

# ONROAD



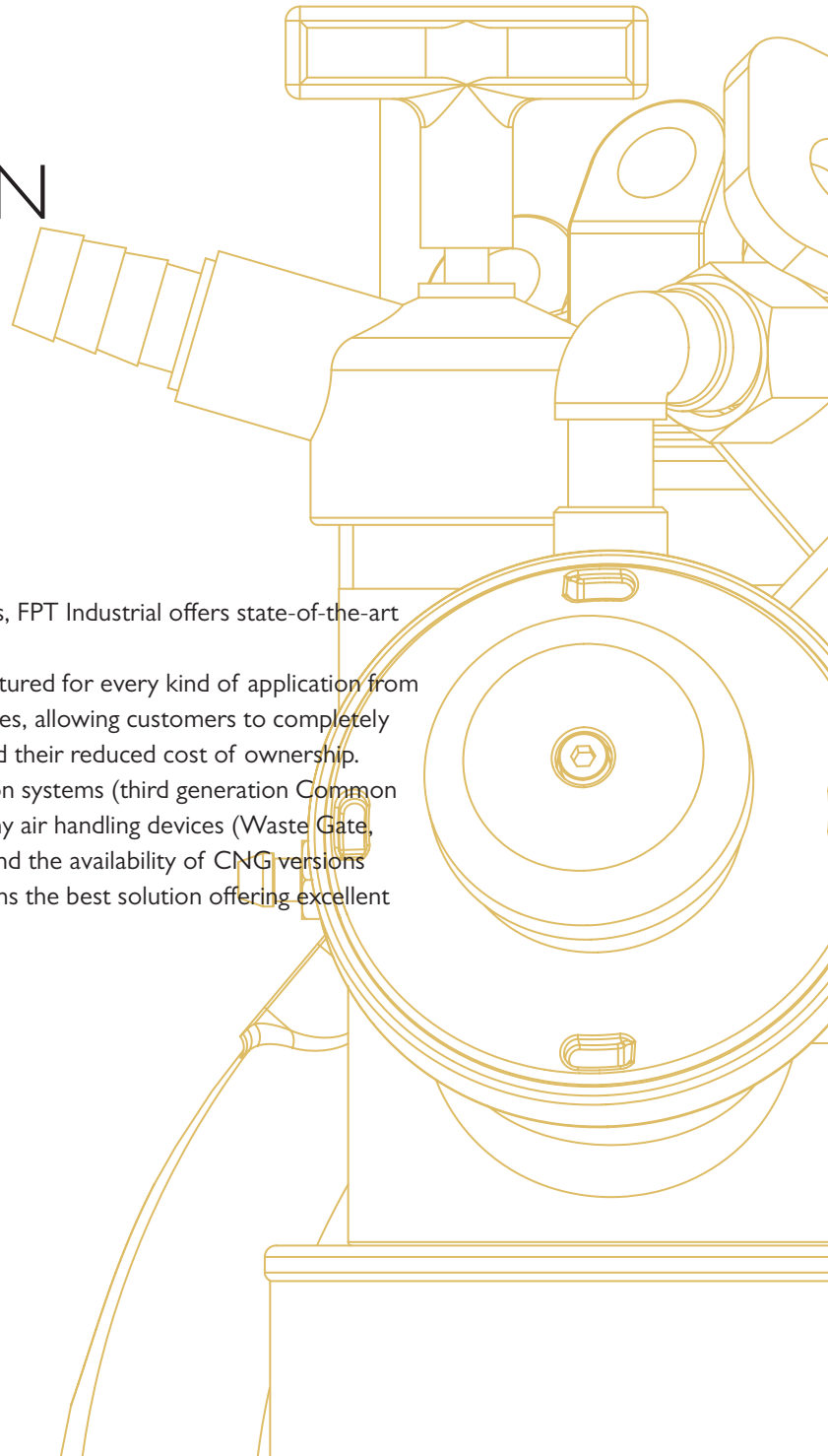


# THE ROAD TO INNOVATION

Whatever you should move, either people or goods, FPT Industrial offers state-of-the-art powertrain solutions for On Road applications.

FPT Industrial engines are designed and manufactured for every kind of application from light, medium and heavy commercial vehicles to buses, allowing customers to completely rely on their cutting-edge technological contents and their reduced cost of ownership.

The presence of sophisticated electronic injection systems (third generation Common Rail and Electronic Unit Injector), the choice of many air handling devices (Waste Gate, Variable Geometry and Two Stage Turbocharger) and the availability of CNG versions make FPT Industrial engines for On Road applications the best solution offering excellent performance and a true respect for environment.



# FPT Industrial offers superior technology and outstanding advantages



## **PERFORMANCE**

Power demand and torque response guaranteed in the most severe operating conditions for a wide range of applications  
State-of-the-art injection systems and turbocharging solutions for improved fuel economy  
Proven and break-through after-treatment technologies for emissions reduction and low operating costs

## **RESPECT FOR THE ENVIRONMENT**

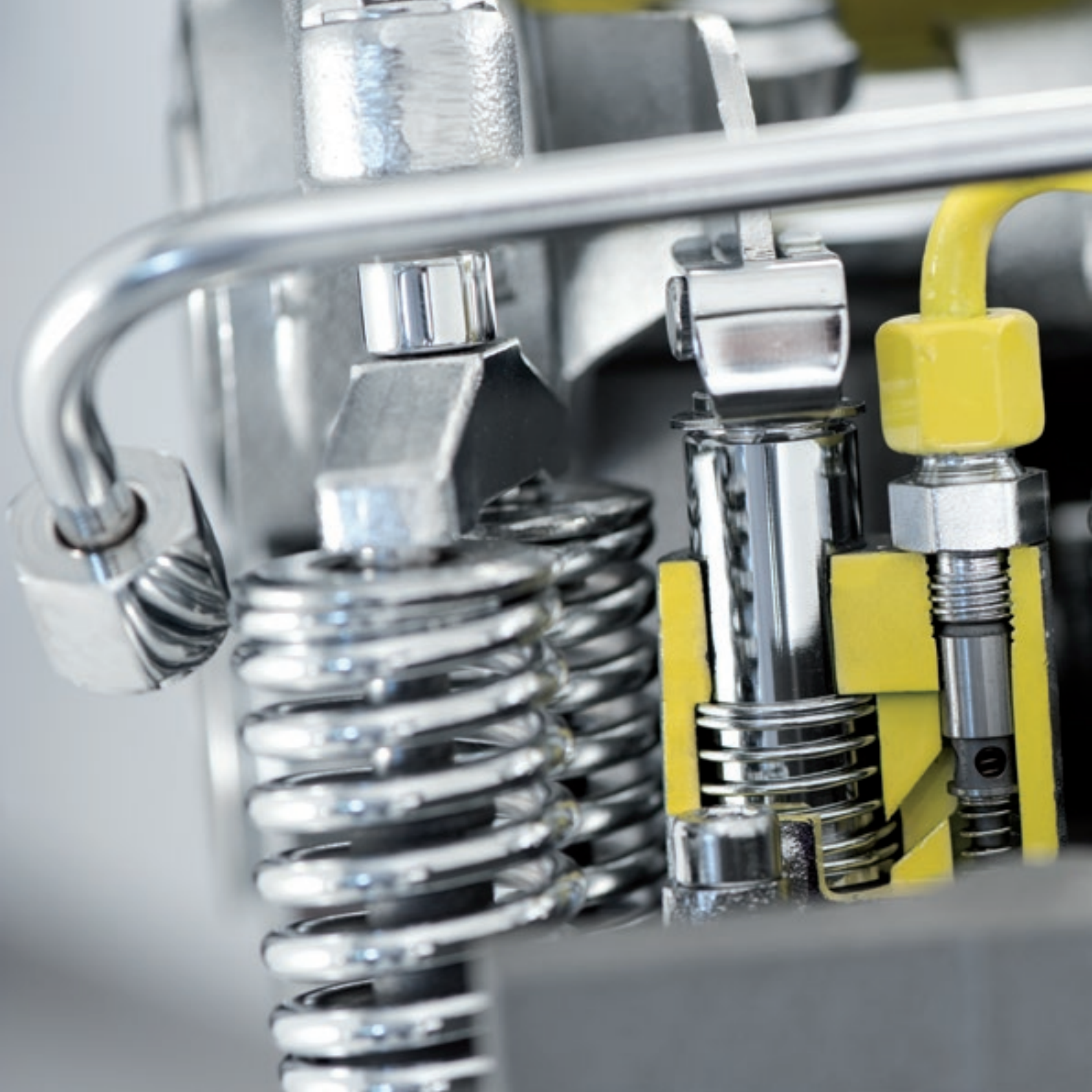
Compliance with the most stringent emissions legislations (EURO VI/EPA 10)  
Wide range of alternative fuel engines available

## **RUNNING COSTS REDUCTION**

Best in class in maintenance intervals  
Low fuel consumption

## **FLEXIBILITY**

Availability of a wide range of options to create tailor-made products  
On request supply of interface components such as transmissions, radiators, air filters, silencers, DPF + DOC, SCR system and cold start accessories  
Compact engine lay-out





# THE SOLUTION FOR THE FUTURE, TODAY

## SCR ONLY TECHNOLOGY FOR EURO VI

Technological excellence and product innovation for FPT Industrial represent the truly determining factor and part of its primary strategic mission. The company is focusing its research and development activities in order to become the innovation leader in the industrial powertrain field and a reference provider of the most cost-efficient powertrain solutions for Euro VI.

FPT Industrial aims to comply with the new emission limits ensuring a minimal impact on the vehicle architecture and the lowest possible increase in cost, an objective that will be achieved through HI-eSCR technology. The breakthrough patented technology, based on an experience of more than 8 years and 400.000 engines produced, allows our engines to meet Euro VI standards without resorting to EGR (Exhaust Gas Recirculation), guaranteeing a very high NO<sub>x</sub> conversion efficiency (over 95% versus 80-85% of best competitors).



HI-WAY

IVECO

HI WAY






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# Scenario


During the combustion process, inside a Diesel engine, the chemical energy is transformed into a mechanical one. Because of the chemistry of combustion, several toxic substances are produced, of which the most harmful are Nitrogen Oxides (NO<sub>x</sub>) and Particulate Matter (PM).

The new Euro VI exhaust emission regulations, which applied to all new medium and heavy commercial vehicles and buses registered from 1st January 2014, introduce significant reductions in permitted tail-pipe emissions of these harmful pollutants:


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 *NO<sub>x</sub> emissions reduced by 80% compared to Euro V (ETC test cycle, equivalent emissions)*

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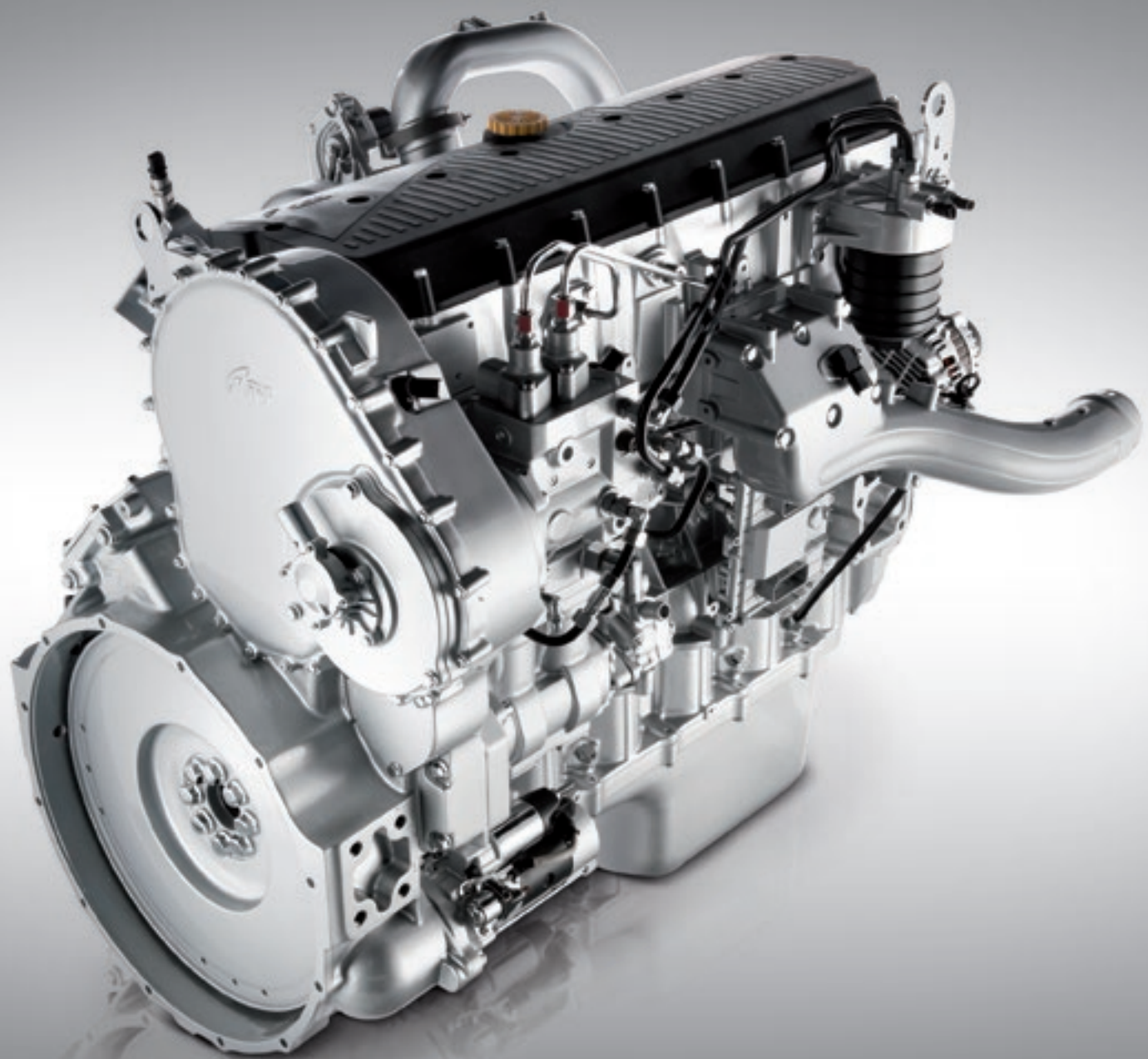
 *PM mass reduction by 50% compared to Euro V (ETC test cycle, equivalent emissions) and the introduction of a particle number limit, that will result in an overall particulate matter reduction of more than 95%*

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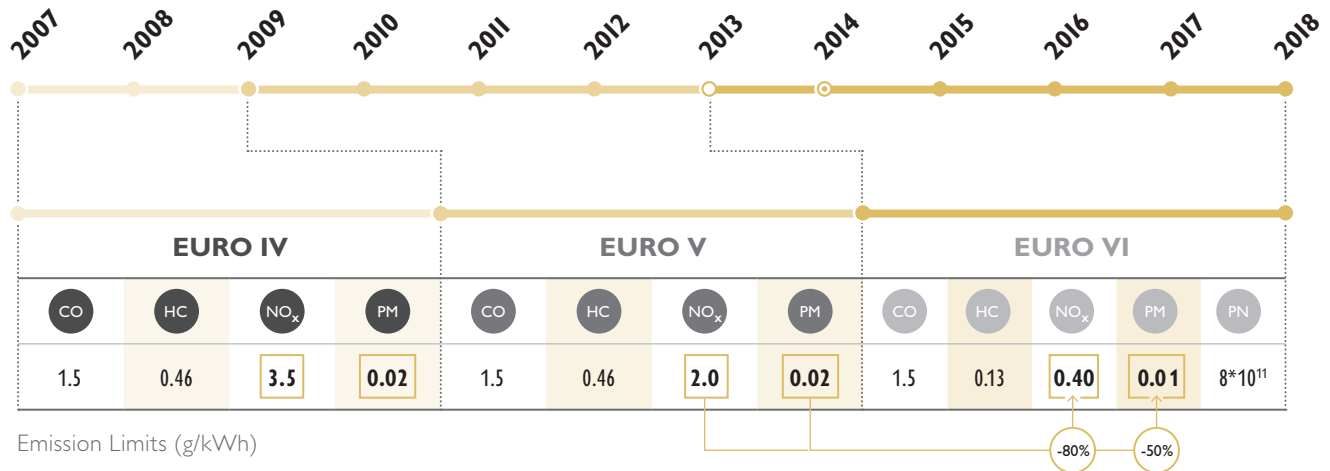
 *Introduction of an ammonia emission limit*

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# Emission regulations-roadmap



## LEGEND

CO Carbon Monoxide  
 HC Hydrocarbons  
 NO<sub>x</sub> Nitrogen Oxides  
 PM Particulate Matter  
 PN Particle Number

○ New Homologations  
 ● New Registrations

Euro IV and V emission limits according to European Static Cycle (ESC)

Euro VI emission limits according to World Harmonized Transient Cycle (WHTC)

Euro V engines can be sold until 31.12.2013

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# Euro VI engines

By way of continuous technical advances to an already state of the art engine range, Euro VI sees also the introduction of reengineered engines, allowing our customers to retain their class leading features, such as minimized Total Cost of Ownership. Key to the optimization of combustion efficiency is high mean effective cylinder pressure and high injector nozzle pressures.

To achieve these aims, important changes to the crankcase and cylinder head design have been made, resulting in an increase in structural rigidity and in swept volume. The engines fitted with the latest generation of multiple events Common Rail fuel injection equipment with peak nozzle pressures of up to 2200 bar. A new Electronic Control Unit has been introduced to manage both engine parameters and accurate control of the after-treatment system. The new control unit has been designed to optimize packaging and to fully integrate all engine, SCR and DPF (Diesel Particulate Filter) functions. For Cursor engines using the Variable Geometry Turbocharger, electronic control has been introduced

to optimize load response at low engine speeds and to increase the effectiveness of the engine brake. In addition, all engines will now make use of the flap type engine brake valve in order to support passive DPF regeneration and to improve engine brake performance by up to 30% compared to current Euro V engines.

For the very best in environmental performance, the engines were equipped with closed circuit engine breathing systems even at Euro IV/V level and this feature is retained for Euro VI. By means of the optimized combustion regime, engine-out particulate emissions are very low, meaning that forced regeneration of the DPF is not required, an important aspect in terms of fuel consumption and periodic servicing. In addition, since the engine only breathes clean filtered air, rather than recirculated exhaust gases, engine wear is maintained very low and oil change intervals are maintained high, with service intervals of up to 150.000 km without increased oil sump.

This too brings advantages in terms of operating costs and reduced down time for scheduled maintenance.

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# Advantages



- ✓ Increased driveability due to lower noise and vibration
  - ✓ Less sophisticated air handling system for same performance as competitors
  - ✓ Low operating costs due to low engine wear and long maintenance intervals (up to 150.000 km, depending on the mission)
  - ✓ Compact and lean design, both of the engine and the HI-eSCR after-treatment system, lowering total weight and easy installation
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# HI-eSCR system

Due to the opposite reaction to combustion temperature, the reduction of either of the combustion products (NO<sub>x</sub> or PM) necessarily implies the increase of the other one. In order to further reduce NO<sub>x</sub>, as required by Euro VI, it is necessary to work on different combustion management and exhaust gas treatment system.

This means that Euro VI emission limits can be reached only through the use of SCR (Selective Catalytic Reduction), either with or without EGR. The use of an EGR system reduces the NO<sub>x</sub> emissions in the combustion chamber, through exhaust gas recirculation with a consequential increase in the production of particulate matter (PM) and a reduction in combustion efficiency. Furthermore, with high engine-out particulate emissions, a forced regeneration of the DPF is required.

FPT Industrial has chosen instead to increase the engine combustion efficiency to reduce the PM without using re-circulated exhaust gasses. While the remaining PM is reduced in the passive DPF, the NO<sub>x</sub> is reduced in the SCR system, while improving fuel consumption,

performance and reliability. FPT Industrial's HI-eSCR is able to reduce the NO<sub>x</sub> levels more than 95%.

The "SCR Only" technology sees the introduction of a new integrated approach that is the result of extensive research by FPT Industrial, research that has led to the creation of numerous significant patents.

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# Patents



*“Closed” loop control to allow precise dosing of NO<sub>x</sub> and ammonia sensors to provide accurate info on the composition of exhaust gases and reduce the use of AdBlue*

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*Adaptive AdBlue dosing system in order to cut the level of NO<sub>x</sub> emissions entering the SCR catalyst*

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*Thermally insulated high turbulence mixing, to allow homogeneous hydrolysis of urea, creating correct distribution in exhaust gas flow*

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*Improved exhaust gas temperature control to speed up SCR light-off in the cold part of emission cycle*

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All the components of the exhaust after-treatment system are contained in a compact and fully enclosed structure thereby not impeding body building or chassis equipment mounting activities and minimizing the weight impact.

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# Main Components

HI-eSCR main components are:

- ✓ *The Diesel Oxidation Catalyst (DOC)*
- ✓ *The Passive Diesel Particulate Filter (DPF)*
- ✓ *The AdBlue dosing module*
- ✓ *The AdBlue mixer*
- ✓ *The Selective Catalytic Reduction (SCR)*
- ✓ *The Clean Up Catalyst (CUC)*

The whole system is fitted with a network of integrated sensors to control the  $\text{NO}_x$  and any excess of  $\text{NH}_3$  (ammonia) emitted.

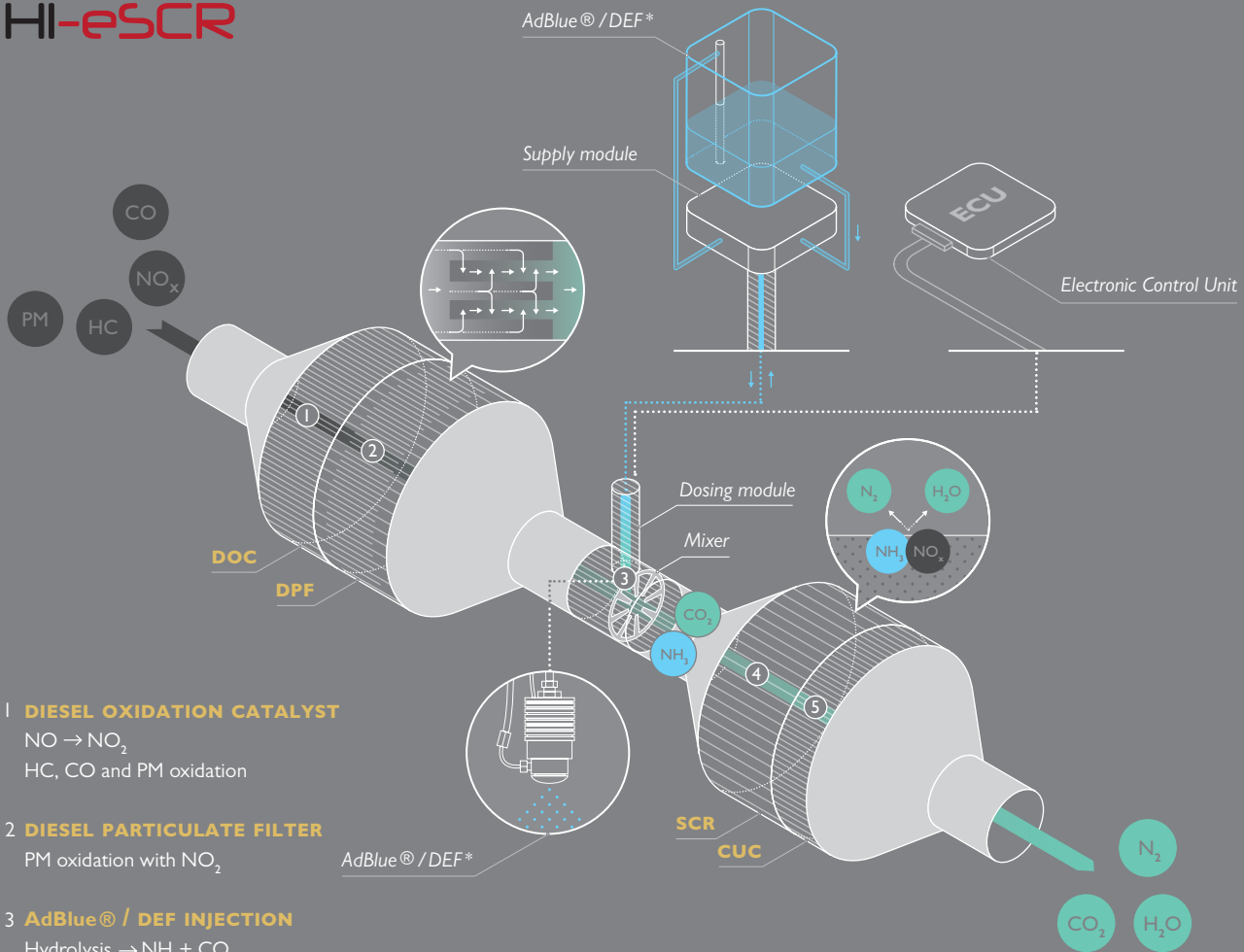
Exhaust gas flow coming from the engine enters the DOC, where NO is oxidised in  $\text{NO}_2$ , which helps to reduce the PM in the subsequent passive DPF. The filter is automatically regenerated at lower temperatures compared to the active DPF used by our competitors. The ECU (Engine Control Unit), the brain behind the HI-eSCR system, checks, through integrated sensors' network, the amount of Water-Urea (AdBlue) solution to be injected in the exhaust pipe. To increase the durability of the injector, Dosing Module is cooled by the engine coolant.

The HI-eSCR after-treatment system adopts a catalyst converting  $\text{NO}_x$  into Nitrogen ( $\text{N}_2$ ) and Water ( $\text{H}_2\text{O}$ ) thanks to the chemical reaction with a Water-Urea solution. In the end, the integrated CUC eliminates the remaining ammonia ( $\text{NH}_3$ ). The result is a reduction of  $\text{NO}_x$  superior to 95%.

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# HI-eSCR



## 1 DIESEL OXIDATION CATALYST

NO → NO<sub>2</sub>  
 HC, CO and PM oxidation

## 2 DIESEL PARTICULATE FILTER

PM oxidation with NO<sub>2</sub>

AdBlue® / DEF\*

## 3 AdBlue® / DEF INJECTION

Hydrolysis → NH<sub>3</sub> + CO<sub>2</sub>

## 4 SELECTIVE CATALYTIC REDUCTION

NO and NO<sub>2</sub> reduction by NH<sub>3</sub> to N<sub>2</sub> and H<sub>2</sub>O

## 5 CLEAN-UP CATALYST

Residual NH<sub>3</sub> oxidation

\*AdBlue® / DEF = CO(NH<sub>2</sub>)<sub>2</sub> + H<sub>2</sub>O

## LEGEND

PM Particulate Matter  
 HC unburnt Hydrocarbons  
 NO<sub>x</sub> Nitrogen Oxides  
 CO Carbon Monoxide  
 N<sub>2</sub> Nitrogen  
 CO<sub>2</sub> Carbon Dioxide  
 H<sub>2</sub>O Water

# Six reasons to choose HI-eSCR

## 1 SCR HERITAGE

FPT Industrial's heritage in SCR technology is well-established. From the introduction of the Euro IV emission regulations in 2005 we have equipped more than 400.000 vehicles with this technology.

## 2 OUTSTANDING PERFORMANCE

Our engines are developed to maximize torque and power density with the shortest load response time, without compromising the impact on the environment, due to the use of the HI-eSCR system.

## 3 FUEL CONSUMPTION

The efficiency of the combustion process optimizes fuel consumption reducing customer running costs.

## 4 DPF PASSIVE REGENERATION

The absence of EGR improves engine efficiency and drastically reduces the outflow of particulate matter. This allows for the use of a passive DPF, where forced filter regeneration will not be necessary. DPF filter replacement/cleaning for heavy duty applications is up to 600.000 km depending on the mission.

## 5 COMPACT PACKAGING

Compared to competitor's engines the thermodynamic efficiency of the FPT Industrial solutions allows to downsize displacement, not needing any additional cooling power, optimizing packaging space and minimizing weight.

## 6 MAINTENANCE INTERVALS

The optimized combustion process preserves oil physical properties reducing maintenance activities and related downtime. The engines maintain their best in class oil maintenance intervals of up to 150.000 km depending on the mission, without an increased oil sump.





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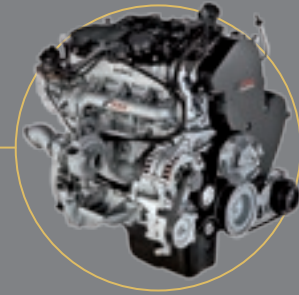
# The F1 Series

The F1 Series is the result of more than 35 years of experience in the field of light commercial vehicles. To deliver optimum efficiency and minimum oil consumption together with long service intervals, F1 engines feature the last generation Common Rail, four valves per cylinder, maintenance-free hydraulic valve and advanced air handling systems.

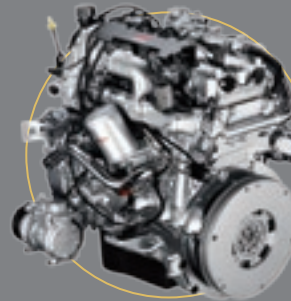
For this series, EGR (Exhaust Gas Recirculation) and SCR (Selective Catalytic Reduction) technology have been recognized as the best solution to make engines compliant with Euro VI standards.

The engines are available for both transversal and longitudinal installation in diesel and CNG versions.

S23 ENT



S30 ENT



S30 ENTG





APPLICATION	MODEL	CYLINDER ARRANGEMENT	AIR INTAKE	TURBOCHARGING	INJECTION SYSTEM	DISPLACEMENT LITERS	POWER			TORQUE			EMISSION STANDARD	EXHAUST SYSTEM
							KW	HP	RPM	NM	KGM	RPM		
○	S23 ENT	L4 / TAA	WG	ECR	2,3	93	126	3600	320	33	1800	Euro 4	ec-EGR + DOC	
○	S23 ENT	L4 / TAA	WG	ECR	2,3	71	97	3900	240	24	1800	Euro 5	ec-EGR + DOC + DPF	
○	S23 ENT	L4 / TAA	WG	ECR	2,3	78	106	3900	270	28	1500	Euro 5 / Euro 5+	ec-EGR + DOC + DPF	
○	S23 ENT	L4 / TAA	WG	ECR	2,3	93	126	3600	320	33	1800	Euro 5 / Euro 5+	ec-EGR + DOC + DPF	
○	S23 ENT	L4 / TAA	VGT	ECR	2,3	107	146	3600	350	36	1500	Euro 5 / Euro 5+	ec-EGR + DOC + DPF	
○	S30 ENT	L4 / TAA	WG	ECR	3,0	107	146	3500	350	36	1400	Euro 4	ec-EGR + DOC	
○	S30 ENT	L4 / TAA	WG	ECR	3,0	107	146	3500	350	36	1500	Euro 5 / Euro 5+	ec-EGR + DOC + DPF	
○	S30 ENT	L4 / TAA	VGT	ECR	3,0	125	170	3500	400	41	1250	Euro 5	ec-EGR + DOC + DPF	
○	S30 ENT	L4 / TAA	VGT	ECR	3,0	125	170	3500	430	44	1250	Euro 5+	ec-EGR + DOC + DPF	
○	S30 ENT	L4 / TAA	VGT	ECR	3,0	130	177	3500	400	41	1250	Euro 5 / Euro 5+	ec-EGR + DOC + DPF	
○	S30 ENT	L4 / TAA	2stT	ECR	3,0	150	204	3500	470	48	1400	Euro 5 / Euro 5+	ec-EGR + DOC + DPF	
○	S30 ENT	L4 / TAA	WG	ECR	3,0	107	146	3500	350	36	1400	Euro III	—	
○	S30 ENT	L4 / TAA	VGT	ECR	3,0	81	110	3500	260	27	1200	EEV	ec-EGR + DOC + DPF	
○	S30 ENT	L4 / TAA	VGT	ECR	3,0	96	131	3500	300	31	1300	EEV	ec-EGR + DOC + DPF	
○	S30 ENT	L4 / TAA	VGT	ECR	3,0	107	146	3500	370	38	1300	EEV	ec-EGR + DOC + DPF	
○	S30 ENT	L4 / TAA	VGT	ECR	3,0	110	150	3500	370	38	1320	EEV	ec-EGR + DOC + DPF	
○	S30 ENT	L4 / TAA	2stT	ECR	3,0	125	170	3500	400	41	1250	EEV	ec-EGR + DOC + DPF	
○	S30 ENT	L4 / TAA	2stT	ECR	3,0	129	175	3500	430	44	1600	EEV	ec-EGR + DOC + DPF + SCR + CUC	
○	S30 ENT	L4 / TAA	VGT	ECR	3,0	81	110	3500	260	27	1200	Euro VI	ec-EGR + DOC + DPF + SCR + CUC	
○	S30 ENT	L4 / TAA	VGT	ECR	3,0	96	131	3500	300	31	1300	Euro VI	ec-EGR + DOC + DPF + SCR + CUC	
○	S30 ENT	L4 / TAA	WG	ECR	3,0	107	146	3500	350	36	1250	Euro VI	ec-EGR + DOC + DPF + SCR + CUC	
○	S30 ENT	L4 / TAA	VGT	ECR	3,0	110	150	3500	370	38	1320	Euro VI	ec-EGR + DOC + DPF + SCR + CUC	
○	S30 ENT	L4 / TAA	VGT	ECR	3,0	125	170	3500	400	41	1250	Euro VI	ec-EGR + DOC + DPF + SCR + CUC	
○	S30 ENT	L4 / TAA	VGT	ECR	3,0	129	175	3500	430	44	1600	Euro VI	ec-EGR + DOC + DPF + SCR + CUC	
○	S30 ENTG	L4 / TAA	WG	MPI	3,0	100	136	3500	350	36	1500	EEV / Euro VI	3 WAY CATALYST	

#### LEGEND

##### APPLICATION

- Light
- Truck
- ◎ Bus

##### ARRANGEMENT

- L In line

##### AIR INTAKE

- TAA Turbocharged aftercooler

##### TURBOCHARGING

- WG Wastegate
- VGT Variable Geometry Turbo
- 2stT Two Stage Turbocharger

##### INJECTION SYSTEM

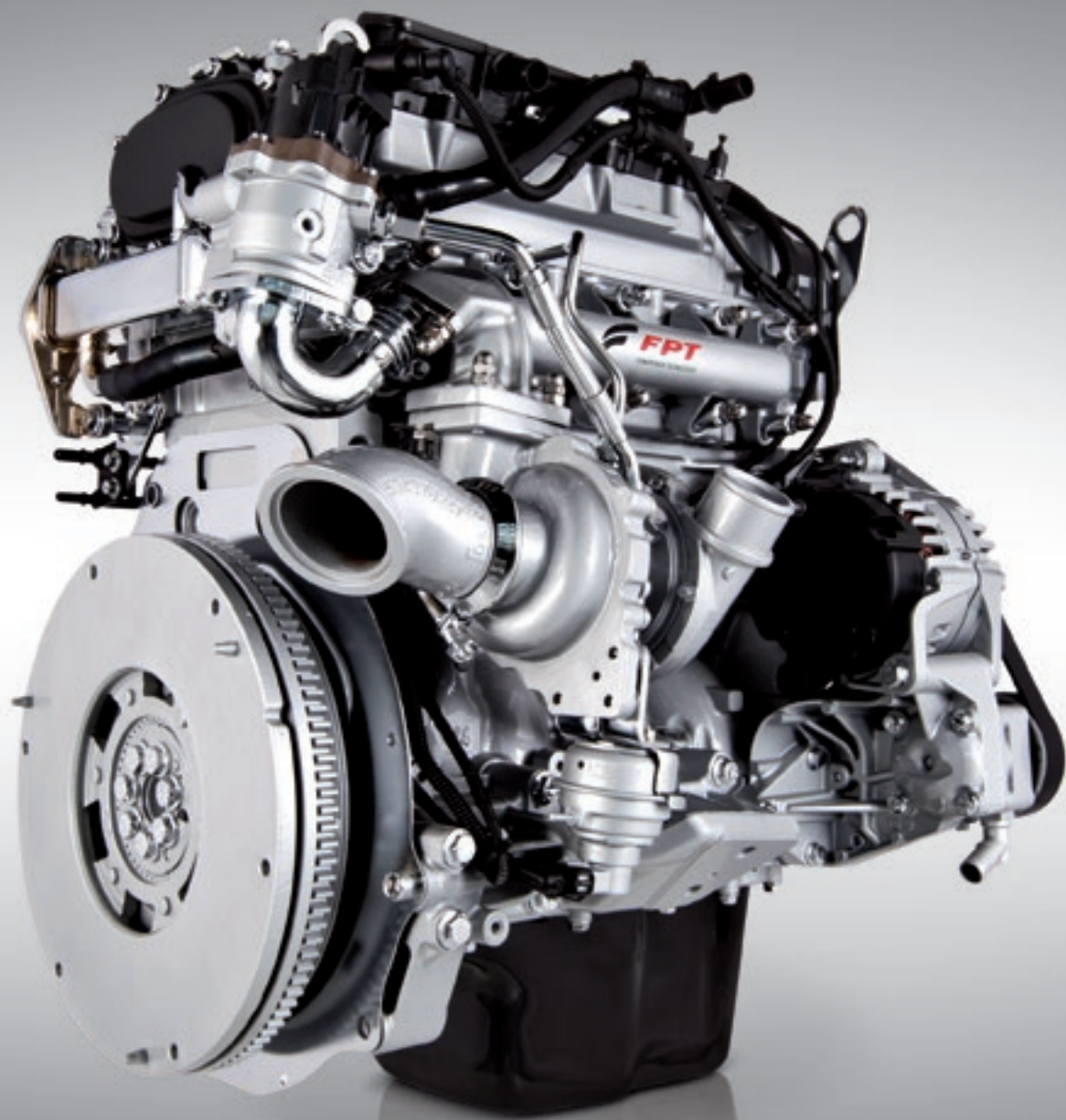
- ECR Electronic Common Rail
- MPI Multi Point Injection

##### EMISSION STANDARD

- EEV Enhanced Environmentally friendly Vehicle

##### EXHAUST SYSTEM

- CUC Clean Up Catalyst
- DOC Diesel Oxidation Catalyst
- DPF Diesel Particulate Filter
- ec-EGR External Cooled Exhaust Gas Recirculation
- SCR Selective Catalytic Reduction





IVECO

NEW DAILY

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# Features

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## **UP TO 40.000 KM OIL CHANGE INTERVALS**

Functional engine design in terms of mechanical clearances, piston rings and engine oil system calculation.

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## **SPECIFIC FEATURES**

F1 Series specifically developed for commercial vehicles; starting temperature with glow plugs down to  $-25^{\circ}\text{C}$ . Performance achieved with external cooled EGR, FGT with Wastegate valve, VGT or Two Stage Turbocharger.

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## **ELECTRONIC INJECTION SYSTEM**

Injection system based on Common Rail; state-of-the-art technology for accurate fuel delivering. A brand new 3rd generation Common Rail System up to 2.000 bar for S30 to comply with Euro VI.

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## **AIR HANDLING**

Two Stage Turbocharger (S30), VGT with air-to-air charge cooler air unit or FGT with Wastegate valve. 4 valves per cylinder to increase engine efficiency through the optimization of thermodynamic performance.

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## **ENGINE DESIGN**

Dual mass flywheel, hydraulic tappets with roller finger followers, multiple fuel injection, suspended oil pan, bed-plate in addition to engine block, timing system driven by toothed belt for S23.

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## **COMPONENTS INTEGRATION**

Integration of components such as patented CCV (Closed Crankcase Ventilation), oil cooler, oil, water and steering pumps.

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## **SERVICEABILITY & MAINTAINABILITY**

Worldwide service network. Engine ECU (Electronic Control Unit) with CAN-BUS control and monitoring interfaces for advanced real time diagnosis.

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## **AFTERTREATMENT SYSTEM**

External cooled EGR combined with SCR as the best solution for Euro VI on light duty engine's applications, where vehicle dimensions are a constraint and drivers' attitude towards fuel saving is not so relevant as in the heavy sector.

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## **OPTION LIST**

Options for radiators, air filters, mufflers, air compressor, air conditioning compressor arrangement; both trasversal and longitudinal versions available.

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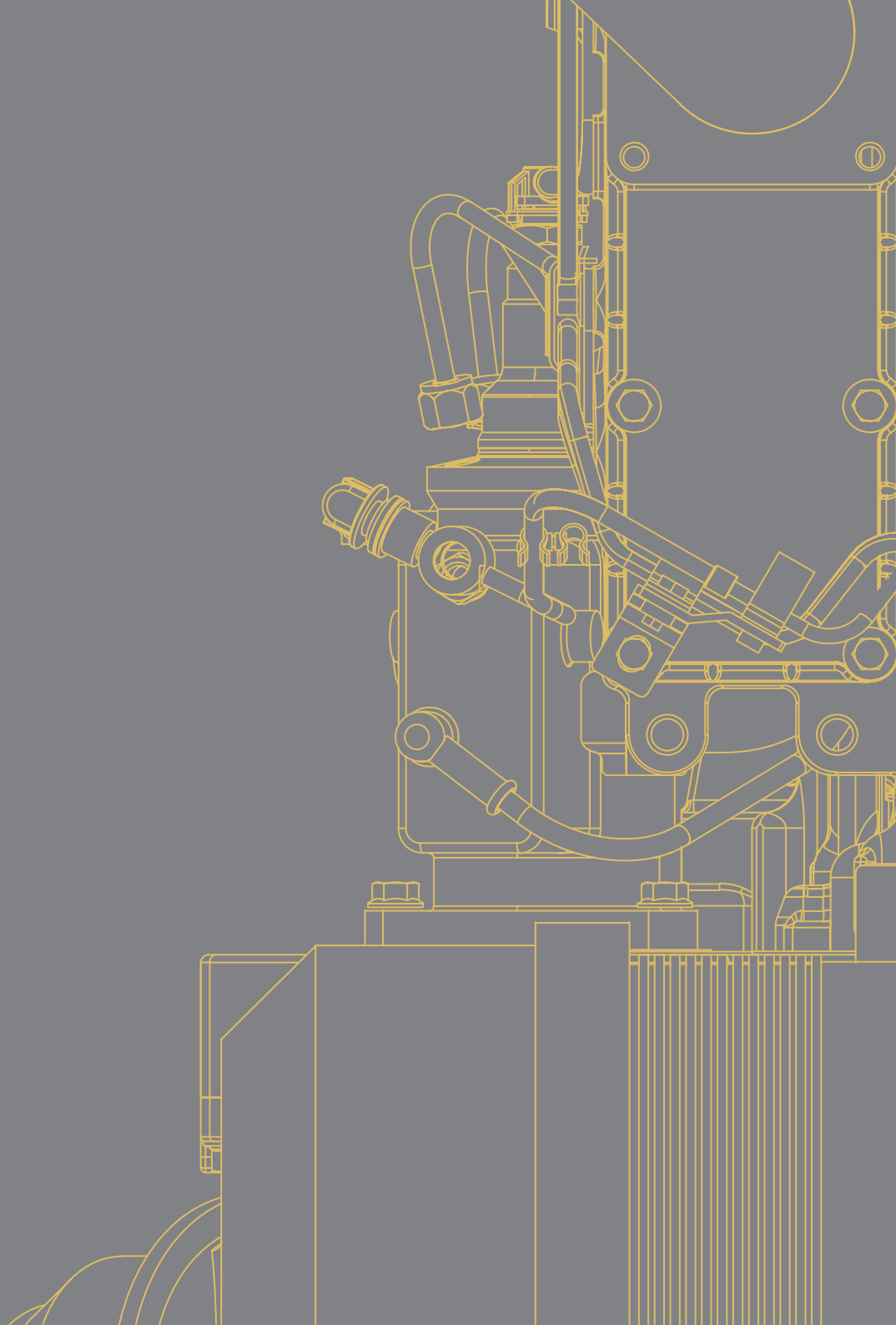
# Benefits

- ✓ **REDUCED MAINTENANCE NEEDS AND OPERATING COSTS**
- ✓ **HIGH PERFORMANCE GUARANTEED IN ALL CONDITIONS**
- ✓ **TOP PERFORMANCE (LOAD RESPONSE, TORQUE, POWER) WITH THE MINIMUM FUEL CONSUMPTION**
- ✓ **HIGH POWER WITH THE SHORTEST TIME TO TORQUE AND LOW FUEL CONSUMPTION**
- ✓ **VIBRATIONS & NOISE REDUCTION**
- ✓ **LEAKAGE PREVENTION**
- ✓ **QUICK AND ACCURATE SERVICE SUPPORT AND REDUCED VEHICLE DOWNTIME**
- ✓ **HIGH RELIABILITY AND LOW RUNNING COSTS (FUEL CONSUMPTION, VEHICLE DOWNTIME)**
- ✓ **CUSTOMER ORIENTATION**





# THE NEF SERIES



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# The NEF Series

Developed to satisfy the most demanding customers' requirements, the NEF Series is the evidence of FPT Industrial technological excellence. Compliant with Euro VI emissions standards, it is the compact, cost-effective and efficient engine solution in the 6 to 18 tons buses/coaches and trucks.

Available in 4 and 6 cylinders, with Diesel Common Rail or CNG multi-point injection system, the NEF Series stands out for its great reliability; furthermore, reduced fuel consumption and remarkable performance make these engines the reference of their category.

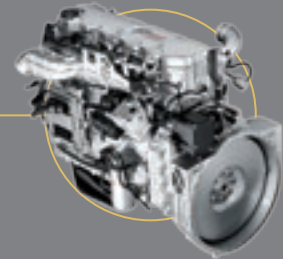
N40 ENT



N45 ENT



N60 ENT



N60 ENTG



N67 ENT





APPLICATION	MODEL	CYLINDER ARRANGEMENT AIR INTAKE	TURBOCHARGING	INJECTION SYSTEM	DISPLACEMENT LITERS	POWER			TORQUE			EMISSION STANDARD	EXHAUST SYSTEM
						KW	HP	RPM	NM	KGM	RPM		
●	N40 ENT	L4 / TAA	WG	ECR	3,9	103	140	2700	460	47	1200-2100	EEV	SCR
◎	N40 ENT	L4 / TAA	WG	ECR	3,9	110	140	2700	600	47	1300	EEV	—
●	N40 ENT	L4 / TAA	WG	ECR	3,9	118	160	2700	530	54	1200-2100	EEV	SCR
●	N40 ENT	L4 / TAA	WG	ECR	3,9	130	177	2700	570	58	1250-2100	EEV	SCR
◎	N40 ENT	L4 / TAA	WG	ECR	3,9	130	177	2500	600	61	1250	EEV	SCR
●	N40 ENT	L4 / TAA	WG	ECR	3,9	134	182	2700	570	58	1200-2100	Euro III	—
●	N40 ENT	L4 / TAA	WG	ECR	3,9	134	182	2700	610	62	1300-2100	EEV	SCR
●	N45 ENT	L4 / TAA	WG	ECR	4,5	118	160	2500	580	59	1250-1940	Euro VI	DOC + DPF + SCR + CUC
●	N45 ENT	L4 / TAA	WG	ECR	4,5	137	186	2500	680	69	1250-1900	Euro VI	DOC + DPF + SCR + CUC
◎	N45 ENT	L4 / TAA	WG	ECR	4,5	137	186	2500	750	69	1400	Euro VI	DOC + DPF + SCR + CUC
●	N45 ENT	L4 / TAA	WG	ECR	4,5	152	207	2500	750	76	1400-1800	Euro VI	DOC + DPF + SCR + CUC
●	N60 ENT	L4 / TAA	WG	ECR	5,9	135	184	2700	650	66	1200-1800	EEV	SCR
● ◎	N60 ENT	L4 / TAA	WG	ECR	5,9	160	218	2700	680	69	1200-2230	Euro III	—
● ◎	N60 ENT	L6 / TAA	WG	ECR	5,9	160	218	2700	680	69	1200-2100	EEV	SCR
● ◎	N60 ENT	L4 / TAA	WG	ECR	5,9	176	239	2700	810	83	1250	Euro III	—
●	N60 ENT	L6 / TAA	WG	ECR	5,9	185	252	2700	850	87	1250-2100	EEV	SCR
◎	N60 ENT	L6 / TAA	WG	ECR	5,9	185	252	2500	850	87	1250	EEV	SCR
◎	N60 ENT	L6 / TAA	WG	ECR	5,9	192	261	2500	1050	107	1250	EEV	SCR
◎	N60 ENT	L6 / TAA	WG	ECR	5,9	194	264	2500	1000	102	1250	EEV	SCR
●	N60 ENT	L6 / TAA	WG	ECR	5,9	202	275	2500	930	95	1250	Euro III	—
●	N60 ENT	L6 / TAA	WG	ECR	5,9	205	279	2500	950	97	1250-2100	EEV	SCR
● ◎	N60 ENT	L6 / TAA	WG	ECR	5,9	220	299	2500	1050	107	1250-1850	EEV	SCR
● ◎	N60 ENTG	L6 / TAA	WG	MPI	5,9	147	200	2700	650	66	1250	EEV	3 WAY CATALYST
●	N67 ENT	L6 / TAA	WG	ECR	6,7	162	220	2500	800	82	1250-1930	Euro VI	DOC + DPF + SCR + CUC
◎	N67 ENT	L6 / TAA	WG	ECR	6,7	184	250	2500	950	96	1400-1500	Euro VI	DOC + DPF + SCR + CUC
●	N67 ENT	L6 / TAA	WG	ECR	6,7	185	252	2500	850	87	1250-2070	Euro VI	DOC + DPF + SCR + CUC
●	N67 ENT	L6 / TAA	WG	ECR	6,7	206	280	2500	1000	102	1250-1970	Euro VI	DOC + DPF + SCR + CUC
◎	N67 ENT	L6 / TAA	WG	ECR	6,7	210	286	2500	1000	102	1250-1600	Euro VI	DOC + DPF + SCR + CUC
● ◎	N67 ENT	L6 / TAA	WG	ECR	6,7	235	320	2500	1100	112	1250-1890	Euro VI	DOC + DPF + SCR + CUC

#### LEGEND

**APPLICATION**  
 ○ Light  
 ● Truck  
 ◎ Bus

**AIR INTAKE**  
 TAA Turbocharged aftercooler

**TURBOCHARGING**  
 WG Wastegate

**INJECTION SYSTEM**  
 ECR Electronic Common Rail  
 MPI Multi Point Injection

**EMISSION STANDARD**  
 EEV Enhanced Environmentally friendly Vehicle

**EXHAUST SYSTEM**  
 CUC Clean Up Catalyst  
 DOC Diesel Oxidation Catalyst  
 DPF Diesel Particulate Filter  
 ec-EGR External Cooled Exhaust Gas Recirculation  
 SCR Selective Catalytic Reduction

**ARRANGEMENT**  
 L In line





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# Features

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## **UP TO 80.000 KM OIL CHANGE INTERVALS**

Long oil change intervals; functional engine design in terms of mechanical clearances, piston rings, engine oil system calculation.

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## **SPECIFIC FEATURES**

Lean lay-out; starting temperature with standard equipment auxiliaries down to  $-25^{\circ}\text{C}$  (with optional water heater down to  $-30^{\circ}\text{C}$ );  $25^{\circ}$  engine continuous inclination in all directions; high performance achieved without either EGR or VGT. Integration of exhaust flap for thermal management, increased brake performance and introduction of improved high-efficiency blow-by on Euro VI engines.

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## **ELECTRONIC INJECTION SYSTEM**

Very compact 2nd generation HD Common Rail System for accurate fuel delivery; state-of-the-art system to optimize thermodynamic performance and achieve flat torque curve.

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## **AIR HANDLING**

Turbocharged with air-to-air aftercooler unit for the optimization of thermodynamic performance, without using Variable Geometry Turbocharger for Euro V & VI emission limits achievement.

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## **ENGINE DESIGN**

Cast iron cylinder head, rear geartrain lay-out, camshaft in crankcase, suspended oil pan, bed-plate in addition to engine block.

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## **COMPONENTS INTEGRATION**

High components integration such as patented CCV (Closed Crankcase Ventilation), oil cooler, oil and water pumps.

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## **SERVICEABILITY & MAINTAINABILITY**

Worldwide service network. Engine ECU (Electronic Control Unit) with CAN-BUS control and monitoring interfaces for advanced real time diagnosis.

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## **AFTERTREATMENT SYSTEM**

SCR system is recognized as the best ATS solution for medium and heavy duty automotive engines to reach Euro VI emission standards; it reduces  $\text{NO}_x$  outside the engine, regardless the combustion process, enhancing engine performance and reliability, reducing at the same time fuel consumption and heat rejection.

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## **OPTION LIST**

Options for transmissions, radiators, air filters, mufflers; standard transmission interface SAE; air compressor, air conditioning compressor and steering pump arrangement; oil sump available for both truck and bus applications.

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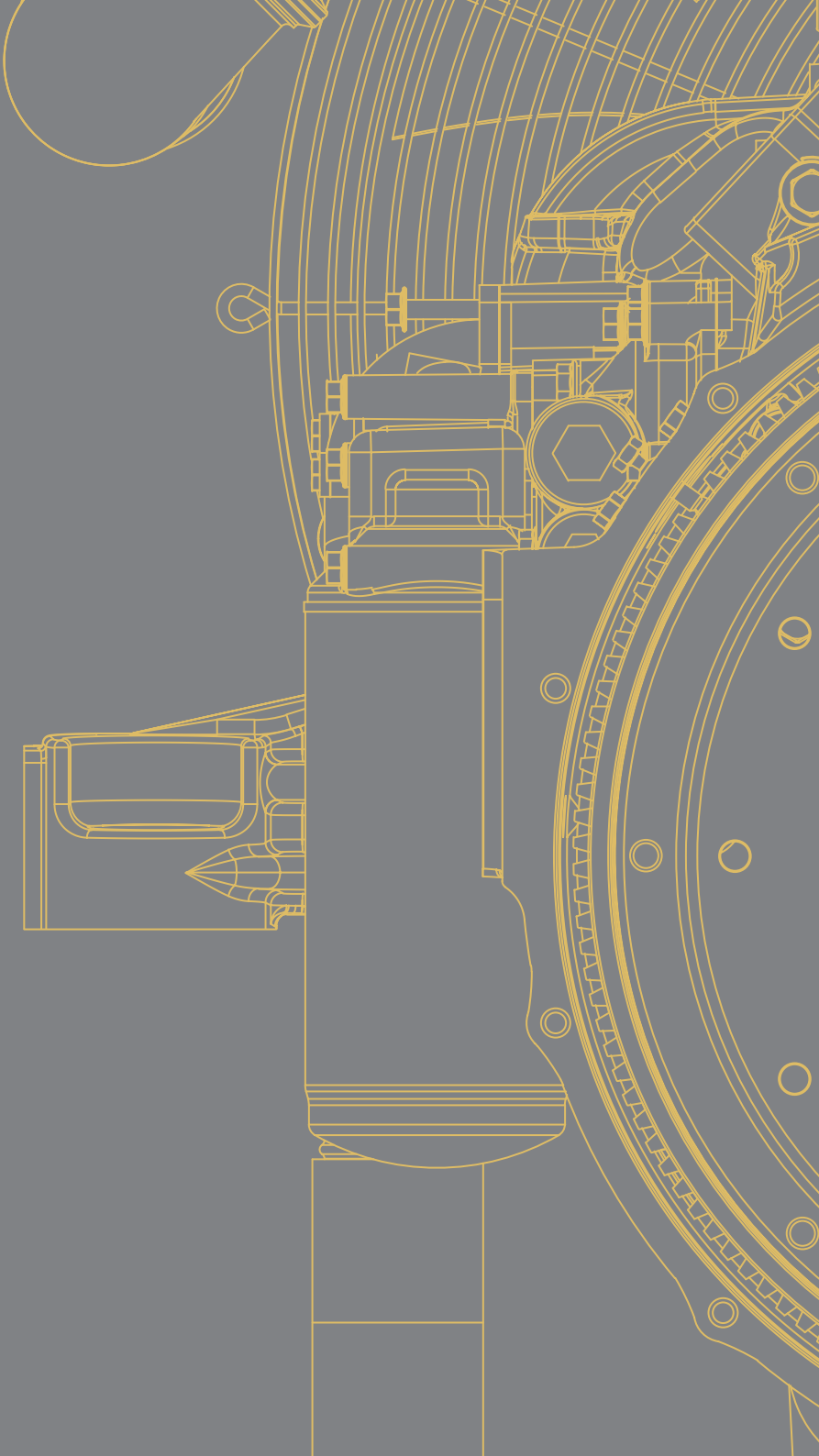
# Benefits

- ✓ **REDUCED OPERATING COSTS**
- ✓ **TOP PERFORMANCE GUARANTEED IN ALL CONDITIONS**
- ✓ **HIGH PERFORMANCE (POWER, TORQUE, LOAD RESPONSE) WITH THE MINIMUM FUEL CONSUMPTION**
- ✓ **HIGH POWER WITH EXCELLENT LOAD RESPONSE AND LOW FUEL CONSUMPTION**
- ✓ **VIBRATIONS & NOISE REDUCTION**
- ✓ **LEAKAGE PREVENTION**
- ✓ **QUICK AND ACCURATE SERVICE SUPPORT AND REDUCED VEHICLE DOWNTIME**
- ✓ **ENVIRONMENTAL CARE, HIGH RELIABILITY AND LOW RUNNING COSTS (FUEL CONSUMPTION, VEHICLE DOWNTIME)**
- ✓ **ENGINE VERSATILITY, CUSTOMER ORIENTATION**





# THE CURSOR SERIES

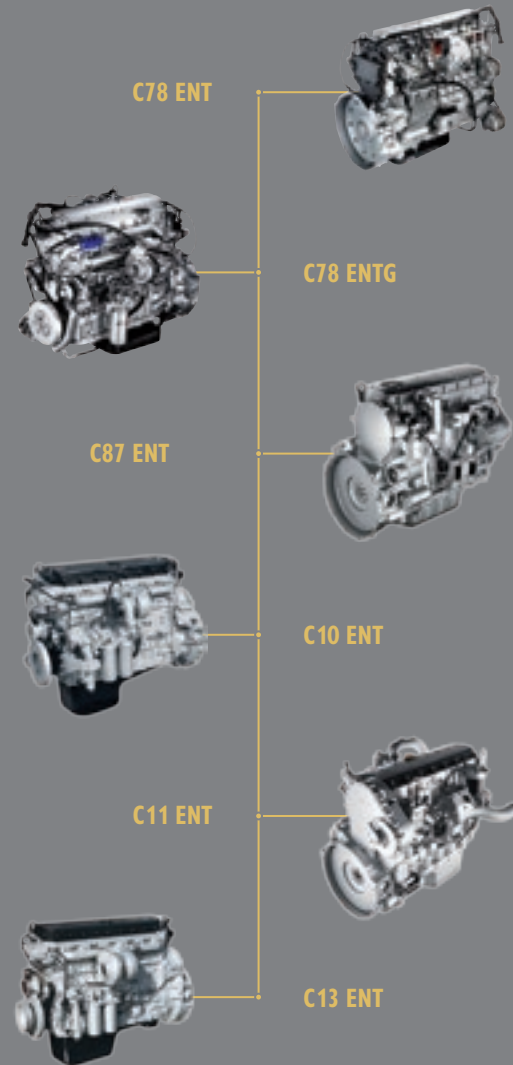


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# The Cursor Series

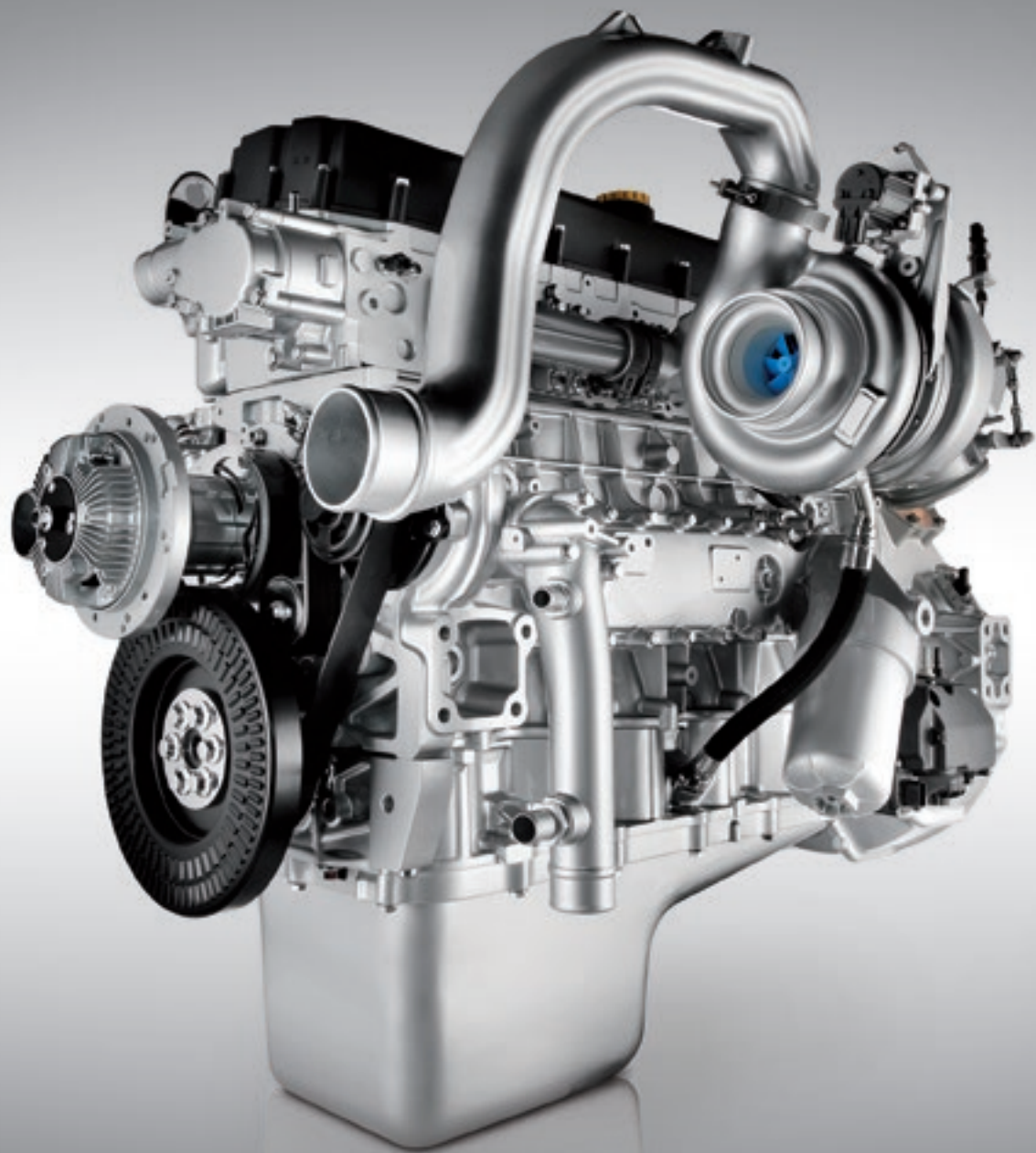
The Cursor Series engines are available in both Diesel and CNG versions, in a range from 180 to 412 kW and are compliant with Euro VI standards.

Thanks to their Electronic controlled Variable Geometry Turbocharger (EVTG), a high maximum torque is developed at low rpm and available over a wide rpm range. Cursor Series stands out for superb performance combined with an extremely low fuel consumption. Best in class intervals for oil changes (up to 150.000 km), DPF cleaning/replacement (up to 600.000 km) and oil consumption provide significant advantages in maintenance costs and vehicle down-time.









APPLICATION	MODEL	CYLINDER ARRANGEMENT AIR INTAKE	TURBOCHARGING	INJECTION SYSTEM	DISPLACEMENT LITERS	POWER			TORQUE			EMISSION STANDARD	EXHAUST SYSTEM
						KW	HP	RPM	NM	KGM	RPM		
⊙	C78 ENT	L6 / TAA	VGT	EUI	7,8	180	245	1850	1100	112	1040-1560	EEV	SCR
⊙	C78 ENT	L6 / TAA	VGT	EUI	7,8	213	290	2050	1100	112	1040-1850	EEV	SCR
●	C78 ENT	L6 / TAA	WG	EUI	7,8	228	310	2400	1300	133	1200-1675	Euro V / EEV	SCR
●	C78 ENT	L6 / TAA	VGT	EUI	7,8	243	330	2400	1400	143	1080-1655	Euro V / EEV	SCR
⊙	C78 ENT	L6 / TAA	VGT	EUI	7,8	243	330	2050	1500	153	1125-1600	EEV	SCR
●	C78 ENT	L6 / TAA	VGT	EUI	7,8	259	352	2400	1500	153	1200-1685	Euro III	—
●	C78 ENT	L6 / TAA	VGT	EUI	7,8	265	360	2400	1500	153	1200-1685	Euro V / EEV	SCR
⊙	C78 ENT	L6 / TAA	VGT	EUI	7,8	280	381	2050	1500	153	1125-1780	EEV	SCR
● ⊙	C78 ENTG	L6 / TAA	WG	MPI	7,8	180	245	1850	1000	101	1050	EEV / Euro VI	3 WAY CATALYST
● ⊙	C78 ENTG	L6 / TAA	WG	MPI	7,8	200	272	2000	1100	112	1100	EEV / Euro VI	3 WAY CATALYST
● ⊙	C78 ENTG	L6 / TAA	WG	MPI	7,8	213	290	2000	1100	112	1100	EEV / Euro VI	3 WAY CATALYST
● ⊙	C78 ENTG	L6 / TAA	WG	MPI	7,8	221	301	2000	1200	122	1200	EEV / Euro VI	3 WAY CATALYST
● ⊙	C78 ENTG	L6 / TAA	WG	MPI	7,8	243	330	2000	1300	133	1200	EEV / Euro VI	3 WAY CATALYST
● ⊙	C87 ENT	L6 / TAA	WG	ECR	8,7	228	310	2200	1300	133	1200	Euro VI	DOC + DPF + SCR + CUC
● ⊙	C87 ENT	L6 / TAA	WG	ECR	8,7	243	330	2200	1400	143	1200	Euro VI	DOC + DPF + SCR + CUC
● ⊙	C87 ENT	L6 / TAA	WG	ECR	8,7	265	360	2200	1650	168	1200	Euro VI	DOC + DPF + SCR + CUC
● ⊙	C87 ENT	L6 / TAA	EVGT	ECR	8,7	294	400	2200	1700	173	1200	Euro VI	DOC + DPF + SCR + CUC
⊙	C10 ENT	L6 / TAA	VGT	EUI	10,3	280	381	2100	1600	163	1000-1660	EEV	SCR
●	C10 ENT	L6 / TAA	VGT	EUI	10,3	294	400	2100	1900	194	1050-1550	Euro III	—
●	C10 ENT	L6 / TAA	VGT	EUI	10,3	310	422	2100	1900	194	1050-1550	Euro V / EEV	SCR
●	C10 ENT	L6 / TAA	VGT	EUI	10,3	316	430	2100	1900	194	1000-1590	Euro III	—
●	C10 ENT	L6 / TAA	VGT	EUI	10,3	331	450	2100	2100	214	1050-1550	Euro V / EEV	SCR
⊙	C10 ENT	L6 / TAA	VGT	EUI	10,3	331	450	2100	2100	214	1050-1500	EEV	SCR

#### LEGEND

##### APPLICATION

- Light
- Truck
- ⊙ Bus

##### ARRANGEMENT

- L In line

##### AIR INTAKE

- TAA Turbocharged aftercooler

##### TURBOCHARGING

- WG Wastegate
- VGT Variable Geometry Turbo
- EVGT Electronic Variable Geometry Turbocharger

##### INJECTION SYSTEM

- ECR Electronic Common Rail
- EUI Electronic Unit Injector
- MPI Multi Point Injection

##### EMISSION STANDARD

- EEV Enhanced Environmentally friendly Vehicle

##### EXHAUST SYSTEM

- CUC Clean Up Catalyst
- DOC Diesel Oxidation Catalyst
- DPF Diesel Particulate Filter
- SCR Selective Catalytic Reduction

APPLICATION	MODEL	CYLINDER ARRANGEMENT AIR INTAKE	TURBOCHARGING	INJECTION SYSTEM	DISPLACEMENT LITERS	POWER			TORQUE			EMISSION STANDARD	EXHAUST SYSTEM
						KW	HP	RPM	NM	KGM	RPM		
●	C10 ENT	L6 / TAA	VGT	EUI	10,3	338	460	2100	2100	214	1050-1550	Euro V / EEV	SCR
● ◎	C11 ENT	L6 / TAA	EVGT	ECR	11,1	309	420	1900	1900	204	1050	Euro VI	DOC + DPF + SCR + CUC
●	C11 ENT	L6 / TAA	EVGT	ECR	11,1	338	460	1900	2150	219	1050	Euro VI	DOC + DPF + SCR + CUC
●	C11 ENT	L6 / TAA	EVGT	ECR	11,1	353	480	1900	2250	229	1050	Euro VI	DOC + DPF + SCR + CUC
●	C13 ENT	L6 / TAA	WG	EUI	12,9	280	381	1900	1900	194	1000-1515	Euro III	—
●	C13 ENT	L6 / TAA	WG	EUI	12,9	301	409	1900	1900	194	1000-1515	Euro V	SCR
●	C13 ENT	L6 / TAA	WG	EUI	12,9	309	420	1900	1900	194	1000-1515	Euro III	—
●	C13 ENT	L6 / TAA	VGT	EUI	12,9	324	441	1900	2200	224	1000-1400	Euro III	—
●	C13 ENT	L6 / TAA	VGT	EUI	12,9	324	441	1900	2200	224	1000-1400	Euro V	SCR
●	C13 ENT	L6 / TAA	VGT	EUI	12,9	331	450	1900	2200	224	1000-1440	Euro V	SCR
●	C13 ENT	L6 / TAA	VGT	EUI	12,9	382	520	1900	2300	235	1000-1600	Euro V	SCR
●	C13 ENT	L6 / TAA	WG	EUI	12,9	353	480	1900	2200	224	1000-1540	Euro III	—
●	C13 ENT	L6 / TAA	WG	EUI	12,9	353	480	1900	2200	224	1000-1540	Euro V / EEV	SCR
●	C13 ENT	L6 / TAA	VGT	EUI	12,9	368	500	1900	2300	235	1000-1525	Euro V / EEV	SCR
●	C13 ENT	L6 / TAA	VGT	EUI	12,9	397	540	1900	2300	235	1000-1525	Euro III	—
●	C13 ENT	L6 / TAA	VGT	EUI	12,9	412	560	1900	2500	255	1000-1575	Euro V / EEV	SCR
●	C13 ENT	L6 / TAA	WG	ECR	12,9	302	411	1900	2100	214	1000	Euro VI	DOC + DPF + SCR + CUC
●	C13 ENT	L6 / TAA	WG	ECR	12,9	331	450	1900	2200	224	1000	Euro VI	DOC + DPF + SCR + CUC
●	C13 ENT	L6 / TAA	EVGT	ECR	12,9	368	500	1900	2300	235	1000	Euro VI	DOC + DPF + SCR + CUC
●	C13 ENT	L6 / TAA	EVGT	ECR	12,9	412	560	1900	2500	255	1000	Euro VI	DOC + DPF + SCR + CUC

## LEGEND

### APPLICATION

- Light
- Truck
- ◎ Bus

### ARRANGEMENT

- L In line

### AIR INTAKE

- TAA Turbocharged aftercooler

### TURBOCHARGING

- WG Wastegate
- VGT Variable Geometry Turbo
- EVGT Electronic Variable Geometry Turbocharger

### INJECTION SYSTEM

- ECR Electronic Common Rail
- EUI Electronic Unit Injector
- MPI Multi Point Injection

### EMISSION STANDARD

- EEV Enhanced Environmentally friendly Vehicle

### EXHAUST SYSTEM

- CUC Clean Up Catalyst
- DOC Diesel Oxidation Catalyst
- DPF Diesel Particulate Filter
- SCR Selective Catalytic Reduction



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# Features

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## **UP TO 150.000 KM OIL CHANGE INTERVALS**

Best in class for oil change intervals; functional engine design in terms of mechanical clearances, piston rings, green oil filters, low viscosity oils, engine oil system calculation.

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## **SPECIFIC FEATURES**

Lean lay-out; starting temperature down to -25°C; performance achieved thanks to the Electronic Unit Injector and VGT without cooled EGR (neither internal nor external). Introduction of centrifugal blow-by on Euro VI engines and electronic governed exhaust flap for increased engines brake power up to 30 %.

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## **ELECTRONIC INJECTION SYSTEM**

Cursor Series feature 3rd generation common rail on Euro VI engines and electronic controlled unit injectors on Euro IV/V engines. Designed to optimized fuel delivery they assure top power and torque.

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## **AIR HANDLING**

VGT with air-to-air charge cooled air system with 4 valves per cylinder to increase engine efficiency through the optimization of thermodynamic performance.

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## **ENGINE BRAKE SYSTEM**

The ECU controlled engine brake system reduces brake pad wear and consequent operation costs. Further introduction of an electronic governed exhaust flap on Euro VI increases the engine brake power up to 30 %. Auto-engaging function increases driveability.

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## **ENGINE DESIGN**

Super-finished helicoidal timing gears, high flexibility of injection system, bed-plate in addition to engine block, rear geartrain lay-out, suspended oil pan. Integrated Common Rail in cylinder head for Euro VI (- 1 dBA).

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## **COMPONENTS INTEGRATION**

High components integration such as patented CCV (Closed Crankcase Ventilation), oil cooler, oil and water pumps.

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## **SERVICEABILITY & MAINTAINABILITY**

Worldwide service network. Enhanced engine serviceability and diagnosis by mounting the Electronic Control Unit on the engine with CAN-BUS control and monitoring systems interface.

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## **AFTERTREATMENT SYSTEM**

SCR system is recognized as the best ATS solution for medium and heavy duty automotive engines to reach emission standards; it reduces NO<sub>x</sub> outside the engine, regardless the combustion process, enhancing engine performance and reliability, reducing at the same time fuel consumption and heat rejection.  
Oil sump available for both truck and bus applications.

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# Benefits

- ✓ **REDUCED OPERATING COSTS**
- ✓ **HIGH PERFORMANCE GUARANTEED IN ALL CONDITIONS**
- ✓ **OPTIMUM ENGINE PERFORMANCE**
- ✓ **HIGH ENGINE POWER DENSITY AND FAST LOAD RESPONSE TIME WITH THE LOWEST FUEL CONSUMPTION**
- ✓ **DRIVING COMFORT**
- ✓ **VIBRATIONS & NOISE REDUCTION**
- ✓ **LEAKAGE PREVENTION**
- ✓ **QUICK AND ACCURATE SERVICE SUPPORT AND REDUCED VEHICLE DOWNTIME**
- ✓ **ENVIRONMENTAL CARE, HIGH RELIABILITY AND LOW RUNNING COSTS (FUEL CONSUMPTION, VEHICLE DOWNTIME)**



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# CNG engines – Features

## F1, NEF and CURSOR Series

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### **UP TO 40.000 KM OIL CHANGE INTERVALS**

Functional engine design in terms of mechanical clearances, piston rings, chrome ceramic oil sealing and engine oil system calculation.

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### **INJECTION SYSTEM**

Multipoint sequential injection is an indirect injection system that ensures an accurate fuel delivering process and very stable combustion avoiding backfire troubles. Thanks to specific pistons, combustion is optimized and CNG burns readily and completely. Gas chemical composition quality doesn't affect combustion processes.

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### **AIR HANDLING**

Air-to-air charge cooler and turbocharger with Wastegate valve are used on all CNG engine models, assuring good transient response.

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### **ENGINE DESIGN**

Indirect injection, taking place in the air inlet manifold, and stoichiometric combustion of gas engines allow to reduce noise and vibrations of around 3-5 dB in comparison with Diesel engines, also thanks to a minor compression ratio. Cast iron crankshaft with counterweights (F1), rear distribution (NEF & CURSOR) for better driving comfort.

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### **COMPRESSED NATURAL GAS FUEL**

CNG is one of the cheapest fuel types. Strong economic advantages for the customer along the vehicle useful life.

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### **SERVICEABILITY & MAINTAINABILITY**

Worldwide service network. Engine ECU (Electronic Control Unit) with CAN-BUS control and monitoring interfaces for advanced real time diagnosis and efficient engine management.

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### **AFTER-TREATMENT SYSTEM**

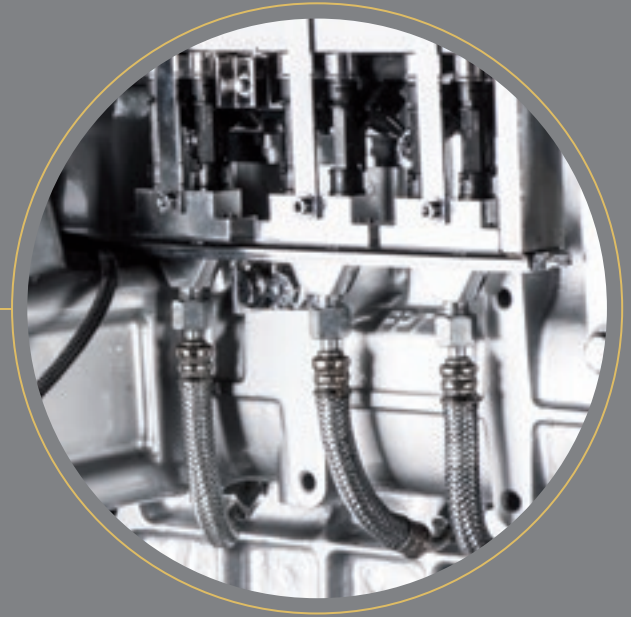
Thanks to lambda closed loop control and the use of a simple three way catalyst, CNG engines are able to reduce the amount of pollutants (NO<sub>x</sub>, HC, CO) by 95%, complying both to EEV and Euro VI emission requirements.

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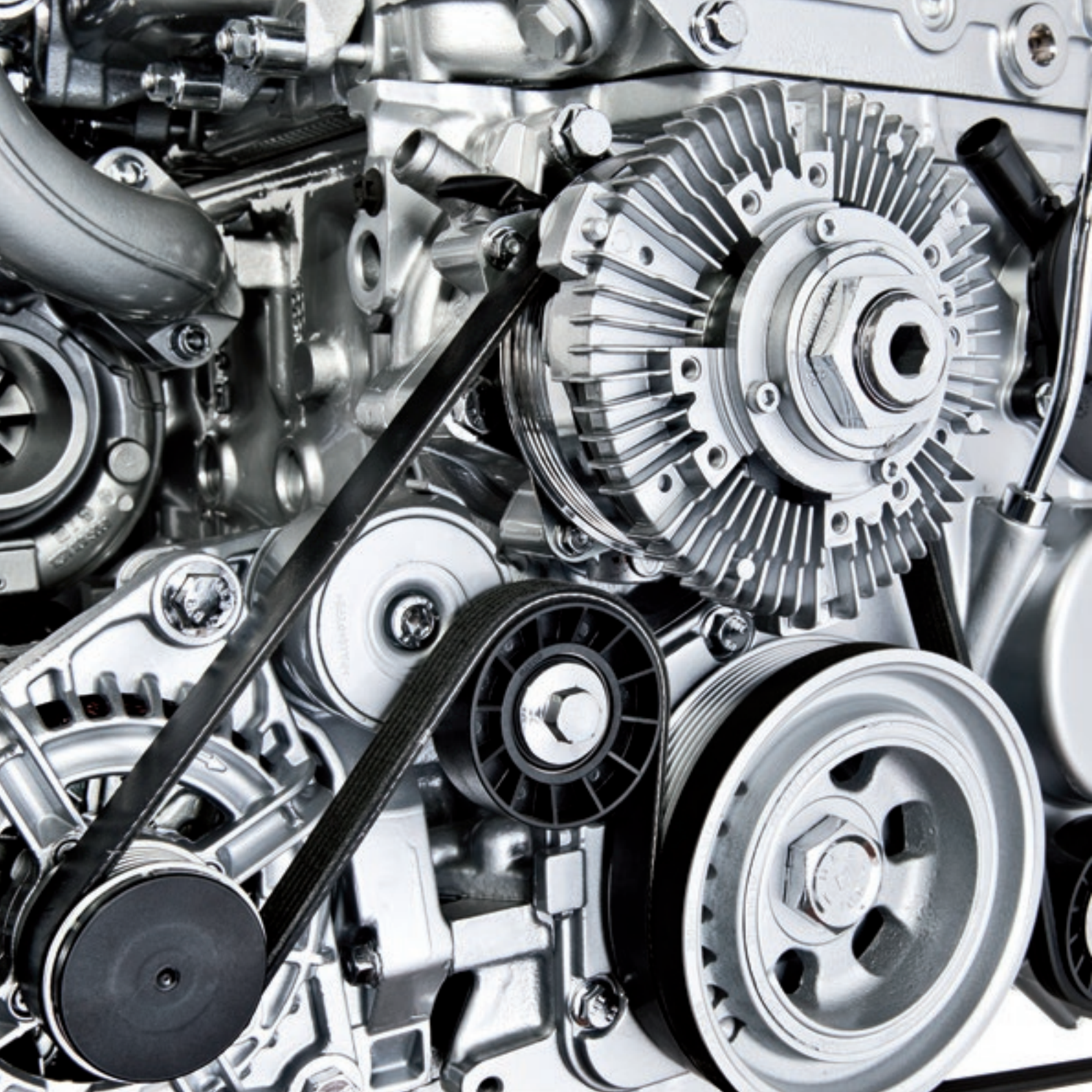


# Benefits

- ✓ **REDUCED MAINTENANCE NEEDS  
AND OPERATING COSTS**
- ✓ **COMBUSTION EFFICIENCY**
- ✓ **EXCELLENT LOAD RESPONSE  
LOW FUEL CONSUMPTION**
- ✓ **VIBRATIONS & NOISE REDUCTION**
- ✓ **REDUCED OPERATING COSTS**
- ✓ **QUICK AND ACCURATE SERVICE SUPPORT  
REDUCED VEHICLE DOWNTIME**
- ✓ **SIMPLE ATS ARCHITECTURE  
TO REACH EMISSION LIMITS**









POWER			TORQUE			EMISSION STANDARD	EXHAUST SYSTEM
KW	HP	RPM	NM	KGM	RPM		
93	126	3600	320	33	1800	Euro 4	ec-EGR + DOC
71	97	3900	240	24	1800	Euro 5	ec-EGR + DOC + DPF
78	106	3900	270	28	1500	Euro 5 / Euro 5 +	ec-EGR + DOC + DPF
93	126	3600	320	33	1800	Euro 5 / Euro 5 +	ec-EGR + DOC + DPF
107	146	3600	350	36	1500	Euro 5 / Euro 5 +	ec-EGR + DOC + DPF
107	146	3500	350	36	1400	Euro 4	ec-EGR + DOC
107	146	3500	350	36	1500	Euro 5 / Euro 5 +	ec-EGR + DOC + DPF
125	170	3500	400	41	1250	Euro 5	ec-EGR + DOC + DPF
125	170	3500	430	44	1250	Euro 5 +	ec-EGR + DOC + DPF
130	177	3500	400	41	1250	Euro 5 / Euro 5 +	ec-EGR + DOC + DPF
150	204	3500	470	48	1400	Euro 5 / Euro 5 +	ec-EGR + DOC + DPF
107	146	3500	350	36	1400	Euro III	—
81	110	3500	260	27	1200	EEV	ec-EGR + DOC + DPF
96	131	3500	300	31	1300	EEV	ec-EGR + DOC + DPF
107	146	3500	370	38	1300	EEV	ec-EGR + DOC + DPF
110	150	3500	370	38	1320	EEV	ec-EGR + DOC + DPF
125	170	3500	400	41	1250	EEV	ec-EGR + DOC + DPF
129	175	3500	430	44	1600	EEV	ec-EGR + DOC + DPF + SCR + CUC
81	110	3500	260	27	1200	Euro VI	ec-EGR + DOC + DPF + SCR + CUC
96	131	3500	300	31	1300	Euro VI	ec-EGR + DOC + DPF + SCR + CUC
107	146	3500	350	36	1250	Euro VI	ec-EGR + DOC + DPF + SCR + CUC
110	150	3500	370	38	1320	Euro VI	ec-EGR + DOC + DPF + SCR + CUC
125	170	3500	400	41	1250	Euro VI	ec-EGR + DOC + DPF + SCR + CUC
129	175	3500	430	44	1600	Euro VI	ec-EGR + DOC + DPF + SCR + CUC
100	136	3500	350	36	1500	EEV / Euro VI	3 WAY CATALYST
103	140	2700	460	47	1200-2100	EEV	SCR
110	140	2700	600	47	1300	EEV	—
118	160	2700	530	54	1200-2100	EEV	SCR
130	177	2700	570	58	1250-2100	EEV	SCR
130	177	2500	600	61	1250	EEV	SCR
134	182	2700	570	58	1200-2100	Euro III	—
134	182	2700	610	62	1300-2100	EEV	SCR
118	160	2500	580	59	1250-1940	Euro VI	DOC + DPF + SCR + CUC →

## LEGEND

### APPLICATION

- Light
- Truck
- ⊙ Bus

### ARRANGEMENT

- L In line

### AIR INTAKE

- TAA Turbocharged aftercooler

### TURBOCHARGING

- WG Wastegate
- VGT Variable Geometry Turbo
- EVGT Electronic Variable Geometry Turbocharger

### INJECTION SYSTEM

- ECR Electronic Common Rail
- EUI Electronic Unit Injector
- MPI Multi Point Injection

### EMISSION STANDARD

- EEV Enhanced Environmentally friendly Vehicle

### EXHAUST SYSTEM

- CUC Clean Up Catalyst
- DOC Diesel Oxidation Catalyst
- DPF Diesel Particulate Filter
- ec-EGR External Cooled Exhaust Gas Recirculation
- SCR Selective Catalytic Reduction

APPLICATION	MODEL	CYLINDER ARRANGEMENT AIR INTAKE	TURBOCHARGING	INJECTION SYSTEM	DISPLACEMENT LITERS
●	N45 ENT	L4 / TAA	WG	ECR	4,5
⊙	N45 ENT	L4 / TAA	WG	ECR	4,5
●	N45 ENT	L4 / TAA	WG	ECR	4,5
●	N60 ENT	L4 / TAA	WG	ECR	5,9
● ⊙	N60 ENT	L4 / TAA	WG	ECR	5,9
● ⊙	N60 ENT	L6 / TAA	WG	ECR	5,9
● ⊙	N60 ENT	L4 / TAA	WG	ECR	5,9
●	N60 ENT	L6 / TAA	WG	ECR	5,9
⊙	N60 ENT	L6 / TAA	WG	ECR	5,9
⊙	N60 ENT	L6 / TAA	WG	ECR	5,9
⊙	N60 ENT	L6 / TAA	WG	ECR	5,9
●	N60 ENT	L6 / TAA	WG	ECR	5,9
●	N60 ENT	L6 / TAA	WG	ECR	5,9
● ⊙	N60 ENT	L6 / TAA	WG	ECR	5,9
● ⊙	N60 ENTG	L6 / TAA	WG	MPI	5,9
●	N67 ENT	L6 / TAA	WG	ECR	6,7
⊙	N67 ENT	L6 / TAA	WG	ECR	6,7
●	N67 ENT	L6 / TAA	WG	ECR	6,7
●	N67 ENT	L6 / TAA	WG	ECR	6,7
⊙	N67 ENT	L6 / TAA	WG	ECR	6,7
● ⊙	N67 ENT	L6 / TAA	WG	ECR	6,7
⊙	C78 ENT	L6 / TAA	VGT	EUI	7,8
⊙	C78 ENT	L6 / TAA	VGT	EUI	7,8
●	C78 ENT	L6 / TAA	WG	EUI	7,8
●	C78 ENT	L6 / TAA	VGT	EUI	7,8
⊙	C78 ENT	L6 / TAA	VGT	EUI	7,8
●	C78 ENT	L6 / TAA	VGT	EUI	7,8
●	C78 ENT	L6 / TAA	VGT	EUI	7,8
⊙	C78 ENT	L6 / TAA	VGT	EUI	7,8
● ⊙	C78 ENTG	L6 / TAA	WG	MPI	7,8
● ⊙	C78 ENTG	L6 / TAA	WG	MPI	7,8
● ⊙	C78 ENTG	L6 / TAA	WG	MPI	7,8
● ⊙	C78 ENTG	L6 / TAA	WG	MPI	7,8

POWER			TORQUE			EMISSION STANDARD	EXHAUST SYSTEM
KW	HP	RPM	NM	KGM	RPM		
137	186	2500	680	69	1250-1900	Euro VI	DOC + DPF + SCR + CUC
137	186	2500	750	69	1400	Euro VI	DOC + DPF + SCR + CUC
152	207	2500	750	76	1400-1800	Euro VI	DOC + DPF + SCR + CUC
135	184	2700	650	66	1200-1800	EEV	SCR
160	218	2700	680	69	1200-2230	Euro III	—
160	218	2700	680	69	1200-2100	EEV	SCR
176	239	2700	810	83	1250	Euro III	—
185	252	2700	850	87	1250-2100	EEV	SCR
185	252	2500	850	87	1250	EEV	SCR
192	261	2500	1050	107	1250	EEV	SCR
194	264	2500	1000	102	1250	EEV	SCR
202	275	2500	930	95	1250	Euro III	—
205	279	2500	950	97	1250-2100	EEV	SCR
220	299	2500	1050	107	1250-1850	EEV	SCR
147	200	2700	650	66	1250	EEV	3 WAY CATALYST
162	220	2500	800	82	1250-1930	Euro VI	DOC + DPF + SCR + CUC
184	250	2500	950	96	1400-1500	Euro VI	DOC + DPF + SCR + CUC
185	252	2500	850	87	1250-2070	Euro VI	DOC + DPF + SCR + CUC
206	280	2500	1000	102	1250-1970	Euro VI	DOC + DPF + SCR + CUC
210	286	2500	1000	102	1250-1600	Euro VI	DOC + DPF + SCR + CUC
235	320	2500	1100	112	1250-1890	Euro VI	DOC + DPF + SCR + CUC
180	245	1850	1100	112	1040-1560	EEV	SCR
213	290	2050	1100	112	1040-1850	EEV	SCR
228	310	2400	1300	133	1200-1675	Euro V / EEV	SCR
243	330	2400	1400	143	1080-1655	Euro V / EEV	SCR
243	330	2050	1500	153	1125-1600	EEV	SCR
259	352	2400	1500	153	1200-1685	Euro III	—
265	360	2400	1500	153	1200-1685	Euro V / EEV	SCR
280	381	2050	1500	153	1125-1780	EEV	SCR
180	245	1850	1000	101	1050	EEV / Euro VI	3 WAY CATALYST
200	272	2000	1100	112	1100	EEV / Euro VI	3 WAY CATALYST
213	290	2000	1100	112	1100	EEV / Euro VI	3 WAY CATALYST
221	301	2000	1200	122	1200	EEV / Euro VI	3 WAY CATALYST

## LEGEND

### APPLICATION

- Light
- Truck
- ⊙ Bus

### ARRANGEMENT

- L In line

### AIR INTAKE

- TAA Turbocharged aftercooler

### TURBOCHARGING

- WG Wastegate
- VGT Variable Geometry Turbo
- EVGT Electronic Variable Geometry Turbocharger

### INJECTION SYSTEM

- ECR Electronic Common Rail
- EUI Electronic Unit Injector
- MPI Multi Point Injection

### EMISSION STANDARD

- EEV Enhanced Environmentally friendly Vehicle

### EXHAUST SYSTEM

- CUC Clean Up Catalyst
- DOC Diesel Oxidation Catalyst
- DPF Diesel Particulate Filter
- ec-EGR External Cooled Exhaust Gas Recirculation
- SCR Selective Catalytic Reduction

APPLICATION	MODEL	CYLINDER ARRANGEMENT AIR INTAKE	TURBOCHARGING	INJECTION SYSTEM	DISPLACEMENT LITERS
● ⊙	C78 ENTG	L6 / TAA	WG	MPI	7,8
● ⊙	C87 ENT	L6 / TAA	WG	ECR	8,7
● ⊙	C87 ENT	L6 / TAA	WG	ECR	8,7
● ⊙	C87 ENT	L6 / TAA	WG	ECR	8,7
● ⊙	C87 ENT	L6 / TAA	EVGT	ECR	8,7
⊙	C10 ENT	L6 / TAA	VGT	EUI	10,3
●	C10 ENT	L6 / TAA	VGT	EUI	10,3
●	C10 ENT	L6 / TAA	VGT	EUI	10,3
●	C10 ENT	L6 / TAA	VGT	EUI	10,3
●	C10 ENT	L6 / TAA	VGT	EUI	10,3
⊙	C10 ENT	L6 / TAA	VGT	EUI	10,3
●	C10 ENT	L6 / TAA	VGT	EUI	10,3
● ⊙	C11 ENT	L6 / TAA	EVGT	ECR	11,1
●	C11 ENT	L6 / TAA	EVGT	ECR	11,1
●	C11 ENT	L6 / TAA	EVGT	ECR	11,1
●	C13 ENT	L6 / TAA	WG	EUI	12,9
●	C13 ENT	L6 / TAA	WG	EUI	12,9
●	C13 ENT	L6 / TAA	WG	EUI	12,9
●	C13 ENT	L6 / TAA	VGT	EUI	12,9
●	C13 ENT	L6 / TAA	VGT	EUI	12,9
●	C13 ENT	L6 / TAA	VGT	EUI	12,9
●	C13 ENT	L6 / TAA	VGT	EUI	12,9
●	C13 ENT	L6 / TAA	VGT	EUI	12,9
●	C13 ENT	L6 / TAA	VGT	EUI	12,9
●	C13 ENT	L6 / TAA	VGT	EUI	12,9
●	C13 ENT	L6 / TAA	VGT	EUI	12,9
●	C13 ENT	L6 / TAA	VGT	EUI	12,9
●	C13 ENT	L6 / TAA	VGT	EUI	12,9
●	C13 ENT	L6 / TAA	VGT	EUI	12,9
●	C13 ENT	L6 / TAA	VGT	EUI	12,9
●	C13 ENT	L6 / TAA	WG	ECR	12,9
●	C13 ENT	L6 / TAA	WG	ECR	12,9
●	C13 ENT	L6 / TAA	EVGT	ECR	12,9
●	C13 ENT	L6 / TAA	EVGT	ECR	12,9



POWER			TORQUE			EMISSION STANDARD	EXHAUST SYSTEM
KW	HP	RPM	NM	KGM	RPM		
243	330	2000	1300	133	1200	EEV / Euro VI	3 WAY CATALYST
228	310	2200	1300	133	1200	Euro VI	DOC + DPF + SCR + CUC
243	330	2200	1400	143	1200	Euro VI	DOC + DPF + SCR + CUC
265	360	2200	1650	168	1200	Euro VI	DOC + DPF + SCR + CUC
294	400	2200	1700	173	1200	Euro VI	DOC + DPF + SCR + CUC
280	381	2100	1600	163	1000-1660	EEV	SCR
294	400	2100	1900	194	1050-1550	Euro III	—
310	422	2100	1900	194	1050-1550	Euro V / EEV	SCR
316	430	2100	1900	194	1000-1590	Euro III	—
331	450	2100	2100	214	1050-1550	Euro V / EEV	SCR
331	450	2100	2100	214	1050-1500	EEV	SCR
338	460	2100	2100	214	1050-1550	Euro V / EEV	SCR
309	420	1900	1900	204	1050	Euro VI	DOC + DPF + SCR + CUC
338	460	1900	2150	219	1050	Euro VI	DOC + DPF + SCR + CUC
353	480	1900	2250	229	1050	Euro VI	DOC + DPF + SCR + CUC
280	381	1900	1900	194	1000-1515	Euro III	—
301	409	1900	1900	194	1000-1515	Euro V	SCR
309	420	1900	1900	194	1000-1515	Euro III	—
324	441	1900	2200	224	1000-1400	Euro III	—
324	441	1900	2200	224	1000-1400	Euro V	SCR
331	450	1900	2200	224	1000-1440	Euro V	SCR
382	520	1900	2300	235	1000-1600	Euro V	SCR
353	480	1900	2200	224	1000-1540	Euro III	—
353	480	1900	2200	224	1000-1540	Euro V / EEV	SCR
368	500	1900	2300	235	1000-1525	Euro V / EEV	SCR
397	540	1900	2300	235	1000-1525	Euro III	—
412	560	1900	2500	255	1000-1575	Euro V / EEV	SCR
302	411	1900	2100	214	1000	Euro VI	DOC + DPF + SCR + CUC
331	450	1900	2200	224	1000	Euro VI	DOC + DPF + SCR + CUC
368	500	1900	2300	235	1000	Euro VI	DOC + DPF + SCR + CUC
412	560	1900	2500	255	1000	Euro VI	DOC + DPF + SCR + CUC



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# Questions & answers on HI-eSCR

*Which are the main benefits for OEMs and final customers?*

Definitely, also considering technical improvements adopted on FPT Euro VI engines, OEMs and final customer will benefit from:

- No need to rework their vehicle cooling system (same as the Euro V cooling package)
- Lower engine complexity and efficient thermal management (no EGR) that improve system reliability, engine durability and performance
- HI-eSCR with passive DPF regeneration
- Higher power potential without a mandatory sophisticated air handling system
- Low operating costs due to low engine wear and high maintenance intervals (up to 150.000 km, depending on the mission)
- Compact and lean design, both of the engine and the HI-eSCR system, lowering weight and installation space. New “One-Box Layout” designed for a better integration on vehicle

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*Might SCR be affected by efficiency loss?*

New Euro VI standards introduce enhanced emission durability requirements up to 700,000 km or 7 years for the largest vehicles. FPT Industrial has set its goals much higher than the required limits (more than 1.000.000 km), granting high NO<sub>x</sub> conversion efficiency without loss

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*Does the system “engine + SCR” require particular installation specifications?*

The new HI-eSCR system has been designed to optimize layout and minimize weight impact, resulting in a single, simple box shaped including DOC (Diesel Oxidant Catalyst), DPF (Diesel Particulate Filter), SCR (Selective Catalytic Reduction) and CUC (Clean-Up Catalyst)

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*Which are the main advantages of “One Box” layout solutions for OEMs and final customers?*

All components have been installed with extreme compactness, achieving superior conversion efficiencies for all pollutants. The entire HI-eSCR system, including CUC (the catalyst added to eliminate residual ammonia slip) will be contained in a compact, fully enclosed structure thereby not impeding body building or chassis equipment mounting activities. Furthermore, the “One box layout” solution has been designed to assure outstanding performance all along the engine lifecycle, avoiding minimum exhaust backpressure troubles)

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*What about changes in consumption, operating costs and performance of Euro VI engines compared with Euro V versions?*

Despite the request of remarkable reductions in pollutants, like NO<sub>x</sub> and PM, operating costs (fuel consumption and AdBlue) will not be affected by any changes. While performance stays the same, without resorting to complex air handling systems

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*SCR components / engine components should be affected by the use of Biodiesel fuels?*

The ‘SCR Only’ technology is designed to operate in compliance with Euro VI legislation using standard Diesel fuel according to current European specifications (EN 590); different fuels with higher biodiesel content are not allowed because out of standard Euro VI homologation and must be specifically required by the Customer and validated / homologated due to the biodiesel blends’ phosphorus and alkali metals contents which are potentially detrimental for the SCR performances and durability

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*How much autonomy does the system offer?  
How long does the AdBlue last?*

The standard AdBlue tank must be large enough to allow 2 main tank fill-ups before the urea tank needs to be filled. However, the FPT catalogue contains different types of tanks, thus offering OEMs the possibility of sizing the system to meet their own needs

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*Is AdBlue distributed and easy to find everywhere?*

The distribution network in Europe is almost as extensive as that of normal fuel stations. In the United States, since the EPA10 (on road) standard came into force in 2010, which all the major players have responded to by adopting the SCR system, the AdBlue distribution network has already been developed and will expand further

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*What happens when the AdBlue tank is empty?*

The AdBlue level is indicated on the vehicle dashboard, which also has a reserve telltale that warns the driver in advance that the AdBlue is low. When the AdBlue runs out, the engine goes into derating mode, reducing torque by 50%. This reduction is obviously able to maintain the safety of the vehicle/operator at all times

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*What happens at very low temperatures?*

The engine coolant warms the AdBlue inside the tank and the delivery pipes, which are designed not to be affected by freezing temperatures. At particularly low temperatures, when the AdBlue reaches its freezing point of  $-11^{\circ}\text{C}$  ( $12^{\circ}\text{F}$ ), the engine can anyhow normally work while the SCR system is under de-icing

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*What is AdBlue?*

It is a solution of chemical grade urea and de-mineralized water. AdBlue is a key component of SCR systems and reacts with engine exhaust in the presence of a dedicated catalyst, breaking down  $\text{NO}_x$  into safe nitrogen and water vapour, which occur naturally in the atmosphere

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*Is AdBlue difficult to use?*

The operator only needs to refill the AdBlue tank, which is designed to hold at least enough additive required for at least two full tanks of fuel. It is a nontoxic substance, but due to its chemical nature, AdBlue must be transported and stored like alimentary beverages. AdBlue has a typical shelf life of 6-12 months. Storage temperature should not fall below  $-11^{\circ}\text{C}$  (AdBlue freezing point) or exceed  $+30^{\circ}\text{C}$ , as this would reduce its shelf life. In areas where the temperature is frequently in excess of  $30^{\circ}\text{C}$  (i.e. Greece, Spain) it is necessary to ensure that the solution is not stored under direct sunlight.

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*What does it mean DPF  
with passive regeneration?  
Will it bring some advantages  
to OEMs and final customers?*

FPT Industrial technology allows to improve engine efficiency through an optimized combustion process which drastically reduces the outflow of particulate matter. The modest engine-out PM emissions are then brought to the necessary levels to comply with emission standards using a “full-flow” DPF that will achieve continuous regeneration. Forced filter regeneration will not be necessary. No additional aiding devices (e.g.: HydroCarbon Injector - HCl doser) are needed to perform DPF regeneration. This will mean a lower SCR management complexity assuring better fuel consumption and lower operating and maintenance costs

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*What about DPF service intervals?  
Better or worst in comparison  
with competitors?  
Additional costs for the final customer*

The DPF is designed to reduce as much as possible the maintenance; anyhow due to the ash accumulation inside the DPF, it is required the filter replacement/cleaning every 600.000 km for heavy duty applications. Thanks both to the Passive regeneration and the “wall-flow” DPF, FPT ATS is not affected from clogging troubles. OEMs will benefit in term of system efficiency and operating costs

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All the pictures, drawings illustrations and descriptions contained in this brochure are based on product information available to FPT Industrial at the time of printing (30/06/2014).

Some of the engine line-ups may refer to a specific market configuration which may not be present or offered for sale available in all other markets. The colors featured in this brochure may differ from the originals.

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