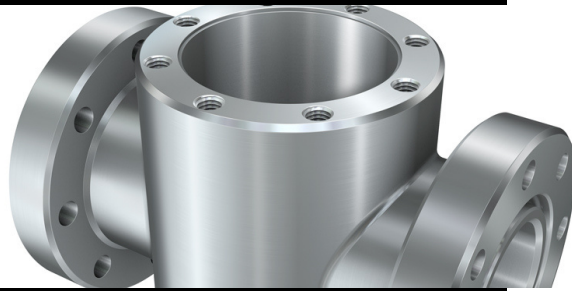




Al Osman



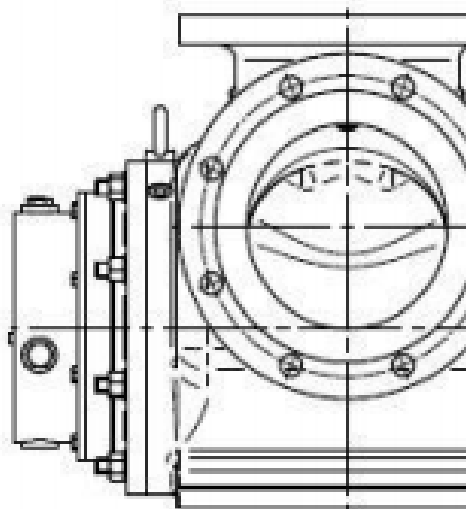
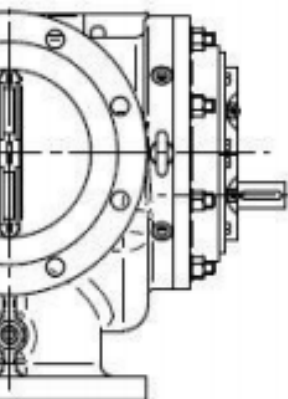
Positive  
Displacement  
pumps

For **Oil & Gas** And Marine Applications

## 2021

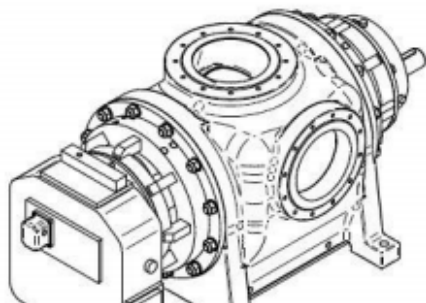
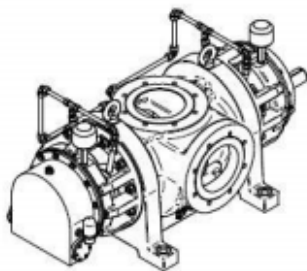
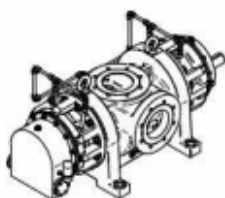
- 3** HR/HRV Twin Screw Pump Series
- 5** HD/HDL/HDV Twin Screw Pump Series
- 7** UD - UDL/JDL - UDV/JDV Twin Screw Pump Series
- 9** SR/SD/SDL/SRV/SDV Twin Screw Pump Series
- 11** HM/HM - V Twin Screw Pump Series
- 13** VDC Twin Screw Pumps Series
- 15** MP Twin Screw Pump Series
- 17** M/D Hollow Rotary Disk Pump Series
- 19** CN Rotary Vane Pump Series

**HR/HRV**  
**Twin Screw Pump**  
**Series**



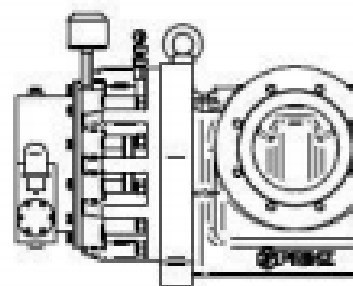
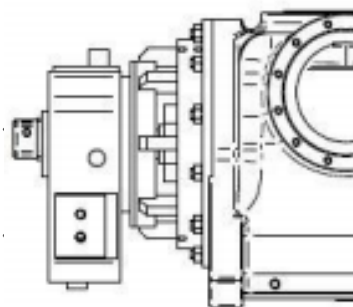
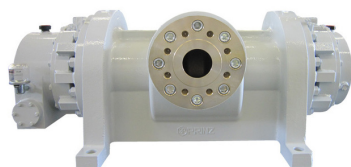
| PUMP TYPE  | TWIN SCREW PUMPS – EXTERNAL TIMING GEARS   |   |  |
|--|--|---|--|
| Pump Series  | HR Series:   | HRV Series :  |  |
| Installation Options:                              | Horizontal   | Vertical  |  |
| Executions:  | High Capacity<br>Standard & API 676 with deviations - Timing Gears - External Gears and Bearings   |   |  |
| Optimized for Applications in:                     | Oil&Gas Downstream, Petrochemical, Chemical, Marine & Shipbuilding, General Industry   |   |  |
| Suitable to Fluid having the following properties: | Abrasives and not Abrasives  |   |  |
|  | Corrosive (Alkaline / Acid / Aggressive) and not Corrosive   |   |  |
|  | Low / Medium / High / Very High Viscosities  |   |  |
|  | Not Lubricating or Lubricating   |   |  |
|  | Medium / High percentage of Gas or Air dissolved in Liquid   |   |  |
|  | Slightly Dirty (small soft particles)  |   |  |
| Advantages of the Operating Principle:             | Capability of handling a Wide Range of viscosities and pressures<br>= one pump for many types of fluids and many flow rates!   |   |  |
|  | High Suction Lift Capability – the pump NPSH being very low - down to 1,5 meters.  |   |  |
|  | Self Priming without any auxiliary devices.  |   |  |
|  | Capable to pump very viscous fluids thanks to its smooth axial and low-pulsation movement.   |   |  |
|  | Pulsations are minimized and flow rate is uniform, allowing to handle fluids that are very viscous and sensitive to shear stresses or turbulences, thanks to the low Internal velocities given by the screws movement. |   |  |
|  | High Rotating Speeds are possible thanks to the low inertia of the screws.   |   |  |
|  | Screws are contact-less so wear-out is minimized and Pump Life is extended.  |   |  |
|  | Flow rate is constant even when pressure changes.  |   |  |
|  | Reversible at Low Speeds / Pressure.   |   |  |
|  | Capability of Dry Running for a limited period and in particular conditions.   |   |  |
| Low noise level & Low vibration.                   |  |   |  |
| Pump Series  | HR Series:   |   |  |
| Maximum design pressure:                           | 14 bar (standard) [204 psig]   |   |  |
| Flow rates:  | up to 3500 m <sup>3</sup> /h [15400 GPM]   |   |  |
| Viscosity of the pumped fluid:                     | up to 35.000 cSt   |   |  |
| Pipe Nominal Size DN:                              | from 50 to 750 [from 2" up to 30"]   |   |  |
| Rotation speed:                                    | from 200 up to 2200 rpm  |   |  |
| Temperature range:                                 | -46 / +300 °C [-51 / +572 °F] - ON REQUEST -60°C   |   |  |
| Pulsations:  | Minimized (almost zero)  |   |  |
| Bearing types:                                     | External Bearings and Gears in oil bath / grease   |   |  |
| Standard Materials:                                | Casing / Liner   | Screws  | Shafts                                       |
|  | Cast Iron, Ductile Cast Iron   | Ductile Cast Iron   | High Strength Low Alloy Steel                |
|  | Carbon Steel (Cast or Fabricated)  | High Strength Low Alloy Steel                                   | Stainless Steel AISI 420                     |
|  | Low Temperature Carbon Steel (Cast or Fabricated)  | Stainless Steel AISI 420  | Stainless Steel 17-4 PH                      |
|  | 12% Cr Stainless Steel   | Stainless Steel AISI S316/S316L                                 | Stainless Steel XM-19                        |
|  | Stainless Steel AISI S316/S316L (Cast or Fabricated)   | Stainless Steel 17-4 PH or AISI 431                             | Duplex & Super Duplex St. Steel              |
|  | Bronze, Nickel Aluminium Bronze  | Duplex & Super Duplex St. Steel                                 | HVOF Spray Coating /Tungsten Carbide Coating |
|  |  | HVOF Spray Coating /Tungsten Carbide Coating                    | Chromium Plating                             |
|  |  | Nitriding   | Nitriding                                    |
|  | Customized materials:  | Other Alloys and Material Combinations are available on request |  |
|  | NORSOK Compliant Materials are available on request  |   |  |
| Main Application Fields:                           | HR / HRV Series  |   |  |
|  | OIL & GAS DOWNSTREAM: Tank Storages / Terminals, Oil Pipelines   |   |  |
|  | PETROCHEMICAL: Refinery, Petrochemical Complex, Lubricants Plants, Bitumen/Asphalt/Tar Plants  |   |  |
|  | CHEMICAL: Resin Production, Paint Production, Green Fuels, Polymeric Suspensions   |   |  |
|  | MARINE & SHIPBUILDING: Tankers, Barges, Cargo Ships, Support Vessels, FPSOs, Offshore Platforms Hulls<br>POWER GENERATION: Heavy Fuel Oil Power Plants, Lube Oil Systems   |   |  |

**HD/HDL/HDV  
Twin Screw Pump  
Series**



| PUMP TYPE  | TWIN SCREW PUMPS - EXTERNAL TIMING GEARS   |  |  |
|--|--|--|--|
| Pump Series  | HD Series:   | HDL Series:  | HDV Series :                                 |
| Installation Options:                              | Horizontal (Cast Casing)   | Horizontal (Fabricated Steel Casing, with Replaceable Liner) | Vertical                                     |
| Executions:  | Standard & API 676 - Timing Gears - External Gears and Bearings  |  |  |
| Optimized for Applications in:                     | Oil&Gas, Petrochemical, Chemical, Marine & Shipbuilding, General Industry  |  |  |
| Suitable to Fluid having the following properties: | <p>Abrasive and not Abrasive</p> <p>Corrosive (Alkaline / Acid / Aggressive) and not Corrosive</p> <p>Low / Medium / High / Very High Viscosities</p> <p>Not Lubricating or Lubricating</p> <p>Medium / High percentage of Gas or Air dissolved in Liquid (Multiphase versions available)</p> <p>Slightly Dirty (small particles)</p>  |  |  |
| Advantages of the Operating Principle:             | <p>Capability of handling a Wide Range of viscosities and pressures = one pump for many types of fluids and many flow rates!</p> <p>High Suction Lift Capability – the pump NPSH being very low - down to 1,5 meters.</p> <p>Self Priming without any auxiliary devices.</p> <p>Capable to pump very viscous fluids thanks to its smooth axial and low-pulsation movement.</p> <p>Pulsations are minimized and flow rate is uniform, allowing to handle fluids that are very viscous and sensitive to shear stresses or turbulences, thanks to the low Internal velocities given by the screws movement.</p> <p>High Rotating Speeds are possible thanks to the low inertia of the screws.</p> <p>Screws are contact-less so wear-out is minimized and Pump Life is extended.</p> <p>Flow rate is constant even when pressure changes.</p> <p>Reversible at Low Speeds / Pressure.</p> <p>Capability of Dry Running for a limited period and in particular conditions.</p> <p>Low noise level &amp; Low vibration.</p> |  |  |
| Pump Series  | HD, HDL, HDV Series:   |  |  |
| Maximum design pressure:                           | 20 bar (standard) [300 psig]   |  |  |
| Flow rates:  | up to 3500 m3/h [15400 psig]   |  |  |
| Viscosity of the pumped fluid:                     | up to 35.000 cSt   |  |  |
| Pipe Nominal Size DN:                              | from 50 to 750 [from 2" up to 30"]   |  |  |
| Rotation speed:                                    | from 200 up to 2200 rpm  |  |  |
| Temperature range:                                 | -46 / +350 °C [-51 / +662 °F] - ON REQUEST -60°C   |  |  |
| Pulsations:  | Minimized (almost zero)  |  |  |
| Bearing types:                                     | External Bearings and Gears in oil bath  |  |  |
| Standard Materials:                                | Casing / Liner   | Screws   | Shafts                                       |
|  | Cast Iron, Ductile Cast Iron   | Ductile Cast Iron  | High Strength Low Alloy Steel                |
|  | Carbon Steel (Cast or Fabricated)  | High Strength Low Alloy Steel                                | Stainless Steel AISI 420                     |
|  | Low Temperature Carbon Steel (Cast or Fabricated)  | Stainless Steel AISI 420                                     | Stainless Steel 17-4 PH                      |
|  | 12% Cr Stainless Steel   | Stainless Steel AISI S316/S316L                              | Stainless Steel XM-19                        |
|  | Stainless Steel AISI S316/S316L (Cast or Fabricated)   | Stainless Steel 17-4 PH or AISI 431                          | Duplex & Super Duplex St. Steel              |
|  | Bronze, Nickel Aluminium Bronze  | Duplex & Super Duplex St. Steel                              | Monel, Inconel® , Hastelloy                  |
|  | Duplex & Super Duplex St. Steel  | Monel, Inconel® , Hastelloy                                  | HVOF Spray Coating /Tungsten Carbide Coating |
|  | Inconel Weld Overlay (cladding)  | HVOF Spray Coating /Tungsten Carbide Coating                 | Chromium Plating                             |
|  | Monel, Inconel® , Hastelloy  | CRA Weld Overlaid  | CRA Weld Overlaid                            |
|  | Ni-Resist  | Nitriding  | Nitriding                                    |
| Customized materials:                              | Other Alloys and Material Combinations are available on request  |  |  |
|  | NORSOK Compliant Materials are available on request  |  |  |
| Main Application Fields:                           | <p>HD / HDL / HDV Series</p> <p>OIL &amp; GAS UPSTREAM / MIDSTREAM / DOWNSTREAM: FPSOs, Offshore Platforms, Oil Fields, Oil Pipelines, Gathering Stations, Tank Storages / Terminals</p> <p>PETROCHEMICAL: Refinery, Petrochemical Complex, Lubricants Plants, Bitumen/Asphalt/Tar Plants</p> <p>CHEMICAL: Resin Production, Paint Production, Green Fuels, Polymeric Suspensions</p> <p>MARINE &amp; SHIPBUILDING: Tankers, Barges, Cargo Ships, Support Vessels, FPSOs, Offshore Platforms Hulls</p> <p>POWER GENERATION: Heavy Fuel Oil Power Plants, Lube Oil Systems</p>  |  |  |

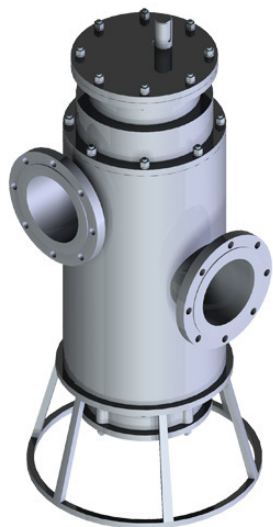
# UD - UDL/JDL - UDV/JDV Twin Screw Pump Series



| PUMP TYPE  |  | TWIN SCREW PUMPS - EXTERNAL TIMING GEARS                     |  |  |
|--|--|--|--|--|
| Pump Series  | UD Series:   | UDL Series & JDL Series:                                     |  | UDV Series & JDV Series:                     |
| Installation Options:                              | Horizontal (Cast Casing)   | Horizontal (Fabricated Steel Casing, with Replaceable Liner) |  | Vertical                                     |
| Executions:  | Standard & API 676 - Timing Gears - External Gears and Bearings  |  |  |  |
| Optimized for Applications in:                     | Oil & Gas Upstream / Midstream, Petrochemical, Chemical, Shipbuilding  |  |  |  |
| Suitable to Fluid having the following properties: | <p>Abrasive and not Abrasive</p> <p>Corrosive (Alkaline / Acid / Aggressive) and not Corrosive</p> <p>Low / Medium / High / Very High Viscosities</p> <p>Not Lubricating or Lubricating</p> <p>Medium / High percentage of Gas or Air dissolved in Liquid (Multiphase versions available)</p> <p>Slightly Dirty (small particles)</p>  |  |  |  |
| Advantages of the Operating Principle:             | <p>Capability of handling a Wide Range of viscosities and pressures = one pump for many types of fluids and many flow rates!</p> <p>High Suction Lift Capability – the pump NPSH being very low - down to 1,5 meters.</p> <p>Self Priming without any auxiliary devices.</p> <p>Capable to pump very viscous fluids thanks to its smooth axial and low-pulsation movement.</p> <p>Pulsations are minimized and flow rate is uniform, allowing to handle fluids that are very viscous and sensitive to shear stresses or turbulences, thanks to the low Internal velocities given by the screws movement.</p> <p>High Rotating Speeds are possible thanks to the low inertia of the screws.</p> <p>Screws are contact-less so wear-out is minimized and Pump Life is extended.</p> <p>Flow rate is constant even when pressure changes.</p> <p>Reversible at Low Speeds / Pressure.</p> <p>Capability of Dry Running for a limited period and in particular conditions.</p> <p>Low noise level &amp; Low vibration.</p> |  |  |  |
| Pump Series  | UD, UDL Series:  |  | JD, JDL Series:                                  |  |
| Maximum design pressure:                           | 50 barg [730 psig]   |  | 149 barg [2170 psig]<br>max ANSI 900 rating      |  |
| Flow rates:  | up to 1000 m3/h [4000 GPM]   |  | up to 600 m3/h [2650 GPM]                        |  |
| Viscosity of the pumped fluid:                     | up to 35.000 cSt   |  | up to 35.000 cSt                                 |  |
| Pipe Nominal Size DN:                              | from 50 to 400 – from 2" to 16"  |  | from 50 to 400 – from 2" to 16"                  |  |
| Rotation speed:                                    | from 200 up to 2200 rpm  |  | from 200 up to 2200 rpm                          |  |
| Temperature range:                                 | -46 / +350 °C [-51 / +662 °F] - ON REQUEST -60°C   |  | -46 / +350 °C [-51 / +662 °F] - ON REQUEST -60°C |  |
| Pulsations:  | Minimized (almost zero)  |  | Minimized (almost zero)                          |  |
| Bearing types:                                     | External Bearings and Gears in oil bath  |  | External Bearings and Gears in oil bath          |  |
| Standard Materials:                                | Casing / Liner   | Screws   |  | Shafts                                       |
|  | Cast Iron, Ductile Cast Iron   | Ductile Cast Iron  |  | High Strength Low Alloy Steel                |
|  | Carbon Steel (Cast or Fabricated)  | High Strength Low Alloy Steel                                |  | Stainless Steel AISI 420                     |
|  | Low Temperature Carbon Steel (Cast or Fabricated)  | Stainless Steel AISI 420                                     |  | Stainless Steel 17-4 PH                      |
|  | 12% Cr Stainless Steel   | Stainless Steel AISI S316/S316L                              |  | Stainless Steel XM-19                        |
|  | Stainless Steel AISI S316/S316L (Cast or Fabricated)   | Stainless Steel 17-4 PH or AISI 431                          |  | Duplex & Super Duplex St. Steel              |
|  | Bronze, Nickel Aluminium Bronze  | Duplex & Super Duplex St. Steel                              |  | Monel, Inconel®, Hastelloy                   |
|  | Duplex & Super Duplex St. Steel  | Monel, Inconel®, Hastelloy                                   |  | HVOF Spray Coating /Tungsten Carbide Coating |
|  | Inconel Weld Overlay (cladding)  | HVOF Spray Coating /Tungsten Carbide Coating                 |  | Chromium Plating                             |
|  | Monel, Inconel®, Hastelloy   | CRA Weld Overlaid  |  | CRA Weld Overlaid                            |
|  | Ni-Resist  | Nitriding  |  | Nitriding                                    |
| Customized materials:                              | Other Alloys and Material Combinations are available on request  |  |  |  |
|  | NORSOK Compliant Materials are available on request  |  |  |  |
| Main Application Fields:                           | UD / UDL / UDV / JDL / JDV Series  |  |  |  |
|  | OIL & GAS UPSTREAM / MIDSTREAM: FPSOs, Offshore Platforms, Oil Fields, Oil Pipelines, Gathering Stations   |  |  |  |
|  | PETROCHEMICAL: Refinery, Petrochemical Complex, Bitumen/Asphalt/Tar Plants   |  |  |  |
|  | CHEMICAL: Resin Production, Green Fuels, Polymeric Suspensions   |  |  |  |
|  | MARINE & SHIPBUILDING: Tankers, FPSOs, Offshore Platforms Hulls  |  |  |  |
|  | POWER GENERATION: Heavy Fuel Oil Power Plants  |  |  |  |

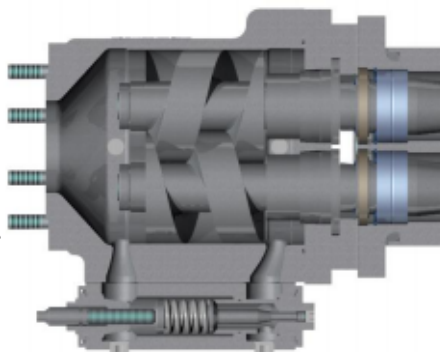
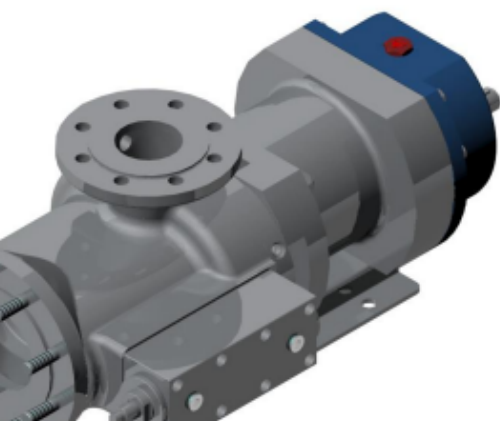


**SR/SD/SDL/SRV/SDV**  
**Twin Screw Pump Series**



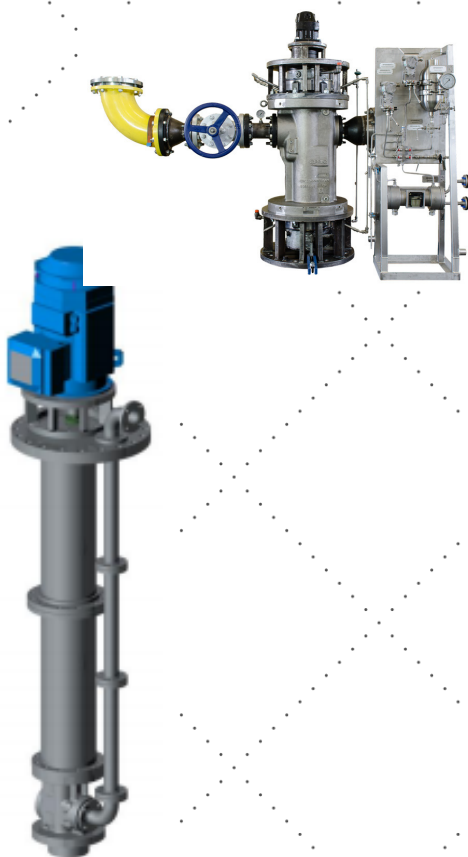
| PUMP TYPE  | TWIN SCREW PUMPS - INTERNAL TIMING GEARS  |  |  |                          |
|--|---|--|--|--------------------------|
| Pump Series  | SR Series:  | SD Series:   | SDL Series:  | SRV Series & SDV Series: |
| Installation Options:                              | Horizontal (Cast Casing)  | Horizontal (Cast Casing)   | Horizontal (Fabricated Steel Casing, with Replaceable Liner)       | Vertical                 |
| Executions:  | Standard & API 676 - Internal Gears and Bearings (Wetted and cooled by the Pumped Fluid)  |  |  |                          |
| Optimized for Applications in:                     | Oil&Gas, Petrochemical, Chemical, Marine & Shipbuilding, Power Generation   |  |  |                          |
| Suitable to Fluid having the following properties: | Not Abrasive<br>Not Corrosive / Slightly Corrosive<br>Medium / High Viscosities<br>Lubricating / Slightly Lubricating<br>Small percentage of Gas or Air dissolved in Liquid<br>Clean, with Minimal Impurities (Small Amount of Solid Particles)   |  |  |                          |
| Advantages of the Operating Principle:             | Capability of handling a Wide Range of viscosities and pressures = one pump for many types of fluids and many flow rates!<br>High Suction Lift Capability – the pump NPSH being very low - down to 1,5 meters.<br>Self Priming without any auxiliary devices.<br>Capable to pump very viscous fluids thanks to its smooth axial and low-pulsation movement.<br>Pulsations are minimized and flow rate is uniform, allowing to handle fluids that are very viscous and sensitive to shear stresses or turbulences, thanks to the low internal velocities given by the screws movement.<br>High Rotating Speeds are possible thanks to the low inertia of the screws.<br>Screws are contact-less so wear-out is minimized and Pump Life is extended.<br>Flow rate is constant even when pressure changes.<br>Reversible at Low Speeds / Pressure.<br>Capability of Dry Running for a limited period and in particular conditions.<br>Low noise level & Low vibration. |  |  |                          |
| Pump Series  | SR, SRV Series:   | SD Series:   | SDL, SDV Series:   |                          |
| Maximum design pressure:                           | 14 bar (standard) [204 psig]  | 20 bar (standard) [300 psig]                                       | 50 barg [730 psig]   |                          |
| Flow rates:  | up to 1200 m3/h [5280 GPM]  | up to 1200 m3/h [5280 GPM]   | up to 1200 m3/h [5280 GPM]   |                          |
| Viscosity of the pumped fluid:                     | up to 2.000 cSt   | up to 2.000 cSt  | up to 2.000 cSt  |                          |
| Pipe Nominal Size DN:                              | from 50 to 400 – from 2" to 16"   | from 50 to 400 – from 2" to 16"                                    | from 50 to 400 – from 2" to 16"                                    |                          |
| Rotation speed:                                    | from 200 up to 2200 rpm   | from 200 up to 2200 rpm  | from 200 up to 2200 rpm  |                          |
| Temperature range:                                 | -46 / +300 °C [-51 / +572 °F]<br>- ON REQUEST -60°C   | -46 / +300 °C [-51 / +572 °F]<br>- ON REQUEST -60°C                | -46 / +350 °C [-51 / +662 °F]<br>- ON REQUEST -60°C                |                          |
| Pulsations:  | Minimized (almost zero)   | Minimized (almost zero)  | Minimized (almost zero)  |                          |
| Bearing types:                                     | Internal Bearings and Gears, wetted and cooled by the Pumped Fluid  | Internal Bearings and Gears, wetted and cooled by the Pumped Fluid | Internal Bearings and Gears, wetted and cooled by the Pumped Fluid |                          |
| Standard Materials:                                | Casing / Liner  | Screws   | Shafts   |                          |
|  | Cast Iron, Ductile Cast Iron  | Ductile Cast Iron  | High Strength Low Alloy Steel                                      |                          |
|  | Carbon Steel (Cast or Fabricated)   | High Strength Low Alloy Steel                                      | Stainless Steel AISI 420   |                          |
|  | Low Temperature Carbon Steel (Cast or Fabricated)   | Stainless Steel AISI 420   | Stainless Steel 17-4 PH  |                          |
|  | 12% Cr Stainless Steel  | Stainless Steel AISI S316/S316L                                    | Stainless Steel XM-19  |                          |
|  | Stainless Steel AISI S316/S316L (Cast or Fabricated)  | Stainless Steel 17-4 PH or AISI 431                                | Nitriding  |                          |
|  |   | Nitriding  |  |                          |
| Customized materials:                              | Other Alloys and Material Combinations are available on request   |  |  |                          |
|  | NORSOK Compliant Materials are available on request   |  |  |                          |
| Main Application Fields:                           | SR / SD / SDL / SRV / SDV Series  |  |  |                          |
|  | OIL & GAS MIDSTREAM / DOWNSTREAM: Tank Storages / Terminals, Oil Pipelines  |  |  |                          |
|  | PETROCHEMICAL: Refinery, Petrochemical Complex, Lubricants Plants   |  |  |                          |
|  | CHEMICAL: Green Fuels, Clean Chemicals  |  |  |                          |
|  | MARINE & SHIPBUILDING: Tankers, Barges, Cargo Ships, Support Vessels  |  |  |                          |
|  | POWER GENERATION: Heavy Fuel Oil Power Plants, Lube Oil Systems   |  |  |                          |

## HM/HM - V Twin Screw Pump Series



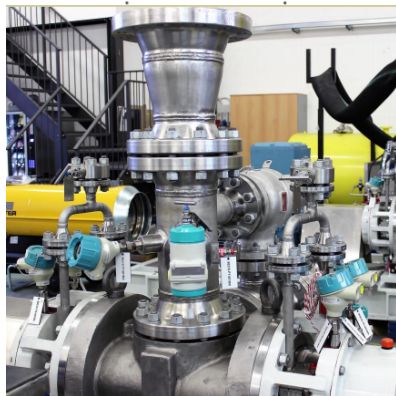
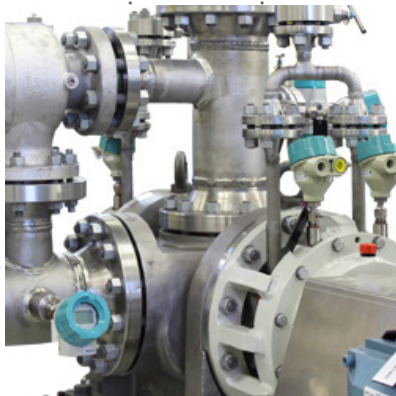
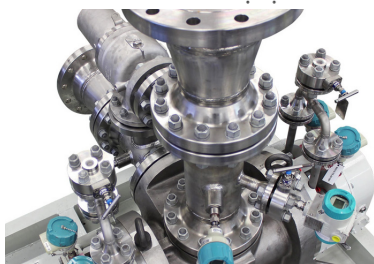
| PUMP TYPE  |  | SCREW PUMPS - TIMING EXTERNAL GEARS          |  |
|--|--|--|--|
| Pump Series  | HM Series:   | HM-V Series:                                 |  |
| Installation Options:                              | Horizontal   | Vertical                                     |  |
| Executions:  | Standard & API 676 - Timing Gears - External Gears and Bearings  |  |  |
| Optimized for Applications in:                     | Oil&Gas, Petrochemical, Chemical, Marine & Shipbuilding, Power Generation, General Industry  |  |  |
| Suitable to Fluid having the following properties: | Abrasive and not Abrasive<br>Corrosive (Alkaline / Acid / Aggressive) and not Corrosive<br>Low / Medium / High Viscosities<br>Not Lubricating or Lubricating<br>Medium percentage of Gas or Air dissolved in Liquid<br>Slightly Dirty (small particles)  |  |  |
| Advantages of the Operating Principle:             | Capability of handling a Wide Range of viscosities and pressures<br>= one pump for many types of fluids and many flow rates!<br>High Suction Lift Capability – the pump NPSH being very low - down to 1,5 meters.<br>Self Priming without any auxiliary devices.<br>Capable to pump very viscous fluids thanks to its smooth axial and low-pulsation movement.<br>Pulsations are minimized and flow rate is uniform, allowing to handle fluids that are very viscous and sensitive to shear stresses or turbulences, thanks to the low Internal velocities given by the screws movement.<br>High Rotating Speeds are possible thanks to the low inertia of the screws.<br>Screws are contact-less so wear-out is minimized and Pump Life is extended.<br>Flow rate is constant even when pressure changes.<br>Reversible at Low Speeds / Pressure.<br>Capability of Dry Running for a limited period and in particular conditions.<br>Low noise level & Low vibration. |  |  |
| Pump Series  | HM Series:   |  |  |
| Maximum design pressure:                           | 20 bar (standard)  |  |  |
| Flow rates:  | up to 80 m3/h [353 GPM]  |  |  |
| Viscosity of the pumped fluid:                     | up to 35.000 cSt   |  |  |
| Pipe Nominal Size DN:                              | from 40 to 100 [from 1.1/2" to 4"]   |  |  |
| Rotation speed:                                    | from 200 up to 3600 rpm  |  |  |
| Temperature range:                                 | -46 / +300 °C [-51 / +572 °F] -ON REQUEST -60°C  |  |  |
| Pulsations:  | Minimized (almost zero)  |  |  |
| Bearing types:                                     | External Bearings and Gears in oil bath  |  |  |
| Standard Materials:                                | Casing / Liner   | Screws                                       | Shafts                                       |
|  | Cast Iron, Ductile Cast Iron   | Ductile Cast Iron                            | High Strength Low Alloy Steel                |
|  | Carbon Steel (Cast or Fabricated)<br>High Strength Low Alloy Steel   | High Strength Low Alloy Steel                | Stainless Steel AISI 420                     |
|  | Low Temperature Carbon Steel (Cast or Fabricated)<br>Stainless Steel AISI 420  | Stainless Steel AISI 420                     | Stainless Steel 17-4 PH                      |
|  | 12% Cr Stainless Steel<br>Stainless Steel AISI 5316/5316L  | Stainless Steel AISI 5316/5316L              | Stainless Steel XM-19                        |
|  | Stainless Steel AISI 5316/5316L (Cast or Fabricated)<br>Stainless Steel 17-4 PH or AISI 431  | Stainless Steel 17-4 PH or AISI 431          | Duplex & Super Duplex St. Steel              |
|  | Bronze, Nickel Aluminium Bronze<br>Duplex & Super Duplex St. Steel   | Duplex & Super Duplex St. Steel              | Monel, Inconel®, Hastelloy                   |
|  | Duplex & Super Duplex St. Steel<br>Monel, Inconel®, Hastelloy  | Monel, Inconel®, Hastelloy                   | HVOF Spray Coating /Tungsten Carbide Coating |
|  | Inconel Weld Overlay (cladding)<br>HVOF Spray Coating /Tungsten Carbide Coating  | HVOF Spray Coating /Tungsten Carbide Coating | Chromium Plating                             |
|  | Monel, Inconel®, Hastelloy<br>CRA Weld Overlay   | CRA Weld Overlay                             | CRA Weld Overlay                             |
|  | Ni-Resist<br>Nitriding   | Nitriding                                    | Nitriding                                    |
| Customized materials:                              | Other Alloys and Material Combinations are available on request  |  |  |
|  | NORSOK Compliant Materials are available on request  |  |  |
| Main Application Fields:                           | HM / HMV Series  |  |  |
|  | OIL & GAS UPSTREAM / MIDSTREAM / DOWNSTREAM: FPSOs, Offshore Platforms, Oil Fields, Oil Pipelines, Gathering Stations  |  |  |
|  | PETROCHEMICAL: Refinery, Petrochemical Complex, Lubricants Plants, Bitumen/Asphalt/Tar Plants  |  |  |
|  | CHEMICAL: Resin Production, Paint Production, Green Fuels, Polymeric Suspensions   |  |  |
|  | MARINE & SHIPBUILDING: Tankers, Barges, Cargo Ships, Support Vessels, FPSOs, Offshore Platforms Hulls  |  |  |
|  | POWER GENERATION: Heavy Fuel Oil Power Plants, Lube Oil Systems  |  |  |

# VDC Twin Screw Pumps Series



| PUMP TYPE  | VERTICAL TWIN SCREW PUMPS  |  |  |
|--|--|--|--|
| Pump Series  | VDC Series:  |  |  |
| Installation Options:                              | Vertical - Submerged   |  |  |
| Executions:  | Standard & API 676 - Timing Gears - External Gears and Bearings  |  |  |
| Optimized for Applications in:                     | Oil&Gas, Petrochemical, Marine & Shipbuilding  |  |  |
| Suitable to Fluid having the following properties: | Abrasive and not Abrasive  |  |  |
|  | Corrosive (Alkaline / Acid / Aggressive) and not Corrosive   |  |  |
|  | Low / Medium / High / Very High Viscosities  |  |  |
|  | Not Lubricating or Lubricating   |  |  |
|  | Medium / High percentage of Gas or Air dissolved in Liquid (Multiphase versions available)   |  |  |
|  | Slightly Dirty (small particles)   |  |  |
| Advantages of the Operating Principle:             | Capability of handling a Wide Range of viscosities and pressures = one pump for many types of fluids and many flow rates!  |  |  |
|  | High Suction Lift Capability – the pump NPSH being very low - down to 1,5 meters.  |  |  |
|  | Self Priming without any auxiliary devices.  |  |  |
|  | Capable to pump very viscous fluids thanks to its smooth axial and low-pulsation movement.   |  |  |
|  | Pulsations are minimized and flow rate is uniform, allowing to handle fluids that are very viscous and sensitive to shear stresses or turbulences, thanks to the low Internal velocities given by the screws movement. |  |  |
|  | High Rotating Speeds are possible thanks to the low inertia of the screws.   |  |  |
|  | Screws are contact-less so wear-out is minimized and Pump Life is extended.  |  |  |
|  | Flow rate is constant even when pressure changes.  |  |  |
|  | Reversible at Low Speeds / Pressure.   |  |  |
|  | Capability of Dry Running for a limited period and in particular conditions.   |  |  |
| Low noise level & Low vibration.                   |  |  |  |
| Pump Series  | VDC Series:  |  |  |
| Maximum design pressure:                           | 50 barg [730 psig]   |  |  |
| Flow rates:  | up to 600 m <sup>3</sup> /h [2650 GPM]   |  |  |
| Viscosity of the pumped fluid:                     | up to 35.000 cSt   |  |  |
| Pipe Nominal Size DN:                              | from 50 to 400 – from 2" to 16"  |  |  |
| Rotation speed:                                    | from 200 up to 2200 rpm  |  |  |
| Temperature range:                                 | -46 / +350 °C [-51 / +662 °F] - ON REQUEST -60°C   |  |  |
| Pulsations:  | Minimized (almost zero)  |  |  |
| Bearing types:                                     | Bearings and Gears wetted by Pumped Fluid  |  |  |
| Bearing types:                                     | External Bearings and Gears in oil bath  |  |  |
| Standard Materials:                                | Casing / Liner   | Screws                                       | Shafts                                       |
|  | Cast Iron, Ductile Cast Iron   | Ductile Cast Iron                            | High Strength Low Alloy Steel                |
|  | Carbon Steel (Cast or Fabricated)  | High Strength Low Alloy Steel                | Stainless Steel AISI 420                     |
|  | Low Temperature Carbon Steel (Cast or Fabricated)  | Stainless Steel AISI 420                     | Stainless Steel 17-4 PH                      |
|  | 12% Cr Stainless Steel   | Stainless Steel AISI S316/S316L              | Stainless Steel XM-19                        |
|  | Stainless Steel AISI S316/S316L (Cast or Fabricated)   | Stainless Steel 17-4 PH or AISI 431          | Duplex & Super Duplex St. Steel              |
|  | Bronze, Nickel Aluminium Bronze  | Duplex & Super Duplex St. Steel              | Monel, Inconel®, Hastelloy                   |
|  | Duplex & Super Duplex St. Steel  | Monel, Inconel®, Hastelloy                   | HVOF Spray Coating /Tungsten Carbide Coating |
|  | Inconel Weld Overlay (cladding)  | HVOF Spray Coating /Tungsten Carbide Coating | Chromium Plating                             |
|  | Monel, Inconel®, Hastelloy   | CRA Weld Overlaid                            | CRA Weld Overlaid                            |
| Ni-Resist  | Nitriding  | Nitriding                                    |  |
| Customized materials:                              | Other Alloys and Material Combinations are available on request  |  |  |
|  | NORSOK Compliant Materials are available on request  |  |  |
| Main Application Fields:                           | VDC Series   |  |  |
|  | OIL & GAS UPSTREAM / MIDSTREAM / DOWNSTREAM: Tank Storages, Gathering Stations   |  |  |
|  | PETROCHEMICAL: Refinery, Petrochemical Complex   |  |  |
|  | MARINE & SHIPBUILDING: Tankers, Barges, FPSOs  |  |  |

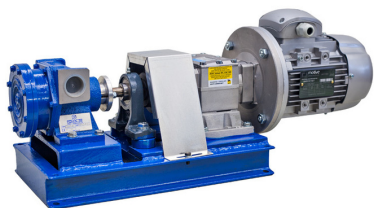
## MP Twin Screw Pump Series



|   |  |  |  |
|---|--|--|--|
| <b>PUMP TYPE</b>  | <b>MULTIPHASE TWIN SCREW PUMPS</b>   |  |  |
| <b>Pump Series<br/>MAX GVF (Gas Void Fraction)</b>        | <b>MP Series:<br/>up to 60% GVF</b>  |  |  |
| <b>Installation Options:</b>                              | Horizontal   |  |  |
| <b>Executions:</b>  | Standard & API 676 - External Timing Gears and Bearings  |  |  |
| <b>Optimized for Applications in:</b>                     | Oil&Gas  |  |  |
| <b>Suitable to Fluid having the following properties:</b> | Abrasives and not Abrasive   |  |  |
|   | Corrosive (Alkaline / Acid / Aggressive) and not Corrosive   |  |  |
|   | Low / Medium / High Viscosities  |  |  |
|   | Not Lubricating or Lubricating   |  |  |
|   | Up to 60% of Gas Void Fraction   |  |  |
|   | Slightly Dirty (small sand particles)<br>Special Hardening available (Tungsten Carbide Coating)  |  |  |
| <b>Advantages of the Operating Principle:</b>             | Capability of handling a Wide Range of viscosities and pressures<br>= one pump for many types of fluids and many flow rates!   |  |  |
|   | High Suction Lift Capability – the pump NPSH being very low - down to 1,5 meters.  |  |  |
|   | Self Priming without any auxiliary devices.  |  |  |
|   | Capable to pump very viscous fluids thanks to its smooth axial and low-pulsation movement.   |  |  |
|   | Pulsations are minimized and flow rate is uniform, allowing to handle fluids that are very viscous and sensitive to shear stresses or turbulences, thanks to the low Internal velocities given by the screws movement. |  |  |
|   | High Rotating Speeds are possible thanks to the low inertia of the screws.   |  |  |
|   | Screws are contact-less so wear-out is minimized and Pump Life is extended.  |  |  |
|   | Flow rate is constant even when pressure changes.  |  |  |
|   | Capable of Pumping Gas mixed with Liquid.  |  |  |
|   | Capability of Dry Running for a limited period and in particular conditions.   |  |  |
|   | Low noise level & Low vibration.   |  |  |
| <b>Pump Series</b>  | <b>MP Series:</b>  |  |  |
| <b>Maximum design pressure:</b>                           | 149 barg [2170 psig]<br>max ANSI 900 rating  |  |  |
| <b>Flow rates (liquid equivalent):</b>                    | up to 3500 m <sup>3</sup> /h [15400 psig]  |  |  |
| <b>Viscosity of the pumped fluid:</b>                     | up to 5.000 cSt  |  |  |
| <b>Pipe Nominal Size DN:</b>                              | from 50 to 750 [from 2" up to 30"]   |  |  |
| <b>Rotation speed:</b>                                    | from 200 up to 2200 rpm  |  |  |
| <b>Temperature range:</b>                                 | -46 / +350 °C [-51 / +662 °F] - ON REQUEST -60°C   |  |  |
| <b>Pulsations:</b>  | Minimized (almost zero)  |  |  |
| <b>Bearing types:</b>                                     | External Bearings and Gears in oil bath  |  |  |
| <b>Liquid Recirculation Options:</b>                      | - No Recirculation<br>- Internal Liquid Recirculation Valve  |  |  |
| <b>Standard Materials:</b>                                | <b>Casing / Liner</b>  | <b>Screws</b>                                | <b>Shafts</b>                                |
|   | Carbon Steel (Cast or Fabricated)  | Ductile Cast Iron                            | High Strength Low Alloy Steel                |
|   | Low Temperature Carbon Steel (Cast or Fabricated)  | High Strength Low Alloy Steel                | Stainless Steel AISI 420                     |
|   | 12% Cr Stainless Steel   | Stainless Steel AISI 420                     | Stainless Steel 17-4 PH                      |
|   | Stainless Steel AISI S316/S316L (Cast or Fabricated)   | Stainless Steel AISI S316/S316L              | Stainless Steel XM-19                        |
|   | Stainless Steel AISI S316/S316L (Cast or Fabricated)   | Stainless Steel 17-4 PH or AISI 431          | Duplex & Super Duplex St. Steel              |
|   | Duplex & Super Duplex St. Steel  | Duplex & Super Duplex St. Steel              | Monel, Inconel®, Hastelloy                   |
|   | Inconel Weld Overlay (cladding)  | Monel, Inconel®, Hastelloy                   | HVOF Spray Coating /Tungsten Carbide Coating |
|   | Monel, Inconel®, Hastelloy   | HVOF Spray Coating /Tungsten Carbide Coating | Chromium Plating                             |
|   | Ni-Resist  | CRA Weld Overlaid                            | CRA Weld Overlaid                            |
|   |  | Nitriding                                    | Nitriding                                    |
| <b>Customized materials:</b>                              | Other Alloys and Material Combinations are available on request  |  |  |
|   | NORSOK Compliant Materials are available on request  |  |  |
| <b>Main Application Fields:</b>                           | <b>MP SERIES</b>   |  |  |
|   | OIL & GAS UPSTREAM / MIDSTREAM: FPSOs, Offshore Platforms, Oil Fields, Oil Pipelines, Gathering Stations   |  |  |

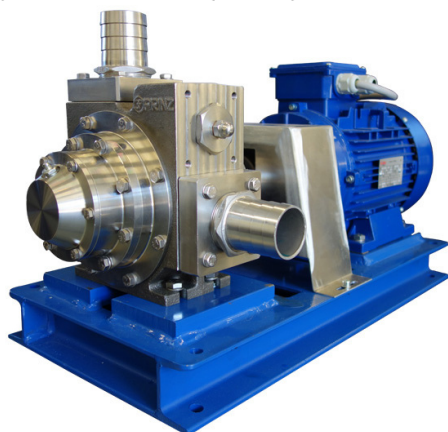


## M/D Hollow Rotary Disk Pump Series



| PUMP TYPE                                |  | HOLLOW DISK PUMPS               |   |                       |
|--|--|---------------------------------|---|-----------------------|
| Executions:                              | Standard & API 676   |                                 |   |                       |
| Advantages:                              | Self Priming without any auxiliary devices - just fill out the cavity with liquid before start-up  |                                 |   |                       |
|  | Low operating speeds - capable of handling very viscous and fluids shear-sensitive - less wear and higher reliability  |                                 |   |                       |
|  | Reverse flow by operating in reverse rotation while keeping constant capacity  |                                 |   |                       |
|  | Elasticity of the disk, with self-recover of the worn out parts and of the thermal expansions, allowing the passage of solid particles in the fluid                |                                 |   |                       |
| Pump Series                              | M Series:  |                                 | D Series:   |                       |
| Maximum differential pressure:           | 7 bar (option 9 bar)   |                                 | 7 bar (option 9 bar)                                  |                       |
| Flow rates:                              | from 0,3 to 100 m <sup>3</sup> /h [from 1.3 to 440 GPM]  |                                 | from 20 to 210 m <sup>3</sup> /h [from 88 to 925 GPM] |                       |
| Viscosity of the pumped fluid:           | up to 200.000 cSt (from medium to very high)   |                                 | up to 200.000 cSt (from medium to very high)          |                       |
| Pipe Nominal Size DN:                    | from 25 to 150   |                                 | from 100 to 200                                       |                       |
| Rotation speed:                          | up to 500 rpm  |                                 | up to 400 rpm   |                       |
| Temperature range:                       | -20 / +280 °C [-4 / 536 °F]  |                                 | -20 / +280 °C [-4 / 536 °F]                           |                       |
| Handling Solid Particles & Dirty Fluids: | Yes  |                                 | Yes   |                       |
| Handling Aggressive Fluids:              | Yes  |                                 | Yes   |                       |
| Pulsations:                              | Yes  |                                 | Very low  |                       |
| Dosing capability:                       | Good   |                                 | Good  |                       |
| Flanged connections:                     | Available (UNI PN10 - DIN PN16 & ANSI 150)   |                                 | Available (UNI PN10 - DIN PN16 & ANSI 150)            |                       |
| Standard Materials:                      | The Hollow Rotary Disk Pump can be supplied with the following combined materials:   |                                 |   |                       |
|  | Casing and Cover   | Impeller Disk                   | Shaft   |                       |
|  | Cast Iron G25  | Carbon Steel C40                | Carbon Steel C40                                      |                       |
|  | Cast Iron, Nickel Plated   | Stainless Steel AISI 316        | Stainless Steel AISI 316                              |                       |
|  | Cast Iron, Chrome plated   | Nickel Plated Carbon Steel C40  | Nitrided Carbon Steel C40                             |                       |
|  | Stainless Steel AISI 316   | Chrome plated Carbon Steel C40  | Duplex Stainless Steel                                |                       |
|  | Bronze B10   | Duplex Stainless Steel Hardened |   |                       |
| Special Materials:                       | Duplex Stainless Steel   | Super Duplex                    | Super Duplex  |                       |
|  | Super Duplex   | Hastelloy                       | Hastelloy   |                       |
|  | Inconel  | Titanium                        | Titanium  |                       |
|  | Titanium   | Monel                           | Monel   |                       |
|  | Nickel-Aluminium Bronze  |                                 |   |                       |
|  | Alloy 20   |                                 |   |                       |
|  | Hastelloy  |                                 |   |                       |
| Complete Units:                          | We supply the complete unit: Pump, Reduction Gear or Variable Speed Drive, Motor, Baseplate  |                                 |   |                       |
| On Request                               | Please see our website <a href="http://www.3pprinz.com">www.3pprinz.com</a> for further information about our wide range of customization, options and accessories |                                 |   |                       |
| Certifications & Executions              | Pump   | Electrical group                | Other Motors  |                       |
|  | CE Standard  | CE Standard                     | Diesel Engine on request                              |                       |
|  | ATEX on request  | ATEX on request                 | Hydraulic Motor on request                            |                       |
|  | API 676 on request   | UL / NEMA on request            |   |                       |
|  | CE 1935 / 2004 (food contact) on request   |                                 |   |                       |
| APPLICATION FIELDS                       |  |                                 |   |                       |
| Oil & Gas                                | Hydrocarbons (light and heavy)   | All types of Oils               | Bitumen and Tar                                       | Crude Oil (also Sour) |
|  | Chemical Products  | Muds                            |   |                       |
| Petrochemical Industry:                  | Light and Heavy Hydrocarbons   | Lubricating Oil                 | Bitumen and Tar                                       | Diesel                |
|  | Petrochemical Products   | Gasoline                        | Fuel Oil  | All types of Oils     |
|  | Fluids from the Refinery Process   | Phenol                          | Crude Oil   | Benzene and Toluene   |
| Marine & Shipbuilding:                   | Transfer of Tanker Fluids  | Fuel Oil                        | Diesel  | Bilge Water           |
|  | Cargo Load and Offload   | Mud, Sludge, Ooze               | Seawater  | Recycled Oil          |
|  | Service Fluids and Water   | Waste Oil                       | Sewage  | Residues              |

## CN Rotary Vane Pump Series



|  |  |                             |                             |                             |                             |
|--|--|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| <b>Pump type</b>                         | <b>ROTARY VANE PUMP - CN Series</b>  |                             |                             |                             |                             |
| <b>Executions:</b>                       | <b>Standard &amp; API 676</b>  |                             |                             |                             |                             |
| <b>Advantages:</b>                       | Self Priming   |                             |                             |                             |                             |
|  | High Suction Lift  |                             |                             |                             |                             |
|  | Self-adjustment of Wear Out  |                             |                             |                             |                             |
|  | Capable of Pumping Low Viscosity Fluids at Outstanding Performances  |                             |                             |                             |                             |
|  | Lower Power Consumption and Higher Capacity compared to other Positive Displacement Pumps                    |                             |                             |                             |                             |
|  | Interchangeable ports dimensions with other Major Rotary Vane Suppliers                                      |                             |                             |                             |                             |
|  | Accurate Selection of Vanes Materials for allowing very low friction and minimal wear-out                    |                             |                             |                             |                             |
|  | Easy and Fast Maintenance (no need to disassembly from main line)  |                             |                             |                             |                             |
|  | Versions for Reversible Operation (Double Shaft) are available for Loading and Unloading                     |                             |                             |                             |                             |
|  | Suitable to a wide range of Temperatures   |                             |                             |                             |                             |
|  | PTO driven versions are available  |                             |                             |                             |                             |
| <b>CN Series Pump Model</b>              | <b>CN30</b>  | <b>CN40</b>                 | <b>CN50</b>                 | <b>CN60</b>                 | <b>CN70</b>                 |
| Suction Flange Ø                         | 1.1/2" Threaded (Side)   | 2" (Side)                   | 2.5" (Side)                 | 3" (Side)                   | 4" (Side)                   |
| Discharge Flange Ø                       | 1.1/2" Threaded (Side)   | 2" (Top)                    | 2.5" (Top)                  | 3" (Top)                    | 4" (Top)                    |
| Max Rotation speed:                      | 1450 rpm (flow = 15 m3/h)  | 980 rpm                     | 980 rpm                     | 650 rpm                     | 500 rpm                     |
| Flow rate (@ 980 rpm) – 1 cSt            | 10,5 m3/h  | 26 m3/h                     | 44 m3/h                     | -                           | -                           |
| Flow rate (@ 780 rpm) – 1 cSt            | 8.5 m3/h   | 20 m3/h                     | 35 m3/h                     | -                           | -                           |
| Flow rate (@ 640 rpm) – 22 cSt           | 6,9 m3/h   | 16 m3/h                     | 28 m3/h                     | 62 m3/h                     | 115 m3/h @500 rpm           |
| Flow rate (@ 400 rpm) – up to 1100 cSt   | 4,3 m3/h   | 10 m3/h                     | 18 m3/h                     | 40 m3/h                     | 92 m3/h                     |
| Differential pressures [bar]             | 10 bar   | 7 bar                       | 7 bar                       | 7 bar                       | 7 bar                       |
| Max. pressures [barg]                    | 15 barg  | 10 barg                     | 10 barg                     | 10 barg                     | 10 barg                     |
| Temperature range:                       | -20 / +150 °C [-4 / 302 °F]  | -20 / +150 °C [-4 / 302 °F] | -20 / +150 °C [-4 / 302 °F] | -20 / +150 °C [-4 / 302 °F] | -20 / +150 °C [-4 / 302 °F] |
| Viscosity of the pumped fluid:           | From 0,3 cSt up to 500 cSt ; special executions for viscosities higher than 500 cSt are available on request |                             |                             |                             |                             |
| Handling Solid Particles & Dirty Fluids: | Yes (small solids and limited amount)  |                             |                             |                             |                             |
| Handling Aggressive Fluids:              | Yes  |                             |                             |                             |                             |
| Pulsations:                              | Very low   |                             |                             |                             |                             |
| Flanged Adapters:                        | Available on request: UNI PN10 - DIN PN16 & ANSI 150   |                             |                             |                             |                             |
|  |  |                             |                             |                             |                             |
| <b>Standard Materials:</b>               | <b>Casing and Cover</b>  |                             | <b>Vanes</b>                | <b>Rotor</b>                | <b>Shaft</b>                |
|  | Ductile Cast Iron GJS-400  |                             | Polimeric Fiber             | Ductile Cast Iron           | Carbon Steel AISI4140       |
|  | Cast Steel (ASTM A216 WCB)   |                             | Bronze                      | Carbon Steel                | Stainless Steel AISI 316    |
|  | Stainless Steel AISI 316   |                             | PEEK                        | Stainless Steel AISI 316    | Stainless Steel 17-4PH      |
| <b>Special Materials:</b>                | Duplex Stainless Steel   |                             | Self Lubricating Alloys     | Duplex Stainless Steel      |                             |
|  | Super Duplex St. Steel   |                             |                             | Super Duplex St. Steel      |                             |
|  | Inconel  |                             |                             | Inconel                     | Inconel                     |
|  | Titanium   |                             |                             | Titanium                    | Titanium                    |
|  | Nickel-Aluminium Bronze  |                             |                             | Monel                       | Monel                       |
|  | Alloy 20   |                             |                             | Hastelloy                   | Hastelloy                   |
|  | Hastelloy  |                             |                             |                             |                             |
| <b>Complete Units:</b>                   | We supply the complete unit: Pump, Reduction Gear or Variable Speed Drive, Motor, Baseplate                  |                             |                             |                             |                             |
| <b>Certifications &amp; Executions</b>   | <b>Pump</b>  |                             | <b>Electrical group</b>     | <b>Other Motors</b>         |                             |
|  | CE Standard  |                             | CE Standard                 | Diesel Engine on request    |                             |
|  | ATEX on request  |                             | ATEX on request             | Hydraulic Motor on request  |                             |
|  | API 676 on request   |                             | UL / NEMA on request        | PTO Power Take-Off          |                             |
| <b>APPLICATION FIELDS</b>                |  |                             |                             |                             |                             |
| <b>Oil &amp; Gas</b>                     | Light Hydrocarbons   | Medium Hydrocarbons         | Oils                        | Light Crude Oil             | Solvents                    |
| <b>Marine &amp; Shipbuilding:</b>        | Transfer of Tanker Fluids<br>Cargo Load and Offload  | Light Fuel Oil<br>Seawater  | Lube Oil<br>Naptha          | Diesel                      | Recycled Oil                |