



F34ESZW01.A37 (Winco) G-DRIVE TIER 4B



Brochure main description @1500rpm @1800rpm

Application & simbol			Power Generation
Engine identification main			F34
Engine identification rating	kW	-	37
Engine features			PG G-Drive
Emission feature			Tier 4B

Main characteristics @1500rpm @1800rpm

Emission certification			Tier 4B
Commercial code (for order)			F34ESZW01.A37
Other Commercial code			F5HFL465A
Technical code (original plant engine code, on engine block)			F5HFL465A*F001
Technical code family (original plant engine code)			F5HFL465A*F
Stand-by power (gross) [mech]	kW	-	37
Specific power	kW/l	-	10,8
Electric commercial power (estimation alternator power output)	kWe [kVA]	-	30
BMEP	bar	-	7,25
Oil consumption on mission (average)	% fuel consumption		0,25
Cycle			Diesel 4 stroke
Air charging system pattern			Turbocharged
Number of cylinder			4
Configuration (cylinder arrangement)			in line
Bore	mm		99
Stroke	mm		110
Stroke / Bore			1,11
Displacement	l		3,4
Unit Displacement	l		0,85
Bore pitch	mm		
Valves per cylinder			2
Cooling system pattern			liquid
Direction of rotation (looking flywheel)			anti-clockwise
Compression ratio			16,5
Firing order			1 - 3 - 4 - 2
Injection type			Direct - Electronic Common Rail
Engine brake configuration			-
Be10			8000
Cylinder Head			
Single / Multiple			single
Material			cast iron
Head air circulation			
Intake valve dia.	mm		
Exhaust valve dia.	mm		
Camshaft			
Layout			
Cam carrier			
Material and Heat treatment			
Valve train			



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Main characteristics	@1500rpm	@1800rpm
Drivetrain (timing system)		
Valve actuation		
Variable valve actuation system		no
Cylinder block (crankcase)		No Structural
Material of cylinder block		cast iron
Type of liners		block liners
Liners replaceable; (slip fit or interference fit)		
Bearing caps		
Crankcase Ventilation		yes
Oil separator		
Crankshaft & counterweights		
Material		forged Steel
Acceptable Inertia (clutch)	kgm ²	
Balancing		
Turbocharger & EGR system		
Turbocharger type		fix geometry / wastegate
Turbocharger supplier		
Turbocharger control		
Max boost pressure	mbar	
Max turbine inlet temperature	°C	
Method of cooling the turbocharger		
Turbo protection devices		
EGR		yes
EGR control strategy		external cooler EGR
Rate		23,6% @1800rpm
Valve		
Cooler		water cooler
Control		from engine ECU
Air mass measurement		no
Exhaust flap		
Exhaust flap supplier		-
Actuation type		-
Exhaust flap cooling		-
Switchability (1500-1800 rpm)		
Emission level 1500 rpm		
Emission level 1800 rpm		Tier4 Final
Front power take off		
PTO type		
Max torque available from front of crankshaft (no side load)	Nm	
Power take off on gear train		
SAE A 9 teeth	Nm	
SAE A 11 teeth	Nm	
SAE B 13 teeth	Nm	
SAE B (DIN 5482)	Nm	
SAE 2B 15 teeth(ANSI B92,1)	Nm	
References values		
Engine dimension LxWxH (indicative values)	mm	570 x 295 x 490
G-Drive Dimension LxWxH (indicative values)	mm	1195 x 705 x 895



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Main characteristics		@1500rpm	@1800rpm
Max permissible engine inclination	deg	30 all direction	
Engine Weight - Dry (no fluids, value purely indicative)	kg	253	
Engine Weight - Wet (with fluids, value purely indicative)	kg	282	
G-Drive Weight - Dry (no fluids, value purely indicative)	kg	470	
G-Drive Weight - Wet (with fluids, value purely indicative)	kg	485	
Center of gravity (FFOB or RFOB according to picture, standard engine layout)	mm	X= -8,2 , Y= 171,5 , Z= -243,1	
Principal moment of inertia (reference on center of gravity ,standard engine layout)	kgm ²	I1= 3.89e+07 , I2= 1.31e+08 , I3= 1.57e+08	
Principal moment of inertia (reference matrix based on center of gravity,standard engine layout)	kgm ²	I1x;I1y;I1z= 1.167e+08; 2.981e+07; -3.089e+07 I2x;I2y;I2z= 2.981e+07; 1.380e+08; 4.198e+07 I3x;I3y;I3z= -3.089e+07; 4.198e+07; 9.998e+07	
Center of gravity (FFOB or RFOB according to picture, standard IPU/G-Drive layout)	mm		
Principal moment of inertia (reference on center of gravity ,standard IPU/G-Drive layout)	kgm ²		
Principal moment of inertia (reference matrix based on center of gravity,standard IPU/G-Drive layout)	kgm ²		
Mass moment of inertia - rotating components (excluding flywheel)	kgm ²		
Mass moment of inertia - standard flywheel	kgm ²		
Bending moment on the flywheel housing	Nm		
Bending moment on PTO	Nm		
Max static mounting surface load	N		
Crankshaft thrust bearing pressure limit			
Intermittent load:	MPa		
Continuous load:	MPa		
Rear main bearing load	MPa		
Max bending moment available from front of the crankshaft:			
0 deg	Nm		
90 deg	Nm		
180 deg	Nm		
Environmental operating conditions			
Max altitude for declared performances	m	1500	
Max ambient temperature for declared performances	°C	40	
Min guaranteed temperature for cold start w/o any aid (stand alone engine)	°C	- 15	
Min guaranteed temperature for cold start with grid heater (stand alone engine)	°C	-	
Min guaranteed temperature for cold start with grid heater and block heater (stand alone engine)	°C	-	
Time preheating for manifold heater	s	-	
Time post heating for manifold heater	s	-	
Low idle continuous operation time (reccomended)	h	3	
Engine performance			
Continuous power (gross) [mech]	kW	-	26,9
Prime power (gross) [mech]	kW	-	33,6
Stand-by power (gross) [mech]	kW	-	37
Fan consumption [mech]	kW	-	0,3
Continuous power (net) [mech]	kW	-	36,6
Prime power (net) [mech]	kW	-	33,3



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Main characteristics		@1500rpm	@1800rpm
Stand-by power (net) [mech]	kW	-	36,7
Typical generator output		-	0,91
Generator available power @ Prime power	kW	-	30,4
Generator available power @ Stand by	kW	-	33,4

Power limitation according to ambient conditions			
Ambient temperature above xx°C	%/5°C (xx°C)	2 (40)	
Altitude > 1000 < 3000m above sea level	%/500m	N/A	
Altitude > 3000m above sea level	%/500m	N/A	

Power limitation due to safety protections			
Max water temperature (Switch on of the MIL lamp)	°C	104	
Start derating: switch on of the warning coolant temperature lamp (amber color)	°C	106	
Max derating (50% derating) switch on of the high coolant temperature lamp (redcolor)	°C	110	
Altitude level: gradual reduction of transient response by smoke map correction from	m	2000	
Fuel temperature	°C	70	
Intake manifold air temperature	°C	70	
ATS Max gas inlet temperature	°C	550	
Max allowed exhaust temperature	°C		
Turbine overheating protection	°C	700	
Turbine overspeed protection	rpm		
Oil temperature protection	°C	125	
Oil pressure protection (min engine rpm)	bar		

Fuel System			
Fuel density	kg/l	0,835	
Injection system type		Electronic common rail	
Injection pump manufacturer		BOSCH	
Injection model type			
Injection model pump		Bosch CP4.1	
Injection pressure	bar	1600	
Injector		Bosch CRI 2-16 OHW	
Injector installation (sleeve, sealing flat or conical)			
Injector nozzle			
Engine fuel compatibility		see dedicated GOLD Book document on fluids	
Feed pump		on engine	
Max flow	l/h	195	
Nominal feed pressure	bar	0,5 - 1	
Fuel filter		cartridge	
Delta pressure on fuel filter	bar		
Max continuous allowable fuel temperature (without derating)	°C	80	
Max relative pressure at gear pump inlet	bar	1	
Min relative pressure at gear pump inlet	bar	0,5	
Max back flow relative pressure	bar	1,2	
Max back flow restriction	bar	1,2	
Max heat rejection to return fuel	kW		
Max fuel flow	kg/h	8,3 (1800rpm)	
Min fuel tank venting requirement	m³/h		
Prefilter / Water separator micron size	µm	< 100	



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Air Intake System		@1500rpm	@1800rpm
Aftercooling type (air to air or water to air)			-
Interstage cooling type			-
RoA (Temperature raise between ambient and inlet to engine)	°C		≤ 25
Filter air intake temperature (warm air ricirculatuion)	°C		≤ 5
Max intake manifold temperature	°C		50
Compressor inlet pressure (with new air filter)	hPa		≥ - 50
Compressor inlet pressure (with dirty air filter)	hPa		≥ - 65
Air filter type			
Loads on turbocharger on compressor intake	kg		0
Loads on turbocharger on compressor outlet	kg		0
Charge air flow (max)	kg/h	-	205,2

Exhaust System		@1500rpm	@1800rpm
Max back pressure (after exhaust flap) @ rated power with clean system	hPa		220
Max mechanical load on turbine flange	kg		0
Max ambient temperature for exhaust flap actuator	°C		-
Max exhaust temperature After Treatment System	°C		500
Max exhaust flow rate	kg/h		213,5
Energy to exhaust	kW	-	23

After Treatment System		
After Treatment System		DOC+PMCAT
POC		-
DPF		-
DOC		yes
SCR		-
Urea Dosing System		-
AdBlue mixer		-
ATS sensors		n°2 DOC temperature sensor, O2 sensor
DPF regeneration strategy		-

Lubrication System		
Oil sump capacity	l	8
Max	l	8
Min	l	6
Oil system capacity including filter	l	9,5
Oil pump type		gear pump
Oil pump drive arrangement		driven by gear
Min oil pump flow	l/min	
Max oil pump flow (@rated speed)	l/min	
Min oil pressure @ low idle (engine oil temp at 120°C)	kPa (bar)	
Min oil pressure @ rated speed (engine oil temp at 120°C)	kPa (bar)	
Max oil pressure @ rated speed (engine oil temp at 120°C)	kPa (bar)	420 (4,2)
Max oil temperature @ full load (in main gallery)	°C	125
Max oil pressure peak on cold engine	bar	
Oil cooler type		



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Lubrication System

Transducer for indicating oil temperature and pressure		
Max engine angularity - longitudinal / transversal (std oil pan)	deg	35
Allowed engine gradability during installation on vehicle	deg	± 4
Oil servicing intervals	h	see dedicated GOLD Book document on fluids
Oil filter type		cartridge
Oil filter capacity	l	
Max oil content admitted in blow by gas (after filter)	g/h	
Approved engine oil specifications		see dedicated GOLD Book document on fluids
Oil for cold condition mission (T° ambient < -25°C)		see dedicated GOLD Book document on fluids

Cooling system

	@1500rpm	@1800rpm
Type (water to water or air to water)		liquid
Recommended coolant		see dedicated GOLD Book document on fluids
Min radiator cap pressure	kPa	
Warnnig setting first threshold	°C	102
Max additional restriction (cooling system)	Pa	
Air to boil (prime power, open genset configuration)	°C	52,3
Air to boil (stand by, open genset configuration)	°C	50
EGR Cooler water flow (for ΔT=6°C)	l/s	
LP-CAC water flow (for ΔT=6°C)	l/s	-

Fan

Diameter	mm	450
Number of blades		
Drive ratio		1,1 : 1
Speed		6,07 m/s @1800rpm
Air flow		0,97 m3/s
Power consumption		0,3 kW @1800rpm

Radiator

Core dimensions LxWxh	mm	590 x 80 x 755
Dry weight	kg	18
Radiator coolant capacity	l	3
Optimum coolant temperature range @engine out (50% glycol)	°C	83 + 99
Engine Water pump Type		centrifugal pump
Engine water pump drive		driven by belt
Coolant capacity (engine only)	l	5
Coolant capacity (radiator & hoses)	l	
Thermostat type		wax type
Thermostat position		on cylinder head
Thermostat opening / fully open temperature	°C	80 + 90
Recommended coolant circuit pressurization range (relative)	hPa	
Coolant engine pressure outlet – inlet (delta pressure, open thermostat, high idle conditions)	hPa	130
Coolant engine pressure outlet – inlet (only with remote thermostat, ex. retarder)	hPa	-
Min coolant pressure (no pressure cap and thermostat closed)	hPa	
Coolant water pump inlet pressure (water temperature 60-100°C)	hPa	560



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Cooling system		@1500rpm	@1800rpm
Coolant flow to radiator @rated speed	l/h		
Min coolant expansion space (% total cooling system capacity)	%		
Max coolant flow to accessories @ rated speed from cab heater	l/min		
Engine out coolant to ambient @rated speed	delta °C	59 (1800rpm)	
Engine out coolant to ambient @torque speed	delta °C		
Charge air cooler outlet to ambient @max rpm - CAC dT	delta °C	53 (1800rpm)	
Coolant engine flow	l/min	-	96

Electrical, Electronic and Control Systems

System voltage	V	12
Engine control unit		Bosh EDC17C41
ECU software		P1096
ECU Vehicle connection		via body computer with CAN line
ECU operating range	°C	-30 ÷ +95
Temperature of ECU case for <5' after power up	°C	85
ECU rated continuous temperature	°C	80
ECU communication protocol		SAE J1939
Min power supply for ECU operation	V	10
Max power supply for ECU operation	V	16
Battery wire connection resistance value @20°C (from battery to ECU)	mΩ	≤ 70
Diagnostic system		ISO 14229
Min cranking speed TDC @-30°C	rpm	
Average cranking speed	rpm	
N° tooth pinion/crown gear		
Min battery voltage	V	6
Mean battery voltage	V	14 ± 0,5
Min battery current	Ah	
Mean battery current	Ah	
Max starting circuit resistance (to starter)	mΩ	< 70

Cold starting

Without air preheating	°C
With air preheating (if available)	°C

Emission gaseus and particulales

NOx (Oxides of nitrogen) [NRSC]	g/kWh
HC (Hydrocarbons) [NRSC]	g/kWh
NOX+HC [NRSC]	g/kWh
CO (Carbon monoxide) [NRSC]	g/kWh
PM (Particlutes) [NRSC]	g/kWh
CO2 (Carbon Dioxide) [NRSC]	g/kWh
NOx (Oxides of nitrogen) [NRTC]	g/kWh
HC (Hydrocarbons) [NRTC]	g/kWh
NOX+HC [NRTC]	g/kWh
CO (Carbon monoxide) [NRTC]	g/kWh
PM (Particlutes) [NRTC]	g/kWh
CO2 (Carbon Dioxide) [NRTC]	g/kWh



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Maintenance

Oil drain interval	see dedicated GOLD Book document on fluids
Oil filter change	see dedicated GOLD Book document on fluids
Oil refilling time	daily check to evaluate oil refill necessity
CCV filter change	1800 h
Fuel filter change	see dedicated GOLD Book document on fluids
Fuel pre-filter change	see dedicated GOLD Book document on fluids
Belt replacement	3000 h
Valve lash check /adjustment	for life
AdBlue filter Change	-
DPF filter service	-
Coolant change	see dedicated GOLD Book document on fluids

Engine Noise

Overall sound pressure (engine only)	dBA
Overall sound pressure (with accessories only)	dBA
Exhaust noise (w/o Muffler)	dBA
Noise spectrum (octave analysis performed at the position of maximum noise) - diagram	Table dB-Hz

Step Load

		@1500rpm	@1800rpm
G1 (% of PrP)	%		
G2 (% of PrP)	%		
G3 (% of PrP)	%	-	100
G1 (% of PrP) [open flap]	%	-	-
G2 (% of PrP)[open flap]	%	-	-
G3 (% of PrP)[open flap]	%	-	-
G1 (% of PrP) [closed flap]	%	-	-
G2 (% of PrP) [closed flap]	%	-	-
G3 (% of PrP) [closed flap]	%	-	-
Removal load (G1)	%		
Removal load (G2)	%		
Removal load (G3)	%	-	100
Emergency (xxx)	%		
Emergency (xxx)	%		
Emergency (xxx)	%		

Maximum Rating Performance Data

		@1500rpm	@1800rpm
Torque	Nm	-	194
Ambient Temperature	°C	-	25
EGR Rate	%	-	23,6
Fuel Flow	g/s	-	2,31
Fuel consumption (BSFC) (prime power)	(kg/h) [g/kWh]	-	(7,8) [236,7]
Fuel consumption (BSFC) (stand by)	(kg/h) [g/kWh]	-	(8,34) [234,6]
Fuel consumption (BSFC) (80% prime power)	(kg/h) [g/kWh]	-	(6,6) [243]
Fuel consumption (BSFC) (50% prime power)	(kg/h) [g/kWh]	-	(4,5) [267]
Fuel consumption (BSFC) (25% prime power)	(kg/h) [g/kWh]	-	(3) [325]
AdBlue consumption (prime power)	% of fuel cons	-	-
AdBlue consumption (stand by)	% of fuel cons	-	-
AdBlue consumption (80% prime power)	% of fuel cons	-	-



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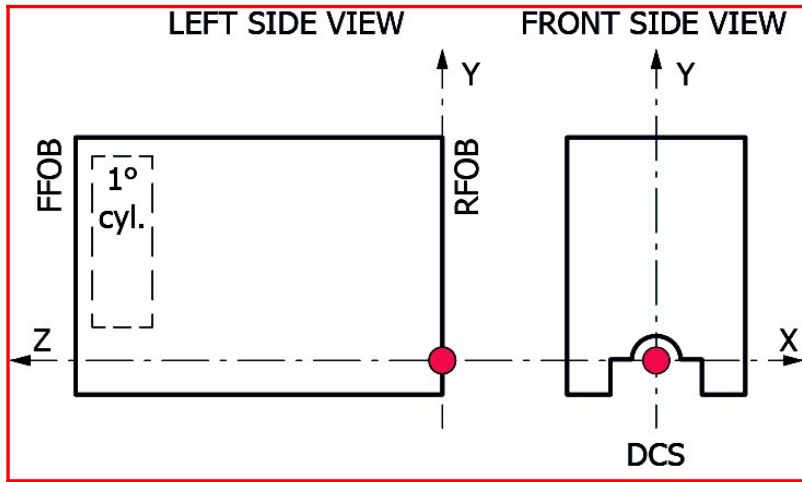
Maximum Rating Performance Data		@1500rpm	@1800rpm
AdBlue consumption (50% prime power)	% of fuel cons	-	-
AdBlue consumption (25% prime power)	% of fuel cons	-	-
Exhaust Gas Flow	kg/h	-	213,5

Design air handling system data		@1500rpm	@1800rpm
EGR flow	kg/h	-	13,6
EGR pressure	kPa		
Boost pressure (compressor outlet)	kPa	-	1704
Pressure drop on charge air cooling system	kPa	-	2,3
Max temperature after HP-Compressor	°C		
Boost temperature (includes EGR effect)	°C	-	100
Back pressure before DOC	kPa		
Exhaust Gas Temp between HP-TC	°C		
Max Exhaust Gas Temp (after TC)	°C	-	396
Max admitted back pressure after SCR	kPa	-	-
Max admitted back pressure after TC	kPa	-	1091
Power engine coolant without EGR & CAC (prime power)	kW [kcal/kWh]		
Power engine coolant without EGR & CAC (stand by)	kW [kcal/kWh]		
Power high Temperature EGR Cooler (engine water) (prime power)	kW [kcal/kWh]		
Power high Temperature EGR Cooler (engine water) (stand by)	kW [kcal/kWh]		
Power to coolant due to EGR LP-Circuit (prime power)	kW [kcal/kWh]		
Power to coolant due to EGR LP-Circuit (stand by)	kW [kcal/kWh]		
Total Power to coolant (prime power)	kW [kcal/kWh]	-	25,4
Total Power to coolant (stand by)	kW [kcal/kWh]	-	27,2
Total pump water flow	l/s	-	1,6
Radiator Coolant Flow (5% less if continuous deaerating system, coolant according to FPT norms)	l/min		
EGR Cooler water flow (for $\Delta T=6^{\circ}C$)	l/s		
LP-CAC water flow (for $\Delta T=6^{\circ}C$)	l/s	-	-
Power in CAC (air to air) (prime power)	kW [kcal/kWh]	-	-
Power in CAC (air to air) (stand by power)	kW [kcal/kWh]	-	-
Power Radiated	kW	-	5,4

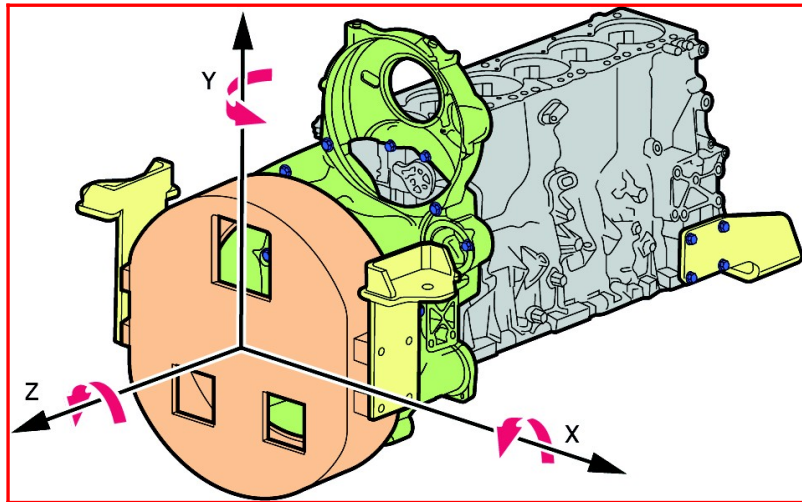
Images



F34ESZW01.A37 (Winco) G-DRIVE TIER 4B



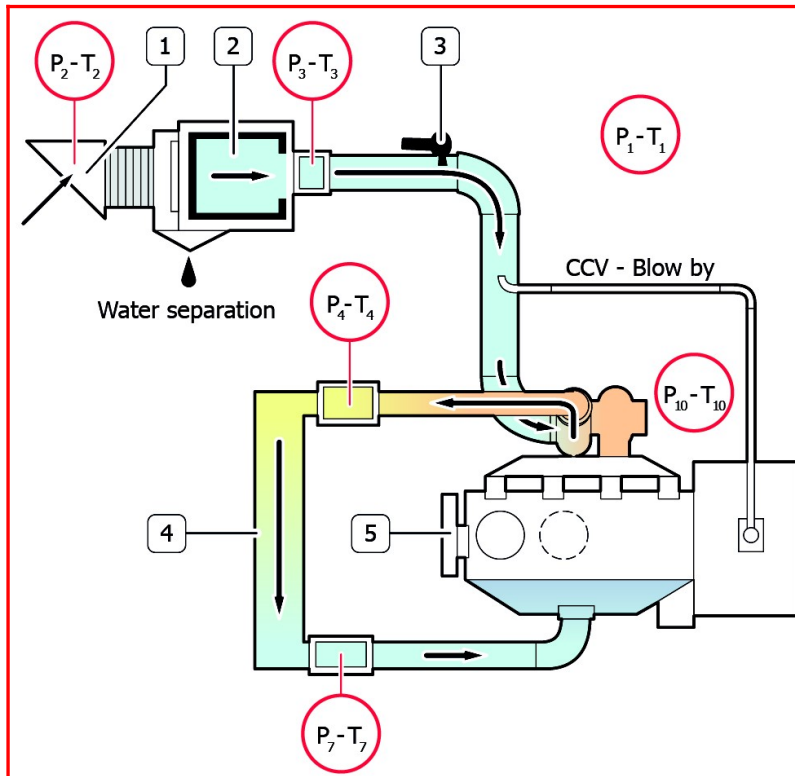
Principal Moment of Inertia



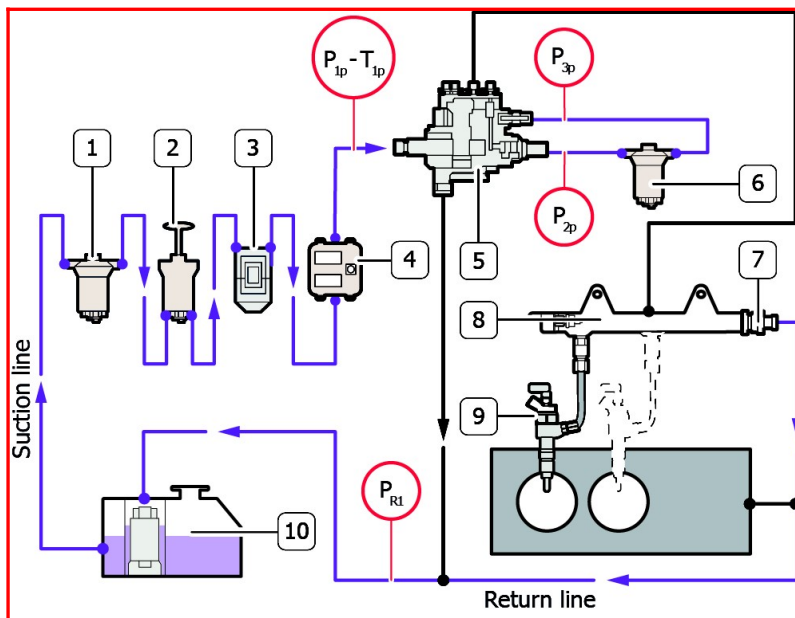
Components



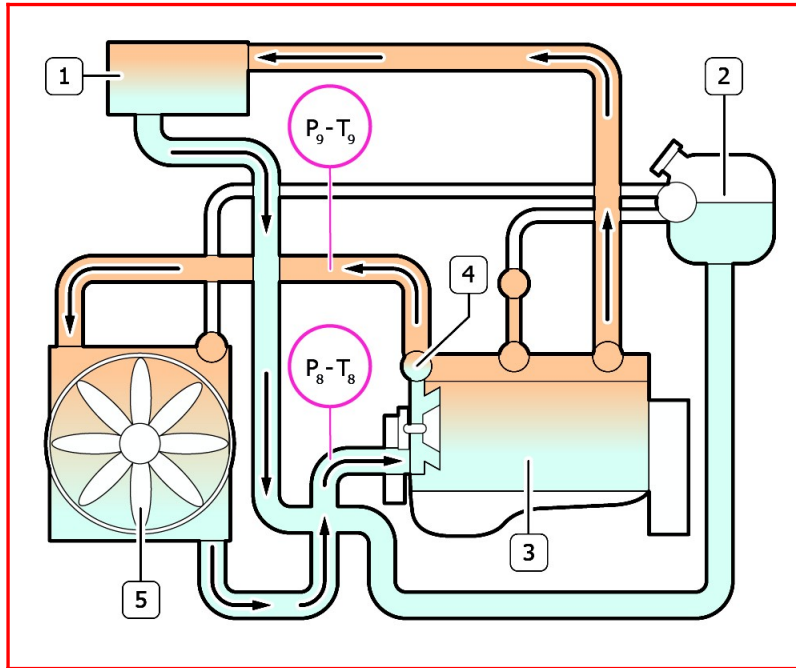
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1.Snorkel 2.Air Filter 3.Humidity sensor 4.Intercooler



1.Inspection glass with strainer 2.Prime pump 3.Pre-filter with water separator 4.ECU 5.High Pressure pump 6.Fuel Filter 7.Overpressure valve 8.Common Rail 9.Injectors 10.Fuel tank



1.Heating element 2.Expansion tank 3.Engine 4.Thermostat 5.Radiator



ACRONYMS LIST

Acronyms	Description
-	Not Needed
2stTC	Two Stage Turbo (sequential)
Ag	Agricultural
ASC	Ammonia Slip Catalyst (same as CUC)
ATS	After Treatment System
BSFC	Brake Specific Fuel Consumption
CAC	Charge Air Cooler
CCDPF	Close Coupled DPF
CCV	Crankcase Ventilation
CE	Construction Equipment
CI	Cast Iron
CRS	Common Rail System
CRSN	Common Rail System NKW (Commercial vehicles)
CUC	Clean Up Catalyst for ammonia (same as ASC)
DAVNT	Dual Axis Variable Nozzle Turbine
DCS	Drawing Coordinate System
DI	Direct Injection
DOC	Diesel Oxidation Catalyst
DOHC	Double Over Head Camshaft
DPF	Diesel Particulate Filter
ECEGR	External Cooled EGR
ECU	Engine Control Unit
EEGR	External EGR
EGR	Exhaust Gas Recirculation
epWG	Electro pneumatic WG
eVGT	Electrical VGT
eWG	Electrical WG
FFOB	Front Face of Block
FGT	Fixed Geometry Turbocharger (no WG)
FIE	Fuel Injection System
HD	Heavy Duty
HLA	Hydraulic Lash Adjusters
IDI	Indirect Injection

Acronyms	Description
IEGR	Internal EGR
IPU	Industrial Power Unit
ISC	Interstage Cooling
LD	Light Duty
LDCV	Light Duty Commercial Vehicles
LH	Left Hand Side
LWR	Laser Welded Rail
MD	Medium Duty
n/a	Not Available
NA	Natural Aspirated
NS	Non Structural
OHV	Over Head Valves
OPT	Option
PCP	Peak Cylinder Pressure
PTO	Power Take Off
RFOB	Rear Face of Block
RH	Right Hand Side
S	Structural
SAPS	Sulphated Ash, Phosphorus, Sulphur
SCR	Selective Catalytic Reduction catalyst
SCRoF	SCR on filter
SOHC	Single Over Head Camshaft
STD	Standard
TC	Turbocharged
TCA	Turbocharged, Charge Air Cooled
THM	Thermal Management
UFDPF	Under Floor DPF
UQS	Urea Quality Sensor
VE	Bosch Distributor Mechanical Pump
VFT	Variable Flow Turbine
VGT	Variable Geometry Turbocharger
WG	Waste Gate Turbocharger
XPI	Extra high Pressure Injection (Scania, Cummins)

Unit of misure according to international system of unit. Engine accessories and Options available on Option List. All data is subject to change without notice.

UPDATING

Revision	Description	Date
Revision 1.0_Oct 2021		October/2021