casing at the top and bottom.

Pump is flooded & starts to discharge the process medium under pressure: Once the pump is fully flooded, the driving gear (Top) and driven gear (Bottom) form a liquid seal thanks to their intermeshing teeth, which then enables the fluid to exit the discharge of the pump under pressure. The delivery pressure is dependent on the installed power of the motor.

Product Group	Specifications & Material Options	
Helical External Gear Pumps	Connection Sizes	2" – 10"
	Capacity Range	1– 320 m^3/hr
	Pressure Range	1– 15 Bar
	Temperature Range	up to 350°C
	Speed Range	50 – 1500 rpm
	Viscosity Range	20 – 55'000 cPs
	Pump Body & Cover	Cast Iron Ductile Cast Iron Cast Steel Stainless Steel AISI 304/316
	Gears	Cast Iron Ductile Cast Iron Cast Steel Stainless Steel AISI 304/316
	Bearings	SnBz12 Bronze Carbon Graphite Ina Bushing Bearings
	Sealing	Soft Seal / Packed Gland Mechanical Seal

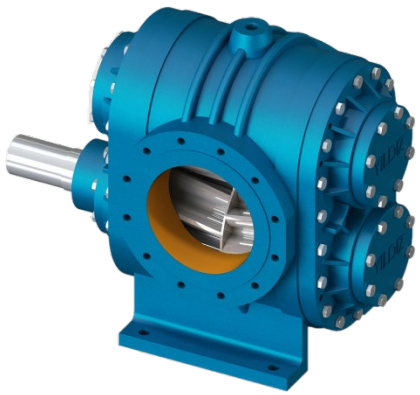


Sizes Available:

Model	Max Flow, m³/hr	Max Pressure, Bar	Viscosity Range, cSt	Max Speed, rpm	Max Temperature, °C
YHL 2	12	10	10 – 550	900	200
YHL 2½	38	15	10 – 55.000	450	350
YHL 3	38	15	10 – 55.000	450	350
YHL 4	76	15	10 – 55.000	450	200
YHL 8	250	15	10 – 55.000	450	200
YHL 10	250	15	10 – 55.000	450	200

YHL 2" w/ Relief Valve

YHL 250

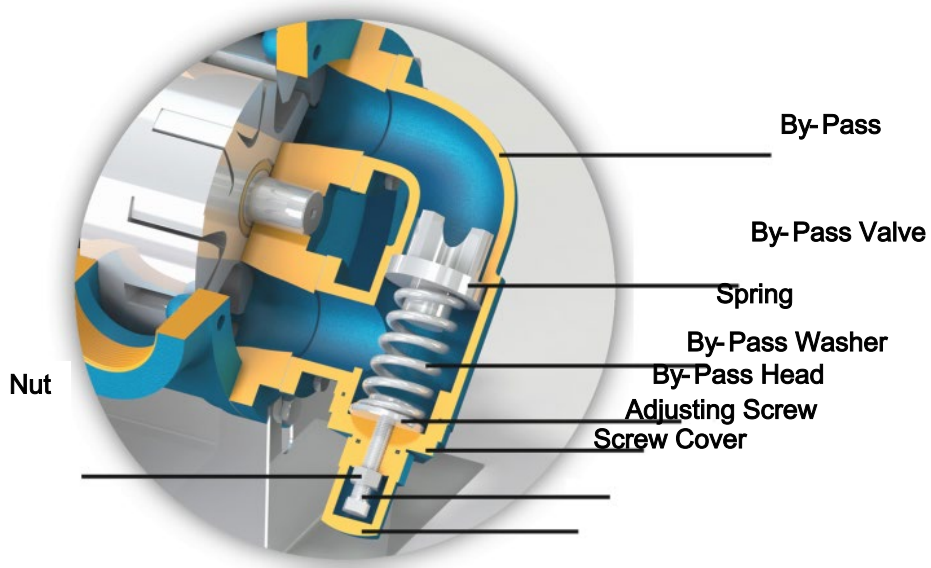


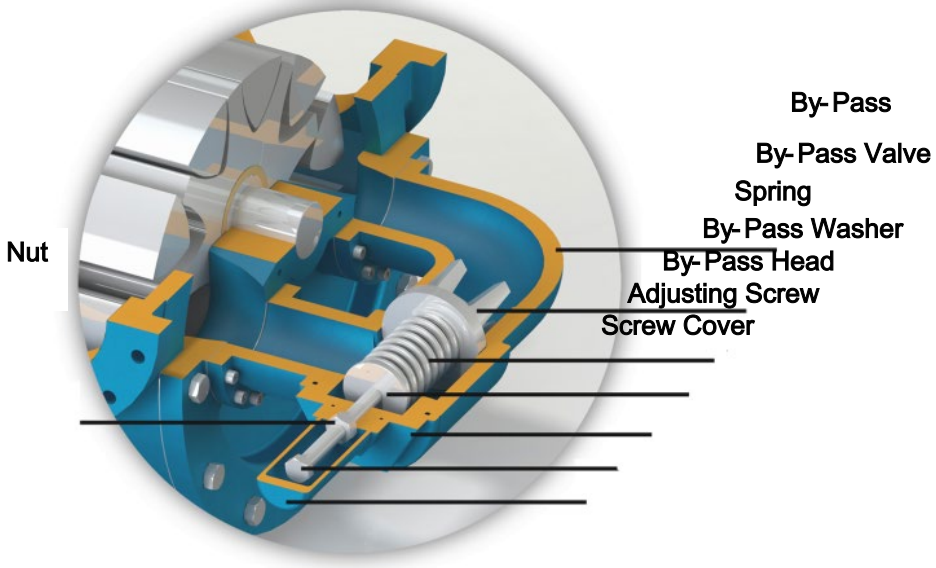
YHL 8

By-Pass /Pressure Relief Valve Operation:

The intended purpose of a By-Pass or Pressure Relief Valve (PRV) is to ensure that the pump and drive unit are protected from unnecessary damage that may be incurred during over-pressurisation which is mainly caused by closed valve operation or blockages in the discharge line. By-Passes can be either installed on the pipework and route fluid back to the suction of the pump or tank, in the form of a By-Pass Circuit, or indeed installed directly on the pump head, as detailed below. The By-Pass, when opened, relieves excess fluid and pressure from the discharge section of the pump to the suction side and effectively allow the pump to recirculate within itself until the blockage in the line has been cleared or closed valve opened to allow the process medium to carry on through the system and drop the pressure in the line to an acceptable level for the installed equipment.

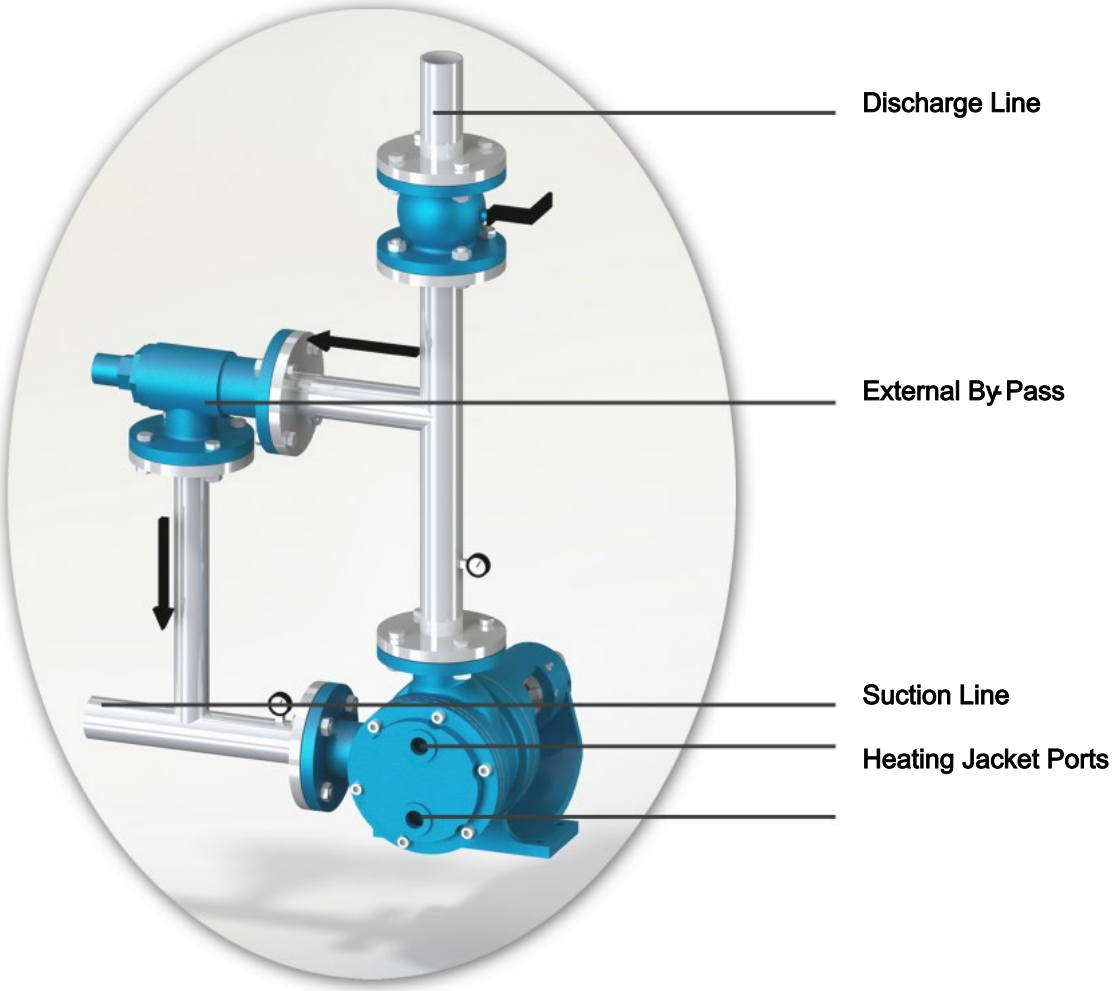
As By-Passes are spring-loaded and adjustable, they can be tweaked in situ to cater for changing system or pump requirements.





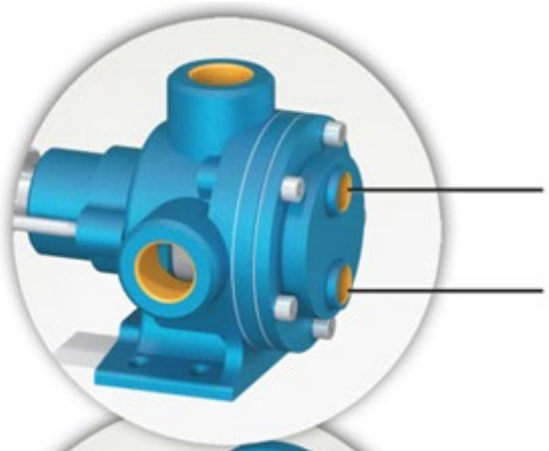
By-Pass Circuit:

A By-Pass Circuit is generally used when a built-on PRV cannot be installed, for example when the pump is fitted with a heating jacket instead. Tapflo UK Ltd. can deliver pumps fitted with By-Pass Circuits upon request, jacketed and unjacketed. Instead of fluid circulating round the pump head the excess flow and pressure is instead diverted from the discharge pipework back to suction.

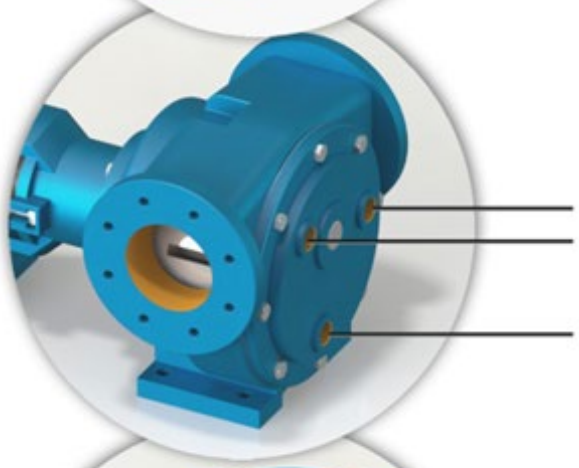


Heating Jackets:

Heating Jackets are used when the process fluid temperature needs to be maintained. Tapflo Industrial Gear Pumps can be supplied with these fitted to the front cover alone or on the bearing bracket as well (Double Jacketed). Existing units can also be upgraded to have a heating jacket fitted to the front cover by a simple cover change. The cover in question is detailed below (image 2), the 2 top ports are the hot water inlet / outlet and the bottom port is for discharge of condensed water.

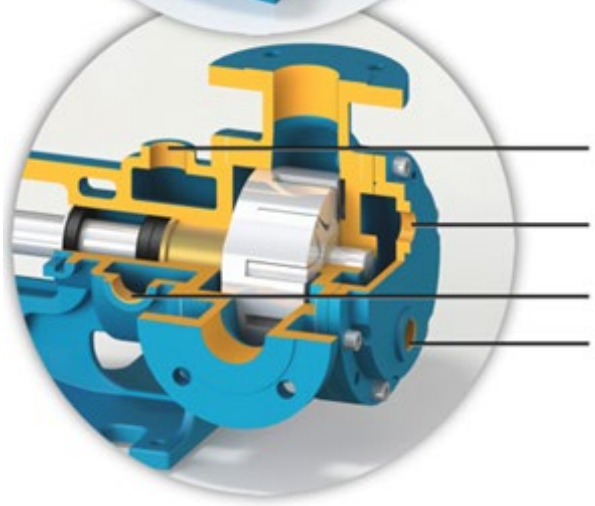


Hot Water Inlet / Outlets



Hot Water Inlet / Outlets

Condensed Water Discharge



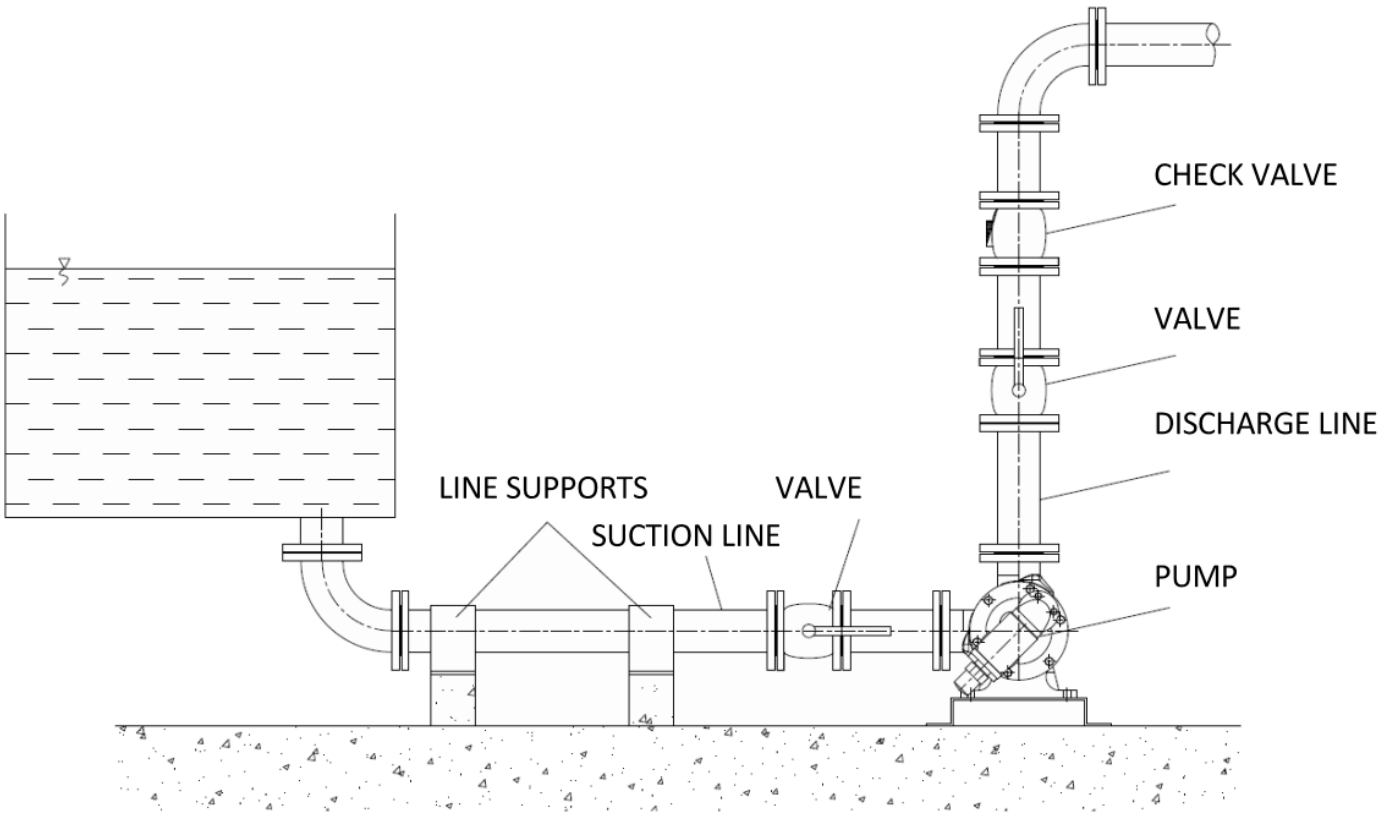
Hot Water Inlet / Outlets

Hot Water Inlet / Outlets

Installation Recommendations:

Below are some useful installation recommendations to ensure that unnecessary damage and inconsistent performance can be avoided when usingTapflo Industrial Gear Pumps.

- Never use the pump as a support for pipework. Pipework leading to and from the pump needs to be adequately supported to ensure that the pump flanges are not exposed to excessive loads and tension.
- The diameter of the all pipework, fittings and accessories should be at least equal to or larger than the pump ports. Generally the velocity within the pipework should not exceed 2 m/s on the suction side and 3 m/s on the discharge side. Exceeding these values can result in major friction losses in the suction pipework leading to cavitation issues and high discharge pressure requirements.
- Tapflo Industrial Gear Pumps are NOT solids handling, therefore, during the installation of pipework, measures must be put in place to ensure that when the pump is commissioned no particulates can enter the pump.
- Isolation Valves on both the pump suction and discharge are recommended to allow for isolation of the pump on the line for maintenance purposes. The Valve on the Discharge can also be used as a manual control valve and installed as close as possible to the pump.
- If the discharge pipework is quite long, a Check Valve is also recommended to be installed so that the pressure in the line can be held by the Valve and therefore avoiding both unnecessary strain on the pump and backflow.

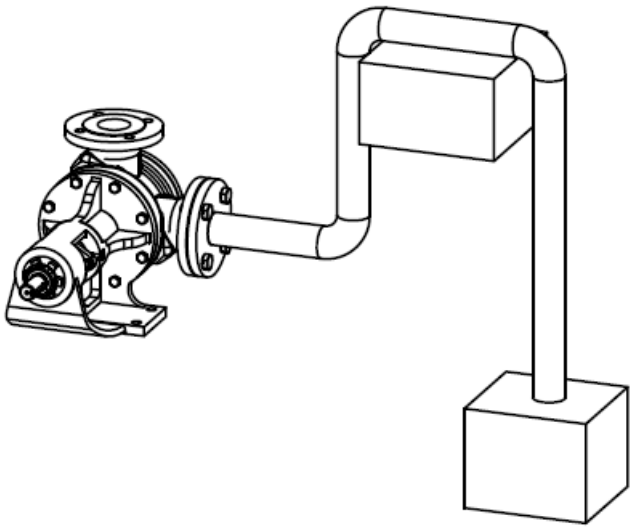


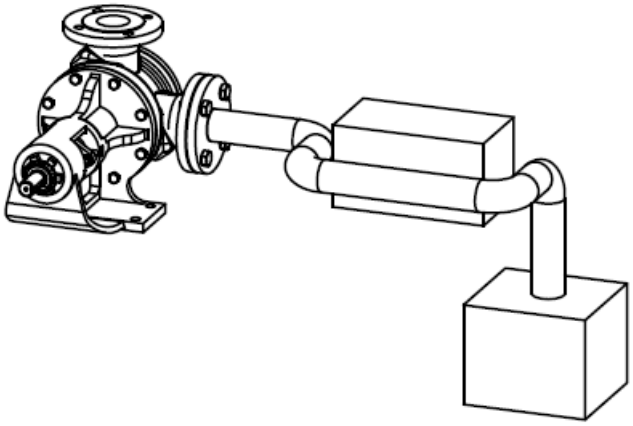
Suction Pipework Recommendations:

Suction Pipework should be fitted tightly and installed in such a way to ensure that air pockets cannot develop during operation and damage the pump.

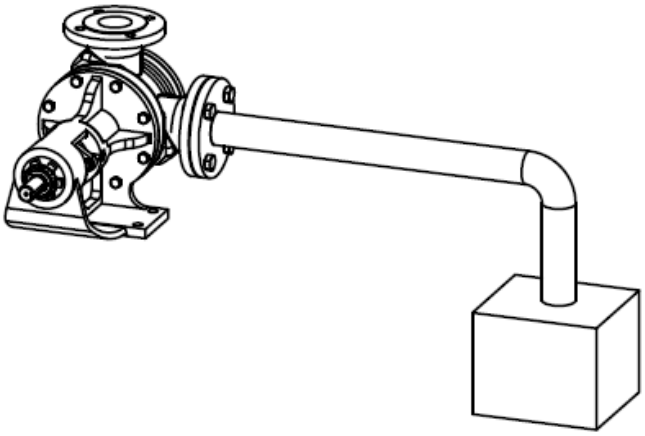
To avoid unnecessary and excessive friction losses, suction pipework should be as short as possible with few convolutions, sharp elbows and sudden changes in direction as possible.

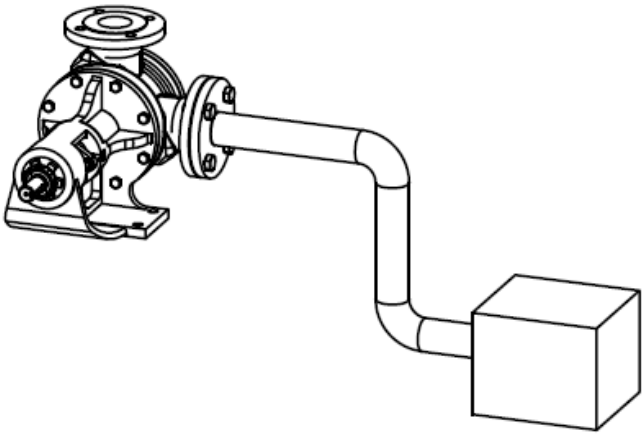
Examples:





Avoid the above as air pockets can form in the top of the horseshoe, if absolutely necessary use horizontal elbows instead.





The above show recommended suction line installations for a suction lift application. The design to the right is preferred as it brings the process fluid source closer to the pump, therefore reducing the suction lift requirement for the pump.

Recommended Operational Checks:

Below is a list of recommended operational checks that will enable operators to extend the life of the pump and avoid any unnecessary damage.

Regularly check the following:

- Noise, vibration and heat levels.
- Abnormal leakages.
- Flow Rates & Discharges Pressures to ensure that they are within the usual and expected ranges. Having a Flow Meter and Suction & Discharge Pressure Gauges / Sensors are recommended.
- Elastic parts on the Coupling (if present).
- Electrical Current Draws on the motor. If higher than normal this is generally an indication of elevated discharge pressures or blockages within the pump or pipework.

Other recommendations:

- All valves on auxiliary systems should be OPEN.
- If the pump is equipped with a Packed Gland a certain amount of leakage (small drips) is expected. However, if after prolonged periods of operation this leakage increases then tighten the nuts on the packing press until the leakage level reverts back to normal. If the nuts are tightened fully then replace the packing gland.
- If the pump is Mechanically Sealed then no leakage should be expected. If leakage is detected then this indicates that the mechanical seal faces have been damaged and the seal needs replacing. The lifetime of the seal is application and usage dependent, if you are experiencing undesirable and low seal life please contact our sales or technical department for further assistance.

Trouble-Shooting Guide:

Below is a brief summary of some of the possible malfunctions, causes & remedies which may occur during the operation of your Gear Pump.

Malfunction	Possible Cause	Remedy
No Flow whilst the pump is ON	Wrong direction of rotation	Reverse rotational direction by inverting wiring on motor
	Air Pockets in the Suction Line	Fill the Suction Line Manually and discharge all air left in the line
	Check Valve Jammed / Blocked	Clean / Repair / Replace Check Valve
	Insufficient Sealing on Pipework or Pump causing Air Ingress	Check and Seal the Suction Line & Change Pump Seal, if necessary
Insufficient Capacity and / or Pressure	Check Valve Jammed / Blocked	Clean / Repair / Replace Check Valve
	Air Leakage	Check and Seal the Suction Line & Change Pump Seal, if necessary
	Elevated NPSHr	Shorten Length and / or Increase the ø of the Suction Pipework Reduce Manometric Suction Head Move pump closer to the fluid source
	Pump is excessively worn	Check Rotor Gear Spacing, decrease tolerance by removing Washers, if necessary
	Safety Valve / PRV is Open or is set too low	Adjust Set Pressure & Check Valve Mechanism for Blockages
Pump is making Irregular Noise	Cavitation – Manometric Suction Head is too high	Shorten Length and / or Increase the ø of the Suction Pipework Reduce Manometric Suction Head Move pump closer to the fluid source Check Filters / Strainers on Suction Line
	Rotor / Gear Damage	Check Gears & change, if necessary
	Pump is misaligned with Drive Assembly	Correct using Washers & Spacers & Laser Re-Alignment
	Vibration Noise coming from Safety Valve / PRV	Adjust Set Pressure & Change, if necessary