

CHP & HYBRID POWER PLANT

HYUNDAI
POWER PLANT SOLUTIONS

Make More Profit With
Twice The Efficiency

Why CHP

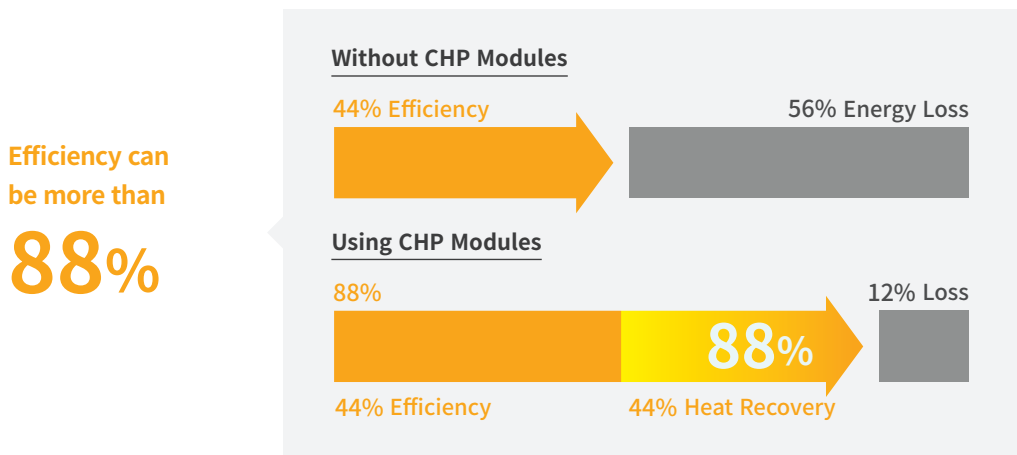
The economics of engines in on-site power generation applications often depend on effective use of the thermal energy contained in the exhaust gas and cooling systems, which generally represents 60 to 70 percent of the inlet fuel energy.

Most of the waste heat is available in the engine exhaust and jacket coolant, while smaller amounts can be recovered from the lube oil cooler and the turbocharger's intercooler and after cooler(if so equipped).

Why Are They Good?

1. MORE PROFIT WITH BETTER EFFICIENCY

The fuel efficiency can grow about twice as much when using CHP modules.



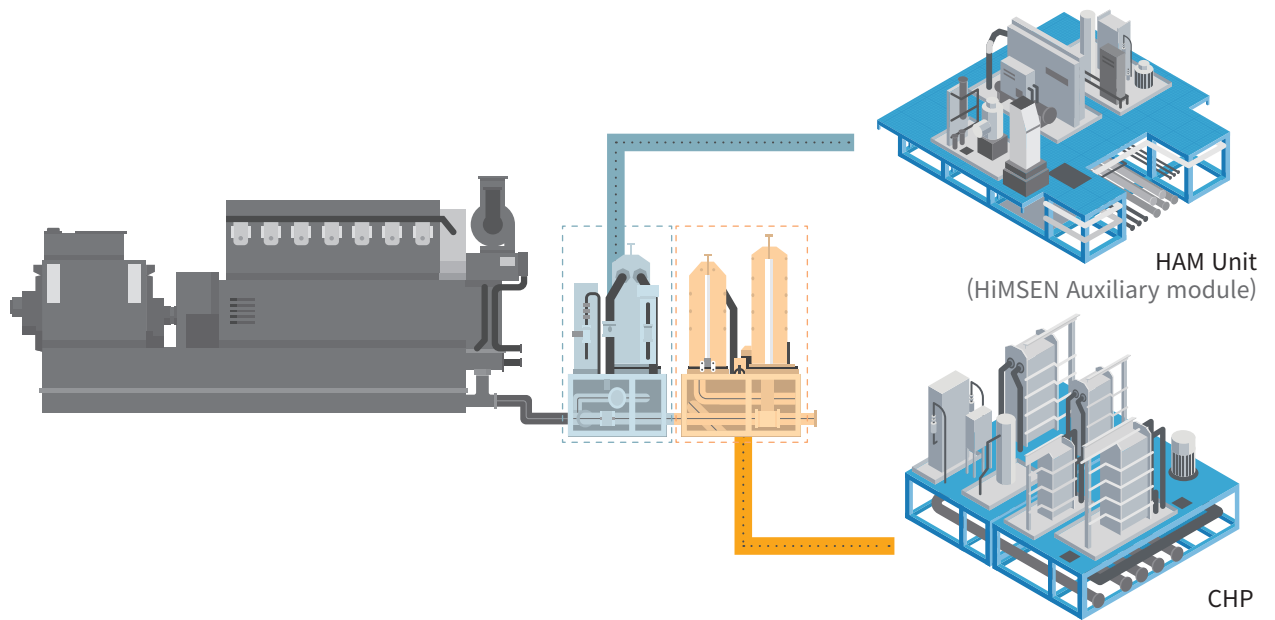
2. EASY AND FAST INSTALLATION

The units are carefully modularized so that transportation and installation can be easier and provided faster. Also, the CHPs are pre-designed, so that they can be instantly provided upon request.

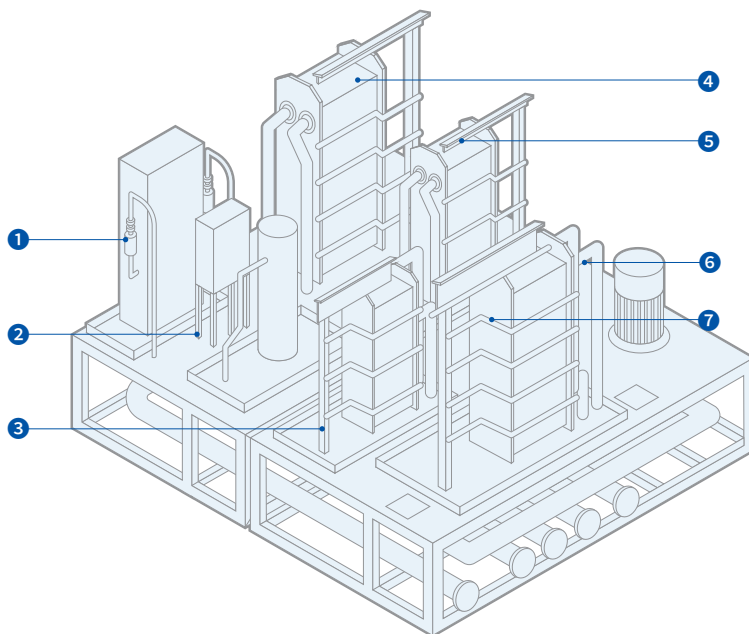
3. EASY CUSTOMIZATION

| | | | |
|--|--|---|---|
| PP Power Plant | | | Electricity |
| CHP Combined Heating Power Plant | | + | Electricity Heat |
| CCHP Combined Cooling, Heating & Power plant | | + | Electricity Heat Cooling |
| WHRS Waste Heat Recovery System | | + | Electricity + α Heat |
| WHRCS Waste Heat Recovery Cooling System | | + | Electricity + α Cooling |

Combined Heat & Power Modules



The Components of CHP Modules

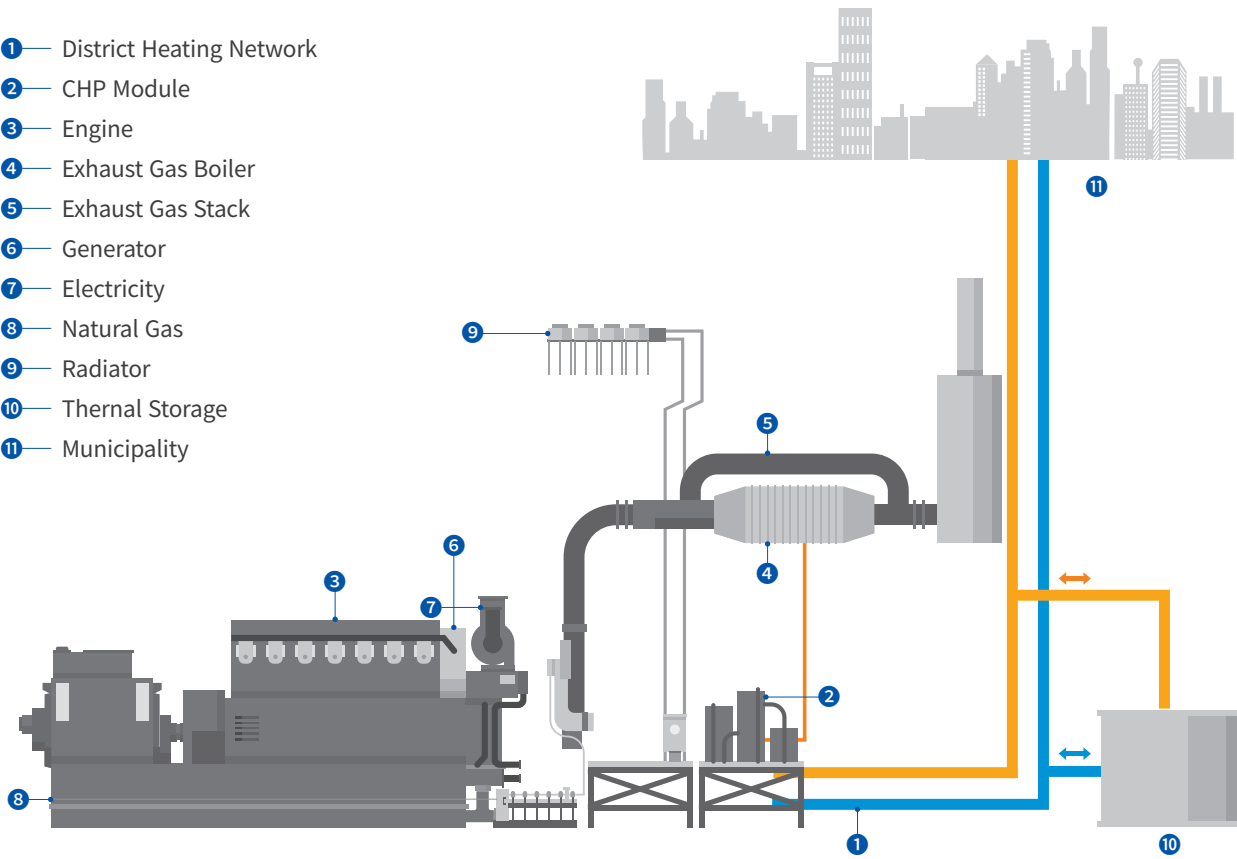


- ① — JW Preheater
- ② — LO Preheating Unit
- ③ — HT Heat Exchanger
- ④ — LO Cooler
- ⑤ — HT Back-up Cooler
- ⑥ — CHP Feed Pump
- ⑦ — LT Heat Exchanger

The CHP is attached to the HAM module which is attached to the engine.

Operation Flow of CHP

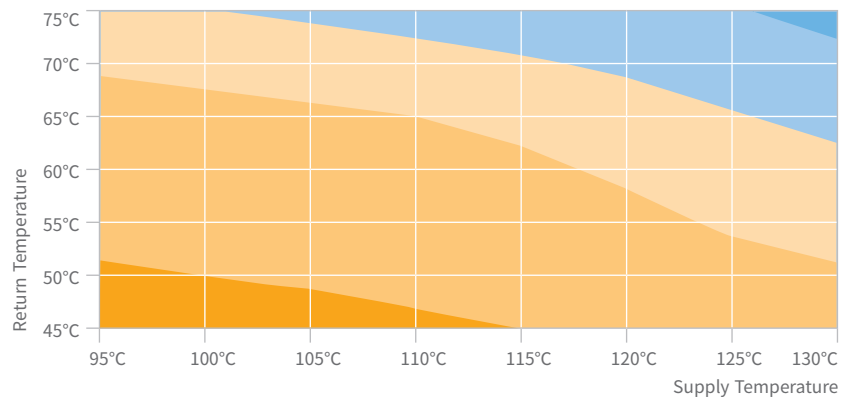
- 1 — District Heating Network
- 2 — CHP Module
- 3 — Engine
- 4 — Exhaust Gas Boiler
- 5 — Exhaust Gas Stack
- 6 — Generator
- 7 — Electricity
- 8 — Natural Gas
- 9 — Radiator
- 10 — Thermal Storage
- 11 — Municipality



CHP takes the exhaust gas through the WHRB(Waste Heat Recovery Boiler) which has the Cooling Water compartment and Heat exchanger

The Return Temperature Depending On The Supply Temperature

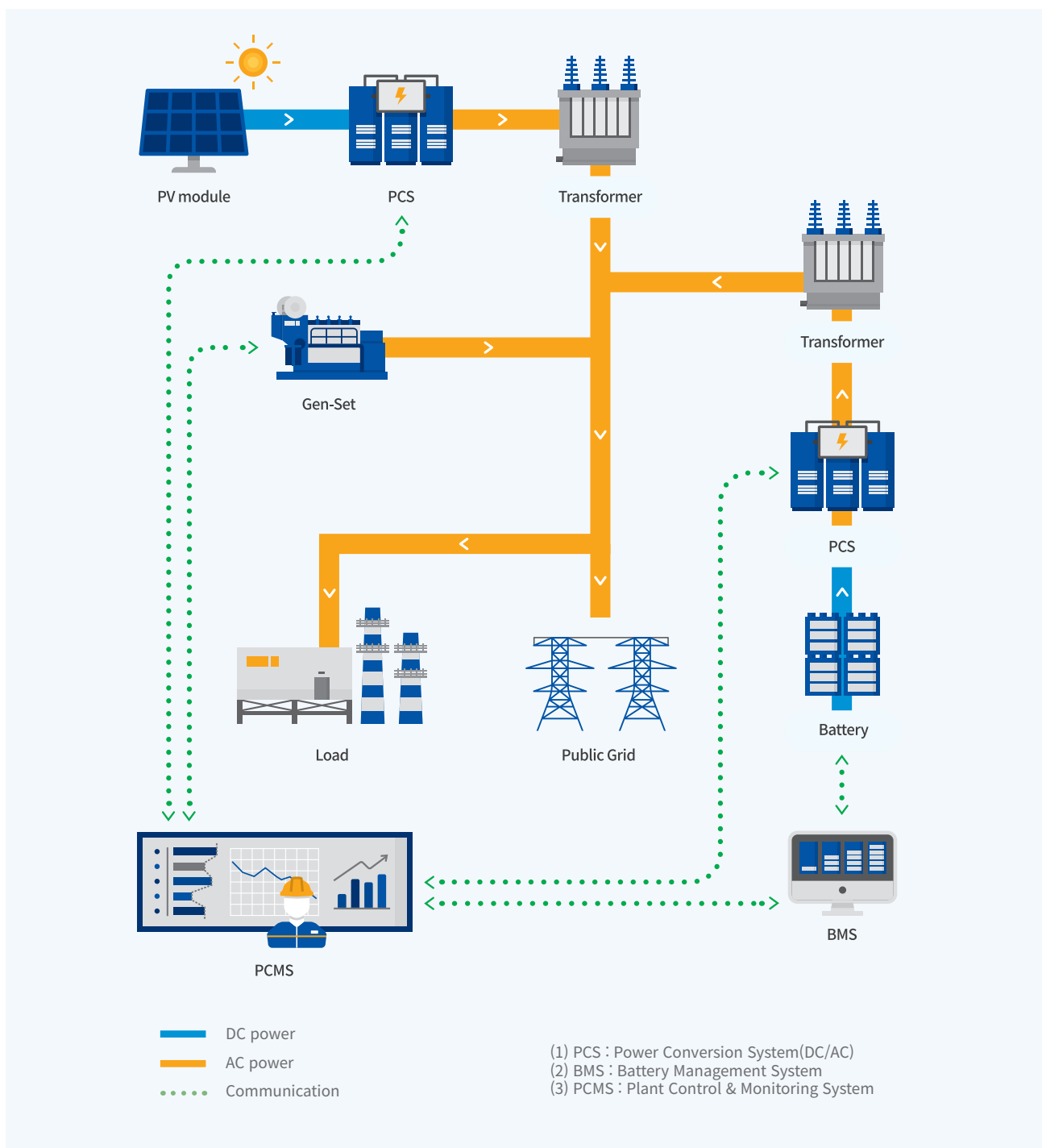
- 82% - 84%
- 84% - 86%
- 86% - 88%
- 88% - 90%
- 90% - 92%



HYBRID POWER PLANT SOLAR + ENGINE POWER

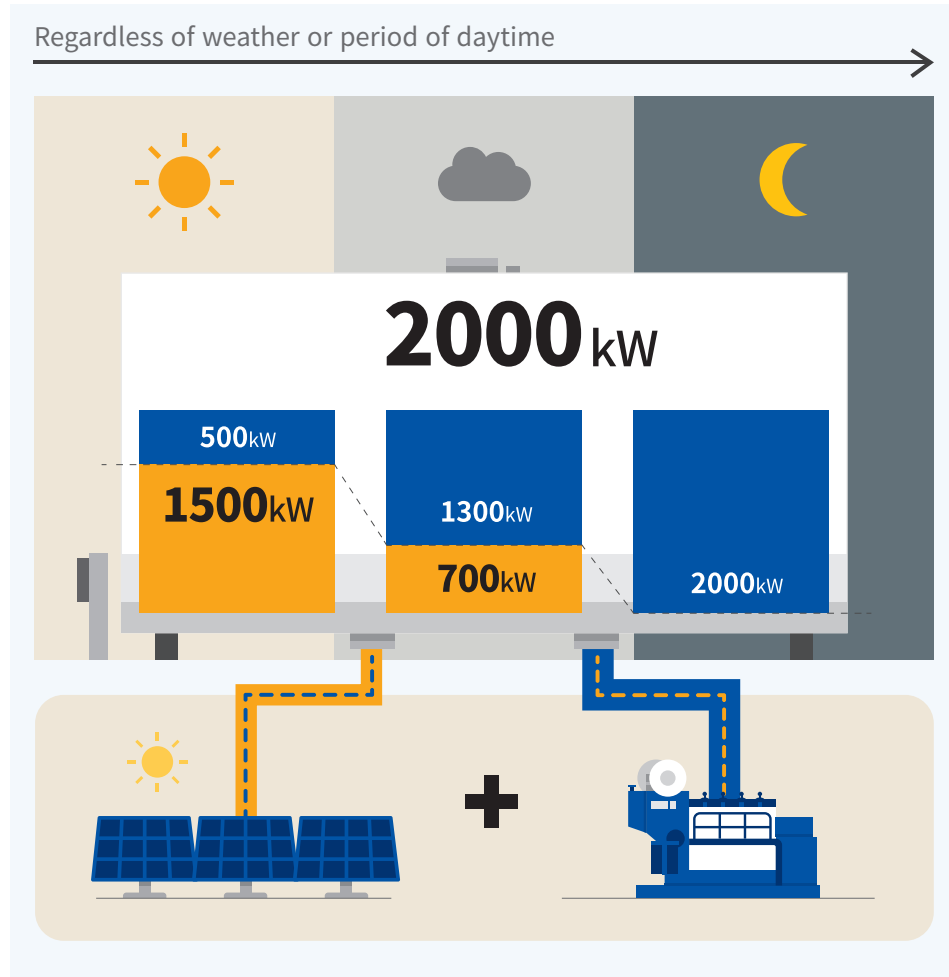
Hybrid power plant can supply stable power through balance between or among the power source. Regardless of weather or natural condition, it produces constant power.

Hybrid power plant overall scheme

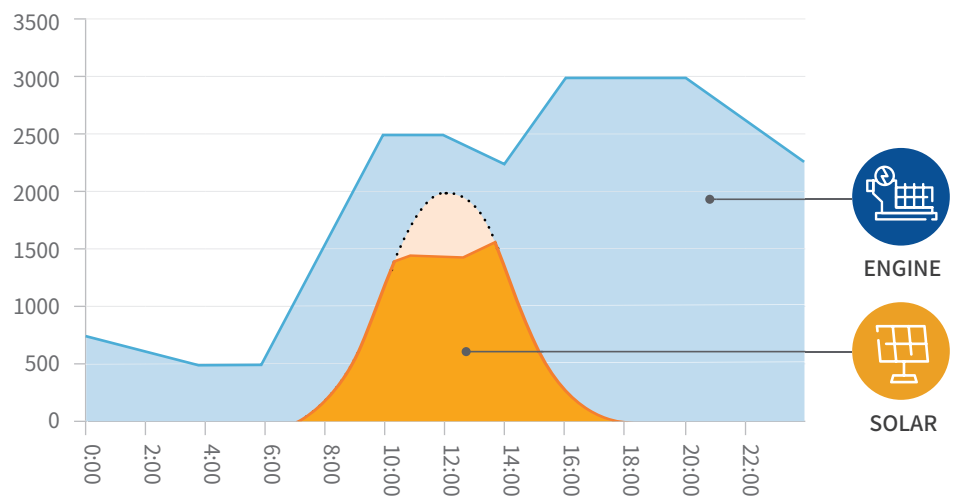


SOLAR PV POWER + GEN-SET PROFILE

How a typical day could look like



24h load and PV energy generation profile



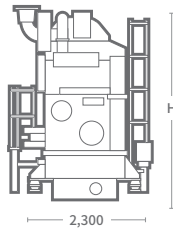
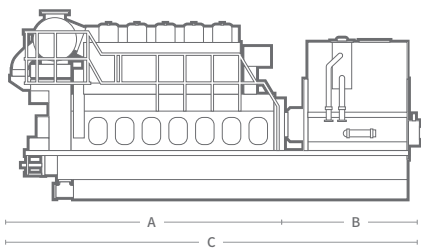
HIMSEN ENGINE LINE-UP FOR STATIONARY GENSETS

‘HiMSEN’® is the registered brand name of HYUNDAI’s own design engine and the abbreviation of ‘Hi-touch Marine & Stationary Engine’.



Gas Fuel

H35/40G Bore: 350mm Stroke: 400mm



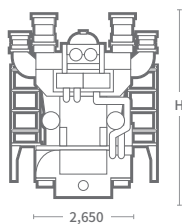
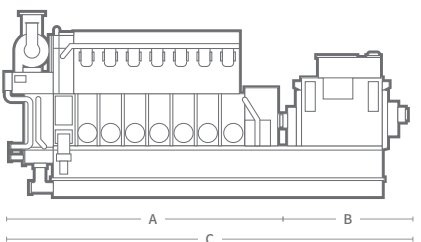
Main Data

Dimensions

| Speed | 720rpm | | 750rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|-----------|----------|----------|----------|----------|---------------|-------|--------|-------|---------------|--------|
| | 60Hz | | 50Hz | | | | | | | |
| Frequency | Eng.(kw) | Gen.(kw) | Eng.(kw) | Gen.(kw) | A | B | C | H | Engine | GenSet |
| 6H35/40G | 2,880 | 2,764 | 2,880 | 2,764 | 5,760 | 3,130 | 8,890 | 3,959 | 33.7 | 68.6 |
| 7H35/40G | 3,360 | 3,225 | 3,360 | 3,225 | 6,112 | 3,374 | 9,486 | 4,130 | 38.6 | 77.1 |
| 8H35/40G | 3,840 | 3,686 | 3,840 | 3,686 | 6,602 | 3,594 | 10,196 | 4,130 | 41.5 | 82.0 |
| 9H35/40G | 4,320 | 4,147 | 4,320 | 4,147 | 7,092 | 4,097 | 11,189 | 4,130 | 44.6 | 89.1 |

Based on alternator efficiency of 96%.

H35/40GV Bore: 350mm Stroke: 400mm



Main Data

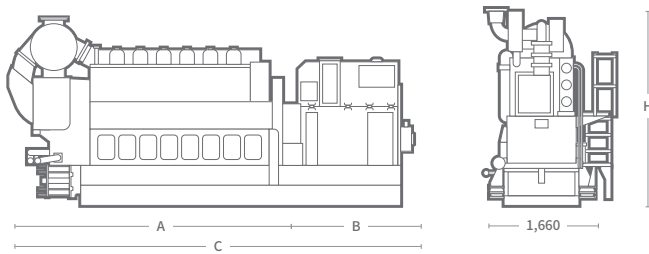
Dimensions

| Speed | 720rpm | | 750rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|------------|----------|----------|----------|----------|---------------|-------|--------|-------|---------------|--------|
| | 60Hz | | 50Hz | | | | | | | |
| Frequency | Eng.(kw) | Gen.(kw) | Eng.(kw) | Gen.(kw) | A | B | C | H | Engine | GenSet |
| 12H35/40GV | 5,760 | 5,558 | 5,760 | 5,558 | 6,624 | 3,760 | 10,384 | 4,723 | 56.0 | 108.8 |
| 14H35/40GV | 6,720 | 6,518 | 6,720 | 6,518 | 7,295 | 3,860 | 11,155 | 4,723 | 63.3 | 121.3 |
| 16H35/40GV | 7,680 | 7,449 | 7,680 | 7,449 | 7,914 | 3,479 | 11,393 | 4,723 | 69.1 | 130.9 |
| 18H35/40GV | 8,640 | 8,380 | 8,640 | 8,380 | 8,585 | 3,859 | 12,444 | 4,794 | 76.3 | 141.2 |
| 20H35/40GV | 9,600 | 9,360 | 9,600 | 9,360 | 9,344 | 3,659 | 13,003 | 4,794 | 84.0 | 153.9 |

Based on alternator efficiency of 96.5-97.5%.

Dual Fuel

H27DF Bore: 270mm Stroke: 330mm



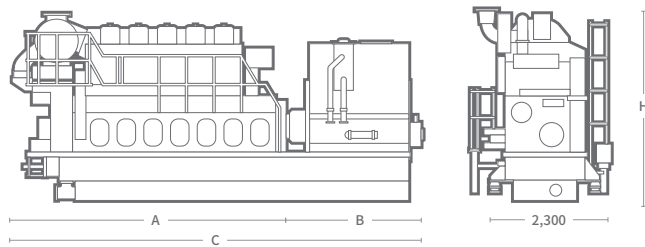
Main Data

Dimensions

| Speed | 900rpm | | 1,000rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|---------------|----------|----------|----------|----------|---------------|-------|-------|-------|---------------|--------|
| | 60Hz | | 50Hz | | | | | | | |
| | Eng.(kW) | Gen.(kW) | Eng.(kW) | Gen.(kW) | A | B | C | H | Engine | GenSet |
| 6H27DF | 1,710 | 1,624 | 1,860 | 1,767 | 4,414 | 2,262 | 6,676 | 3,103 | 23.5 | 33.7 |
| 7H27DF | 1,995 | 1,895 | 2,170 | 2,061 | 4,797 | 2,262 | 7,059 | 3,241 | 27.7 | 37.7 |
| 8H27DF | 2,280 | 2,177 | 2,480 | 2,368 | 5,311 | 2,340 | 7,651 | 3,371 | 34.0 | 44.8 |
| 9H27DF | 2,565 | 2,462 | 2,790 | 2,678 | 5,691 | 2,490 | 8,181 | 3,371 | 36.2 | 47.2 |

Based on alternator efficiency of 95-96%.

H35DF Bore: 350mm Stroke: 400mm



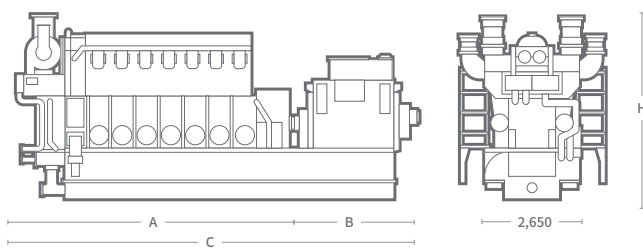
Main Data

Dimensions

| Speed | 720rpm | | 750rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|---------------|----------|----------|----------|----------|---------------|-------|--------|-------|---------------|--------|
| | 60Hz | | 50Hz | | | | | | | |
| | Eng.(kW) | Gen.(kW) | Eng.(kW) | Gen.(kW) | A | B | C | H | Engine | GenSet |
| 6H35DF | 2,880 | 2,764 | 2,880 | 2,764 | 5,760 | 3,130 | 8,890 | 3,959 | 33.7 | 68.6 |
| 7H35DF | 3,360 | 3,225 | 3,360 | 3,225 | 6,112 | 3,374 | 9,486 | 4,130 | 38.6 | 77.1 |
| 8H35DF | 3,840 | 3,686 | 3,840 | 3,686 | 6,602 | 3,594 | 10,196 | 4,130 | 41.5 | 82.0 |
| 9H35DF | 4,320 | 4,147 | 4,320 | 4,147 | 7,092 | 4,097 | 11,189 | 4,130 | 44.6 | 89.1 |

Based on alternator efficiency of 96%.

H35DFV Bore: 350mm Stroke: 400mm



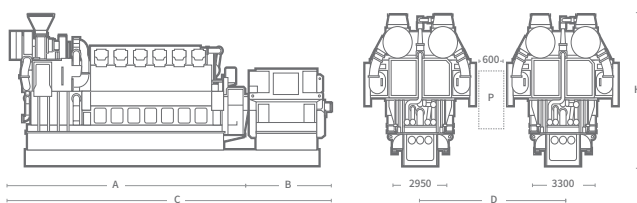
Main Data

Dimensions

| Speed | 720rpm | | 750rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|-----------------|----------|----------|----------|----------|---------------|-------|--------|-------|---------------|--------|
| | 60Hz | | 50Hz | | | | | | | |
| | Eng.(kW) | Gen.(kW) | Eng.(kW) | Gen.(kW) | A | B | C | H | Engine | GenSet |
| 12H35DFV | 5,760 | 5,558 | 5,760 | 5,558 | 6,624 | 3,760 | 10,384 | 4,723 | 56.0 | 108.8 |
| 14H35DFV | 6,720 | 6,518 | 6,720 | 6,518 | 7,295 | 3,860 | 11,155 | 4,723 | 63.3 | 121.3 |
| 16H35DFV | 7,680 | 7,449 | 7,680 | 7,449 | 7,914 | 3,479 | 11,393 | 4,723 | 69.1 | 130.9 |
| 18H35DFV | 8,640 | 8,380 | 8,640 | 8,380 | 8,585 | 3,859 | 12,444 | 4,794 | 76.3 | 141.2 |
| 20H35DFV | 9,600 | 9,360 | 9,600 | 9,360 | 9,344 | 3,659 | 13,003 | 4,794 | 84.0 | 153.9 |

Based on alternator efficiency of 96.5-97.5%.

H54DFV Bore: 540mm Stroke: 600mm



Main Data

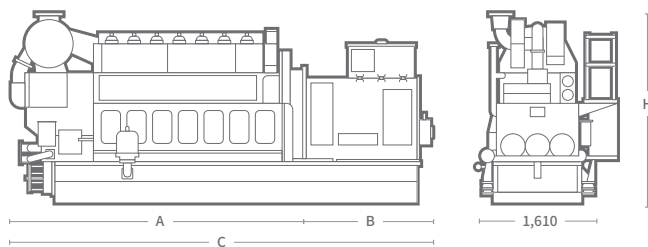
Dimensions

| Speed | 600rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|----------------------|----------|----------|---------------|-------|--------|-------|---------------|--------|
| | 50/60Hz | | | | | | | |
| | Eng.(kW) | Gen.(kW) | A | B | C | H | Engine | GenSet |
| 12H54DFV TSTC | 17,640 | 17,199 | 12,416 | 4,393 | 16,809 | 8,319 | 300.9 | 398.4 |
| 14H54DFV TSTC | 20,580 | 20,066 | 13,566 | 4,337 | 17,903 | 8,319 | 331.8 | 438.8 |
| 16H54DFV TSTC | 23,520 | 22,932 | 14,991 | 4,522 | 19,513 | 8,614 | 371.1 | 488.8 |
| 18H54DFV TSTC | 26,460 | 25,799 | 16,141 | 4,692 | 20,833 | 8,614 | 402.7 | 531.7 |

Based on alternator efficiency of 97.5%.

Liquid Fuel

H21/32 Bore: 210mm Stroke: 320mm



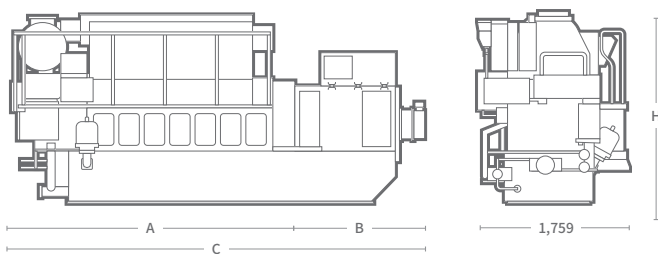
Main Data

Dimensions

| Speed | 900rpm | | 1,000rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|----------------|----------|----------|----------|----------|---------------|-------|-------|-------|---------------|--------|
| | 60Hz | | 50Hz | | | | | | | |
| | Eng.(kw) | Gen.(kw) | Eng.(kw) | Gen.(kw) | A | B | C | H | Engine | GenSet |
| 6H21/32 | 1,200 | 1,128 | 1,200 | 1,128 | 3,781 | 2,180 | 5,961 | 2,781 | 15.1 | 25.1 |
| 8H21/32 | 1,600 | 1,512 | 1,600 | 1,512 | 4,453 | 2,345 | 6,798 | 2,911 | 18.4 | 29.9 |
| 9H21/32 | 1,800 | 1,710 | 1,800 | 1,710 | 4,783 | 2,423 | 7,206 | 2,911 | 19.8 | 31.9 |

Based on alternator efficiency of 94-95%.

H21C Bore: 210mm Stroke: 330mm



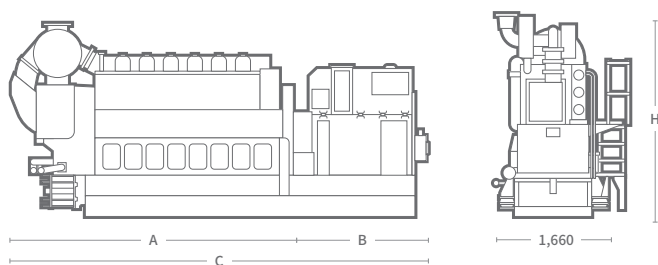
Main Data

Dimensions

| Speed | 900rpm | | 1,000rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|--------------|----------|----------|----------|----------|---------------|-------|-------|-------|---------------|--------|
| | 60Hz | | 50Hz | | | | | | | |
| | Eng.(kw) | Gen.(kw) | Eng.(kw) | Gen.(kw) | A | B | C | H | Engine | GenSet |
| 5H21C | 1,200 | 1,128 | 1,200 | 1,128 | 3,735 | 2,249 | 5,984 | 2,600 | 14.3 | 22.1 |
| 6H21C | 1,440 | 1,353 | 1,440 | 1,353 | 4,085 | 2,249 | 6,334 | 2,600 | 16.0 | 24.9 |
| 7H21C | 1,680 | 1,587 | 1,680 | 1,587 | 4,435 | 2,305 | 6,740 | 2,600 | 17.8 | 28.3 |
| 8H21C | 1,920 | 1,824 | 1,920 | 1,824 | 4,785 | 2,305 | 7,090 | 2,653 | 19.4 | 30.2 |
| 9H21C | 2,160 | 2,052 | 2,160 | 2,052 | 5,135 | 2,450 | 7,585 | 2,653 | 21.0 | 33.6 |

Based on alternator efficiency of 94-95%.

H25/33 Bore: 250mm Stroke: 330mm



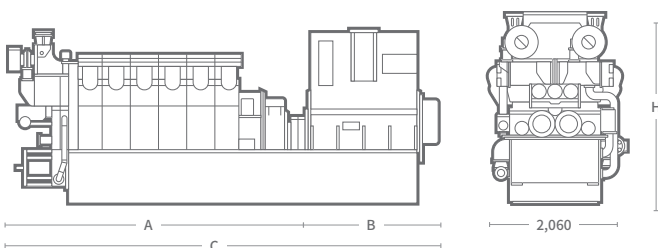
Main Data

Dimensions

| Speed | 900 rpm | | 1000 rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|----------------|----------|----------|----------|----------|---------------|-------|-------|-------|---------------|--------|
| | 60 Hz | | 50 Hz | | | | | | | |
| | Eng.(kw) | Gen.(kw) | Eng.(kw) | Gen.(kw) | A | B | C | H | Engine | GenSet |
| 6H25/33 | 1,740 | 1,653 | 1,800 | 1,710 | 4,414 | 2,262 | 6,676 | 2,961 | 20.2 | 30.2 |
| 7H25/33 | 2,030 | 1,928 | 2,100 | 1,995 | 4,797 | 2,262 | 7,059 | 3,241 | 22.5 | 32.7 |
| 8H25/33 | 2,320 | 2,215 | 2,400 | 2,292 | 5,311 | 2,340 | 7,651 | 3,371 | 24.1 | 34.9 |
| 9H25/33 | 2,610 | 2,505 | 2,700 | 2,592 | 5,691 | 2,490 | 8,181 | 3,371 | 26.2 | 37.2 |

Based on alternator efficiency of 95-96%.

H25/33V Bore: 250mm Stroke: 330mm



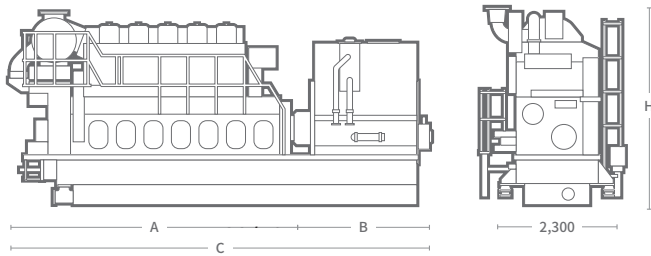
Main Data

Dimensions

| Speed | 900rpm | | 1000rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|------------------|----------|----------|----------|----------|---------------|-------|--------|-------|---------------|--------|
| | 60Hz | | 50Hz | | | | | | | |
| | Eng.(kw) | Gen.(kw) | Eng.(kw) | Gen.(kw) | A | B | C | H | Engine | GenSet |
| 12H25/33V | 3,840 | 3,696 | 3,840 | 3,696 | 5,524 | 3,334 | 8,858 | 3,750 | 33.5 | 58.2 |
| 14H25/33V | 4,480 | 4,300 | 4,480 | 4,300 | 5,944 | 3,504 | 9,448 | 3,750 | 36.5 | 63.4 |
| 16H25/33V | 5,120 | 4,915 | 5,120 | 4,915 | 6,364 | 3,682 | 10,046 | 3,750 | 39.5 | 69.6 |
| 18H25/33V | 5,760 | 5,558 | 5,760 | 5,558 | 6,784 | 3,772 | 10,556 | 3,750 | 42.5 | 77.5 |
| 20H25/33V | 6,400 | 6,208 | 6,400 | 6,208 | 7,204 | 3,727 | 10,931 | 3,750 | 45.5 | 79.5 |

Based on alternator efficiency of 96-97%.

H32/40 Bore: 320mm Stroke: 400mm

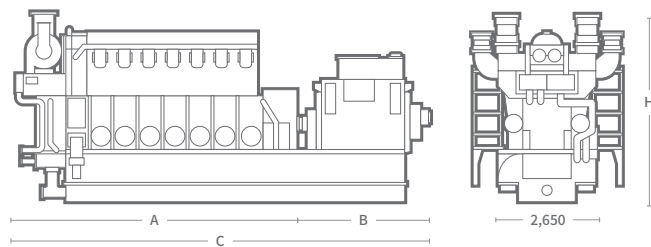


Main Data

| Speed | 720 rpm | | 750 rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|----------------|----------|----------|----------|----------|---------------|-------|--------|-------|---------------|--------|
| | 60 Hz | | 50 Hz | | A | B | C | H | Engine | GenSet |
| | Eng.(kW) | Gen.(kW) | Eng.(kW) | Gen.(kW) | | | | | | |
| 6H32/40 | 2,850 | 2,736 | 2,850 | 2,736 | 5,760 | 3,130 | 8,890 | 3,959 | 33.7 | 68.6 |
| 7H32/40 | 3,325 | 3,192 | 3,325 | 3,192 | 6,112 | 3,374 | 9,486 | 4,130 | 38.6 | 77.1 |
| 8H32/40 | 3,800 | 3,648 | 3,800 | 3,648 | 6,602 | 3,594 | 10,196 | 4,130 | 41.5 | 82.0 |
| 9H32/40 | 4,275 | 4,104 | 4,275 | 4,104 | 7,092 | 4,097 | 11,189 | 4,130 | 44.6 | 89.1 |

Based on alternator efficiency of 96%.

H32/40V Bore: 320mm Stroke: 400mm

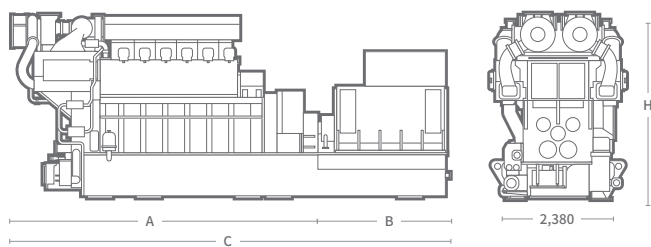


Main Data

| Speed | 720rpm | | 750rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|------------------|----------|----------|----------|----------|---------------|-------|--------|-------|---------------|--------|
| | 60Hz | | 50Hz | | A | B | C | H | Engine | GenSet |
| | Eng.(kW) | Gen.(kW) | Eng.(kW) | Gen.(kW) | | | | | | |
| 12H32/40V | 5,700 | 5,500 | 5,700 | 5,500 | 6,624 | 3,760 | 10,384 | 4,723 | 56.0 | 108.8 |
| 14H32/40V | 6,560 | 6,450 | 6,560 | 6,450 | 7,295 | 3,860 | 11,155 | 4,723 | 63.3 | 121.3 |
| 16H32/40V | 7,600 | 7,372 | 7,600 | 7,372 | 7,914 | 3,479 | 11,393 | 4,723 | 69.1 | 130.9 |
| 18H32/40V | 8,550 | 8,293 | 8,550 | 8,293 | 8,585 | 3,859 | 12,444 | 4,794 | 76.3 | 141.2 |
| 20H32/40V | 9,500 | 9,262 | 9,500 | 9,262 | 9,344 | 3,659 | 13,003 | 4,794 | 84.0 | 153.9 |

Based on alternator efficiency of 96.5%.

H32CV Bore: 320mm Stroke: 450mm

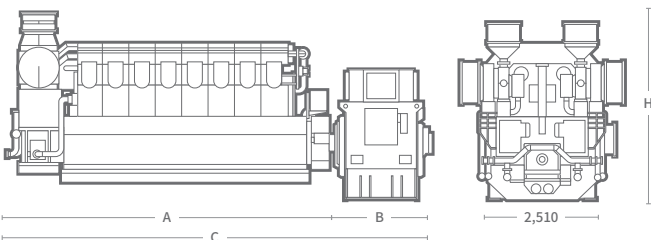


Main Data

| Speed | 720rpm | | 750rpm | | Dimension(mm) | | | | Dry Mass(ton) | |
|----------------|----------|----------|----------|----------|---------------|-------|--------|-------|---------------|--------|
| | 60Hz | | 50Hz | | A | B | C | H | Engine | GenSet |
| | Eng.(kW) | Gen.(kW) | Eng.(kW) | Gen.(kW) | | | | | | |
| 12H32CV | 7,200 | 6,948 | 7,200 | 6,948 | 7,526 | 3,900 | 11,426 | 4,362 | 78.0 | 121.2 |
| 14H32CV | 8,400 | 8,106 | 8,400 | 8,106 | 8,126 | 4,100 | 12,226 | 4,362 | 88.0 | 137.9 |
| 16H32CV | 9,600 | 9,264 | 9,600 | 9,264 | 8,726 | 4,300 | 13,026 | 4,448 | 96.0 | 152.6 |
| 18H32CV | 10,800 | 10,422 | 10,800 | 10,422 | 9,326 | 4,500 | 13,826 | 4,448 | 106.0 | 169.3 |

Based on alternator efficiency of 96.5%.

H46/60V Bore: 460mm Stroke: 600mm



Main Data

| Speed | 600rpm | | 600rpm | | Dimension(mm) | | | | Dry Mass (ton) | |
|------------------|----------|----------|----------|----------|---------------|-------|--------|-------|----------------|--------|
| | 60Hz | | 50Hz | | A | B | C | H | Engine | GenSet |
| | Eng.(kW) | Gen.(kW) | Eng.(kW) | Gen.(kW) | | | | | | |
| 12H46/60V | 14,400 | 14,040 | 14,400 | 14,040 | 10,410 | 3,627 | 14,037 | 4,975 | 205.3 | 256.4 |
| 16H46/60V | 19,200 | 18,720 | 19,200 | 18,720 | 12,410 | 3,724 | 16,134 | 4,975 | 227.8 | 286.6 |
| 18H46/60V | 21,610 | 21,060 | 21,600 | 21,060 | 13,410 | 3,625 | 17,035 | 5,288 | 239.0 | 313 |

Based on alternator efficiency of 97.5%.

- 1) Depending on alternator.
 - 2) Without common base frame.
 - 3) With common base frame & alternator (Maker: HHI-EES).
- Note) All dimensions and weight are approximate value and subject to change without prior notice.

RELIABLE & POWERFUL SUPPORT AROUND THE WORLD

- Optimized Solutions For Each Customer’s Needs
- Genuine Spare Parts From The Original Equipment Manufacturer
- Fast and Reliable Response Through Our Global Service Network
- 24/7, Immediate Support



Contact Us

Power Plant

Engine Power Plant Sales Department
 1000, Bangeojinsunhwan-doro, Dong-gu, Ulsan, Korea
 (Zip Code: 44032)
Tel +82.31.210.9350~61 **E-mail** hi_pin@hhi.co.kr

Korean-English 24/7 Call Center
Tel +82.70.8670.1122

Customer Service

Hyundai Global Service Co. Ltd
 Centum Science Park 6F 79, Centum jungang-ro,
 Haeundae-gu, Busan, Korea (Zip code : 48058)
Tel +82.51.741.7601
 +82.52.204.7852 (For Warranty Service)
 +82.52.204.7824 (For Sales)
 +82.52.204.7703 (For Power Plant Service)

E-mail service@hyundai-gs.com
 sales@hyundai-gs.com
 powerplant@hyundai-gs.com



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www.hhi.co.kr