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CNG Fueling System













Company History

Aug. 15, 1967 Established Kwangshin Machinery Company

July 1, 1973 Purchased and expanded the Casting Plant located at Sokye-dong Changwon City

Oct. 27. 1976 Entered into a technical collaboration agreement with Mikuni Heavy Industries, Inc., Japan.

Oct. 30, 1976

Designated by the Ministry of Commerce and Industry as the Specialist Vendor for Compressors for Electric Power area.

Dec. 9. 1981 Received a citation from the Prime Minister of Korea for the development of fine products.

Dec. 31, 1985 Designated as a Promising Small/Medium Business by the Small Business Bank (now the Industrial Bank of Korea)

Nov. 1. 1986 Changed the corporate name to Kwangshin Machine Industry Co., Ltd.

May 31, 1989 Moved the plant to Haman

May 20, 1992 Entered into a Distributorship agreement with SULLAIR Corp. of the USA for distribution of its products in Korea.

Oct. 26, 1994 Received a Presidential Citation for localizing GAS Compressors

Entered into a technical collaboration agreement with Samsung Techwin Co., Ltd. for the development of Turbo Compressors Oct. 4, 1996 Certified for ISO 9001

May 1, 1996

Feb. 28, 1997 Established the Compressor System Research Center, a wholly owned subsidiary.

June 26, 1998 Entered into an agreement for the local assembly of Sullair Screw Compressors

Dec. 28, 1998 Entered into an investment agreement with Mikuni Heavy Industries, Japan.

July 30, 1999 Jointly developed Turbo Compressor and Blower with KIMM

Oct. 10, 2000 Designated as a Venture Company by Korean Government

Nov. 6, 2000 Entered into an agreement for the development and production of Turbo Compressors with Hitachi Heavy Industries

Dec. 21, 2001 Started the commercial operation of Kwangshin GEO Series CNG Compressors

Mar. 28, 2002 Obtained the Utility Model Right and applied for a patent for KwangShin CNG Compressors

Sep. 27. 2002 Awarded of Order of Industrial Service Merit for CNG Fueling System Localization

We will be wherever compressors are needed



For the past 35 years since it was founded in 1967, KwangShin has earned its reputation as the leader in the Korean compressor market, and developed new technologies unceasingly.

We have developed the following: reciprocating compressors for industrial use for the first time in Korea ; reciprocating gas compressors for process industries ; and high-pressurized compressors for PET bottle manufacturing. We have been also producing in Korea the screw compressors of Sullair, USA, and developed and supplied various compressors required in various industries. Based on decades of experiences and technical expertise, we also developed high-efficiency Turbo Compressors for the electronic, ship building, automobile and chemical industries that require clean, compressed air in large air volume.

In order to cope with the atmospheric contamination that is getting worse every day, and in an effort to preserve the nature and environment for generations to come, KwangShin initiated the business for the engineering and construction of fueling station and CNG Compressors that uses natural gas for NGV.

KwangShin now handles a complete range of compressors. As a comprehensive compressor manufacturer that can meet the customer requirements for any purpose and any industry, KwangShin will be wherever compressors are needed in the world.







ONE OF THE BEST GAS COMPRESSOR MANUFACTURER IN THE WORLD





Propram 2010

Kwangshin "localized" reciprocating compressors for the first time in Korea, meaning that we were the first Korean company to manufacture reciprocating compressors with Korean technology.

Our compressor development efforts started first when we supplied compressors to fermentation plant. Since then, we have been making continuing efforts for the development of new technologies and products. Now we manufacturing compressors that having its power from 5Hp to 3,000Hp and having its pressure 1Kg/Cm²G to 1,000Kg/Cm²G. Our R&D efforts have never stopped since we purchased up-to-date design development technology. We entered into technical collaboration and/or assistance agreements with premier firms such as Mikuni of Japan, Hitachi works in order to produce state-of-the-art compressors.

Compressors are a key product for the "backbone" industry of Korea. Producing a compressor calls for virtually "zero" tolerance, and without accumulated expertise and experiences, it is virtually impossible to produce a quality compressor. For the past decades, our mission has been : "we produce reliable compressors". That mission has never been changed. At this moment, more than 5,000 Kwangshin compressors are being operated in major plants around the world.

Computation Software help Compressor Design

Kwangshin has developed own compressor design software and all the calculation process are done by this software. The software has data bank of all the gas and mixed gas characteristics to help thermodynamic calculation, the results obtained are defined, by stagc, by cylnder, or by exfect.

Compressor Performance

BHP-adiabatic / mecharnical / valve absorbed / total - Temperature adiabatic

- Compressibility factors
- Mechanical Calcultion
- Inertia force and pressure on the piston rod
- Reverse rod load
- Residual efforts brought to the center of the crankshaft
- Rcsidual efforts at all the parts

- Condensate volume - Gas flow rate through valve - Valve calibration
- Cooler calibration
- Inertia balance weight and of cyclic irregularities Dcpend on Customer Requirements - Pulsation analysis
- Torsional analysis

High Quality and Performance

- The drawings used machiring programing and use high performance NC machine to produce compressor main parts.
- SKILLED Technicalexperts assemble comprssor package
- exclusive test room for gas compreeos
- This all steps are controlled by high quality control system.

Kwangshin delivers Satisfaction to Custommer

On-Time Delivery To Keep Your Project On - Schedule

Reliable on-time delivery is ensured through kwangshin's consistent systematic process control system which covers everything from order acceptance to delivery. Computerized design, N/C machining, assembling and shop test and inspections are utilized throughout, as illustrated below, to provide constant process supervision and process control. As a result, actual order process is always known, assuring on-time delivery.

Perfect and Rapid After Sales & Service

More than 50 after-service staves are always standing by nationwide to provide users with prompt after service to meet regirement of users to the maiximum, and we are proud of the fact that we have established a system to supply any parts rapidly as required.

- Area specific services for our products 7 days a week.
- A proactive service management system with periodic inspection throughout the world.
- Each our agent in the globe provides the quick service to dispatch a competent engineers to the service site.



Rod Load -Angle Diagra

- NC turning machines - NC parallel lathes
 - NC planner



- NC boring machines - NC machining centers











BEFORE YOU BUY CNG FUELING SYSTEM, TAKE A LOOK AT THE COMPANY BEHIND IT

With Kwangshin, you're not just buying a CNG fueling system

You're buying long history & experience in reciprocating compressor technology. Kwangshin is one of best gas compressor manufacturer in the world. An innovator in this field since 1967, Kwangshin sets customized for gas compressor. We use this technology to CNG fueling system.

You're buying global capabilities

Kwangshin sets up production of CNG compressor package over 100 units per month. Those capability produce short delivery to worldwide customer.



You're buying quality assurance

Kwangshin's ISO 9001 certified quality systems, utilizing the most modern equipment and the most advanced manufacturing techniques, are the finest in the industry.

You're buying customer service

Kwangshin's after-sales and service network stands ready to provide one day customer assistance anywhere in the world. We offer everything from technical problem-solving to training customer personnel in the proper operation and maintenance of Kwangshin CNG fueling system. Our after-market support also include worldwide availability of genuine Kwangshin service parts, as well as fast, dependable product delivery. At Kwangshin, Total Customer Satisfaction is a cornerstone of our corporate philosophy.

You're buying commitment to innovation

Underlying Kwangshin's leadership is a dedication to excellence and a commitment to innovation. At Kwangshin, we are constantly exploring new ideas and seeking new ways to meet customer's need for increasingly sophisticated, energy-efficient compressor system. At Kwangshin, more than ever before, we are committed to expending the horizons of CNG fueling compressor technology.





















CNG Fueling System





Natural Gas (NG)

Natural Gas is a mixture of low-quality hydrocarbon that is collected from the seabed or oil field, and generally refers to flammable gas whose main substance is Methane(CH4). When the Natural Gas is frozen to -162°C for transportation or storage, it becomes Liquefied Natural Gas (LNG) with its volume reduced to 1/600. The LNG goes through gasification process before it is supplied via pipe for use by power plant, for industrial purposes and at home. Unlike petroleum that is deposited in selected areas like the Middle East, Natural Gas is available from diverse areas across the world. With huge reserve that ensures long-term supply, it is a perfect energy that can replace petroleum.

Safety

When natural gas leaks, it quickly evaporates into atmosphere as it is lighter than the air(0.65 gravity compared to air). Also, it is safer than other fuels as the lower combustible limit (the lower limit of fuel density that can be combusted) is higher (by 4.5%) than other fuels while the natural ignition temperature is higher than other fuels.

Economical Fuel

Compared to electricity and petroleum, the thermal efficiency of natural gas is superior. As it is supplied via underground pipe, it is more stable. It is an economical fuel with lower storage costs.



CNG Fueling System

CNG (Compressed Natural Gas) fueling system refers to the system that supplies natural gas to NGV(natural gas vehicles), that uses natural gas for its engine.

In particular, NGV uses natural gas for its fuel, contributing to conservation of petroleum and reducing pollution in metropolitan areas. Compared to gasoline, natural gas produces less NO family gas and CO by 30~50%, CO₂ by 20~30%, and produces no SO family gas. Also, the Octane number is 130, which is higher than that(96) of gasoline, reducing fuel consumption with improved engine compression ratio. Other benefits of natural gas include: superior engine ignition at lower temperature; excellent anti-knocking capability; and lower fuel logistic cost with nation-wide pipe lines.

The Composition of CNG Fueling System CNG Compressor (1)

- · Performs the most important task to compress the lowpressure gas to high-pressure(250bar) gas from the fuel pipe and then deliver it to storage cylinder or dispenser.
- Must have a device installed inside, which blow-down the high-pressure gas remaining at each pipe and heat exchangers, when the compressor is stoped.
- It must be equipped with a heat exchanger that decrease the temperature rise caused by the heat generated when the gas is compressed to high-pressure, as well as a filter that removes potential foreign materials.



1) Compressor Package 2) Priority Panel 3) Storage Cylinder 4) Dispenser



Priority Panel ②

- It can be selected the Priority Bank of the cylinder that will store the compressed high-pressure gas.
- When supplying the gas to the dispenser from the cylinder, it controls the selection of bank and gas path.
- Good designed priority panel can save energy and increase fueling speed.

Storage ③

- It stores the high-pressure gas compressed by the compressor, and when necessary provides the fuel to the dispenser.
- An ASME or DOT cylinder, this device is used as normally a buffer or cascade type filling method.
- When a 3-line system is applied, 6 cylinders (high bank-1, medium bank-2, and low bank-3) are used basically in order to maximize fueling efficiency.

Dispenser (4)

- This device supplies the compressed gas in 200bar through the fuel injection connector of the vehicle.
- There are two different models : Single Hose and Dual Hoses. Also, there are two different types : Very Fast Fill and Time Fill.

COMPRESSOR



Total brand name of Kwangshin CNG compressor package. GEO-means Earth. Kwangshin makes best efforts to preserve our environment.

What's Inside of GEO Package

- Compressor with Force feed Lub. System
- Electric Motor or Natural Gas Engine
- Blow Down Vessel with Safety Valve
- Inter-stage/Discharge Line Safety Valve
- Air cooled or Water cooled Heat Exchanger
- Pneumatic or Gas Controlled Purge System
- Inter-stage Separator/Snubber
- Emergency Shutdown System
- Gas Suction Filter
- Local Panel with Indicated P/T
- Oil Free Coalescing Filter on Discharge Line
- Gas Suction Pneumatic Actuated Valve
- Compressor Control System(PLC)-remote
- Fire and Gas Detection System







Kwangshin (GEO Series) Package (up to 450kw)

GEO Series Overall features

Minimized Vibration

The stable compressor structure of opposed balanced type and vibration & pulsation analysis can help to minimize vibration.

Standardzation

Many components are interchangeable throughout the GEO series.

Simple Structure

Designed for easy maintenance with simple structure and appropriate system deployment, this product has a very small installation space compared with other competitive products. Careful attention to location of components ensures easy service access.

Efficient and Convenient Air-cooling Structure

Since it has an air-cooling system, the product does not require cooling water for the CNG compressor and heat exchanger.

Designed for High Efficiency

The product has been designed with our proprietary design program based on the database that contains





our accumulated expertise and know-how. The performance of the compressor has been optimized as the product has been machined with high accuracy NC machine, contributing to saving energy.

Separator / Oil Filtration

Oil separator installed inside the pulsation vessel at each stage. In house high pressure filter plus coalescing filters to remove 99.995% of oil aerosols to within 0.3 to 0.6 micron (Less than 2ppm)

Maintenance

air

Air/Gas Coolers : Clean periodically with compressed

Inlet Gas Filter : SS 10 micron filter Blowdown-can wash

Vessel : Drain condensed foreign material and separated oil every month

Lubricator : Refill the oil

Compressor Valves : 8,000 hours service check

Compressor Rings : 8,000 hours service check

Compressor Bearings : 35,000 hours service check

COMPRESSOR



Kwangshin CNG Compressors – GEO Series

GEO

MAKER	KWANGSHIN	KWANGSHIN	KWANGSHIN
Model No	GEO-A	GEO-B	GEO-C
Number of throws	2	2	4
Stroke(mm)	80	75	75
RPM(max)	1800	1800	1800
Piston Speed	4.800	4.500	4.500
HP/Throw	75	175	175
Rod Load(Kg)	4812	6500	6500
Main Diameter	90	110	110
Rod Diameter	30	40	40
CTOC	225	230	230
Crank Shaft	Carbon Steel	Carbon Steel	Carbon Steel
Connecting Rod	Cast Steel	Cast Steel	Cast Steel
Cross Head	Cast Steel	Cast Steel	Cast Steel



Bare Shaft Compressor

- Designed and manufactured with an automation design program, achieving high efficiency.
- Low rotation speed that extends the life of ring and packing
- Pressurized crank case : Eliminates gas venting to Air
- Direct coupled with drive : No loss in power transmission
- Fuel lubricator that allows individual injection at each lubricating point increasing reliability.

Crank Case

- Designed pressurized crank case structure (MAWP: 30 bar)
- Since the gas leaked from the cylinder is recovered via the gas inlet within the crank case, there is no loss of gas.

Cylinder

- The 1st, 2nd stage and 3rd, 4th stage are designed in tandem structure, minimizing the installation space.
- Attached a heat-dissipating plate to dissipate generated heat as fast as possible.
- The internal surface of the 4th stage cylinder has been treated with induction hardened improving the resistance to wear.

CNG 16



Piston and Piston Rod

• The 1st and 2nd stage piston has been manufactured with one-piece, high strength hollow aluminum alloy casting with anodising.

• The 2nd and 3rd stage piston has been manufactured with one-piece, high strength alloy steel.

• Extended the life of the inner cylinder by using a nonmetal compression rings and wear bands.

Lubricator

• Uses the pump-to-point lubrication system which demonstrates excellent reliability.

• Since there is a sight glass that allows to visually check the fuel injection condition, operating status can be easily identified.

• Enhanced the reliability with plunger pump that injects fuel directly into each lubricating area.

Heat Exchanger

• Fin & tube type air-cooled.

• Enhanced efficiency, as there is no corrosion or contamination caused by cooling water.

• The generated heat is effectively removed thanks to horizontal installation type.

• By using independent and direct drived fan motor, leaked gas and hot air are removed before and after the operation of the compressor.

Are you planning to construct a CNG fueling station?

you must consider the following:

1. Choose the right specialist with proven track records

Kwangshin have decades of experiences and performance records. For the past 35 years, Kwangshin has supplied approximately 5,000 compressors to 40 countries around the world, and has extensive experiences in manufacturing and maintenance. Kwangshin can help you implement your project successfully.

2. Confirm your requirements completely

You must have complete information on the following : the gas pipe inlet pressure of the fueling station, number of vehicles requiring fueling per day, business hours of the fueling station, estimated opening date, and expansion plan in the future.

3. Consider the fueling speed, fueling temperature and oil contents inside the compressed gas

The Cascade method used by Kwangshin allows fueling more than two vehicles simultaneously. We install a large-capacity heat exchanger, which lowers the gas temperature comparatively and reduces the carry-over of aerosol-type oil.

4. Check if there is any gas loss

Depending on the wear condition of piston rod package, up to 4-20% of gas can be lost. Kwangshin uses pressurized crankcase, which allows recovering of the leaked gas back into the compressor inlet without venting the gas into the atmosphere.

5. What is the bank (storage cylinder) ratio when the cascade method is used?

For cascade method, the storage cylinder performs best at the following ratio : High Press: Medium Press: Low Press = 1:2:3.

6. Consider the "After-Service" in the future

Of the all fueling equipments, compressor requires the most periodic maintenance. Consider the maintenance expertise and costs. Only KwangShin will be able to meet your requirements.



Kwangshin CNG Compressors contributes to preserving the clean environment. We will make the best efforts for our children to inherit the clean Earth

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