



**YANMAR**

DIESEL ENGINES

# TNV Series

Max.Output:13.4-96.6hp



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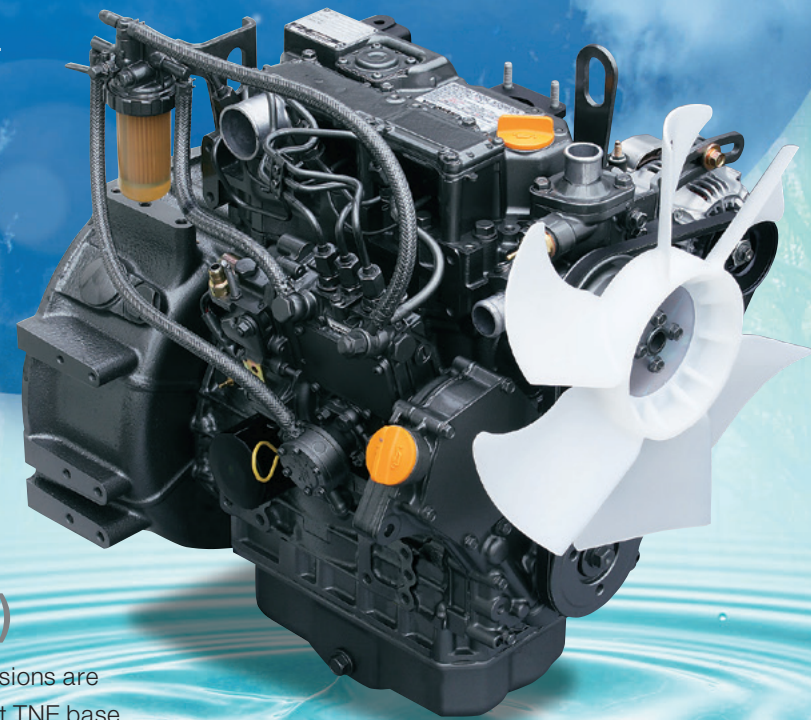
Note : All data subject to alteration without notice.

001A0-G00420 2207®



# The TNV series adds a whole range of “goodies” that make this engine a mechanical “Work of art”

The much acclaimed “Clean and Silent” TNE series has just become even better. Its called the TNV, and it stands for Total New Value. Lets take a look.....



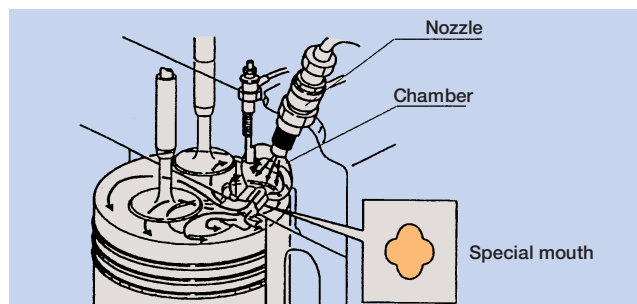
## Emission Reduction (ie a Cleaner Engine)

Cleaner engines with even lower exhaust emissions are achieved by improving on the already excellent TNE base. Stricter emission standards are cleared by a wide margin.

### IDI engines

#### 1. Combustion Chamber

By investigating flow characteristics using experimental and numerical analysis methods, Yanmar research has achieved improved flow mixing in both the main chamber and the special mouth surrounding the injector. More efficient use of the incoming air charge results in cleaner burn and lower exhaust emissions.



#### 2. Fuel Injection Equipment Mechanical Pump

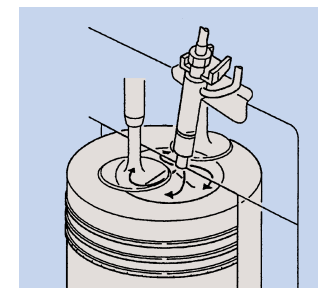
Instead of a PFR pump, a newly developed in-line pump has been used for the smaller TNV engines. Adjustments are made solely in the Yanmar's own FIE factory ensuring precise compliance with regulations. Also the following features are incorporated:

- Increased force is applied by the governor to quicken the fuel controlling rack response time. Engine revs are more constant. Matching to a wide range of machinery is simplified.
- Emmissions have been reduced by controlling fuel injection timing according to engine load.
- Cam profiles are matched to nozzle throttle needs, which give a better controlled injection rate. Emissions are reduced.

### DI engines

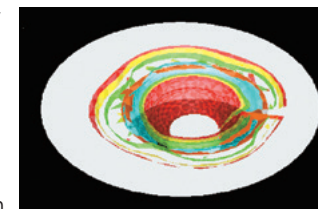
#### 1. Nozzle Installation Angle

The installation angle of the fuel injection nozzle is greater than that in conventional engines, so that uneven atomization of fuel between injections can be reduced. Excellent matching between intake swirl ratio and the shape of the combustion chamber has resulted in uniform mixing of fuel in the combustion chamber. Therefore, performance including combustion efficiency, startability, noise, and exhaust emission has been improved. On the 4TN94L, -98 and -98T by using 2 inlet and 2 exhaust valves, air intake and expulsion is markedly improved. Vertically mounted injector nozzle minimizes imbalance of spray pattern.



#### 2. Combustion Chamber

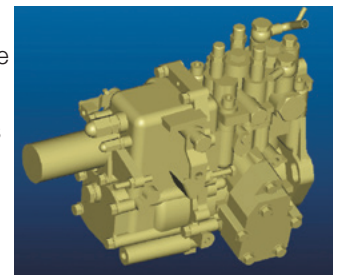
It increases the fluid energy of the air and fuel charge. The swirl effect produced in the chamber continues while combustion occurs, aiding mixing and results in lower exhaust emissions compared to conventional chambers.



#### 3. Fuel Injection Equipment

##### ● MP Type Fuel Injection Pump

A new MP pump has been developed especially for the TNV engine series. Our aim was to make improvements over a wide range of areas to even further reduce emissions.



Features are:

- High injection pressure
- Use of a mono plunger reduces uneven injection between the cylinders.
- Timing Control Device system optimizes injection to take into account speeds, loads and the startup phase.
- New mechanical governor helps to maintain cleaner exhausts.
- Minimal variation from chosen revs at low speed using constant pressure valve.

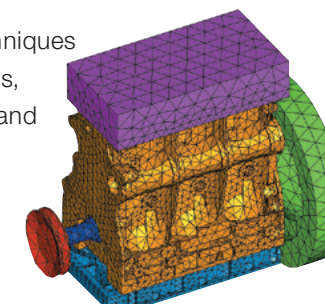
##### ● Fuel Injection Nozzle

- Multiple numbers of very small holes are used to achieve uniform atomization.
- Holes are not simply drilled, their inside edges are carefully rounded to promote even flow and direction of spray, also to reduce resistance.
- Low sack nozzle profile improves combustion. Double corn shape protects from cavitation.

## Noise Level Reduction (ie a more Silent Engine)

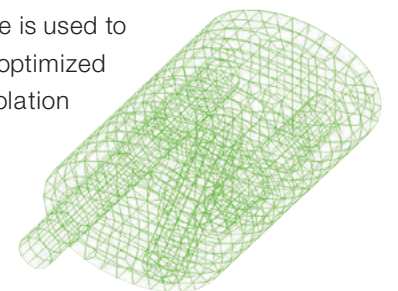
#### 1. Cylinder Block Noise Reduction

Yanmar's original CAE techniques have optimized the stiffness, minimized transformation, and reduced radiant noise.



#### 2. Muffler Noise Reduction

Original CAE technique is used to design a muffler with optimized volumes and sound isolation materials.







3TNV76



3TNV88



4TNV106T

Engine Specifications

| Engine Model                   |                                    | 2TNV70                                                | 3TNV70  | 3TNV76 | 3TNV82A (-B) | 3TNV84T (-B)          | 3TNV88 (-B)        | 4TNV84T (-B) | 4TNV88 (-B)  | 4TNV94L (-B)       | 4TNV98  | 4TNV98T    | 4TNV106       | 4TNV106T           |              |     |
|--------------------------------|------------------------------------|-------------------------------------------------------|---------|--------|--------------|-----------------------|--------------------|--------------|--------------|--------------------|---------|------------|---------------|--------------------|--------------|-----|
| Type                           |                                    | Vertical cylinder, 4-cycle water-cooled diesel engine |         |        |              |                       |                    |              |              |                    |         |            |               |                    |              |     |
| Combustion                     |                                    | Indirect injection (IDI)                              |         |        |              | Direct injection (DI) |                    |              |              |                    |         |            |               |                    |              |     |
| Aspiration                     |                                    | Natural Aspiration                                    |         |        |              | Turbocharged          | Natural Aspiration |              | Turbocharged | Natural Aspiration |         |            | Turbocharged  | Natural Aspiration | Turbocharged |     |
| No. of cylinders               |                                    | 2                                                     | 3       |        |              |                       |                    |              | 4            |                    |         |            |               |                    |              |     |
| Cyl. Bore x stroke             |                                    | mm                                                    | 70 x 74 |        | 76 x 82      | 82 x 84               | 84 x 90            | 88 x 90      |              | 84 x 90            | 88 x 90 | 94 x 110   | 98 x 110      |                    | 106 x 125    |     |
| Displacement                   |                                    | Litter                                                | 0.570   | 0.854  | 1.116        | 1.331                 | 1.496              | 1.642        |              | 1.995              | 2.190   | 3.053      | 3.319         |                    | 4.412        |     |
| Direction of rotation          |                                    | Counterclockwise (viewed from flywheel)               |         |        |              |                       |                    |              |              |                    |         |            |               |                    |              |     |
| Governor system                |                                    | Mechanical                                            |         |        |              |                       |                    |              |              |                    |         |            |               |                    |              |     |
| Cooling System                 |                                    | Radiator                                              |         |        |              |                       |                    |              |              |                    |         |            |               |                    |              |     |
| Lubrication System             |                                    | Forced lubrication by trochoid pump                   |         |        |              |                       |                    |              |              |                    |         |            |               |                    |              |     |
| Starting System                |                                    | Electric starting                                     |         |        |              |                       |                    |              |              |                    |         |            |               |                    |              |     |
| Dry mass (back plate)          |                                    | kg                                                    | 73      | 87     | 94           | 111                   | 150                | 138          |              | 165                | 155     | -          |               | -                  | -            |     |
| Dry mass (Bell housing)        |                                    | kg                                                    | 84      | 98     | 112          | 128                   | 159                | 148          |              | 170                | 165     | 235        |               | 245                | 320          | 340 |
| Applicable Emission Regulation | CEV BS III Compliance              | ○                                                     | ○       | ○      | ○            | ○                     | ○                  | ○            |              | ○ ( ≤37kW)         | ○       | ○ ( ≤37kW) | ○ ( ≥37kW,-Z) | ○ ( ≥37kW,-Z)      | -            | -   |
|                                | Ready for Upcoming CEMM Regulation | ○                                                     | ○       | ○      | ○            | ○                     | ○                  | ○            |              | ○ ( ≤37kW)         | ○       | ○ ( ≤37kW) | -             | -                  | -            | -   |

Output

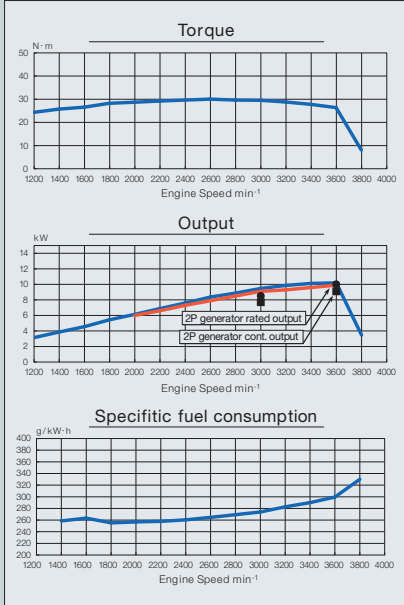
| Model          |                                |                            | 2TNV70             | 3TNV70             | 3TNV76                                | 3TNV82A (-B)   | 3TNV84T (-B)                          | 3TNV88 (-B)    | 4TNV84T (-B)   | 4TNV88 (-B)    | 4TNV94L (-B)   | 4TNV98                                | 4TNV98T        | 4TNV106        | 4TNV106T       |                |
|----------------|--------------------------------|----------------------------|--------------------|--------------------|---------------------------------------|----------------|---------------------------------------|----------------|----------------|----------------|----------------|---------------------------------------|----------------|----------------|----------------|----------------|
| Industrial use | NET kW/<br>NET hp/<br>Gross kW | min <sup>-1</sup><br>(rpm) | 3600               | 9.9/13.3/10.5      | 15.5 / 20.8 / 17.0                    | -              | -                                     | -              | -              | -              | -              | -                                     | -              | -              | -              |                |
|                |                                |                            | 3400               | 9.6 / 12.9 / 10.1  | 14.7 / 19.7 / 16.1                    | -              | -                                     | -              | -              | -              | -              | -                                     | -              | -              | -              |                |
|                |                                |                            | 3200               | 9.3 / 12.5 / 9.8   | 14.0 / 18.8 / 15.1                    | 18.2/24.4/19.9 | -                                     | -              | -              | -              | -              | -                                     | -              | -              | -              |                |
|                |                                |                            | 3000               | 9.1 / 12.2 / 9.5   | 13.7 / 18.4 / 14.6                    | 17.9/24.0/19.2 | 21.9/29.4/23.0                        | -              | 27.1/36.3/28.2 | 41.2/55.2/42.7 | 35.0/46.9/36.5 | -                                     | -              | -              | -              |                |
|                |                                |                            | 2800               | 8.5 / 11.4 / 8.8   | 12.8 / 17.2 / 13.6                    | 16.7/22.4/17.8 | 20.4/27.4/21.3                        | 29.1/39.0/30.2 | 25.2/33.8/26.1 | 38.6/51.8/39.9 | 33.7/45.2/35.0 | -                                     | -              | -              | -              |                |
|                |                                |                            | 2700               | 8.2 / 11.0 / 8.4   | 12.4/ 16.6 / 13.1                     | 16.1/21.6/17.1 | 19.7/26.4/20.5                        | -              | 24.3/32.6/25.1 | 37.1/49.8/38.3 | 32.5/43.6/33.7 | -                                     | -              | -              | -              |                |
|                |                                |                            | 2600               | 7.9 / 10.6 / 8.1   | 11.8 / 15.8 / 12.5                    | 15.5/20.8/16.5 | 19.0/25.5/19.7                        | 26.8/35.9/27.7 | 23.5/31.5/24.2 | 35.7/47.9/36.7 | 31.3/42.0/32.3 | -                                     | -              | -              | -              |                |
|                |                                |                            | 2500               | 7.6 / 10.2 / 7.8   | 11.4 / 15.3 / 12.0                    | 14.9/20.0/15.8 | 18.2/24.4/18.9                        | -              | 22.6/30.3/23.3 | 34.5/46.3/35.5 | 30.1/40.4/31.0 | 43.0/57.7/44.0                        | 51.1/68.5/52.1 | 62.5/83.8/63.9 | 67.7/90.8/70.8 | -              |
|                |                                |                            | 2400               | 7.3 / 9.8 / 7.5    | 11.0 / 14.8 / 11.5                    | 14.3/19.2/15.1 | 17.5/23.5/18.1                        | -              | 21.6/29.0/22.2 | 33.5/44.9/34.3 | 28.8/38.6/29.6 | 41.6/55.8/42.4                        | 49.3/66.1/50.2 | 60.3/80.9/61.6 | 65.5/87.8/68.3 | -              |
|                |                                |                            | 2300               | 7.0 / 9.4 / 7.2    | 10.5 / 14.1 / 11.0                    | 13.8/18.5/14.4 | 16.8/22.5/17.3                        | -              | 20.7/27.8/21.2 | -              | 27.7/37.1/28.5 | 39.9/53.5/40.7                        | 47.4/63.6/48.2 | 58.0/77.8/59.1 | 63.4/85.0/65.9 | -              |
|                |                                |                            | 2200               | 6.6 / 8.9 / 6.8    | 9.9 / 13.3 / 10.3                     | 13.2/17.7/13.8 | 16.0/21.5/16.5                        | -              | 19.9/26.7/20.4 | -              | 26.5/35.5/27.2 | 38.3/51.4/39.0                        | 45.6/61.1/46.3 | 55.5/74.4/56.5 | 61.4/82.3/63.6 | 72.0/96.6/74.2 |
|                |                                |                            | 2100               | 6.3 / 8.4 / 6.5    | 9.5 / 12.7 / 9.9                      | 12.5/16.8/13.0 | -                                     | -              | -              | -              | -              | 35.6/47.7/36.2 (-B)<br>36.8/49.3/37.4 | 43.8/58.7/44.4 | -              | 59.0/79.1/61.0 | 70.9/95.1/72.9 |
| Generator use  | Stand-by                       | 2000                       | 6.0 / 8.0 / 6.1    | 9.0 / 12.1 / 9.3   | 11.8/15.8/12.3                        | -              | -                                     | 18.0/24.1/18.4 | -              | 24.1/32.3/24.6 | 35.3/47.3/35.9 | 41.9/56.2/42.5                        | -              | 56.6/75.9/58.3 | 69.9/93.7/71.6 |                |
|                |                                | 3600                       | 10.0 / 13.4 / 10.6 | 16.0 / 21.5 / 17.6 | 19.5/26.1/21.7                        | -              | -                                     | -              | -              | -              | -              | -                                     | -              | -              | -              |                |
|                |                                | 3000                       | 8.5 / 11.4 / 8.8   | 13.3 / 17.8 / 14.3 | 16.6/22.3/17.9                        | -              | -                                     | -              | -              | -              | -              | -                                     | -              | -              | -              |                |
|                |                                | 1800                       | -                  | 8.0 / 10.7 / 8.3   | 10.7/14.3/11.1                        | 13.2/17.7/13.8 | 18.3/24.5/18.6 (-B)<br>18.8/25.5/19.5 | 16.3/21.9/16.9 | 26.9/36.1/27.7 | 21.6/29.0/22.4 | -              | 40.8/54.7/41.6                        | 50.1/67.2/50.9 | 58.7/78.7/60.5 | 66.9/89.7/69.4 |                |
|                | Continuous                     | 1500                       | -                  | 6.7 / 9.0 / 6.8    | 9.0/12.1/9.2                          | 11.0/14.8/11.3 | 15.3/20.5/15.5 (-B)<br>15.8/21.5/16.3 | 13.5/18.1/13.9 | 21.3/28.6/21.8 | 18.0/24.1/18.5 | -              | 34.4/46.1/34.9                        | 41.7/55.9/42.2 | 49.4/66.2/50.5 | 56.0/75.1/57.6 |                |
|                |                                | 3600                       | 9.1 / 12.2 / 9.7   | 14.5 / 19.4 / 16.1 | 17.7/23.7/19.9                        | -              | -                                     | -              | -              | -              | -              | -                                     | -              | -              | -              |                |
|                |                                | 3000                       | 7.7 / 10.3 / 8.1   | 12.1 / 16.2 / 13.1 | 15.1/20.2/16.5                        | -              | -                                     | -              | -              | -              | -              | -                                     | -              | -              | -              |                |
|                |                                | 1800                       | -                  | 7.3 / 9.8 / 7.5    | 9.8/13.1/10.1                         | 12.0/16.1/12.6 | 16.6/22.5/17.2 (-B)<br>16.6/22.5/17.3 | 14.8/19.8/15.4 | 24.3/32.6/25.1 | 19.6/26.3/20.5 | -              | 36.4/48.8/37.2                        | 45.3/60.7/46.1 | 53.3/71.5/55.1 | 60.9/81.7/63.4 |                |
| 1500           | -                              | 6.1 / 8.2 / 6.3            | 8.2/11.0/8.4       | 9.9/13.3/10.3      | 14.1/19.1/14.4 (-B)<br>14.0/19.0/14.4 | 12.3/16.5/12.7 | 19.1/25.6/19.6                        | 16.4/22.0/16.9 | -              | 30.7/41.2/31.2 | 37.7/50.6/38.2 | 41.2/55.3/42.3                        | 50.9/68.3/52.5 |                |                |                |

Note: When specification varies, the above engine speed and rated output will vary accordingly.

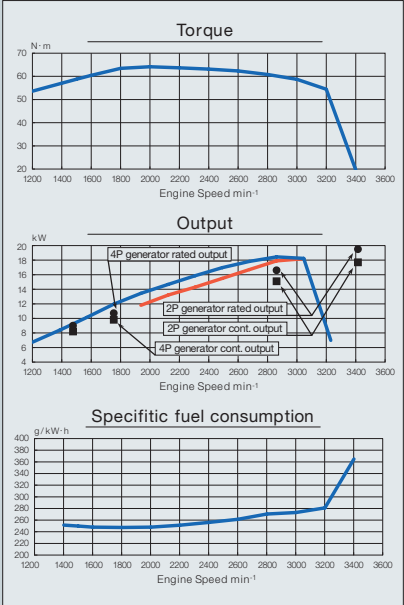


## Performance Curves

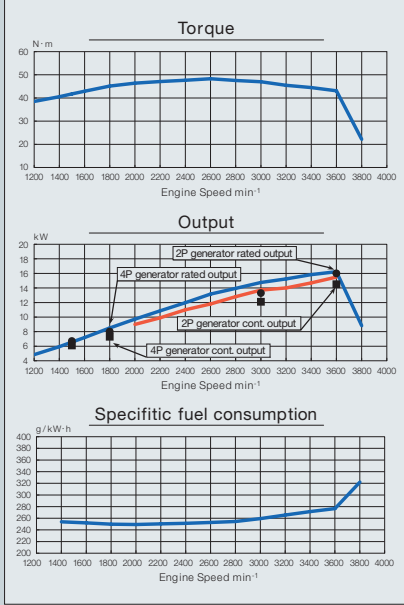
2TNV70



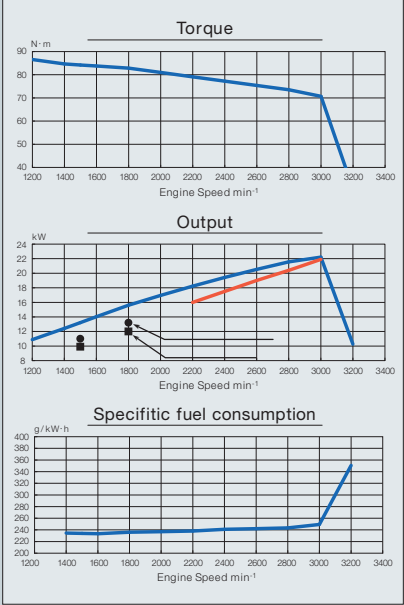
3TNV76



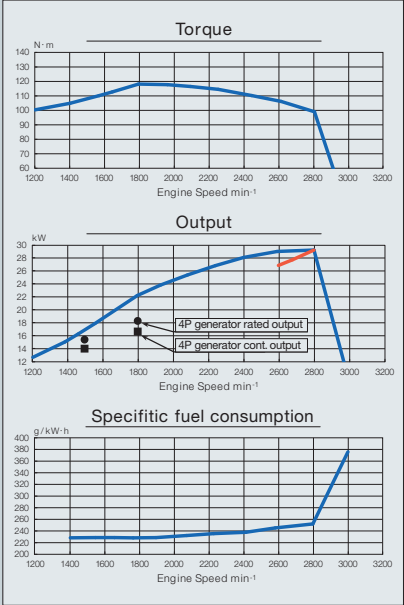
3TNV70



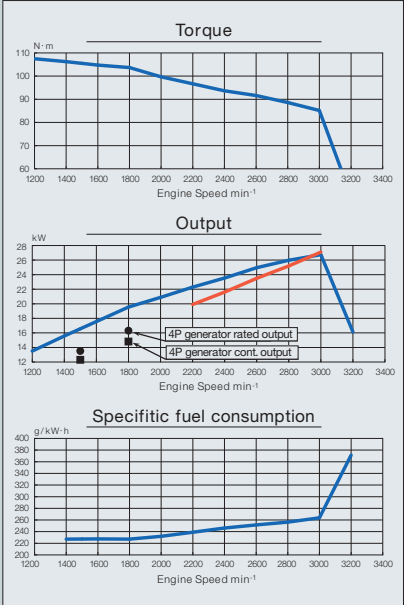
3TNV82A(-B)



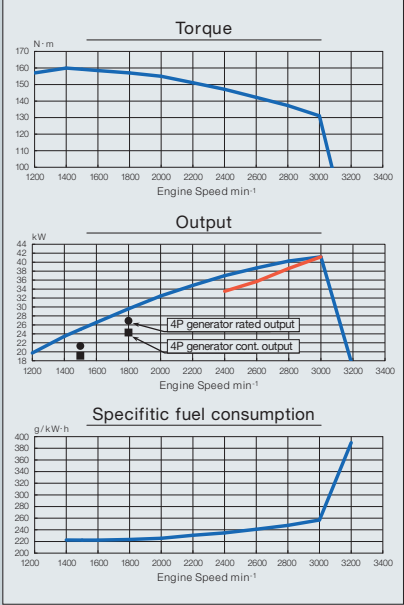
3TNV84T(-B)



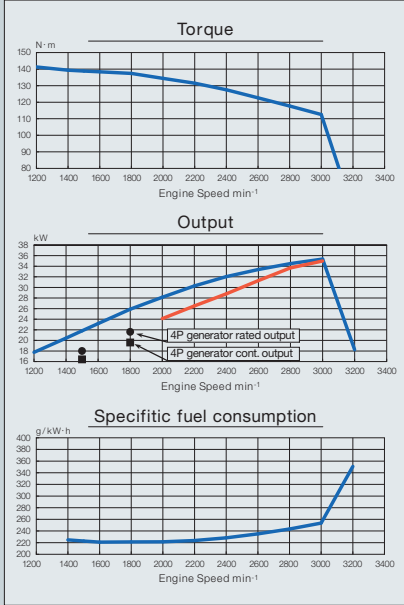
3TNV88(-B)



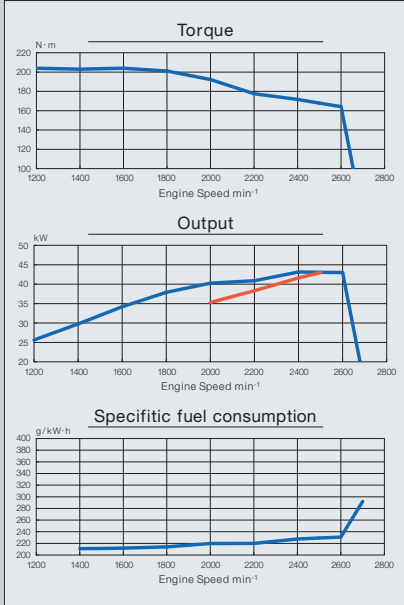
4TNV84T(-B)



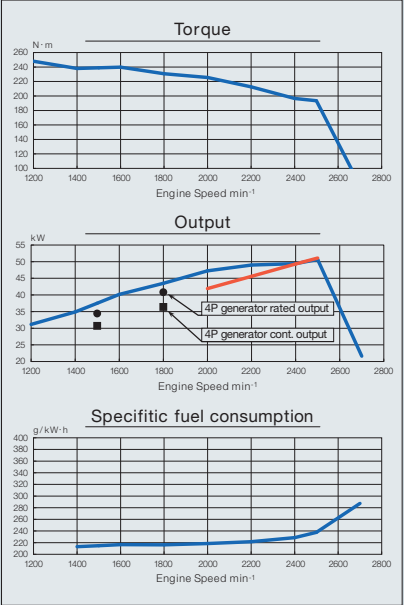
4TNV88(-B)



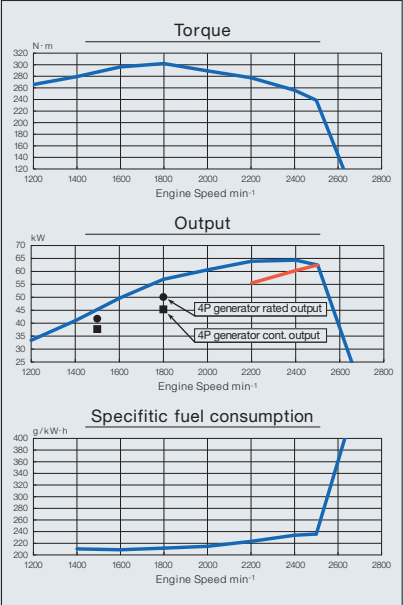
4TNV94L(-B)



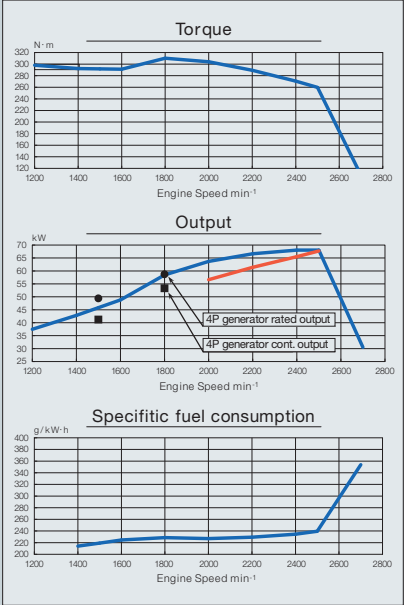
4TNV98



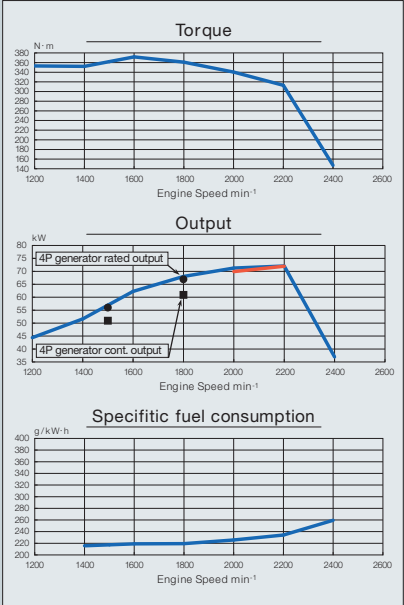
4TNV98T



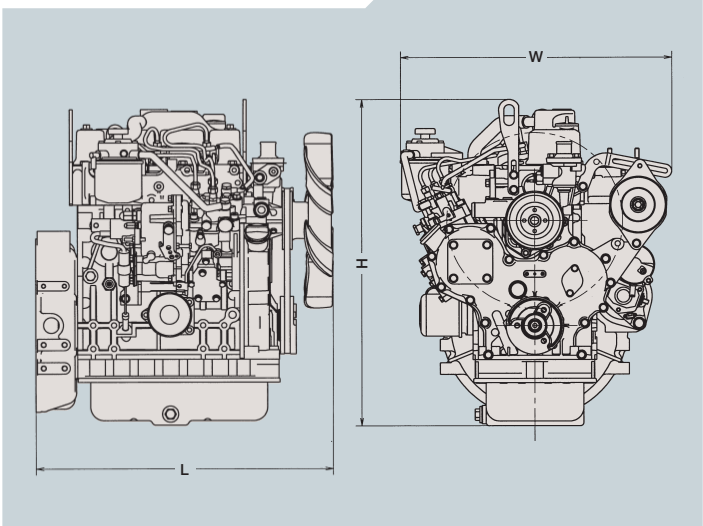
4TNV 106



4TNV 106T



## Engine Dimensions



Unit: mm

| Model | 2TNV70 | 3TNV70 | 3TNV76 |
|-------|--------|--------|--------|
| L     | 415    | 504    | 524    |
| W     | 427    | 427    | 427    |
| H     | 521    | 549    | 572    |

| Model | 3TNV82A | 3TNV84T | 3TNV88 | 4TNV84T | 4TNV88 |
|-------|---------|---------|--------|---------|--------|
| L     | 528.5   | 615.7   | 564.5  | 655     | 655    |
| W     | 498.5   | 517.5   | 517.5  | 517.5   | 517.5  |
| H     | 561     | 652     | 622    | 685     | 622    |

| Model | 4TNV94L | 4TNV98 | 4TNV98T |
|-------|---------|--------|---------|
| L     | 719     | 719    | 719     |
| W     | 496     | 496    | 574     |
| H     | 717     | 717    | 784     |

| Model | 4TNV106 | 4TNV106T |
|-------|---------|----------|
| L     | 890     | 890      |
| W     | 628     | 628      |
| H     | 820     | 869      |

Note:When specification varies,the above performance curve and engine dimensions will vary accordingly.