# B1 ENGINE DESCRIPTION

# 1KR
# 1 OUTLINE

On M 300 Series, a newly-designed Type 1KR-FE engine has been mounted transversely.
Type 1KR-FE engine is an in-line 3-cylinder water-cooled engine with a displacement of 0.996 liter that has been developed, aiming at excellent fuel economy, low noise level, low vibration, light weight and maintenance-free feature.
The vehicles mounted with Type 1KR engine have two different specifications, depending upon the applicable exhaust emission control standards, i.e. the general destination specification and EU destination specification. The general specification vehicles have complied with the exhaust emission control standard, ECE83-03 (the normally-called Euro2) through changing the EFI system specifications as well as the employment of the optimized control. etc. Moreover, the EU specification vehicles have complied with the exhaust emission control standard: EEC:2003/76/(70/220), EEC:R83-05 (the normally-called Euro4) through changing the EFI system specifications and employing the optimized control, etc, combined with the intelligent catalyst.
Furthermore, all the EU specification vehicles have achieved the fuel consumption standard 2004/3 (80/1268).

1.FEATURES

(1) LOW FUEL CONSUMPTION

The intake and exhaust efficiencies have been improved through the employment of a valve actuating mechanism with DOHC4 valves with a variable valve timing device and a longitudinal type straight intake port.
A higher compression ratio has been achieved through a compact combustion chamber and improved cooling around the combustion chamber. Also, the combustion efficiency has been improved.
The resistance related to the pistons has drastically been reduced through the employment of a reduced thrust load of piston due to the adoption of an offset crankshaft, the application of a new type resin coating to the pistons and reduced piston ring tensions.
The pumping loss has been reduced through the employment of DVVT equipment and the introduction of EGR gas in the medium and low loading ranges.

(2) LOW VIBRATION AND LOW NOISE LEVEL

The engine vibration has been reduced and joint rigidity has been improved by adopting a high rigidity aluminum block and a high rigidity aluminum oil pan.
The tapping noise and bending vibration have been reduced by employing a forged individually balanced crankshaft.
The engine mount vibration has been reduced by integrating the engine mount bracket with the chain cover.

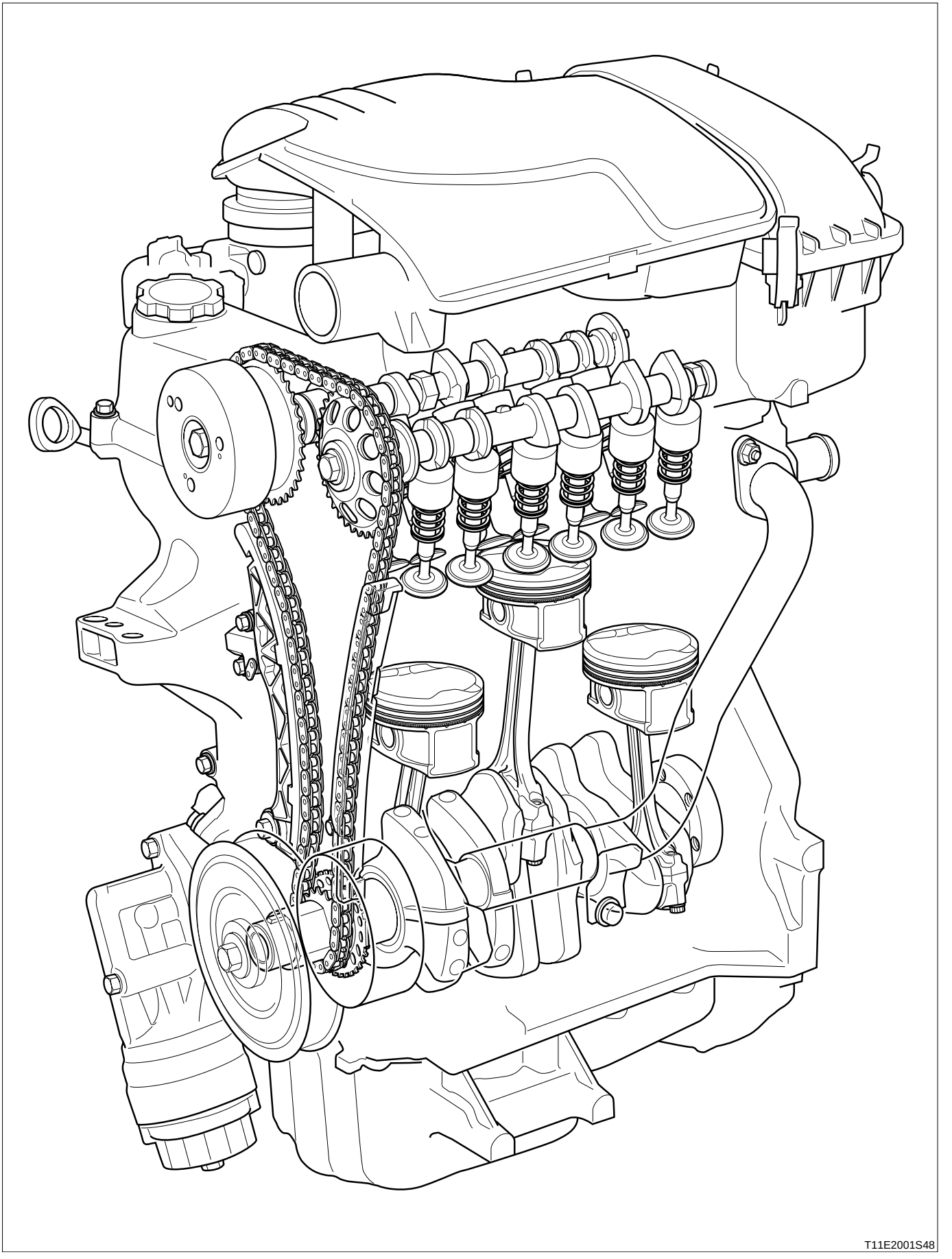
(3) COMPACT SIZE AND LIGHT WEIGHT

The cylinder head-related components have been designed compactly with reduced weight by employing a direct-tapping type DOHC.
The weight has been reduced by employing resin intake manifold, throttle body and head cover.

(4) MAINTENANCE

The maintenance-free feature has been achieved by employing a timing chain equipped with an auto tensioner.
The employment of an element replacement type oil filter has reduced the environmental load substance during the recycling period.

Engine perspective view



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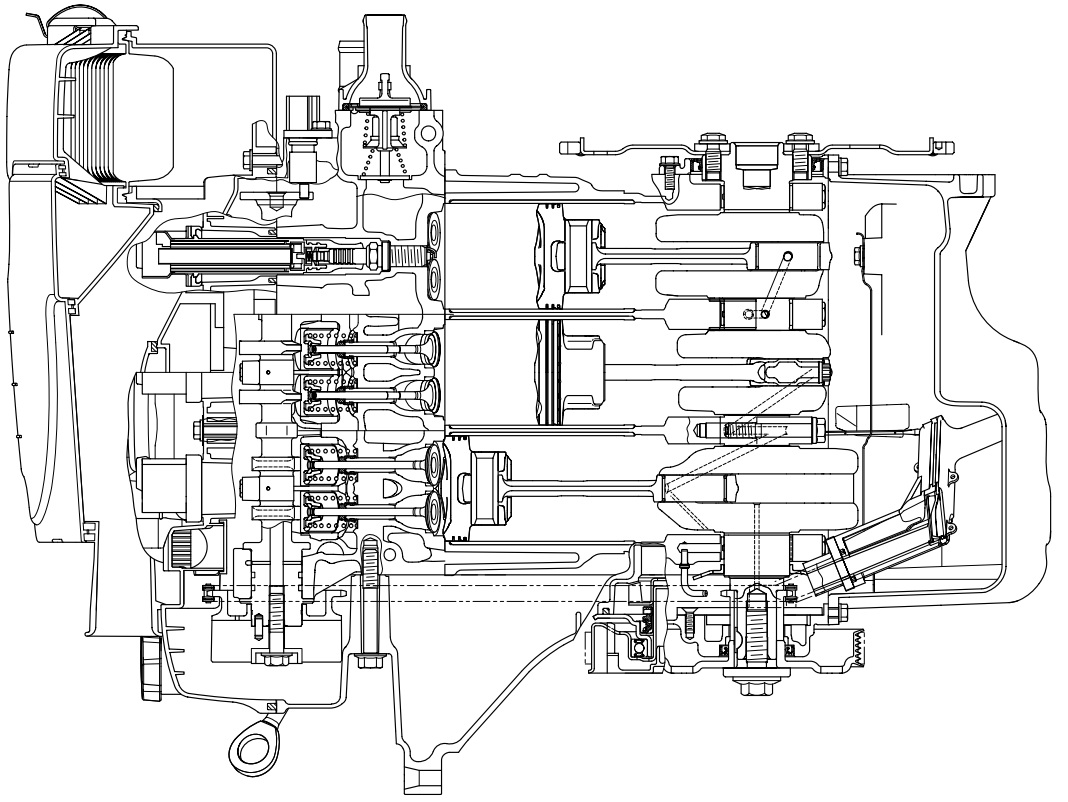
# 2 SPECIFICATIONS

Engine specificatons

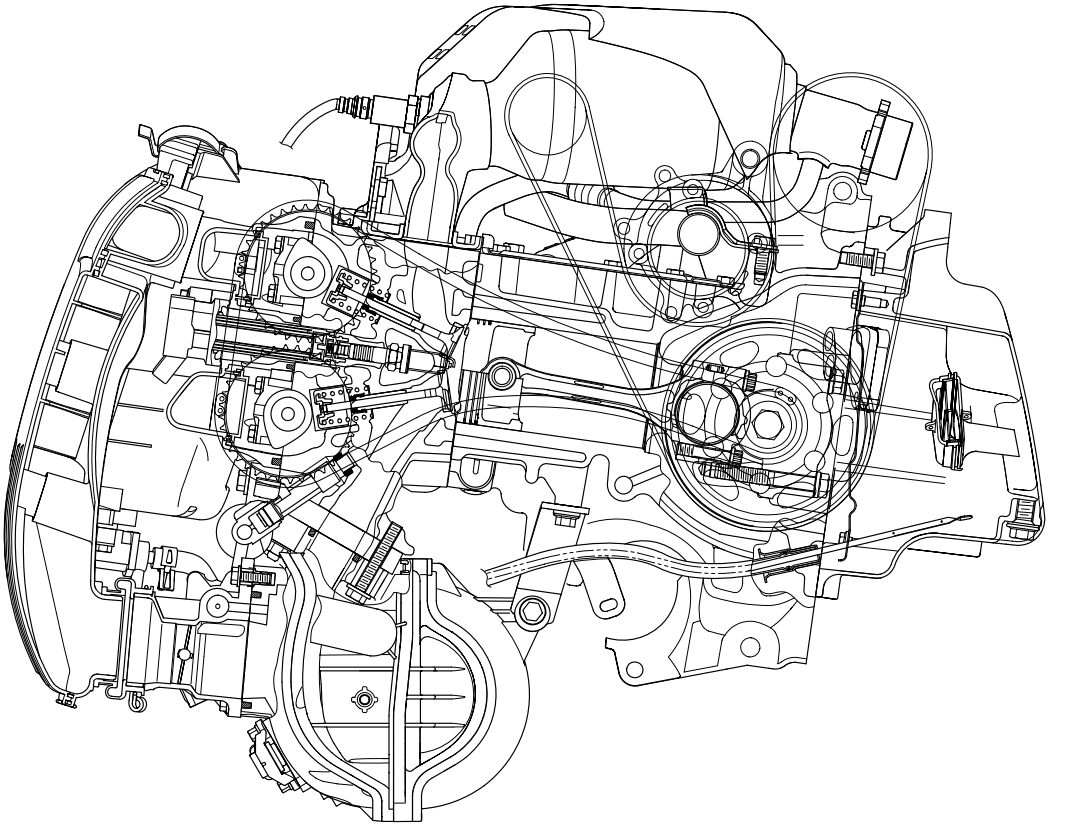
| | | | |
|---|---|---|---|
| Engine type | | | TYPE 1KR-FE |
| Kind | | | Gasoline-fueled, water-cooled 4-cycle |
| Number of cylinders and arrangement | | | 3-cylinder in line, transversely mounted |
| Valve mechanism | | | Chain driven, DOHC (IN2, EX2) |
| Combustion chamber | | | Pent roof |
| Intake and exhaust layout | | | Cross-flow type |
| Total displacement (cc) | | | 998 |
| Bore × Stroke (mm) | | | 71.0×84 |
| Compression ratio | | | 10.5±0.3 |
| Maximum output (kW) [rpm] | | | 51.0/6000 |
| Maximum torque (N·m) [rpm] | | | 94.0/3600 |
| Valve Timing | Intake | Open | 40°-−5° BTDC |
| | | Close | 10°-55° ABDC |
| | Exhaust | Open | 40° BBDC |
| | | Close | 2° ATDC |
| Fuel supplying device | | | Electronically controlled fuel injection system (EFI) |
| Ignition method | | | Full-transistorized DLI type battery ignition |
| Idle revolution speed | | | 800±50 |
| Lubricant used | | | SAE 0W-20 or 5W-30 API SG or higher |

# 3 SECTIONAL VIEW

Engine cross-section view



<Longitudinal cross-section>



<Transverse cross-section>

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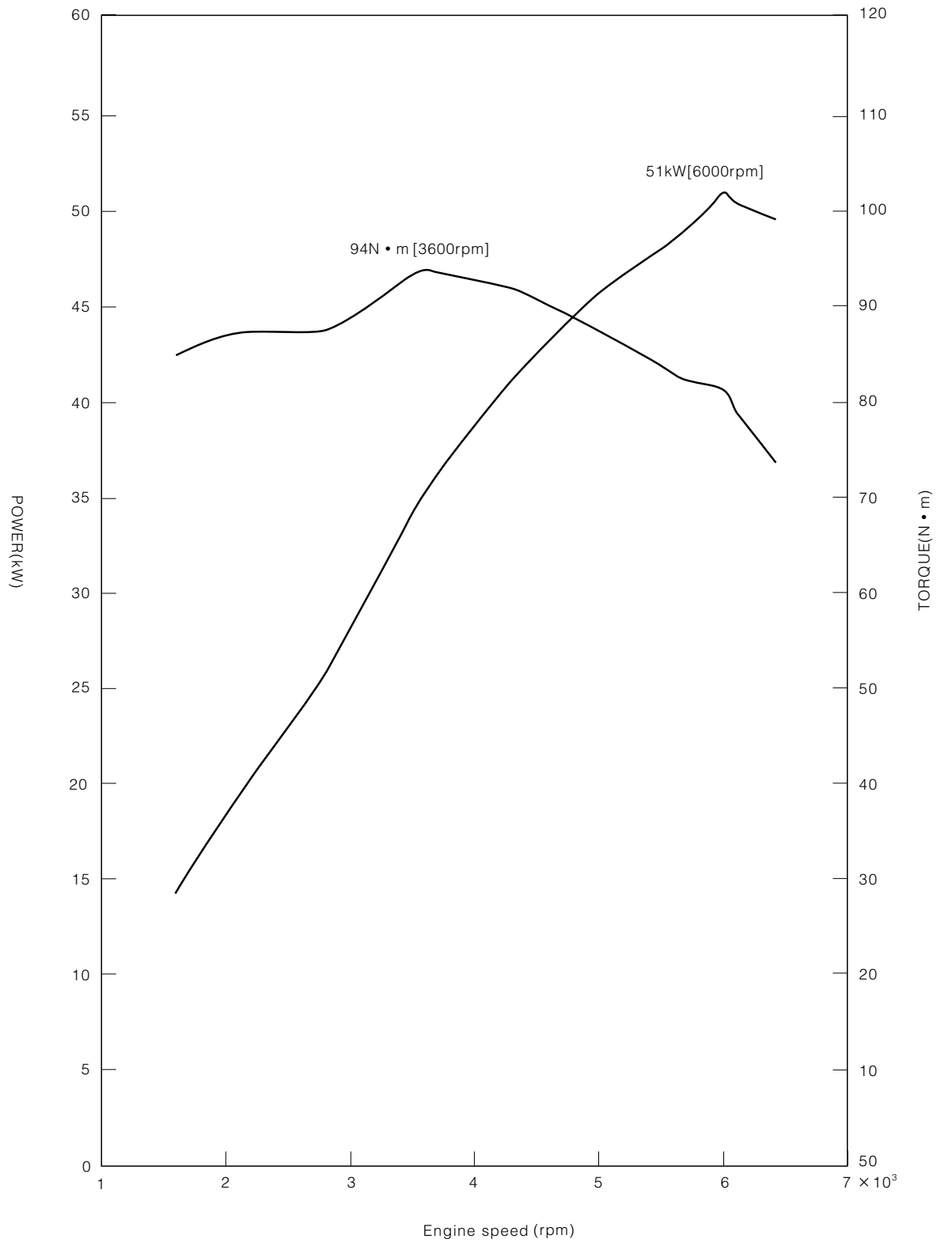
# 4 PERFORMANCE CURVE

Engine performance diagram




Type 1KR-FE Engine

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## K3

# 1 OUTLINE

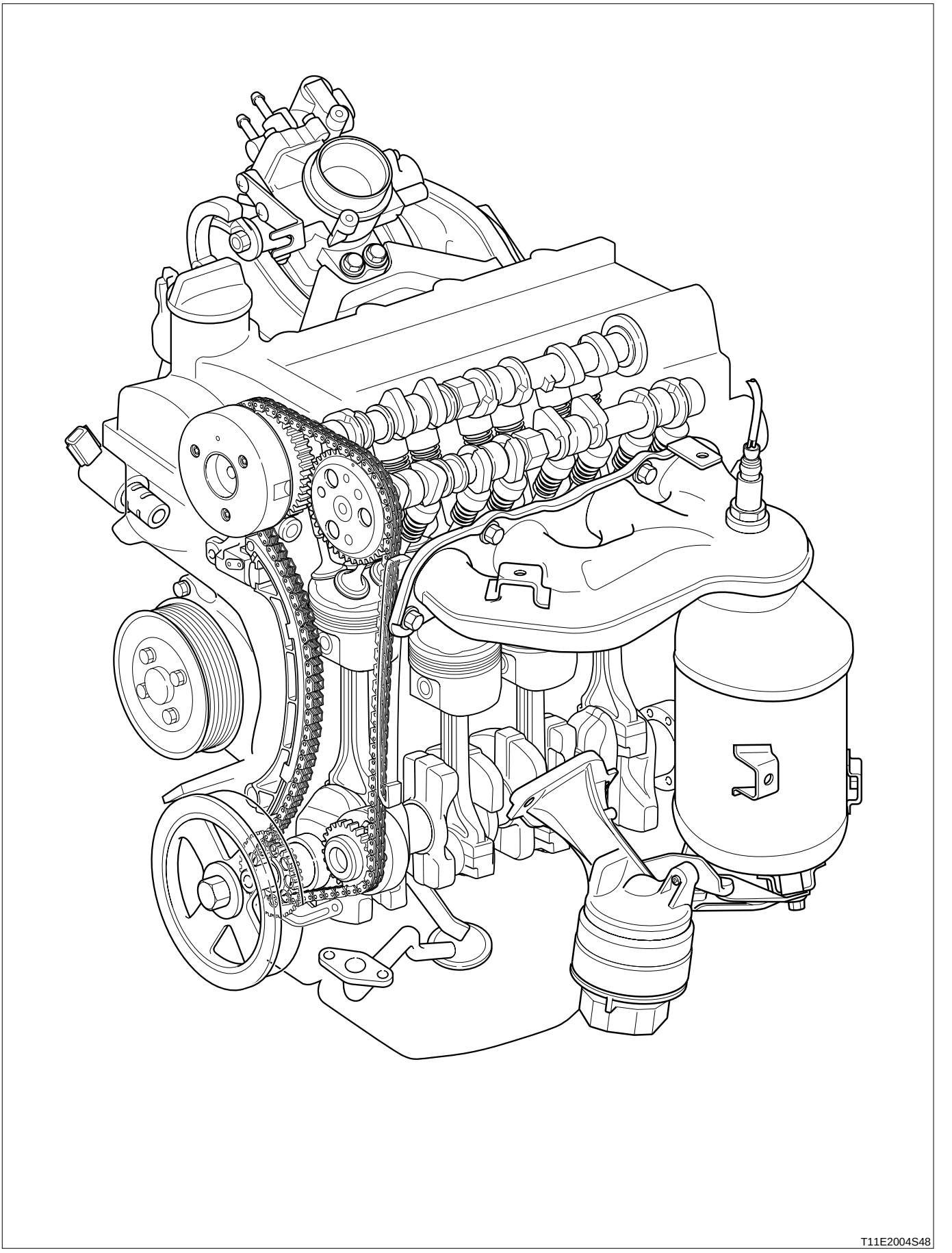
On M 301 Series, Type K3-VE engine has been mounted transversely.

On Type K3-VE engine, the chain cover is integral with the engine mount. This has contributed to a high rigidity and light weight as well as to reduced vibration and noise level.

The vehicles mounted with Type K3-VE engine have two different specifications, depending upon the applicable exhaust emission control standards, i.e. the general destination specification and EU specification. The general specification vehicles have complied with the exhaust emission control standard, ECE83-03 (normally-called Euro2) through changing the EFI system specifications as well as the employment of the optimized control. etc. Moreover, the EU specification vehicles have complied with the exhaust emission control standard: EEC:2003/76/(70/220), EEC:R83-05 (normally-called Euro4) through changing the EFI system specifications and employing the optimized control, etc, combined with the intelligent catalyst.

Furthermore, all the EU specification vehicles have achieved the fuel consumption standard 2004/3 (80/1268).

Engine perspective view



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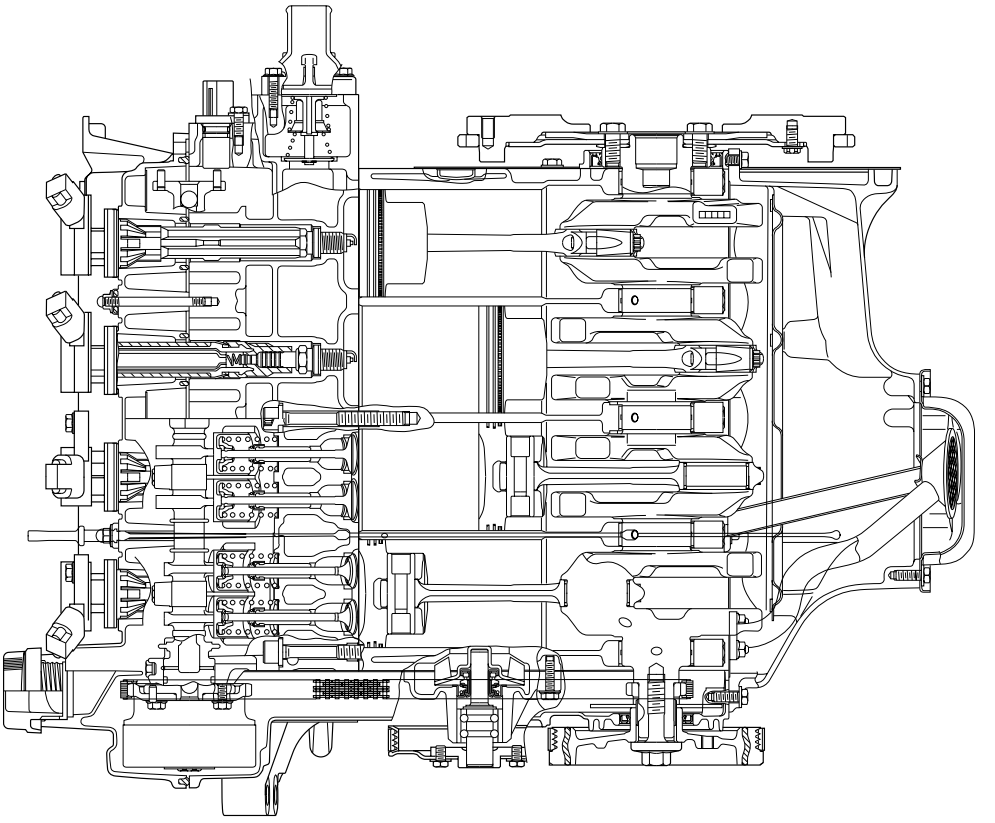
# 2 SPECIFICATIONS

## Engine specifications

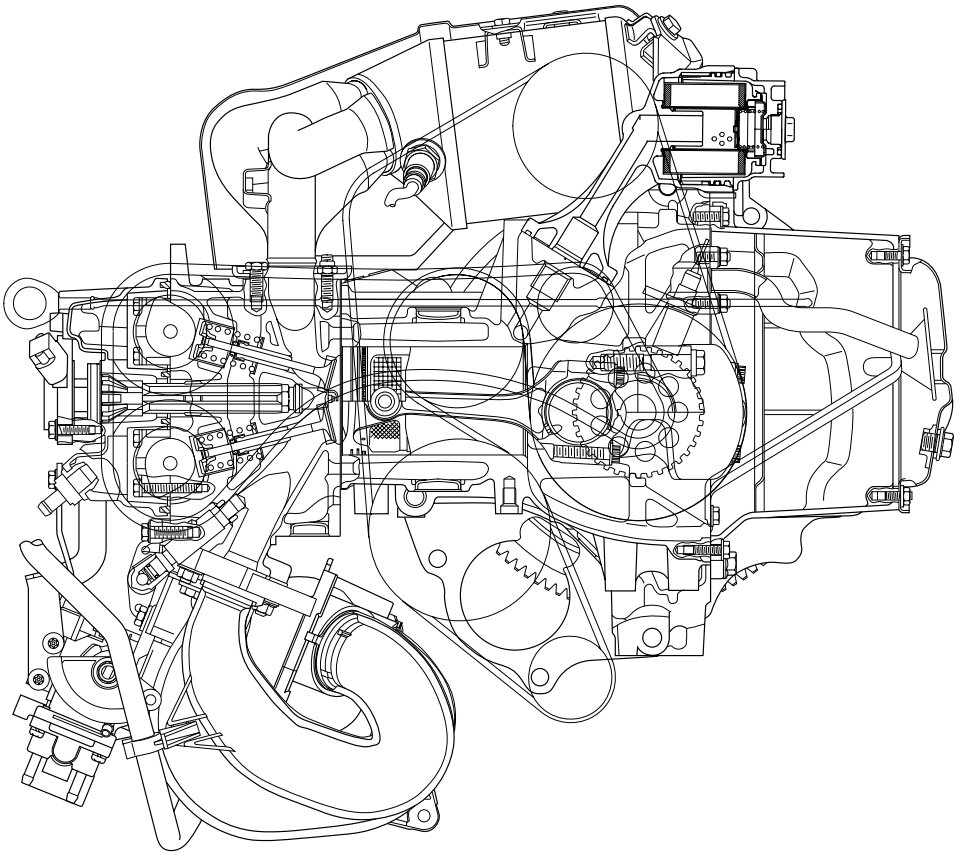
| | | | | |
|---|---|---|---|---|
| Engine type | | | TYPE K3-VE | |
| Kind | | | Gasoline-fueled, water-cooled 4-cycle | |
| Number of cylinders and arrangement | | | 4-cylinder in line, transversely mounted | |
| Valve mechanism | | | Chain driven, DOHC (IN:2, EX:2) | |
| Combustion chamber | | | Pent roof | |
| Intake and exhaust layout | | | Cross-flow type | |
| Total displacement (cc) | | | 1298 | |
| Bore × Stroke (mm) | | | 72.0×79.7 | |
| Compression ratio | | | 10±0.3 | |
| Maximum output (kW) [rpm] | | | 64.0/6000 | |
| Maximum torque (N·m) [rpm] | | | 120.0/3200 | |
| Valve Timing | Intake | Open | 30˚-−12˚ BTDC | |
| | | Close | 10˚-52˚ ABDC | |
| | Exhaust | Open | 30˚ BBDC | |
| | | Close | 2˚ ATDC | |
| Fuel supplying device | | | Electronically controlled fuel injection system (EFI) | |
| Ignition method | | | Full-transistorized DLI type battery ignition | |
| Idle revolution speed | | | MT:650±50 | AT:700±50 |
| Lubricant used | | | SAE 5W-20 or 5W-30 API SG or higher | |

## 3 SECTIONAL VIEW

Engine cross-section view



<Longitudinal cross-section>



<Transverse cross-section>

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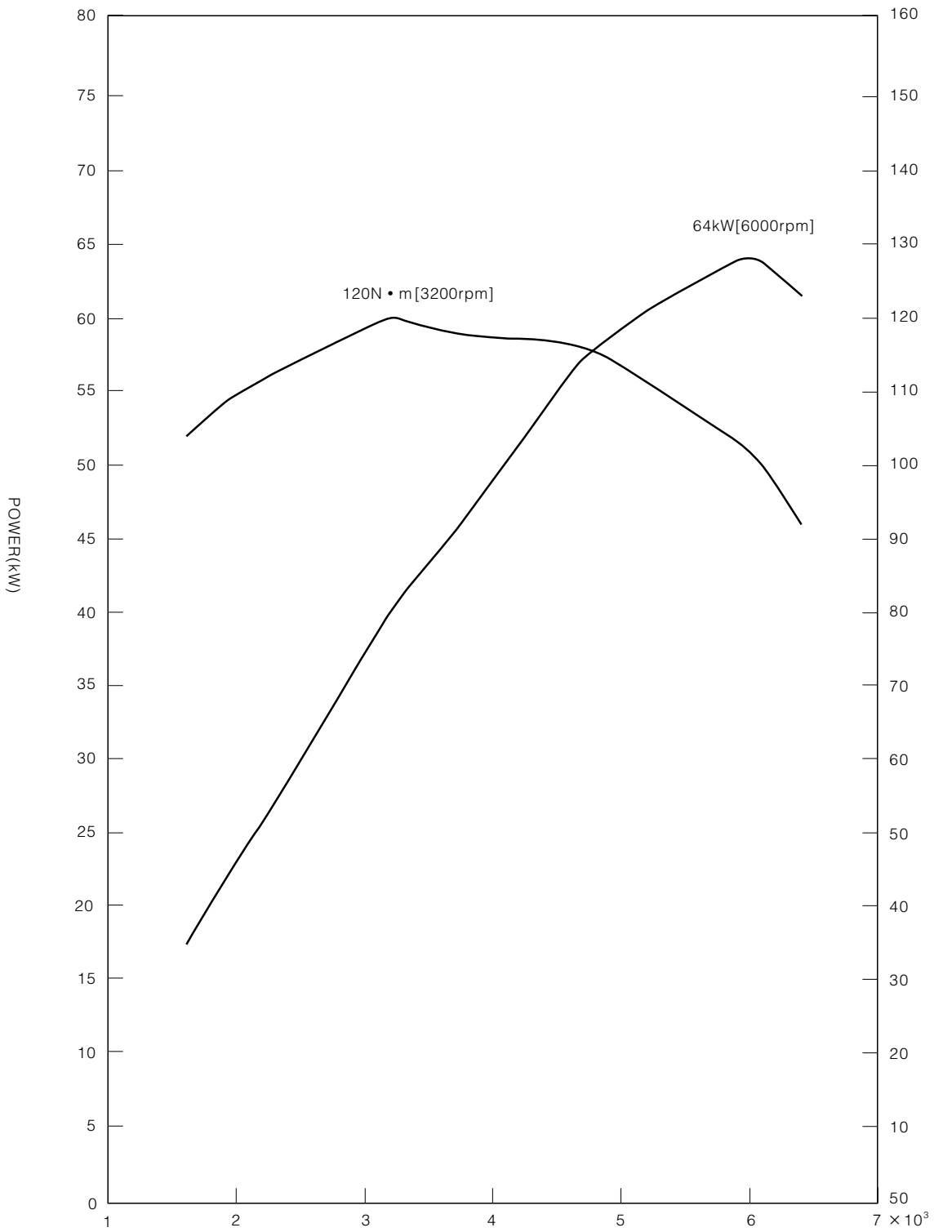
# 4 PERFORMANCE CURVE

Engine performance diagram




Type K3-VE Engine

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