YANMAR

DIESEL ENGINES

TNV Series COMMON RAIL

EPA tier 4 (19-56kW) EU Stage IIIB (37-56 kW)

Call for Yanmar solutions

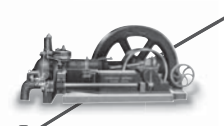
We wish for a Blue Sky in the Future.

Lessening the environmental load,
coexisting with nature – the entire world shares this grand theme.
Diesel engines may be necessary for many industries,
but they also need to be kind to the environment.
Yanmar uses the trust in its technology and flexibility of ideas,
formed over a century, to develop powerful and clean diesel engines
for the new generation that meet the strictest environmental regulations.

To protect our beautiful blue skies,
we continue to refine our technology
to contribute to the future of Earth and humanity.

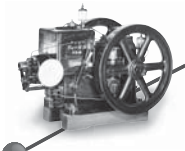
100 Years of Milestones

Yanmar's history started with the wishes of its founder, Magokichi Yamaoka, that he could help make the back-breaking work of farming even a little easier, and that not one drop of fuel be wasted. This led to the development of the HB-Type, the world's first small horizontal water-cooled diesel engine in an era in which there were only large ones.
Our leading technology and the Yanmar Spirit of always responding to the needs of the times have been passed down for the century since our founding.
Yanmar products, with their uniquely creative technology, are now found supporting all sort of industrial fields around the world, whether on farms, in cities, or on the high seas.



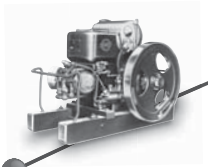
March 22, 1912

Yamaoka Hatsudoki Kosakusho (Engine Manufacturing Company) founded in Osaka city, selling gas motors and suction-type gas motors.



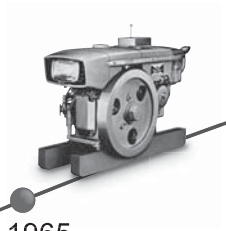
December 23, 1933

HB-Type
3.7-4.5kW (5-6hp)
The world's first small horizontal water-cooled diesel engine



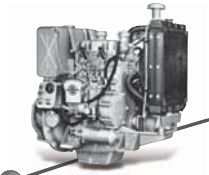
1952

K1-Type
1.1-1.5kW (1.5-2hp)
The world's smallest four-cycle horizontal water-cooled diesel engine



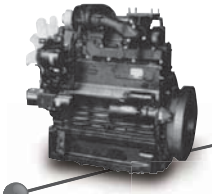
1965

F(E) Series
3.0-8.9kW (4-12hp)
Modernized horizontal water-cooled diesel engine



1968

2W90
10.4-14.9kW (14-20hp)
YANMAR's first vertical water-cooled diesel engine

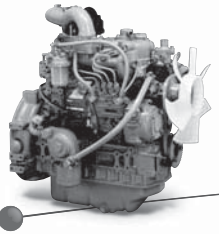


1980

3TN95/4TN95(T)
33.6-63.4kW (45-85hp)
YANMAR's first direct injection (DI) vertical water-cooled diesel engine

1983

L Series
3.0-6.7kW (4-9hp)
The world's smallest and lightest air-cooled diesel engine



1989

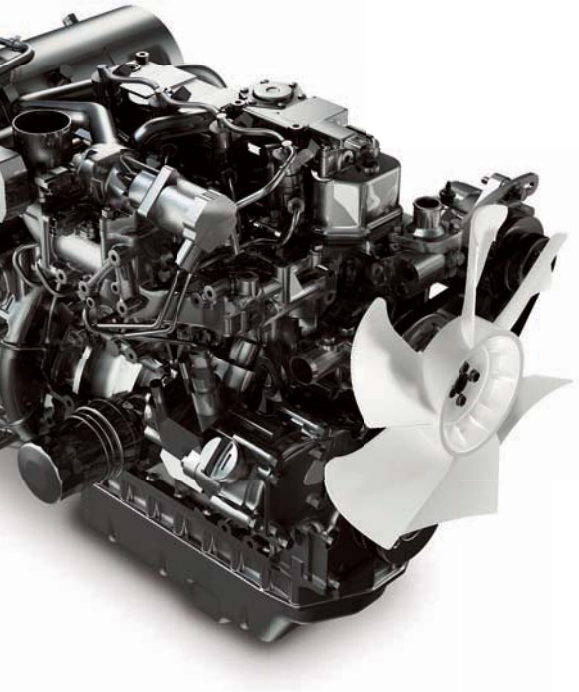
4TN84T-RAC
37.3kW(50hp)
YANMAR's first electronic controlled vertical water-cooled diesel engine

1993

TNE Series
5.7-84.2kW(8-113hp)
Released and obtain the certification for California Air Resources Board (CARB) emissions regulations in 1994

2002

TNV Series(EPA Tier2)
6.1-74.2kW(8-100hp)
Started mass production

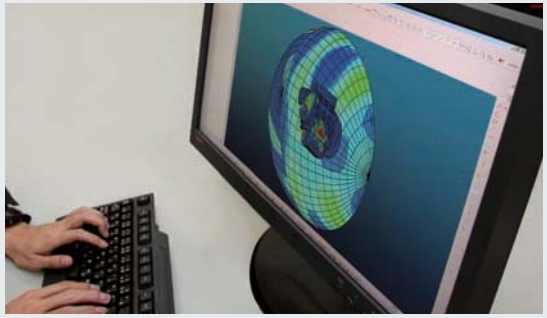


TNV

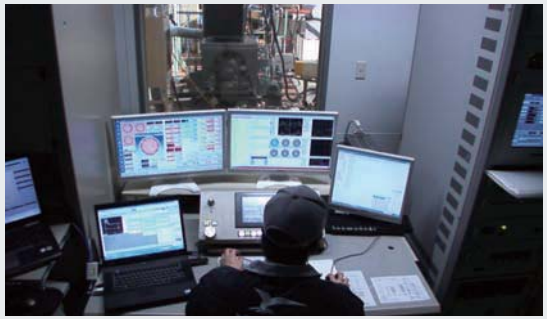
Common Rail Series

Research & Development

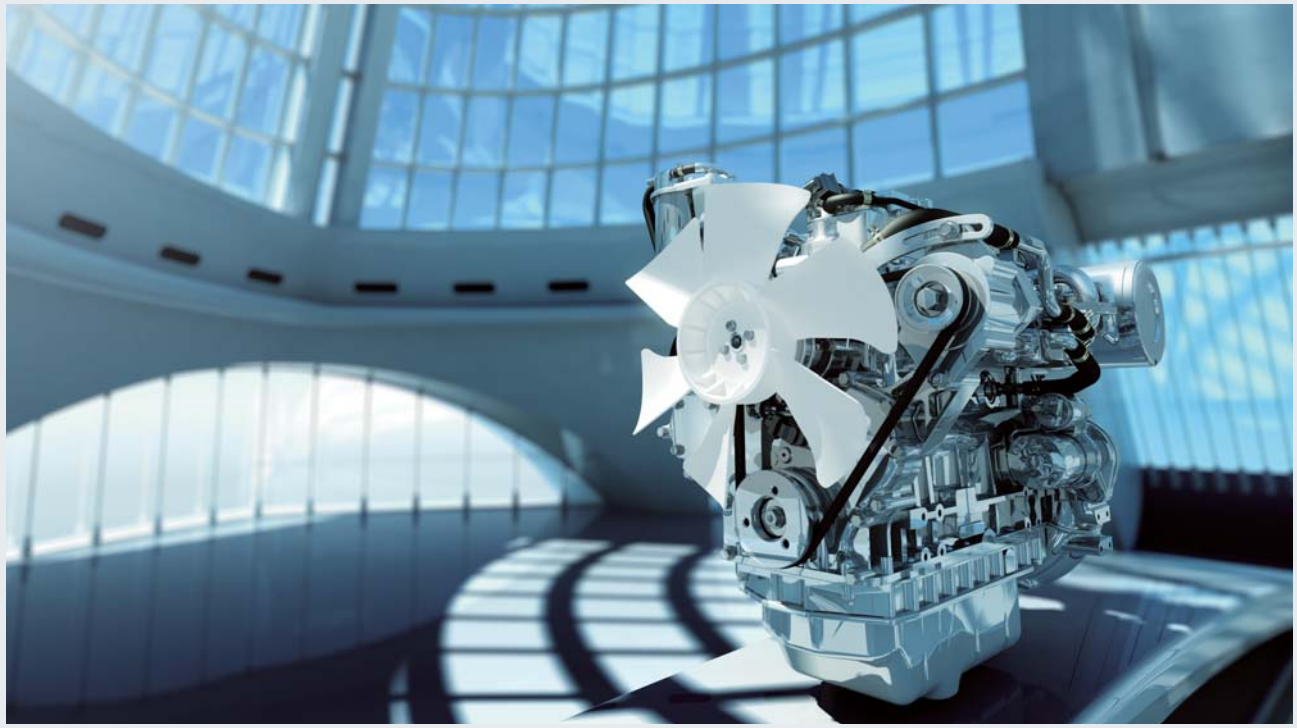
Yanmar operates a diverse R&D program as we seek to create ever-more efficient and ever-more clean-burning diesel engines. Using our own unique technology as a starting-point, we add in the latest in advanced technology to comply with EPA Tier4 / EU Stage IIIB nonroad diesel engine emissions regulations.



Simulation Analysis



Engine Testing Laboratory



EPA
Tier 4
(19-56kW)

EU
Stage IIIB
(37-56kW)

YANMAR TNV Clean Diesel Technologies

- ☑ Direct injection to create clean-burning power
- ☑ Common rail system to allow fine-tuned electronic control of fuel injection
- ☑ Cooled EGR (Exhaust Gas Recirculation) to reduce nitrogen oxides (NOx)
- ☑ Diesel Particulate Filter (DPF*) to catch particulate matter (PM) in the exhaust gas
- ☑ Fully-electronic control to provide total intelligent engine control

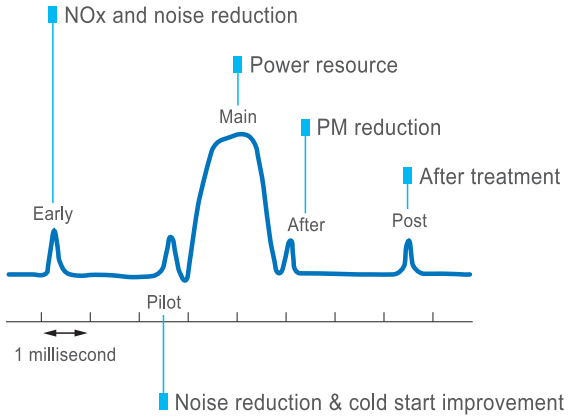
Direct injection

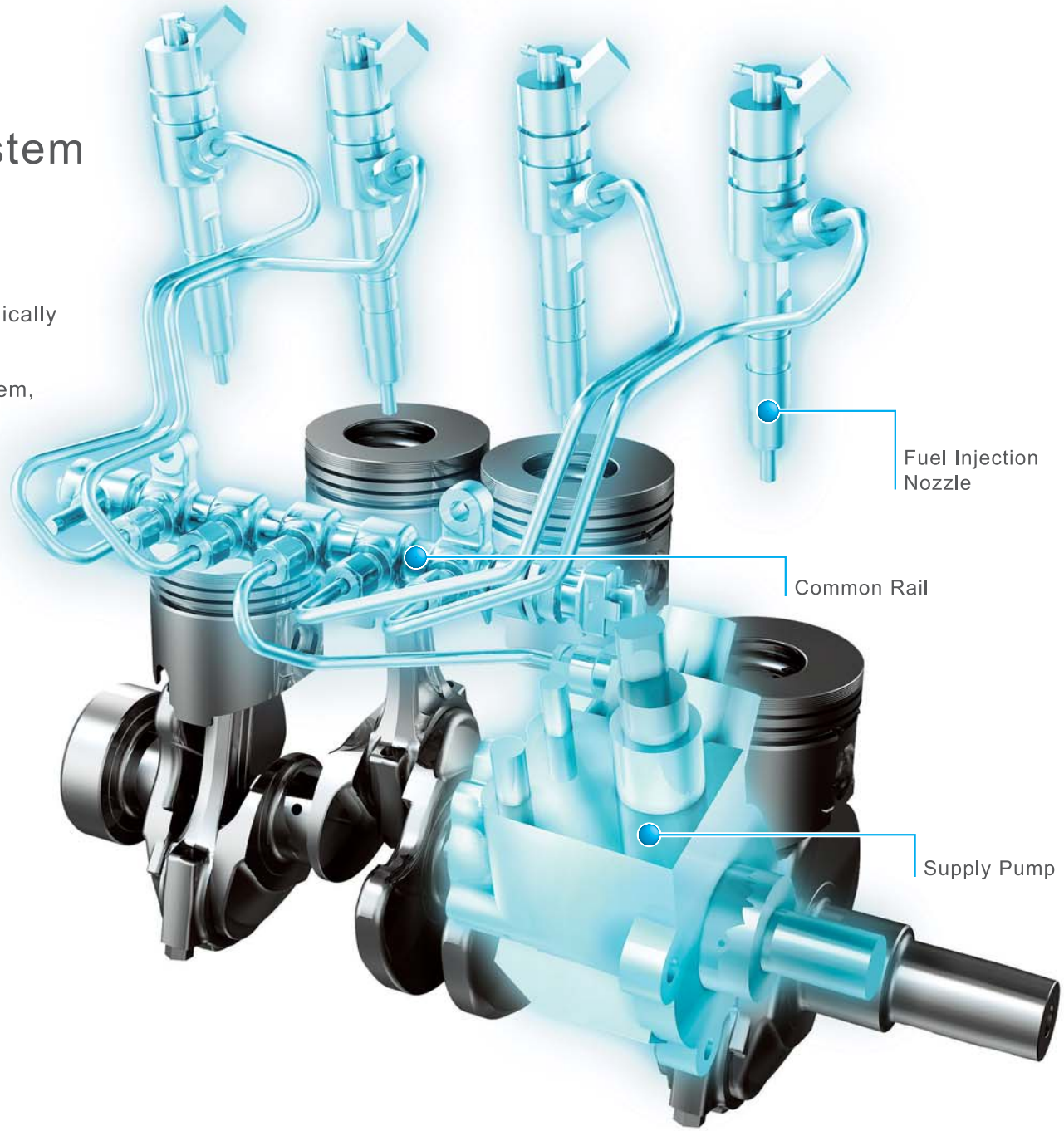
* "DPF" is the filter device designed to remove particulate matter (PM) from exhaust gas.

Common Rail Injection System

High-pressure fuel is stored in the common rail,
and the amount, frequency, and timing
of fuel injection are precisely controlled electronically
in 1/1,000th of a second intervals.
Using a high pressure multi-stage injection system,
we can reduce the amount
of nitrogen oxides (NOx)
and particulate matter (PM) contained
in the exhaust gas and achieve a quiet,
fuel-efficient engine.

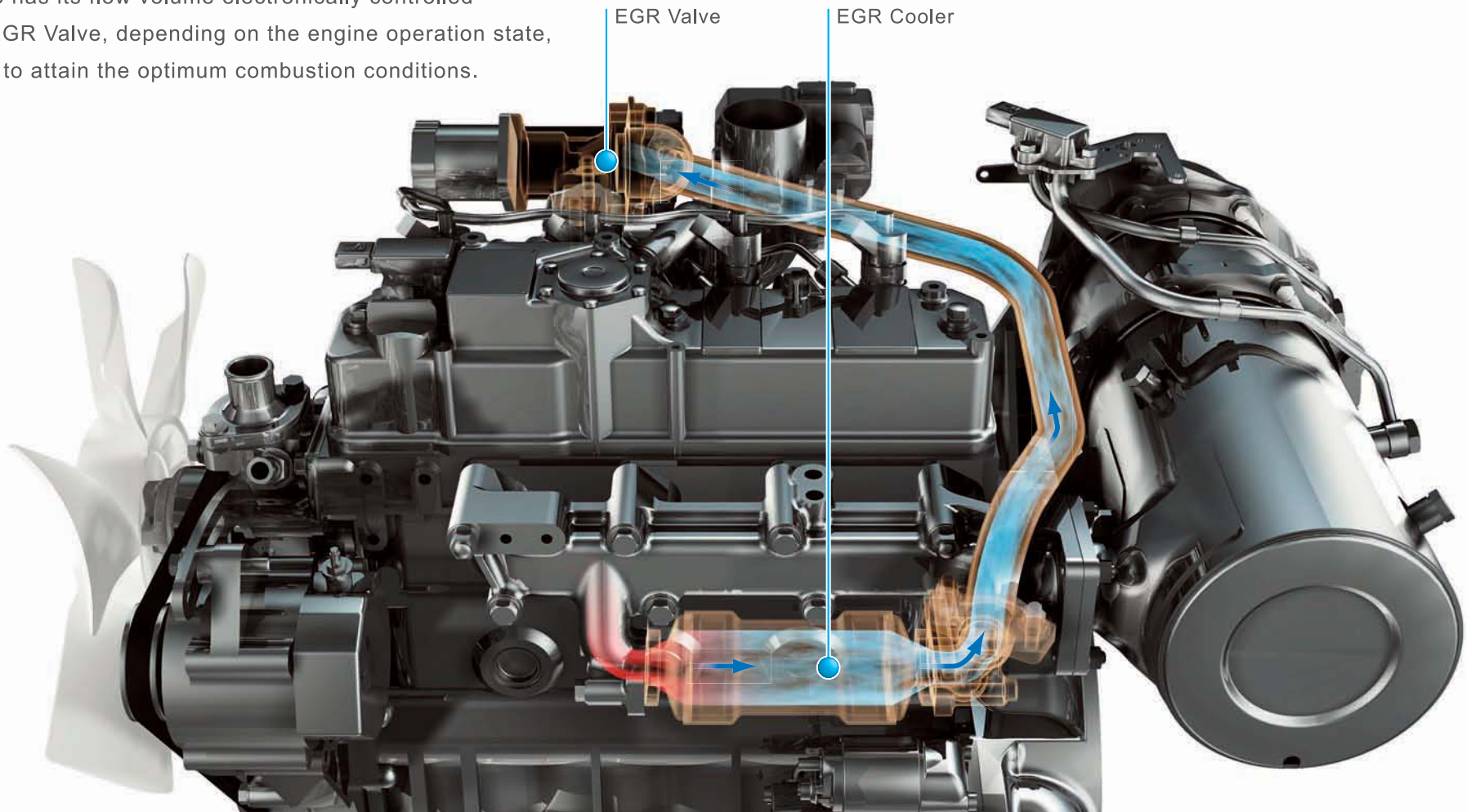
Fuel Injection Patterns of Common Rail





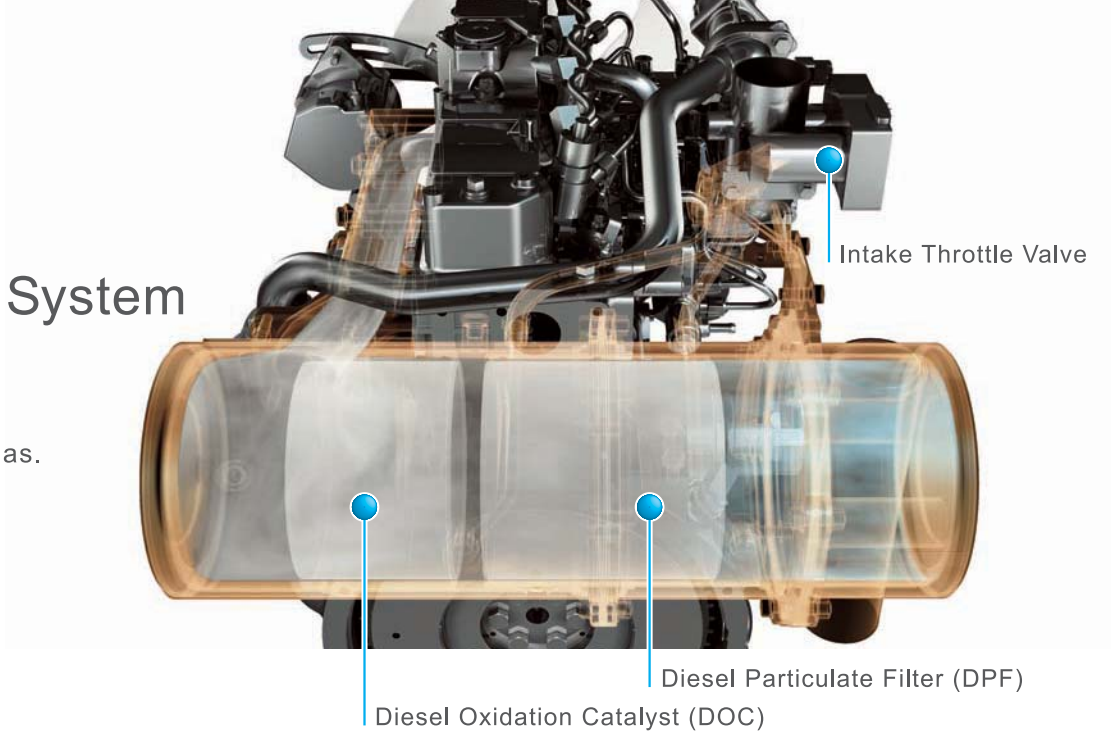
Cooled EGR (Exhaust Gas Recirculation) System

This is a system to recirculate some of the exhaust gas back into the air intake.
This lets us reduce NOx emission by controlling the oxygen concentration
in the combustion chamber and reducing the combustion temperature.
The circulated exhaust gas is cooled by the EGR Cooler
and also has its flow volume electronically controlled
by the EGR Valve, depending on the engine operation state,
in order to attain the optimum combustion conditions.

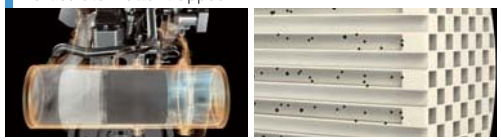


Diesel Particulate Filter (DPF) System

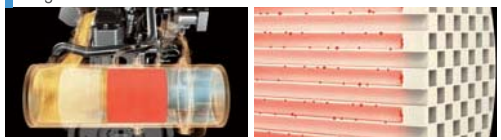
Our engines include a DPF system to catch particulate matter (PM) contained in the exhaust gas. The PM trapped inside the DPF is processed when the DPF automatically regenerates, keeping the filter constantly clean.



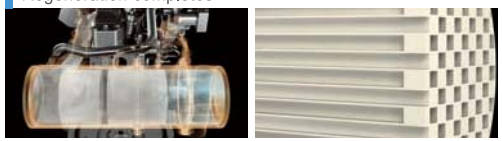
Particulate matter trapped



Regeneration starts



Regeneration completes



Inside of DPF

Regeneration results

Before After

Yanmar's original DPF regeneration control combines three modes

[Assist Regeneration]

When the particulate matter (PM) is trapped in the DPF, the intake throttle valve operates automatically. By reducing the intake air volume and controlling the temperature inside the DPF, the collected particles are automatically eliminated.

[Reset Regeneration]

Following combustion in the cylinder, a small amount of fuel is burnt, and the reaction heat from DOC is used to control the temperature in the DPF and automatically eliminate the collected particles.

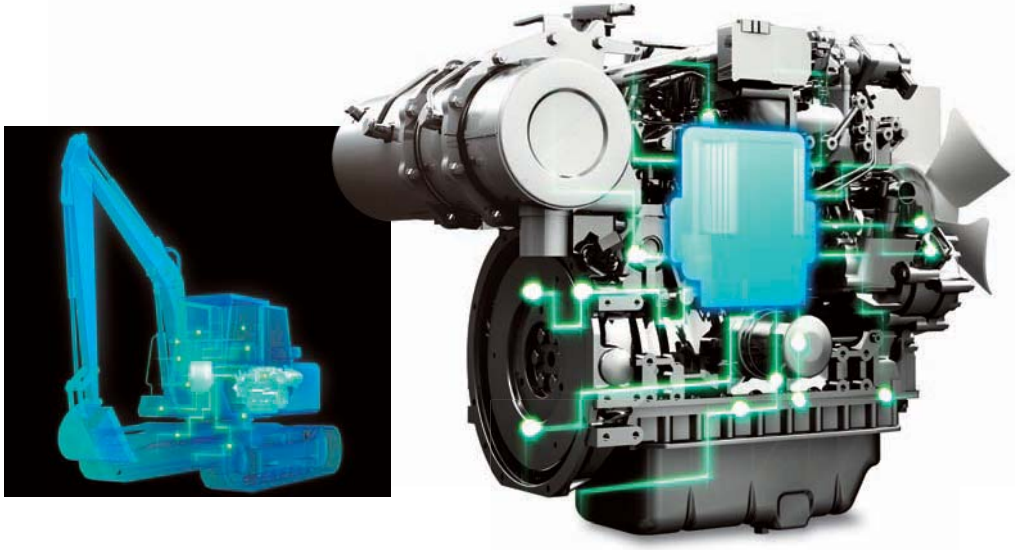
[Stationary Regeneration]

The operator can also use manually control when to eliminate the particles collected in the DPF.

DPF regeneration request switch

ECU (Engine Control Unit)

The ECU is the brain of an engine,
and constantly exchanges information between
the engine itself and the operating machinery
to accurately determine operation status
and provide optimum control for the situation.



SMARTASSIST-Direct

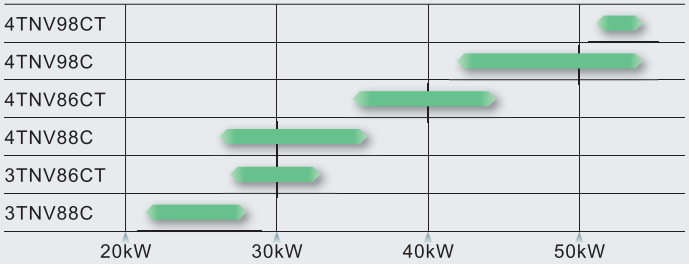
SMARTASSIST-Direct is
Yanmar's standard service tool for
electronically-controlled products,
and allows the engine operation
history information
and control system
operation status to be
easily checked.

Wide Range Application

Construction

Agriculture

Material Handling



Specification

Model		3TNV88C	3TNV86CT	4TNV88C	4TNV86CT	4TNV98C	4TNV98CT
Emission Regulation		EPA Tier4			EU Stage III B		
Combustion System		Direct injection (DI)					
Aspiration		Natural Aspirated	Turbocharged	Natural Aspirated	Turbocharged	Natural Aspirated	Turbocharged
Fuel Injection System		Common Rail					
EGR System		Cooled EGR					
Cylinders		3	3	4	4	4	4
Bore	mm	88	86	88	86	98	98
Stroke	mm	90	90	90	90	110	110
Displacement	L	1.642	1.568	2.190	2.091	3.319	3.319
Max Rated Output (Gross)/speed*1	kW/min-1 (hp/min-1)	27.5/3,000 (36.9/3,000)	32.4/3,000 (43.4/3,000)	35.5/3,000 (47.6/3,000)	44.0/3,000 (59.0/3,000)	51.7/2,500 (69.3/2,500)	53.7/2,500 (72.0/2,500)
After Treatment System		Diesel Particulate Filter (DPF)					
Length*2	mm	781	781	871	890	970	970
Width*2	mm	536	536	524	543	556	574
Height*2	mm	751	762	746	766	806	820
Dry Weight*2	Kg	170	175	205	210	270	275

*1 Conforms to SAE J1995
*2 With Diesel Particulate Filter (DPF) on flywheel housing

All specification data is subject to change without notice.

YANMAR - To conserve fuel is to serve mankind

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