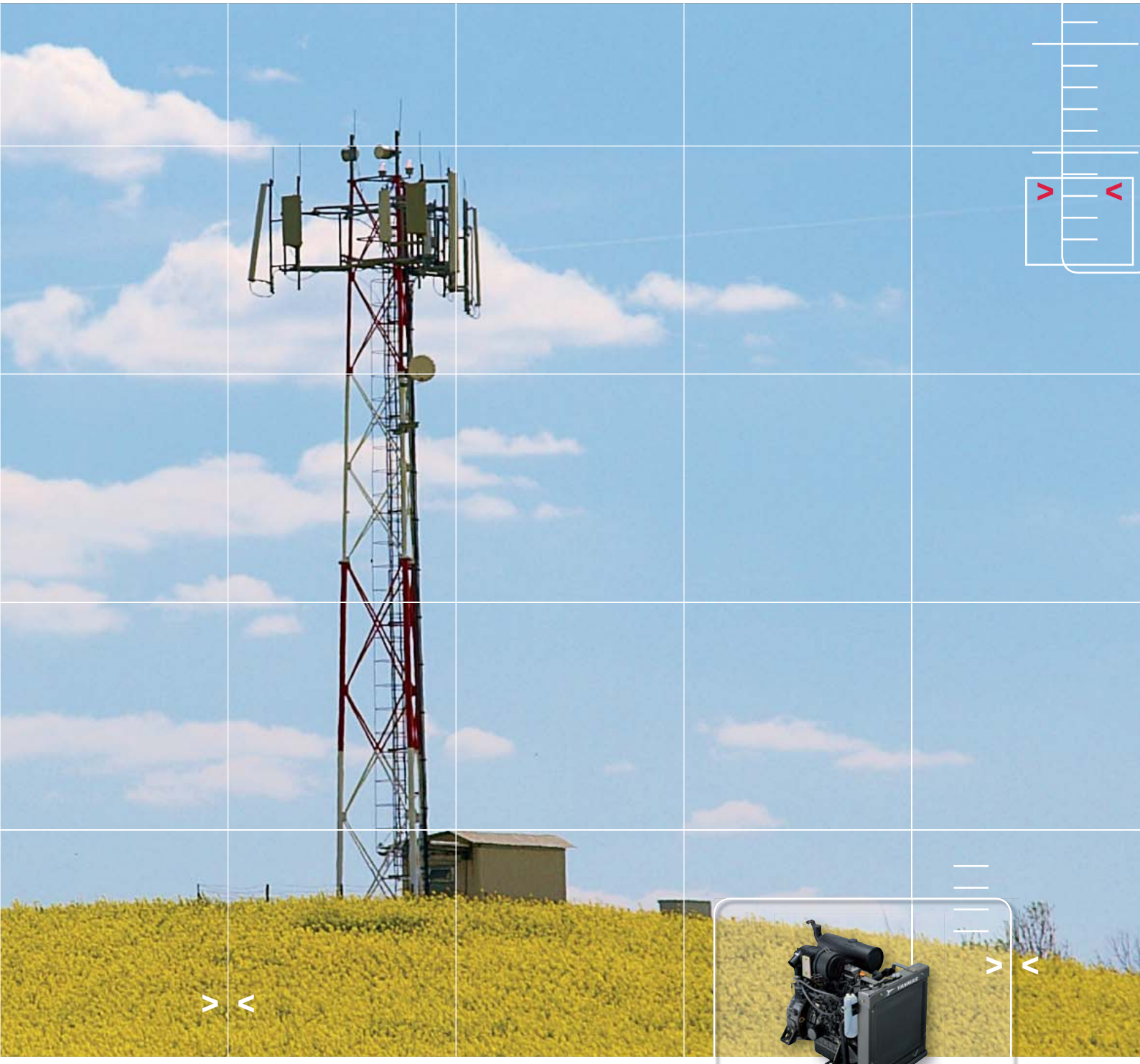
YANMAR

WATER-COOLED DIESEL ENGINES

TNV/TNM Series POWER PACK

Rated Output 6.1~61.7 kW



Call for Yanmar solutions

TNV/TNM Engine Power Pack: A Complete Package of Yanmar

Yanmar was founded in 1912 and developed the world's first commercially compact diesel engine in 1933. The technical innovation has kept on flowering ever since, making Yanmar a perpetual leader in diesel technology.

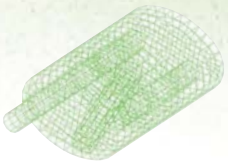
The TNV/TNM Power Pack is designed to meet diverse user needs and market requirements. The compact but powerful, reliable Power Pack provides durable performance, high quality and versatility, while keeping the fuel efficiency and environmental friendliness. It makes the installation and maintenance simple and user-friendly.

Two basis specifications with Power Pack series are available;
Group A provides multi-purpose usage with a wide range of industrial equipment including gensets.
Group B is tailor-made for generator applications. The Yanmar TNV/TNM Power Pack series integrate Yanmar's original diesel engines technologies in an easy-to-use package.

Environment Friendly

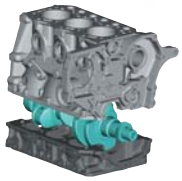
Low Noise, Safe Materials

Yanmar's own CAE technologies have optimized stiffness, minimized transformation and reduced radiant noise.



Novel CAE technologies were used to obtain the best muffler volumes and sound-proofing materials.

The ladder frame structure cylinder block achieves drastic reductions in noise and vibrations from the engine body. (TNM series)



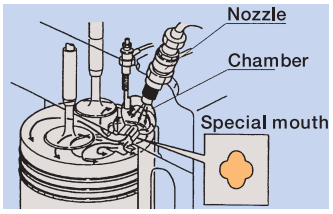
Ladder Frame
(TNM series)

The power pack series has no asbestos, mercury, polybrominated biphenyl, polybrominated diphenyl ether, or cadmium.

Clean Exhaust

[Indirect Injection (IDI) Engines]

Yanmar research has achieved better flow mixing in both the main chamber and the special mouth around the injector. More efficient use of the intake air produces cleaner burn and low exhaust emissions.



Instead of the PFR pump, a newly developed in-line pump is used for the smaller TNV/TNM engines. Precise regulatory compliance is assured by the fact that all adjustment is performed at Yanmar's own FIE factory. The following features are incorporated:

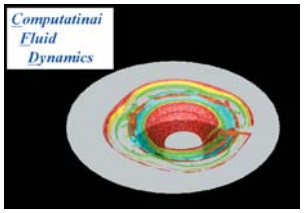
*Bigger governor force accelerates the response of the fuel control rack. Engine revolution is more constant and matching with a wide range of machinery simpler.

*Control of the fuel injection timing according to engine load reduces emissions.

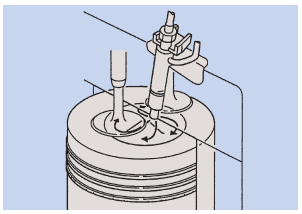
*Cam profiles are matched to nozzle throttle needs for better injection rate control and lower emission.

[Direct Injection (DI) Engines]

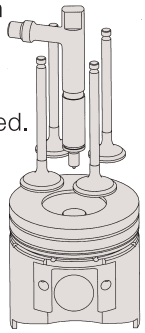
The fluid energy of the air and fuel charge is bigger and the swirl continues in the chamber during combustion, enhancing mixing and reducing exhaust emissions.



The modified angle of the fuel injection nozzle reduces uneven atomization of the fuel between injections. Excellent matching of the intake swirl ratio and combustion chamber shape produces uniform fuel mixing in the combustion chamber. Combustion efficiency, starting, noise and exhaust emission performance are all improved.



Use of 2 intake and 2 exhaust valves on the 4TNV98 and 4TNV98T earns big improvements in air intake and expulsion. The vertically mounted injection nozzle minimizes spray pattern imbalance.



Technologies

Electronic Control (Series3)

This is the system that expands work flexibility. The electronic control system brings the world's highly evolved electronic governing technologies of many years' experience. It's a standard fitting on the 37kW+ engine series, superbly matched to all kinds of equipment, and also available as an option on sub-37kW units.

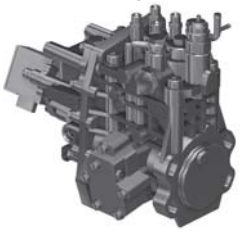
The EGR valve is modulated according to the RPM, load etc. to reduce NOx emissions and treat the environment well. Fuel injection is regulated to the optimum level on starting and acceleration. Therefore black diesel smoke is much reduced. All is controlled by external switches.

Integrated operation of ECU by CAN-bus communication enables RPM adjustment and the switching of governor features to meet the needs of the job.

ECU troubleshooting and service tools have been enhanced for finding the answers on a personal computer.

EGR Control system

Electronic govenor system



MP type fuel Injection Pump with Electronic governor

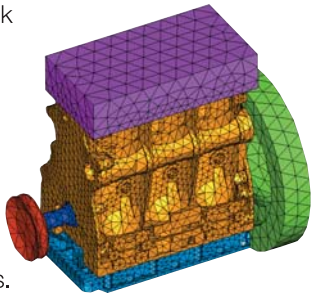
Powerful & Compact

Powerful and compact 2-pole generator specifications are available with the 3TNM68, 3TNV70, 3TNM72 and 3TNV76 engines. The compactness is achieved by the improved combustion chamber and a better fuel injection system. They supply large capacity, persevering power for every type of machinery, working always with clean and environment-friendly combustion performance.

Durability & Reliability

The TNV/TNM engines now proudly take up the running as Yanmar's premium small industrial diesel engines. They offer even more enhanced durability due to better block cooling, a stiffer crank and pistons, finer tolerance in the journal etc.

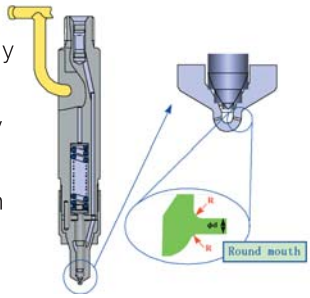
CAE analysis has brought lower vibrations and higher strength to the mounting structure for even better reliability in heavy-duty jobs.



Fuel Economy

Experimental and analytical studies of air flow in the combustion chamber have improved the air and fuel mixing with the help of Yanmar's original specially shaped injection hole. The air flow is now used still more effectively to reduce fuel consumption. Another environment-friendly feature, the engines are compatible with operation on biomass fuel (5%).

[Note: the biomass fuel must comply with the relevant standards.]



Easy Maintenance

Daily checks and servicing of filters and other maintenance points are easy, and that goes a long way towards extending an engine's service life. In the DI engines, the electric fuel feed pump is standard equipment. Air venting from the fuel system is simple and the engine's starting performance is superior, too.

Ready to Run and/or Install

The engine structure satisfies market requirements and many accessory kits are available to assist flexible mounting on various types of machinery.

In generator applications, Group A is for open frame generator sets and Group B for noise-proofed sets.

Safety

All rotating parts have safety covers.

The Wide Output Lineup of TNV/TNM Power Packs

The TNV/TNM power pack series covers a wide horsepower range.
The lineup consists of four engine groups,
each with the optimum design for that output range:

TNM series (3TNM68, 3TNM72)

Ultra-Compact and High Performance. The ladder frame engine structure reduces the noise and vibration. Easy installation and replacement, the perfect fit for your machine.

Series 1 (3TNV70, 3TNV76)

Uses the newly developed intake port for the Indirect Injection (IDI) combustion chamber. A newly designed inline FO injection pump replaces the conventional PFR system to reduce exhaust gas emissions and enhance reliability.

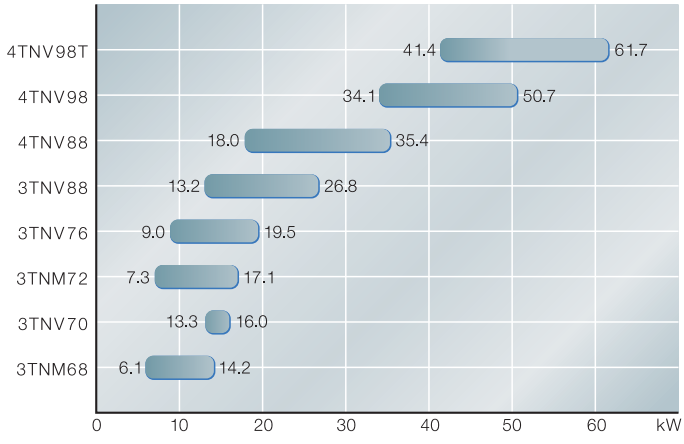
Series 2 (3TNV88, 4TNV88)

Uses the newly developed high-pressure mono-plunger FO injection pump, which controls the evenness of fuel injection to each cylinder. A finely chosen nozzle installation angle produces better mixing of the fuel and air to achieve more effective, cleaner combustion.

Series 3 (4TNV98, 4TNV98T)

Uses 2 intake and 2 exhaust valves and an upright nozzle to improve intake and exhaust efficiency. These valves greatly boost combustion performance, hugely reducing exhaust emissions while maintaining the dynamic and persevering power of the engine.
Uses Electronic Control system and EGR system to reduce NOx emission --- 4TNV98(T)-Z

OUTPUT RANGE CHART



ENGINE SPEC SELECTION CODE

Power Pack Group		Application	
Group A	Induspack	General industrial use	
	Genepack A	Generator use (open type)	2-pole
			4-pole
Group B	Genepack B	Generator use (enclosed type)	2-pole
			4-pole

SPECIFICATIONS

Model	
Type	
Combustion	
Aspiration	
No. of cylinders	
Cyl. bore x stroke [mm]	
Displacement [lit.]	
Direction of rotation	
Cooling system	
Lubrication system	
Starting system	

OUTPUT

Industrial use (Induspack)	Model	
	Code	
	Rated output [kW/min^{-1}]	

Generator use (Genepack)	Model			
	Code			
		No. of poles	50 or 60Hz	Rating
	Engine output [kW/min^{-1}]	2-pole	for 50Hz @3000min^{-1}	Prime power
				Rated output
			for 60Hz @3600min^{-1}	Prime power
				Rated output
		4-pole	for 50Hz @1500min^{-1}	Prime power
				Rated output
			for 60Hz @1800min^{-1}	Prime power
				Rated output
	Applicable Generator Capacity [kVA]	2-pole	for 50Hz @3000min^{-1}	Prime power
				Rated output
			for 60Hz @3600min^{-1}	Prime power
				Rated output
		4-pole	for 50Hz @1500min^{-1}	Prime power
				Rated output
			for 60Hz @1800min^{-1}	Prime power
				Rated output

	TNM series		TNV series					
	3TNM68	3TNM72	3TNV70	3TNV76	3TNV88(-B)	4TNV88(-B)	4TNV98(-Z)	4TNV98T(-Z)
	-AS	-AS	-	-CS	-DS	-DS	-NS	-NS
	-HA	-HA	-	-	-	-	-	-
	-GA	-GA	-	-GA	-GA	-GA	-GA	-GA
	-	-	-HB	-HB	-	-	-	-
	-	-	-	-GB	-GB	-GB	-GB	-GB

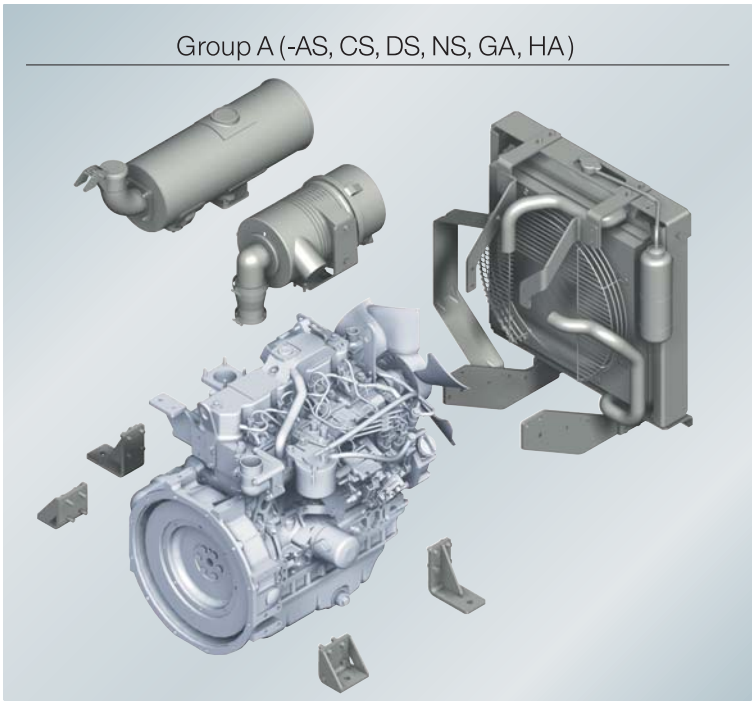
	TNM series		TNV series					
	3TNM68	3TNM72	3TNV70	3TNV76	3TNV88(-B)	4TNV88(-B)	4TNV98(-Z)	4TNV98T(-Z)
	Vertical 4-cylinder water cooled diesel engine							
	Indirect injection				Direct injection			
	NA							TC
	3					4		
	68X72	72X74	70X74	76X82	88X90		98X110	
	0.784	0.904	0.854	1.116	1.642	2.190	3.319	
	Counterclockwise							
	Radiator							
	Forced lubrication by trochoid pump							
	Starting motor (D.C. 12V)							

	TNM series		TNV series				
	3TNM68	3TNM72	3TNV76	3TNV88(-B)	4TNV88(-B)	4TNV98-Z	4TNV98T-Z
	-AS	-AS	-CS	-DS	-DS	-NS	-NS
	14.1/3600	17.1/3600	18.7/3200	26.8/3000	35.4/3000	50.7/2500	61.7/2500

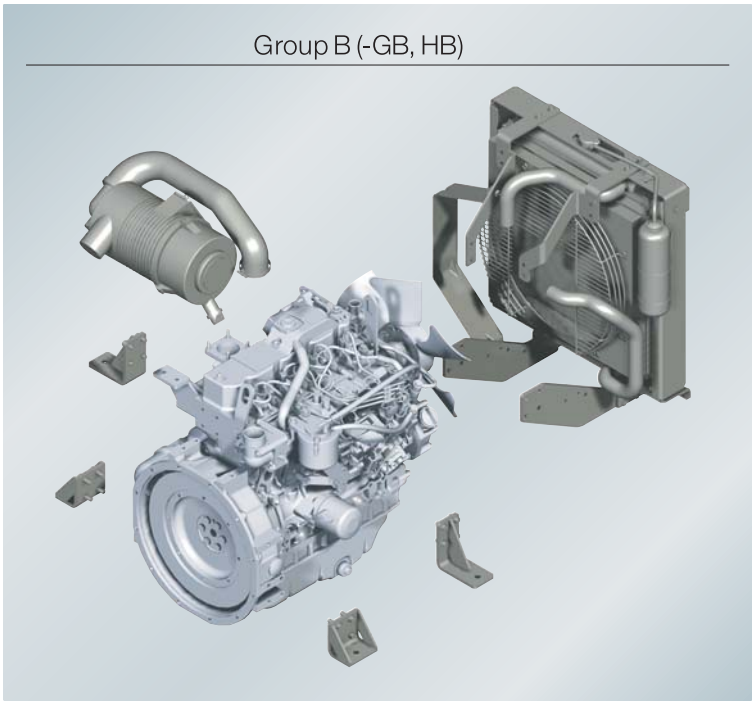
	TNM series				TNV series						
	3TNM68	3TNM68	3TNM72	3TNM72	3TNV70	3TNV76	3TNV76	3TNV88(-B)	4TNV88(-B)	4TNV98	4TNV98T
	-HA	-GA	-HA	-GA	-HB	-HB	-GA,GB	-GA,GB	-GA,GB	-GA,GB	-GA,GB
	10.9	-	13.0	-	12.1	15.1	-	-	-	-	-
	12.0	-	14.3	-	13.3	16.5	-	-	-	-	-
	12.9	-	15.1	-	14.5	17.7	-	-	-	-	-
	14.2	-	16.6	-	16.0	19.5	-	-	-	-	-
	-	5.5	-	6.6	-	-	8.2	12.2	16.4	30.7	37.7
	-	6.1	-	7.3	-	-	9.0	13.2	18.0	34.1	41.4
	-	6.6	-	7.8	-	-	9.8	14.7	19.6	36.4	45.3
	-	7.3	-	8.6	-	-	10.7	16.2	21.6	40.8	50.1
	11.2	-	13.3	-	12.4	16.0	-	-	-	-	-
	12.3	-	14.8	-	13.6	17.1	-	-	-	-	-
	13.2	-	15.7	-	15.0	18.4	-	-	-	-	-
	14.7	-	17.2	-	16.6	20.2	-	-	-	-	-
	-	5.3	-	6.6	-	-	8.4	12.6	17.0	33.2	41.2
	-	5.9	-	7.5	-	-	9.2	13.5	18.7	36.7	45.0
	-	6.6	-	8.0	-	-	10.0	15.4	20.6	40.0	50.0
	-	7.5	-	8.8	-	-	11.0	16.8	22.7	44.4	55.0

ACCESSORIES

Group A (-AS, CS, DS, NS, GA, HA)



Group B (-GB, HB)



Generator use

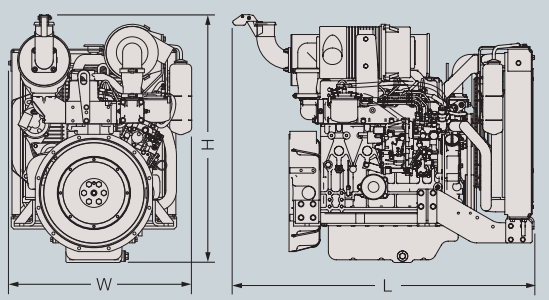
	Model
	Code
Fuel system	Fuel filter
	Mechanical feed pump
	Electric feed pump
Lube system	Oil pan
	L.O. press switch (0.5kg/cm²)
Cooling system	Pusher fan
	Thermostat
	C.W. temp. switch (on at 110 deg. C)
Electrical system	Starting motor
	Stop solenoid
	Alternator (40A)
	Glow plug
	Air heater
Intake and exhaust system	Intake manifold (lateral intake)
	Exhaust manifold (upper side exhaust)
	Turbocharger
P.T.O.	SAE#5 (width: TNV=124, TNM=111)
	Semi SAE#4 (width=105)
	SAE#3 (width=125)
Power pack parts	Air cleaner
	Silencer
	Speed control knob
	Radiator
	Engine foot
	Instrument panel

Industrial use

	Model
	Code
Fuel system	Fuel filter
	Mechanical feed pump
	Electric feed pump
Lube system	Oil pan (drain plug at intake side)
	L.O. press switch (0.5kg/cm²)
Cooling system	Puller fan
	Thermostat
	C.W. temp. switch (on at 110 deg. C)
Electrical system	Starting motor
	Stop solenoid
	Electronic govenor
	Alternator (40A)
	Alternator (55A)
	Glow plug
	Air heater
Intake and exhaust system	Intake manifold (lateral intake)
	Exhaust manifold (upper side exhaust)
	EGR system
	Turbocharger
P.T.O.	SAE#5 (width: TNV=124, TNM=111)
	SAE#4 (width=158)
Power pack parts	Air cleaner
	Silencer
	Speed control knob
	Radiator
	Engine foot
	Instrument panel
	Wire harness
	Accel sensor

DIMENSIONS

Group A (-AS, CS, DS, NS, GA)



Genepack A (-GA, HA)

	TNM series		TNV series				
Model	3TNM68	3TNM72	3TNV76	3TNV88	4TNV88	4TNV98	4TNV98T
Code	-GA, -HA	-GA, -HA	-GA	-(B)GA	-(B)GA	-GA	-GA
Length mm	751	722	745	821	1002	1041	938
Width mm	474	464	518	609	609	703	703
Height mm	668	683	696	792	824	926	925
Weight kg	132	138	158	180	210	280	284

Induspack (-AS, CS, DS, NS)

	TNM series		TNV series				
Model	3TNM68	3TNM72	3TNV76	3TNV88	4TNV88	4TNV98	4TNV98T
Code	-AS	-AS	-CS	-(B)DS	-(B)DS	-ZNS	-ZNS
Length mm	751	722	814	821	1002	1042	936
Width mm	474	464	514	609	609	701	701
Height mm	668	683	696	792	824	967	967
Weight kg	132	138	158	181	211	280	284

	TNM series		TNV series										
													○: Installed on engine, □: Option
	3TNM68	3TNM72	3TNV70	3TNV76		3TNV88		4TNV88		4TNV98		4TNV98T	
	-GA, -HA	-GA, -HA	-HB	-GA	-GB, -HB	-(B)GA	-(B)GB	-(B)GA	-(B)GB	-GA	-GB	-GA	-GB
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	TNM series		TNV series				
	3TNM68	3TNM72	3TNV76	3TNV88	4TNV88	4TNV98	4TNV98T
	-AS	-AS	-CS	-(B)DS	-(B)DS	-ZNS	-ZNS
	○	○	○	○	○	○	○
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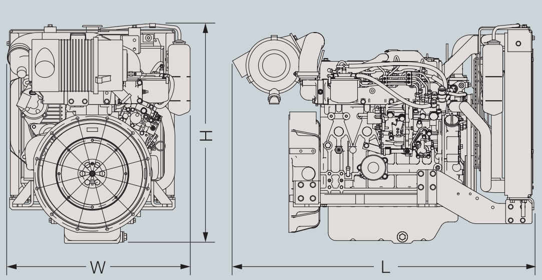
	-	-	-	-	-	○	○
	-	-	-	-	-	○ (loose)	○ (loose)

3TNM68-AS

Group B (-GB, HB)



Genepack B (-GB, HB)

	TNV series		
Model	3TNV70	3TNV76	3TNV76
Code	-HB	-GB	-HB
Length mm	798	814	814
Width mm	518	518	518
Height mm	683	672	694
Weight kg	143	153	153

Model	3TNV88	4TNV88	4TNV98	4TNV98T
Code	-(B)GB	-(B)GB	-GB	-GB
Length mm	875	1002	1155	1154
Width mm	609	609	703	703
Height mm	731	726	846	846
Weight kg	175	202	271	276

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