Global Network

Houston Engineering and Sales Centre
11757 Katy Freeway, Suite 1100, Houston, Texas 77079, USA
Tel +1 281 599 3377 (201)
Fax +1 281 599 7734

Moscow Office
21, 48-1, Bolshaya Ordynka str, Moscow, 119017, Russia
Tel +7 499 750 1733

Milan Office
Via Brianza, 181, 20092, Cinisello Balsamo, Milan, Italy
Tel +39 02 38608 246

Dubai Office
P.O.Box 121151, 8th Floor, Room 805, Aramco Tower, Media City Dubai U.A.E.
Tel +971 4 447 8610
Fax +971 4 447 8666

Shanghai Office
290233, 32/F, New Caohejing International Business Center B, No.391 Guiping Road, Shanghai, China
Tel +86 21 5427 1155
Fax +86 21 5423 5122

Tianjin Office
390385 No.11 WeiWu Road,
Micro-Electronic Industrial Park,
Economic-Technological Development Area,
Tianjin, China
Tel +86 22 23887788
Fax +86 22 23887788 8261

Beijing Office
100020 Room 1005 Unit2, Guang Hua Lu SOHO,
No.22 Guanghua Road, Chaoyang District,
Beijing, China
Tel +86 10 5900 6082
Fax +86 10 5900 6084

Headquarters
Hanwha Techwin R&D Center, 6,
Pangyo-ro 319beon-gil, Bundang-gu,
Seongnam-si, Gyeonggi-do, 13488, Korea
Tel +82 70 7147 4258
Fax +82 31 8018 5729

Changwon Plant
1504, Changwon-daero, Seogyun-gu,
Changwon-si, Gyeongsangnam-do,
51542, Korea
Tel +82 55 260 2663, 2492
Fax +82 55 260 2610

Website: energy.hanwhatechwin.com
E-mail: turbosales@hanwha.com

Present State of Hanwha Techwin Turbo Compressor Authentication
- ISO14001 Authentication
- Korea New Technology Authentication
- IR52 Jang Young Sil Award
- ISO9001 Authentication
- ASME-compliant
- ISO 8573-1 Class zero Authentication

The information in this publication is subject to change without a notice for improvement.
Introduction to Hanwha Techwin

History
Based on over 35 years of accumulated experience in precision machine industry from Gas Turbine to Compressor Business, Hanwha Techwin has been chosen by more than 1,000 customers worldwide.

- 1977 Company Established (Samsung Techwin) in Samsung Group
- 1979 Overhaul and Repair of Aircraft Gas Turbine Engines
- 1996 Industrial Gas Turbine Developed
- 1997 First model of Turbo Compressor Introduced
- 2011 Penetrated into Gas Compressor Market
- 2013 SA3100, the World’s Largest Capacity of Air Cooled Compressor Introduced
- 2014 Contract to Supply the World 1st Integrally Geared Centrifugal Compressor for Offshore VRU Application
- 2015 New Beginning in Hanwha group as “Hanwha Techwin”

Hanwha Techwin is one of the fastest growing solution providers in its industry since 1997. During the last two decades Hanwha Techwin delivered over 4,000 units of turbo compressors worldwide.

Industries & Applications

Upstream & Offshore
- Flash Gas, LP, MP
- Vapor Recovery / Instrument Air

Refinery
- Make-up, Recycle, Booster (H2, Wet)
- Sulfur Recovery / Process Air / Instrument Air

LNG
- boil off gas (Terminal, LNG Plant)
- High Pressure (Terminal)
- Low / High duty (LNGC, LNG FPSO)

Power Generation
- Fuel Gas Booster / N2 Booster (GCC)
- Syngas / Instrument Air

Air Separation
- Main Air / Booster Air or N2
- Cryogenic Expansion

Fertilizer / Gas Processing
- Process Air / Process Gas (NG, NH3, CO2)
- N2 Booster / Instrument Air / NGL

Petro-chemical
- High Pressure (Terminal)
- Refrigeration (Propane, Propylene)
- PTA / boil off gas / Process Air / Instrument Air

Environment & Energy Saving
- Aeration for wastewater treatment
- Pneumatic conveying materials
- Mechanical vapor recompression

Way to ease your mind

Excellent solution and thorough service will guarantee customer’s peace of mind

Stable Operation
- Complying with global industry standards as ISO9001, API672 and customer specific requirements
  - 100% Oil-Free compressed air without any contamination: ISO 8573-1 Class 8 certification
  - * ISO 8573-1 specifies purity classes of compressed air with respect to particles, water and oil independent of the location in the compressed air system at which the air is specified or measured
- Using three-dimensional design system to eliminate potential design flaws in the design phase
- Thorough quality control system to reduce any risk exposure
- The fastest growing in the industry since 1997
- Certified by major players in various industries in the Middle East, Europe, Americas, etc.

Budget Savings
- High efficiency oriented components and low maintenance design will provide customers with lower life-cycle cost
  - Flexible KGV adjusting the flow rate in accordance with the fluctuation of air consumption to reduce energy consumption up to 7%
  - Wear resistance materials as stainless steel for minimizing abrasion and corrosion
  - Precise 5-axis machined impeller and long life guaranteed oil and gas seals
  - Simple and no wearing structure leads minimized maintenance effort and cost
- Energy saving analysis to diagnose current status and find the root cause of energy waste can minimize the unnecessary cost and keep customers’ profit high

Risk Minimization
- Preventive maintenance program provides a guideline or an actual check service for keeping customers’ equipment healthy
- Remote Monitoring System does daily check of customer’s equipment, and provides prompt alarm / notification service once any problem happens
- RUSH112 service and wide range of service network minimizes downtime when emergency situation occurs
Optimized design to maximize customer benefit
Low maintenance and highly efficient design play a key role to maximize customer profit

Energy Saving Inlet Guide Vane
- Precise control of air flow by efficient inlet air control
- Reduction of power consumption through partial load control
- Low pressure loss with airfoil profiled vanes

Durable Coolers
- Water-in-tube inter & aftercooler bundles allow simple maintenance and easy cleaning
- Corrosion / erosion resistant material applied for protecting damage of other components
- Minimizing pressure drop by optimized airflow

Simple & Neat Package
- Complete full package for plug & run provides easy and low-cost installation
- Full enclosure is applicable for clean appearance and quiet operation which creates a comfortable work environment (Low noise with sound enclosure)
- Minimizing maintenance cost by simple structure

Leak-Free Lubrication System
- Minimum air leakage reduces losses and increases overall efficiency
- Leakproof gearbox prevents impurities from entering the process
- Complete lubrication system package (Including Oil reservoir, Auxiliary oil pump, Oil heater, Oil demister)

Maintenance Friendly Gearbox
- Easy maintenance by horizontally split structure
- Minimum cost for inspection and maintenance

Highly Efficient Main Drive Motor
- Highly efficient package saves energy
- Custom motors are available reflecting client requirements (option)

Concentrating on efficiency with reliability
Core Unit is the heart of SM Series to achieve high efficiency and reliability by strictly selected optimized components and simple design

State-of-the-art 5-Axis Machined Impeller
- Precisely balanced and designed for stability and high efficiency
- Wide operational flexibility with turndown ratio of 30-40%
- 115% over-speed spin test to guarantee reliability
- SUS impellers for extended life cycle with low vibration and low noise

Long Life Thrust Bearing
- Tilting pad journal bearings applied on pinion gears offer reliable operation and almost permanent life without replacement
- Low friction loss sleeve journal and taper landed thrust bearings are applied on bull gear

Precise Bull Gear and Pinions
- High precision gear system provides long life time, low vibration and low noise
- Taper land bearings effectively support axial loads delivered from pinion gears that improve stability of rotation and efficiency
- Easy inspection of gear system without stage disassembly

Leak-Free Oil & Gas Seals
- Supplies 100% oil-free air in accordance with ISO8573-1 class zero for minimizing loss from downtime
- 4 stages of sealing which satisfies API specification
- Split structure for easy check and maintenance
### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>SM3000</th>
<th>SM4000</th>
<th>SM5000</th>
<th>SM6000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flow Rate</strong> m³/hr</td>
<td>3,300-5,300</td>
<td>5,300-8,400</td>
<td>8,400-15,000</td>
<td>15,000-21,000</td>
</tr>
<tr>
<td>CFM</td>
<td>1,950-3,100</td>
<td>3,100-4,950</td>
<td>4,950-8,850</td>
<td>8,850-12,400</td>
</tr>
<tr>
<td><strong>Power</strong> HP</td>
<td>210-680</td>
<td>310-1,010</td>
<td>460-3,140</td>
<td>780-2,350</td>
</tr>
<tr>
<td><strong>Discharge Pressure</strong> bar</td>
<td>3.5-18</td>
<td>5.3-18</td>
<td>8.4-21</td>
<td>15.0-31</td>
</tr>
<tr>
<td><strong>Dimension (L×W×H)</strong> mm</td>
<td>P 4,750 x 2,100 x 2,500</td>
<td>S 5,100 x 2,250 x 2,500</td>
<td>P 5,450 x 2,250 x 2,500</td>
<td>S 6,200 x 2,300 x 2,550</td>
</tr>
<tr>
<td><strong>Weight</strong> kg</td>
<td>P 8,700</td>
<td>S 7,050</td>
<td>P 10,250</td>
<td>S 8,400</td>
</tr>
</tbody>
</table>

### Monitoring System

#### Customer Oriented Monitoring System

Provides convenient operation and accurate control

- High-resolution Color LCD Touch Screen Panel
  - Touch screen size: 7.0" Wide or 10.2" Wide
  - Resolution / Color: WVGA 800 x 480 / 65k Color

#### Automatic Control

- Optimization of surge control margin
- High turndown ratio through minimizing surge margin
- Precise pressure control in overall operation range
- Local / Remote control function
- Self check and automatic resolution logic against errors

#### Reliable and Stable Control System

- Conforms to EMC International standard during in operation: CE, RE, C5, RS, ESD, Surge, Burst
  (CISPR 11 Class A, IEC 61000-4)

#### User Friendly Interface with Improved Operability and Legibility

- Conversion to ICON / animation of main information as operation / stop, valve status etc.
- Quickly and easily switchable screen by navigation bar

#### Complete Control Package

- Real-time monitoring by PC and smartphone
  - Warning and trouble shooting message transferred once alarm or shutdown occurs
- Compressor remote management and energy saving solution
Hanwha Techwin provides total care service, called Smart Care, ranging from current equipment diagnosis to urgent repair service to get rid of customer risks. This prevents unnecessary energy loss and minimizes downtime that may occur.

Energy Diagnosis
Operators expect equipment to run in an optimized mode. In many cases, however, it is hard to notice small changes leading to inefficiencies in its operation. Hanwha Techwin provides diagnosis service inspecting if current equipment is being operated properly and efficiently. Through this Service, customers can learn which part causes energy loss and how to improve the efficiency. Ultimately customers minimize waste and maximize profitability.

Preventive Maintenance program
To prevent malfunction during operation, Hanwha Techwin provides 4 programs by operating time and specific programs are customized per each customer’s requirements. This program will enable customer equipment running stably without any problem so that customers can minimize downtime, low life cycle cost through saving additional trouble shooting cost.

Rush 112 Worldwide
Hanwha Techwin is willing to provide immediate service to customers worldwide based on RUSH 112 philosophy.

Optimum flow rate & pressure
- The best value fitting the actual demand

Diagnosis of current condition
- Compressed air consumption
- Operating pressure
- Power consumption
- Facility / Piping condition
- Noise / Vibration

Identifying Gap and Solution
- Lots of reasons for energy loss as excessive pressure, pipeline leakage, heavy fluctuation of flow rate, superannuated equipment…

Leading to the solutions
Energy saving

4,000 8,000 24,000 40,000
by
51 52 53 54

Register into *4CUST Support and Helpful advices
*AMC & ASC
Regional Service Center
Customer
Request
RUSH112

* 4CUST: Customer-centric 4C oriented system (4C: Consumer, Cost, Convenience, Communication)
* AMC: Authorized Maintenance Center
* ASC: Authorized Service Center
Introduction to Hanwha Group

Hanwha Businesses

a FORTUNE Global 500 Company

64 years of business experience with 190 global networks

2015 Total assets of $146billion and total sales of $53billion

Hanwha Technologies

Hanwha Life

Hanwha General Insurance

Hanwha Investment & Securities

Hanwha Asset Management

Hanwha Savings Bank

Hanwha Hotels & Resorts

Hanwha Galleria

Hanwha Galleria Tmeworld

Hanwha City Development

Manufacturing & Construction

Hanwha Corporation

Hanwha Techwin

Hanwha Thales

Hanwha Chemical

Hanwha General Chemical

Hanwha Total Petrochemical

Hanwha Fine Chemical

Hanwha Engineering & Construction

Hanwha Q CELLS

Hanwha Q CELLS Korea

Hanwha Advanced Materials

Hanwha Energy

VEOCHIN NCC

Hanwha City Development

Services & Leisure

Hanwha Hotels & Resorts

Hanwha Galleria

Hanwha Galleria Tmeworld

Hanwha City Development

Office

Authorized Maintenance Center & Authorized Service Center

Belarus  India  Malaysia  Thailand

Brazil  Indonesia  Mexico  Turkey

China  Iran  Poland  Ukraine

Czech  Kazakhstan  Russia  USA

Finland  Korea  Taiwan  Vietnam

Wide Service Network

Provides prompt service for customers around the world, Hanwha Techwin has built a large number of centers globally. Customers can ask for service at anytime through those centers and get solutions in time.

58 Affiliates all over the world

190 Global Networks (As of June 2015)
Driving Performance **SM100 Series**

SM100 series focuses on accomplishing enhanced performance and efficiency to satisfy customers particularly seek performance centered products.

**Flexible packages according to your needs**
- Packaged plug & play type for easy installation
- Standard type without base frame, silencer, cooling water manifold and enclosure
  - Silencer and cooling water manifold can be added as an option

**Advanced efficiency and performance through design modification**
- Thrust collar applied to enhance operation reliability and mechanical efficiency by reducing mechanical loss and oil consumption
- Labyrinth seal of non-contacting type minimizes mechanical loss and needs of replacement
- Reduced distance between shafts to minimize oil mist friction and mechanical loss for improved performance and isothermal efficiency

Shorten by **18%**
### Specification

<table>
<thead>
<tr>
<th>Model</th>
<th>SM3100</th>
<th>SM4100</th>
<th>SM5100</th>
<th>SM6100</th>
<th>SM7100</th>
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<tbody>
<tr>
<td><strong>Flow Rate</strong></td>
<td>m³/hr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,300 - 5,500</td>
<td>5,500 - 9,000</td>
<td>9,000 - 15,000</td>
<td>15,000 - 24,500</td>
<td>24,500 - 32,000</td>
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<tr>
<td></td>
<td>CFM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,950 - 3,250</td>
<td>3,250 - 5,300</td>
<td>5,300 - 8,850</td>
<td>8,850 - 14,400</td>
<td>14,400 - 18,800</td>
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<tr>
<td><strong>Power</strong></td>
<td>kW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>200 - 580</td>
<td>300 - 930</td>
<td>500 - 1,500</td>
<td>800 - 2,500</td>
<td>1,000 - 3,100</td>
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<tr>
<td></td>
<td>HP</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>270 - 780</td>
<td>400 - 1,200</td>
<td>670 - 2,010</td>
<td>1,070 - 3,350</td>
<td>1,340 - 4,155</td>
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<tr>
<td><strong>Discharge Pressure</strong></td>
<td>Bar A</td>
<td>3.5 - 13</td>
<td>50 - 188</td>
<td>3.5 - 11.4</td>
<td>50 - 165</td>
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<tr>
<td></td>
<td>Psi A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dimension (L×W×H)</strong></td>
<td>mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>5,250 x 2,250 x 2,500</td>
<td>5,500 x 2,250 x 2,500</td>
<td>6,250 x 2,250 x 2,550</td>
<td>7,100 x 2,250 x 2,550</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>3,210 x 2,150 x 1,920</td>
<td>3,800 x 2,300 x 2,050</td>
<td>4,750 x 2,490 x 2,130</td>
<td>5,290 x 2,400 x 2,420</td>
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<tr>
<td><strong>Weight</strong></td>
<td>Kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>P</td>
<td>8,600</td>
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<td>13,150</td>
<td>17,900</td>
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<td>S</td>
<td>6,900</td>
<td>7,500</td>
<td>10,300</td>
<td>14,450</td>
</tr>
</tbody>
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**Scope of Supply**

<table>
<thead>
<tr>
<th>P</th>
<th>S</th>
<th>Package type</th>
<th>Standard type</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔</td>
<td>✔</td>
<td>Air intake filter</td>
<td>Air intake filter</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
<td>Inlet guide vanes</td>
<td>Inlet guide vanes</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
<td>Blow off Valve</td>
<td>Blow off Valve</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
<td>Silencer</td>
<td>Silencer</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
<td>Check valve and expansion joint</td>
<td>Check valve and expansion joint</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
<td>Complete lubrication system</td>
<td>Complete lubrication system</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
<td>Aftercooler</td>
<td>Aftercooler</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
<td>Drain traps on all coolers</td>
<td>Drain traps on all coolers</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
<td>Main motor</td>
<td>Main motor</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
<td>PLC control system</td>
<td>PLC control system</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
<td>Base Frame</td>
<td>Base Frame</td>
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<tr>
<td>✔</td>
<td>✔</td>
<td>Cooling water manifold</td>
<td>Cooling water manifold</td>
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<tr>
<td>✔</td>
<td>✔</td>
<td>Sound Enclosure</td>
<td>Sound Enclosure</td>
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<tr>
<td>✔</td>
<td>✔</td>
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<td>Dual oil filter</td>
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<tr>
<td>✔</td>
<td>✔</td>
<td>Block Valve</td>
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<tr>
<td>✔</td>
<td>✔</td>
<td>Companion Flange</td>
<td>Companion Flange</td>
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</table>

**Package type**

**Standard type**

- Auto trap
- MODBUS / PROFIBUS Interface
- Motor winding / bearing protection

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Hanwha Techwin