FOR MORE INFORMATIONS

GAUSSIN MANUGISTIQUE

GAUSSIN MANUGISTIQUE® is specialized in the auditing of handling processes, and the development of wheeled handling systems used to install and transport heavy, bulky or fragile loads. With more than 50,000 handling vehicles worldwide, GAUSSIN Manugistique boasts a strong reputation in four fast-expanding markets: Energy, Transport, the Environment and Raw Materials. GAUSSIN MANUGISTIQUE® has been listed on NYSE Alternext since 16 June 2010. GAUSSIN shares have been listed since 20 July 2012 in the E2 trading group E2 (public offer), since obtaining AMF Visa no. 12-360 on 17/07/12, as indicated in the Prospectus available free of charge on www.gaussin.com.

DOCK IT
PORT EQUIPMENT

NATURAL GAS
POWER PACK
GAUSSIN

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NATURAL GAS
POWER PACK
GAUSSIN

The new NATURAL GAS technology brings together several benefits

Energie source: CNG/LNG

• CNG = Compressed Natural Gas (Gaz Naturel Compressé)
- Also commercially called NGV or GNV.
- Stored under pressure of 200 bar at room temperature (15°C).

• LNG = Liquified Natural Gas (Gaz Naturel Liquéfié)
- Stored under pression of a few bar and a very low temperature (ex: 8 bar at -135°C).
- In terms of embedded energy: 1 liter of diesel = 5.2 liters of CNG = 1.8 liters of LNG.
- The Powerpack© can use 2 kinds of gas.
- The difference is made in the vehicle with 2 different packs (LNG/CNG).

Use description

• CNG

The gas is stored under high pressure at 200 bar in the tanks. It is transferred to the Powerpack© through HP piping a valve is used to isolate the quick coupler to purge the residual pressure around the coupler (in order to allow its disconnection) while limiting the volume discharged to the atmosphere. The same functionality is available on the Powerpack© because of extra storage the gas under high pressure then goes to a high-pressure coalescing filter for filtering the oil residues introduced during compression.

After this filter, the gas is expanded in the expansion valve, which regulates the pressure at the inlet of the engine about 7-8 Bar.

A sensor for pressure and temperature verifies that the gas is supplied to the engine in good condition pressure sensors enable to know the level of filling of the two tanks and perform leak detection at startup.

• LNG

Fuel is stored in the cryogenic tank in a liquid form at a pressure of approximately 8 bars and a temperature of about -140°C. The gas is then warmed by a heat exchanger. It remains at a pressure of around 8 bar and reaches a temperature higher than -40°C to go to the Powerpack© in gaseous state manual Isolation and purge valves also guarantee the Powerpack© disconnection in any case.

A pressure regulator limits the maximum pressure to the motor to 8 bar as for the CNG circuit is found an isolation valve and a sensor for pressure and temperature. An isolation valve selects the choice of powering the motor from the LNG or CNG circuit and protects the components of the other circuit.

CO^2 emissions

For similar fuel consumption, gas combustion produces about 12% less CO^2 than a diesel engine.

A concept designed to...

- → Carry out the maintenance of the Powerpack© without immobilizing the vehicle.
- → Reach a service availability ratio of 99%.
- → Directly access all the mechanical components defined as repairable.
- → Considerably increase the service life of the vehicle.
- → Exchange the Powerpack© for another or change it to a different power.
- → The principle of the Powerpack© is adaptable to any source of energy (diesel, electric, gas, hydrogen...).
- → Limit the space required to perform maintenance to 4 m².

Tanks capacity

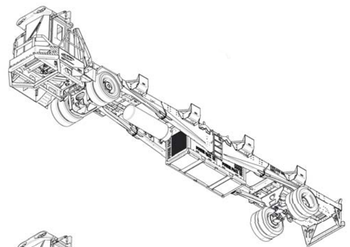
A CNG tank of 70 liters (15°C, 140 bar) is embedded in the Powerpack©.
Energy capacity: 98 kWh (about 10 liters of Diesel)
CNG Pack: 5 tanks of 294 liters = 1 470 liters (15°C, 200 bar)

Benefits over diesel

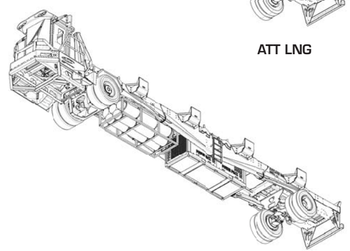
- Fuel costs
- Reduced pollutant emissions
- Lesser noise and vibrations

Technical specification

Brand: CUMMINS
Type: ISL GeEV 300
Displacement: 8.9 L
Power: 224 kW
Max. torque: 1166 Nm
Alternator: 24 V, 100 A



ATT LNG



ATT CNG