GEHO’s commitment and experience
In "waterland Holland" extensive dewatering operations with economic and reliable dewatering operations with economic and reliable dewatering systems are essential to allow excavations under dry conditions.
Over half a century GEHO PUMPS has acquired specialist knowledge about dewatering systems. The company has achieved this by means of active participation in design and development. On this basis GEHO PUMPS offers a purpose-built range of pumps and accessories, as well as expertise services from engineering to installation and supervision. GEHO’s open, wellpoint-dewatering systems are used throughout the world to the satisfaction of the Dutch and the major international construction companies.

A) The System: Wellpoint Dewatering

The construction of pipelines, buildings and civil engineering works generally involves excavations and the digging of trenches. These may be of such depth that the bottom is below the water table or ground water level. Because of this (especially in permeable soils such as sand), the ground water will flow into the trench or excavation through the bottom and sides, and will fill it to a certain depth. To enable work in such excavations to be carried out under dry conditions, this water has to be removed or be prevented from entering through the bottom and slopes of the excavation.

- The vertical wellpoint dewatering system

By the aid of vertical wellpoints connected to a headerpipe system and a dewatering pump the ground water is artificially and temporarily lowered.
Dewatering belongs to the civil engineering subject and the success of the dewatering depends besides the civil engineering conditions highly on the geological and hydrological circumstances.

The wellpoint dewatering system in comparison with other dewatering systems is:

- applicable in most type of soils
- a flexible system
- effective and efficient
- easily to adapt according to the practical dewatering results achieved

B) The Pump for the Wellpoint Dewatering System

**GEHO ZD 900 - Piston type wellpoint dewatering Pump**

*Reciprocating vacuum pumps, type Geho ZD 900*

The use of reciprocating pumps for handling water-air mixtures has become an obvious choice in many applications.
More particularly in wellpoint drainage, these pumps have come into widespread use because they perform their duty reliably under all conditions, with a minimum of attention and maintenance.

These ZD piston pumps are the most economical pumps for wellpoint drainage operations as they have an extremely high efficiency of about 92% resulting in a very low horse power motor requirement of only 7.5 kW. This means when operating with diesel engines you can comfortably use a one cylinder engine compared to a 3-cylinder of 22 Kw before. Fuel saving per pump can go up to 27,500 liters per year per pump.

Another main advantage in pumping water from drainage wells is that they develop a pulsating vacuum, causing the water and/or air to be snatched out of the ground, as it were. Since this effect is beneficial to the stability of the bottom and slopes of the excavation, the reciprocating pump can indeed claim to be a universal pump suitable for horizontal drainage, for drainage from wells with free gravity inflow, or functioning on the vacuum principle. Thanks to their dual (duplex) form of construction, these pumps are characterized by very steady operation (fig. 13.7). A major advantage is that the capacity remains constant despite any increase in suction and/or delivery head. This is in marked contrast with centrifugal pumps, whose capacity shows a marked decrease if the suction head or delivery head is increased while the relatively high installed power remains viable.

The piston pump is elfpriming and can handle therefor water and air without the need of an addional vacuum pump. Because of their smooth operation and slow running at a low rate of about 65 – 70 strokes per minute the pumps have by far the longest life-time for these wellpoint drainage applications.

**General description of the ZD series**
The GEHO ZD series is a twin cylinder quadruple acting crankshaft driven vacuum piston pump. The GEHO design is purpose built contractor proven and is extremely suitable for wellpoint dewatering by gravity or by vacuum and for horizontal dewatering.

**Key features:**
- tough compact construction with integral single helical precision gears
- self contained oil splash lubrication
- meehanite disc type pistons with double cup leathers
- precision machined wear resistant and easy to replace stainless steel liners
- one-piece abrasion and corrosion resistant hard surface piston rod
- soft graphite cotton packed stuffingbox
- flat spring loaded brass valves with rubber discs and stainless steel guides
- crankcase, liquid end and pistons are meehanite cast iron
- ample size inspection covers
- cross head and connecting rod sleeve bearings
- anti-friction type drive shaft and crankshaft bearings

**Favourable operation characteristics**
Water, air or water and air mixture are primed and discharged 4 times per crankshaft revolution. Two crankshafts driven pistons are arranged an a Vee at 90°, so that the four piston strokes for each revolution follow in regular succession. The crank timing produces a moderate pulsating type action in the dewatering line that prevents clogging of the wellpoint strainers and achieves priming from greater depths. The flow and pressure fluctuations in a duplex pump are inherently more favourable than in a simplex pump as shown in figures 1 and 2.
Benefits

- Constant water-and airflow independent of suction and discharge head
- Self-priming with a suction-lift (vacuum) capability of 9.6mwc without the aid of a separate power absorbing vacuum priming pump
- Pulsating vacuum preventing wellpoint clogging
- Robust design for ease of transportation and handling
- Permanent high efficiency minimising energy consumption
- About twice as efficient as a conventional vacuum priming impeller pump
- Unprecedented high availability allowing continuous and unattended operation
- Rapid and economical maintenance and low spare parts usage
- Accessibility for ease of inspection and maintenance which require no special skills
- Resistant to brackish water
- Economical and longer carefree service life reducing overall project costs
- Permit universal applications. Depending on soil conditions as many as 40-100 wellpoints and 40-300 metres of header pipe can be connected to a single pump.

Technical data

<table>
<thead>
<tr>
<th>Pump type and size</th>
<th>ZD 900</th>
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<tbody>
<tr>
<td>Water capacity</td>
<td>m3/h</td>
</tr>
<tr>
<td>Air capacity max.</td>
<td>m3/h</td>
</tr>
<tr>
<td>Vacuum up to</td>
<td>mwc</td>
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<tr>
<td>Head</td>
<td>mwc</td>
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<tr>
<td>Suction diameter</td>
<td>mm</td>
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<tr>
<td>Discharge diameter</td>
<td>mm</td>
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<tr>
<td>Electric motor rating</td>
<td>KW</td>
</tr>
<tr>
<td>Diesel engine rating</td>
<td>KW/hp</td>
</tr>
<tr>
<td>Fuel tank capacity</td>
<td>Ltr.</td>
</tr>
<tr>
<td>Mounted skid dimensions</td>
<td>M</td>
</tr>
<tr>
<td>- E-motor driven</td>
<td>2.0×0.7×1.3</td>
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<tr>
<td>- Diesel motor driven</td>
<td>2.8×0.7×1.3</td>
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<tr>
<td>Mounted skid weight</td>
<td>Kg</td>
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<tr>
<td>- E-motor driven</td>
<td>900</td>
</tr>
<tr>
<td>- Diesel motor driven</td>
<td>1075</td>
</tr>
</tbody>
</table>

Electric motor three-phase a.c. motor to IEC-standards, 380V, 50Hz, B3, and IP54 with star-delta starter and with plug and socket IP44

Diesel engines make Hatz and Lister diesel engines with manual start as standard.

Skid assembly pump with V-belt transmission and enclosed belt guard. Pump and driver mounted on fabricated steel skid with lifting beam and lug.