GTN 25

Self-cleaning centrifugal separator for hazardous fuel oils

Fig.1 GTN 25

The GTN 25 is a separator for gas turbine fuel treatment, and was designed to treat fuels that constitute an explosion hazard. It is therefore suitable for inert gas blanketing. The GTN 25 is the core component in the complete process and system solution for the best possible treatment of hazardous fuels.

Special features of the GTN 25 are the Optiflow™ inlet, the optimized disk stack, which ensures the highest separation efficiency of water and solids, and the inert gas blanketing system.

Applications
Purification of primarily explosive mineral oils such as naphtha and light crude oils. One version of the GTN 25 is optimized for the separation of heavy fuel oils (HFO). It was designed for land-based installations, but can also be installed on platforms with low sea heave.

Throughput capacity
The rated maximum capacity is 25 m^3/h. The actual maximum recommended capacity depends on the oil to be purified and the performance required (please refer to Alfa Laval capacity tables).

Operating principles

Separation takes place inside a rotating bowl. The feed is introduced to the bowl (fig 2) from the top via a stationary inlet pipe (1) and accelerated in the distributor (2) before entering the disc stack (3). The Optiflow™ inlet device in the distributor ensures smooth acceleration of the feed liquid. The separation of the two liquid phases and the solids takes place between the discs. The oil phase moves towards the centre and is discharged via a stationary paring disc (4). The water droplets separated from the feed coalesce at a cylindrical oil/water interface, and the water phase leaves the bowl over the top disc (5) and is taken out by another paring disc (6). The diameter of a gravity disc, forming the inlet to the paring disc chamber, determines the position of the oil/water interface in the bowl and has to be selected according to the density of the light phase. Before oil is fed into the bowl, water is added to form a liquid seal around the periphery of the top disc. The heavy solids are collected at the periphery and ejected from the bowl intermittently at full operating speed. This discharge is achieved by a hydraulic system below the separation space. At preset intervals, this system forces the sliding bowl bottom (7) to drop down, thus opening the solids ports (8) at the periphery. Before discharge, water is added to displace the oil in order to minimize the loss of oil. After discharge, a new water seal is established in the bowl.

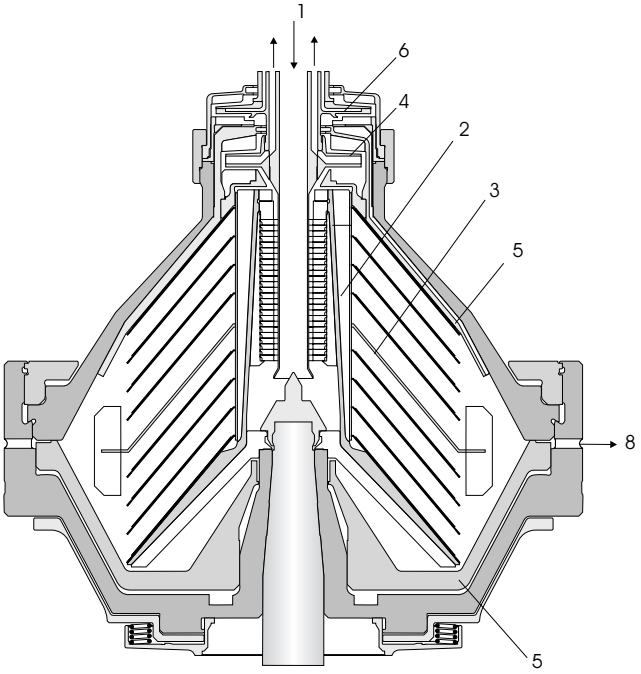


Fig. 2 Typical bowl for a solids-ejecting centrifuge for purification. The details illustrated do not necessarily correspond to the centrifuge described.

Standard design

The bowl is mounted on a vertical spindle driven by a horizontally mounted motor via a worm gear. The bottom part of the machine forms a housing for the worm gear and also contains the oil bath. Around the bowl is a space formed by the upper part of the frame (which acts as a receptacle for the solids), and the frame hood (which carries the inlet and outlet devices).

The design conforms with a number of EC directives. In addition to the general directives for machinery and centrifuges, the design also complies with ATEX directive 94/9/EC and EN 1127-1. The leakage rate conforms with DIN 24400, Teil 2. The machine is equipped with DIN flange connections.

Standard equipment

Separator with electric motor of controlled torque type, feed and discharge device, vibration dampers, inert gas connections, earthing kits, vibration switch, temperature sensor for motor winding, cover interlocking kit, standard set of spare parts, tools.

Auxiliary equipment

Process components, including inlet and outlet pipes, valves and flexible connections.

Seal pot with connections for maintaining positive inert gas pressure. Programmable logic control unit for functions such as solids discharge control. Starter for electric motor. Inert gas control unit with inlet tubing.

Technical specification

Max throughput capacity	25 m^3/h [1]
Feed temperature range	0-100 °C
Feed inlet pressure	0 – 120 kPa max. [2]
Light phase density (HFO version)	max. 991 kg/m^3 at 15 °C
Oil outlet pressure	max. 420 kPa
Water outlet pressure	max. 480 kPa [3]
Motor power	18.5 kW
Motor speed synchronous 50/60 Hz	1500/1800 rpm
Starting time	6-8 min
Stopping time	45 min
Sound pressure	84 dB(A)
Free gas volume	249 dm^3
Inert gas pressure upper/bottom part	5/6 kPa [4]
Overhead hoist lifting capacity	1150 kg

[1] Valid for oil viscosity comparable to distillate no 2. Actual capacity depends on oil density and viscosity, and required degree of separation

[2] Depending on flow rate and viscosity

[3] Depending mainly on gravity disc diameter

[4] Only used if required by process

Shipping data (approximate)

Centrifuge incl. bowl and motor	1484 kg
Motor	201 kg
Bowl	415 kg
Gross weight (approx.)	1850 kg
Volume	4.56 m^3

Utilities consumption

Electric power	max. 14 kW [1]
Water seal water and discharge water per discharge	17 dm^3
Closing water	170 dm^3/h
Inert gas	max. 1200 Ndm^3/h [2]

[1] Actual consumption depends mainly on throughput capacity and feed viscosity

[2] At 100 kPa outlet pressure and a flow rate of 25 m^3/h. At 400 kPa 30 Ndm^3/h. Presupposes an installation according to Alfa Laval's recommendations.

Materials

Bowl body and bowl hood	Stainless steel 1.4462, UNS S31803
Lock ring	Steel 25CrMo4, UNS G41300.
Distributor	Aluminium bronze CuALl10Fe
Bowl Disc	Stainless steel 1.4401 UNS 31600
Paring chamber cover, Level ring small lock ring	Brass
Frame, lower and upper parts	Cast grey iron.
Frame hood	Cast aluminium alloy.
Gaskets and O-rings	Nitrile rubber.

Inert gas system description.

When a centrifuge is used for separating hazardous fuels, an explosive mixture of air and fuel gases can be formed. To prevent an explosion taking place if an ignition source is activated, the oxygen concentration around the bowl inside the centrifuge is reduced to a level where ignition is not possible. This is done by feeding inert gas to the gear casing and the bowl casing.

The inert gas outlets are connected to a water seal tank to ensure positive pressures in the centrifuge and its peripheral equipment, including the sludge tank. The pressure in the gear casing is slightly higher than in the bowl casing.

Before production, the centrifuge system must be purged with at least 5 volumes of inert gas. During production, the feed rate of inert gas can usually be decreased to the extent that it continues to compensate only for the loss of inert gas. The inert gas is monitored by two independent functions to fulfill demands for redundancy.

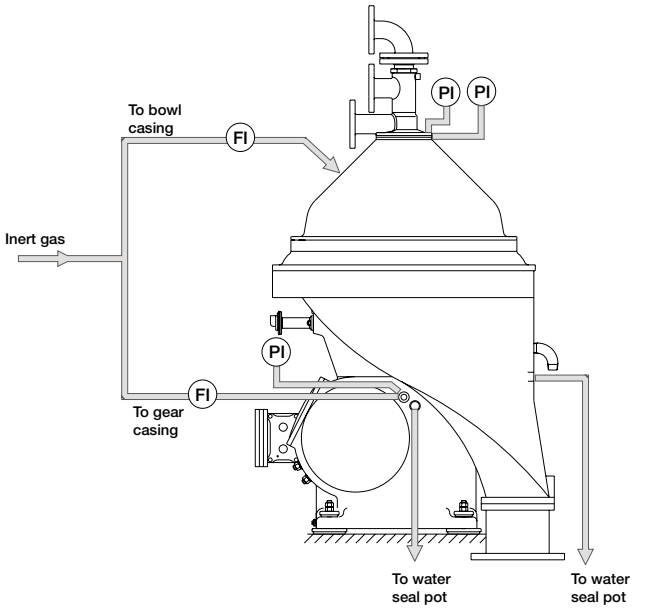
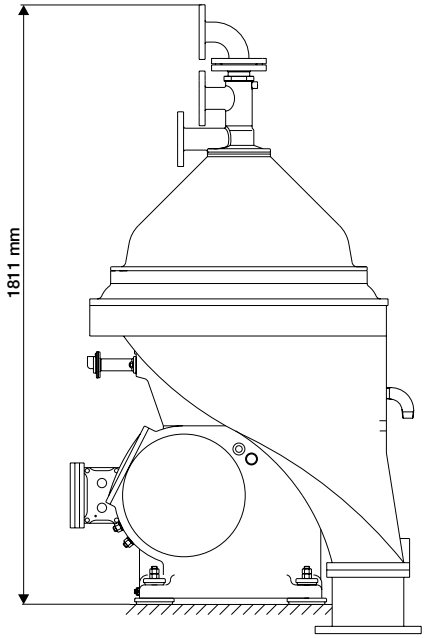
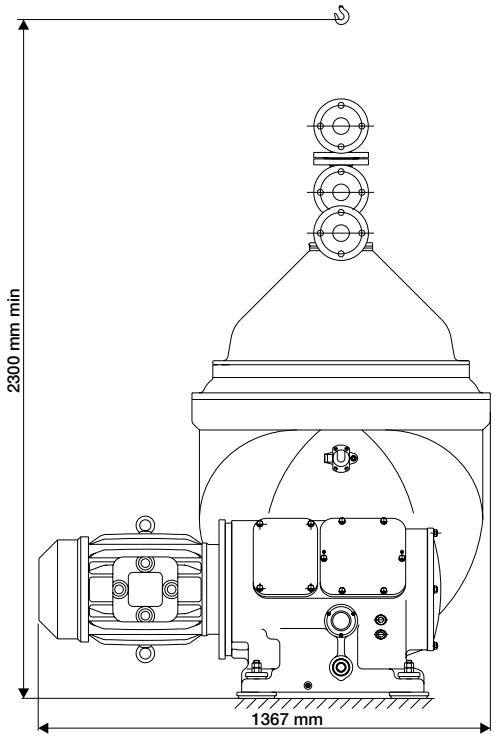
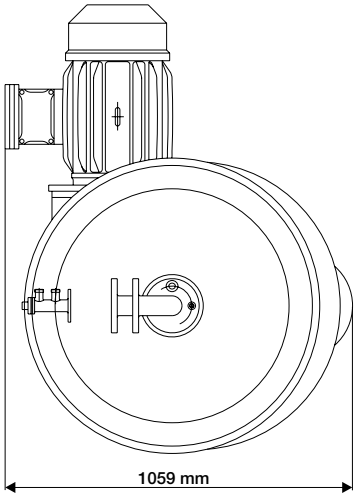


Fig. 3 Simplified flowsheet for an inert gas system for centrifuge only, showing the principle.
FI = Flow indication
PI = Pressure indication

Dimensions







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