

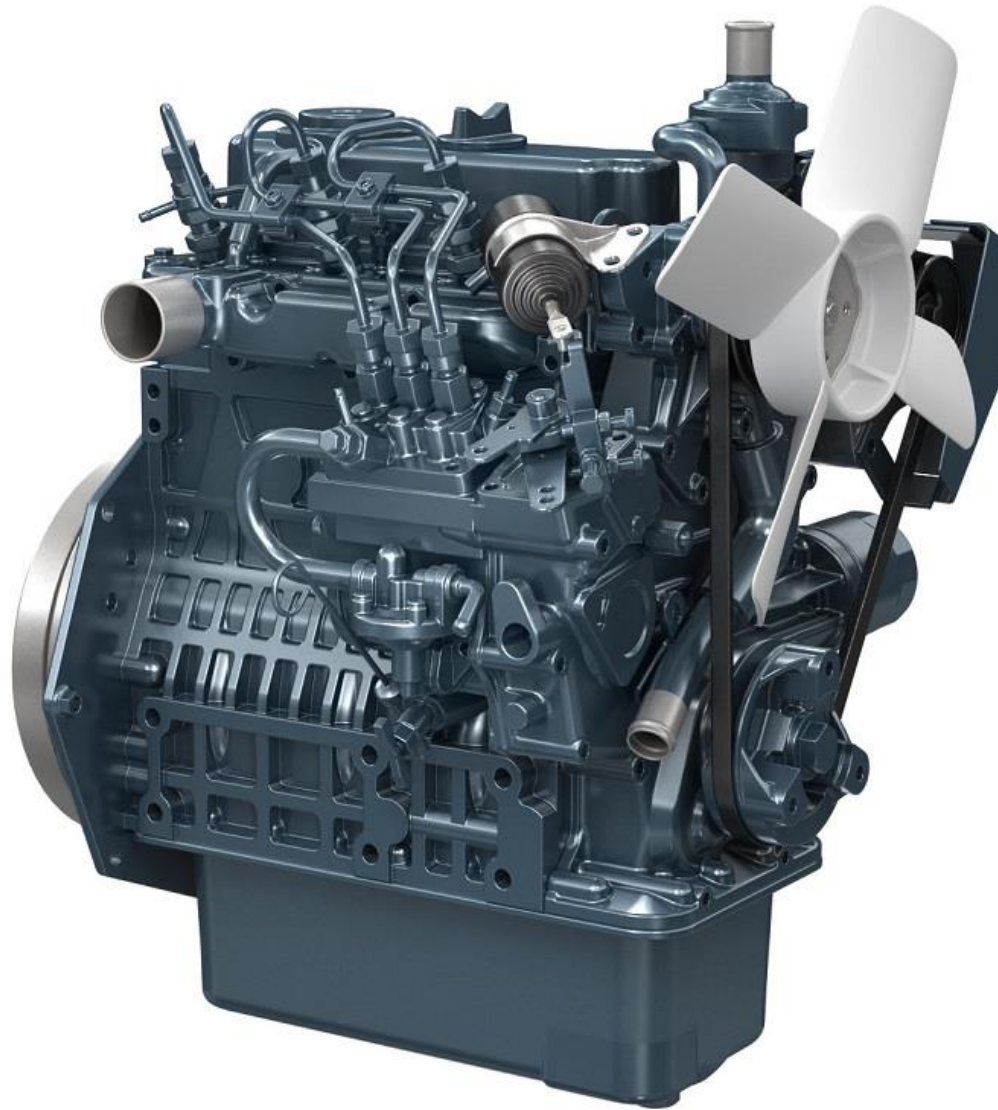
Technical information **for D902**

Notes

- This document is applied for Kubota **D902 model** for OEM.
- This document is intend to provide installation guide for the engine to the application.
- The information in this document subject to change without notice.

The latest document is available on the AM website.
Printed copies are for reference only.

D902



	Unit	D902-E2	D902-E3	D902-E4
Type		Vertical, water cooled 4-cycle IDI diesel engine		
Cylinders		3		
Bore and Stroke	mm (in)	72.0 x 73.6 (2.83 x 2.90)		
Displacement	L (cu.in)	0.898 (54.80)		
Aspiration		Naturally Aspirated		
Aftertreatment		None		
Rated power ^{*1}	kW (HP) / rpm	18.5 (24.8) / 3600		
Maximum torque ^{*1}	Nm (lb-ft) / rpm	56.1 (41.4) / 2600		
No load maximum speed ^{*1}	rpm	3870		
No load minimum idling speed ^{*1}	rpm	950		
Maximum air intake restriction with new air cleaner element	kPa (mmAq)	2.45 (250)		
Maximum air intake restriction with dirty air cleaner element	kPa (mmAq)	4.90 (500)		
Maximum exhaust pressure	kPa (mmHg)	9.3 (70)		
Injection timing (High pressure overflow method)	degree	TDC -21		TDC -20
Fuel injection pressure	MPa (psi)	13.7 (1990)		

*1: Gross intermittent SAE J1995

*Specifications are subjected to change without prior notice.

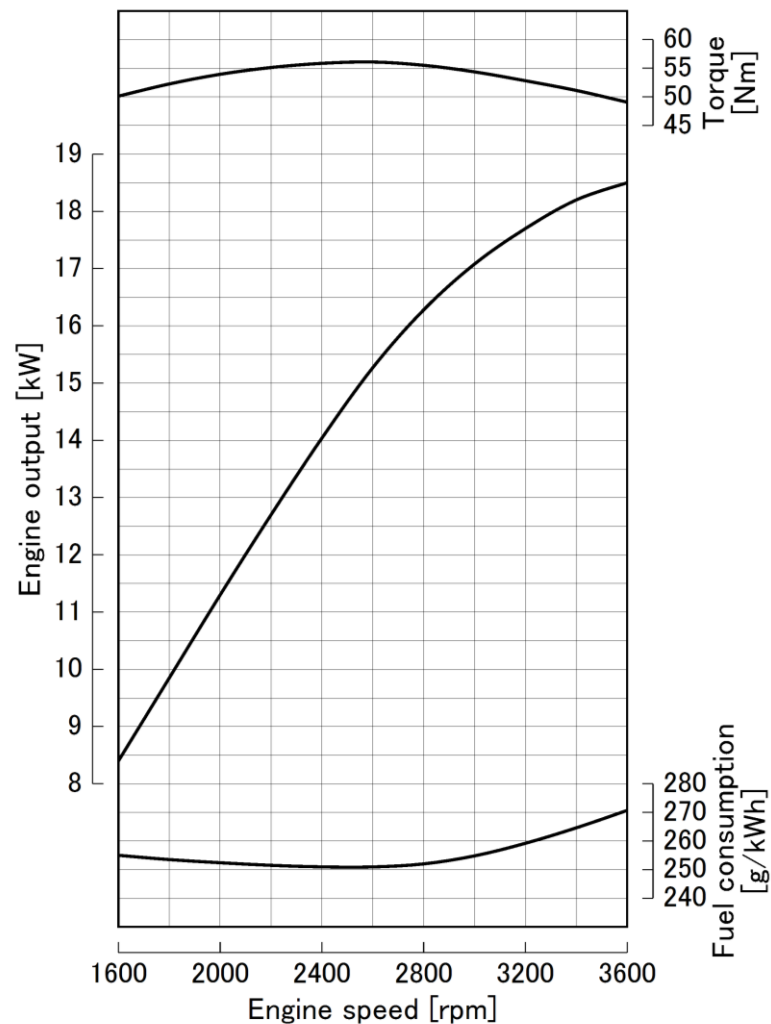
	Unit	D902-E2	D902-E3	D902-E4
Combustion chamber type		Spherical type (E-TVCS: Three Vortex Combustion System)		
Fuel injection pump type		In-line pump		
Governor type		Centrifugal ball mechanical type governor		
Injector		Throttle type		
Direction of rotation		Counter clockwise viewed from flywheel side		
Firing order		1 - 2 - 3		
Compression ratio		24.0		
Lubricating system		Forced lubrication by trochoid pump		
Cooling system		Pressurized radiator, forced circulation with water pump		
Exhaust Gas Recirculation (EGR)		None		
Starting aid device		Glow plug		
Starter motor	V - kW	12 - 1.2		
Charging alternator	V - W	12 - 480		
Lubricating oil capacity	L (U.S. gal)	3.7 (0.98)		
Recommended coolant capacity	L (U.S. gal)	3.1 (0.82)		
Length x Width x Height ^{*1}	mm (in)	434 x 401 x 544 (17.1 x 15.8 x 21.4)		
Dry weight ^{*1}	kg (lb)	72 (159)		

*1: Excluded cooling fan

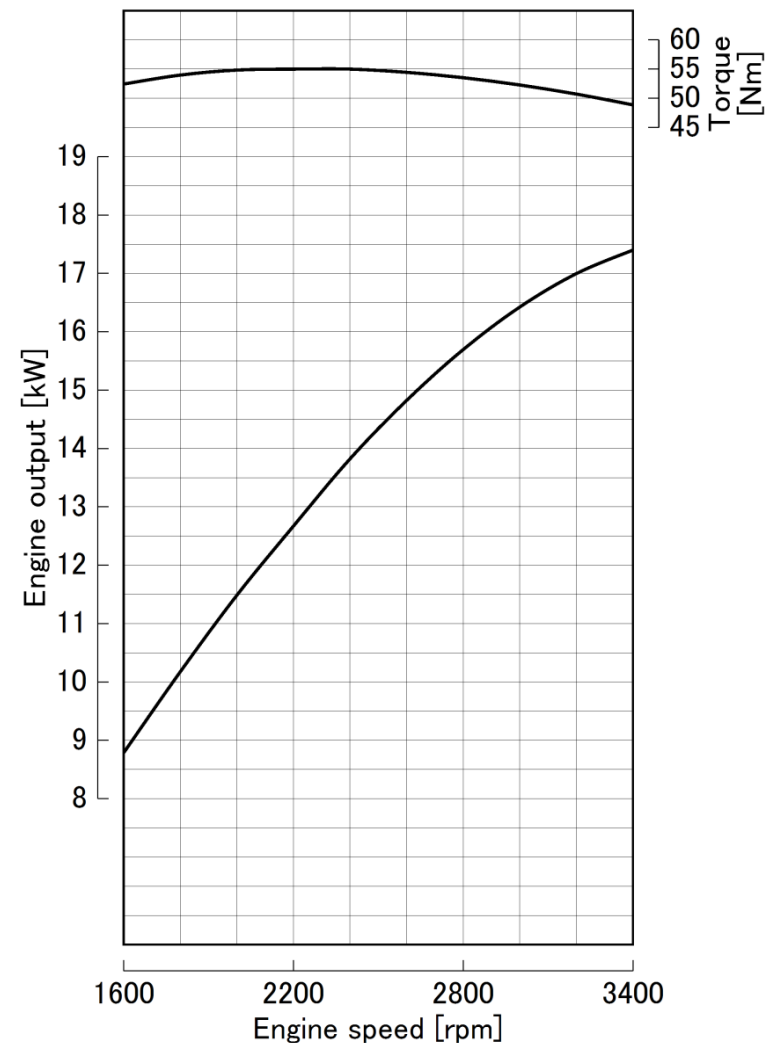
*Specifications are subjected to change without prior notice.

Performance Curves (1/2)

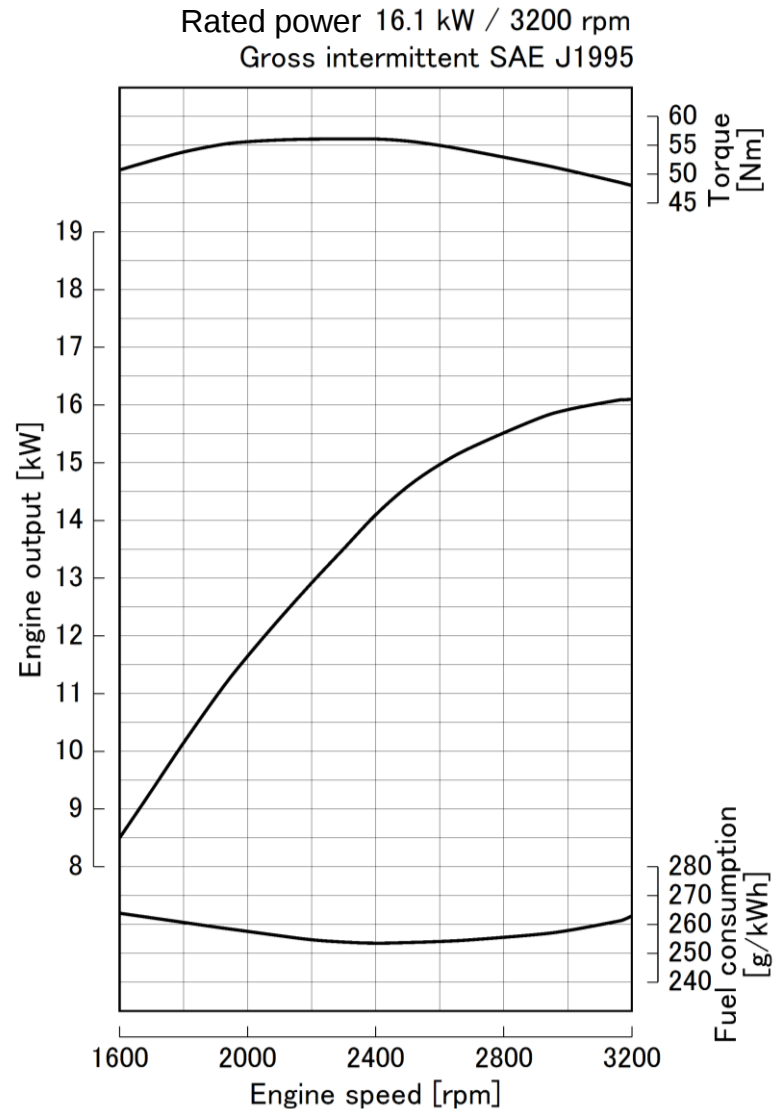
Rated power 18.5 kW / 3600 rpm
Gross intermittent SAE J1995



Rated power 17.4 kW / 3400 rpm
Gross intermittent SAE J1995



Performance Curves (2/2)



Rated power at each engine speed.

Model				Engine speed (rpm)						
				2300	2400	2600	3000	3200	3400	3600
D902	E2	Gross intermittent ^{*1}	kW	12.0	12.1	13.4	15.1	16.1	17.4	18.5
			HP	16.1	16.2	18.0	20.2	21.6	23.3	24.8
		Net intermittent ^{*2}	kW	11.6	11.7	12.9	14.4	15.3	16.5	17.5
			HP	15.6	15.7	17.3	19.3	20.5	22.1	23.5
		Net continuous ^{*2}	kW	10.1	10.2	11.2	12.5	13.3	14.3	15.2
			HP	13.5	13.7	15.0	16.8	17.8	19.2	20.4
	E3	Gross intermittent ^{*1}	kW	12.0	12.1	13.4	15.1	16.1	17.4	18.5
			HP	16.1	16.2	18.0	20.2	21.6	23.3	24.8
		Net intermittent ^{*2}	kW	11.6	11.7	12.9	14.4	15.3	16.5	17.5
			HP	15.6	15.7	17.3	19.3	20.5	22.1	23.5
		Net continuous ^{*2}	kW	10.1	10.2	11.2	12.5	13.3	14.3	15.2
			HP	13.5	13.7	15.0	16.8	17.8	19.2	20.4
	E4	Gross intermittent ^{*1}	kW	12.0	12.1	13.4	15.5	16.1	17.4	18.5
			HP	16.1	16.2	18.0	20.8	21.6	23.3	24.8
		Net intermittent ^{*2}	kW	11.6	11.7	12.9	14.8	15.3	16.5	17.5
			HP	15.6	15.7	17.3	19.8	20.5	22.1	23.5
		Net continuous ^{*2}	kW	10.1	10.2	11.2	12.9	13.3	14.3	15.2
			HP	13.5	13.7	15.0	17.3	17.8	19.2	20.4
		No load minimum idling speed ^{*1}	rpm	1250	1300	1300	1450	1300	1200	950

*1: SAE J1995, *2: SAE J1349

Note: Net power calculation conditions.

Cooling fan, fan drive pulley, and fan pulley specifications.

Model	Fan diameter (mm)	Number of blade	Shape	Fan drive pulley diameter (mm)	Fan pulley diameter (mm)
D902	300	4	straight	100	82

Maximum Torque

Model				Engine speed (rpm)						
				2300	2400	2600	3000	3200	3400	3600
D902	E2	Rated power* ¹	kW	12.0	12.1	13.4	15.1	16.1	17.4	18.5
			HP	16.1	16.2	18.0	20.2	21.6	23.3	24.8
		Engine speed at maximum torque	rpm	1800	1900	2200	2000	2400	2400	2600
		Maximum torque* ¹	Nm	52.1	54.6	54.3	55.4	56.1	55.0	56.1
			lb-ft	38.4	40.3	40.0	40.9	41.4	40.6	41.4
	E3	Rated power* ¹	kW	12.0	12.1	13.4	15.1	16.1	17.4	18.5
			HP	16.1	16.2	18.0	20.2	21.6	23.3	24.8
		Engine speed at maximum torque	rpm	1800	1900	2200	2000	2400	2400	2600
		Maximum torque* ¹	Nm	52.1	54.6	54.3	55.4	56.1	55.0	56.1
			lb-ft	38.4	40.3	40.0	40.9	41.4	40.6	41.4
	E4	Rated power* ¹	kW	12.0	12.1	13.4	15.5	16.1	17.4	18.5
			HP	16.1	16.2	18.0	20.8	21.6	23.3	24.8
		Engine speed at maximum torque	rpm	1800	1900	2200	2000	2400	2400	2600
		Maximum torque* ¹	Nm	52.1	54.6	54.3	55.7	56.1	55.0	56.1
			lb-ft	38.4	40.3	40.0	41.1	41.4	40.6	41.4

*1: Gross intermittent SAE J1995

Fuel Consumption (at rated power)

Model				Engine speed (rpm)						
				2300	2400	2600	3000	3200	3400	3600
D902	E2	Rated power*1	kW	12.0	12.1	13.4	15.1	16.1	17.4	18.5
			HP	16.1	16.2	18.0	20.2	21.6	23.3	24.8
		Specific fuel consumption	g/kWh	252	253	254	263	263	275	271
			lb/HPh	0.414	0.416	0.418	0.432	0.432	0.452	0.446
		Fuel consumption	L/h	3.60	3.65	4.05	4.73	5.04	5.69	5.96
			gal/h	0.95	0.96	1.07	1.25	1.33	1.50	1.57
	E3	Rated power*1	kW	12.0	12.1	13.4	15.1	16.1	17.4	18.5
			HP	16.1	16.2	18.0	20.2	21.6	23.3	24.8
		Specific fuel consumption	g/kWh	252	253	254	263	263	275	271
			lb/HPh	0.414	0.416	0.418	0.432	0.432	0.452	0.446
		Fuel consumption	L/h	3.60	3.65	4.05	4.73	5.04	5.69	5.96
			gal/h	0.95	0.96	1.07	1.25	1.33	1.50	1.57
	E4	Rated power*1	kW	12.0	12.1	13.4	15.5	16.1	17.4	18.5
			HP	16.1	16.2	18.0	20.8	21.6	23.3	24.8
		Specific fuel consumption	g/kWh	252	253	254	263	263	275	271
			lb/HPh	0.414	0.416	0.418	0.432	0.432	0.452	0.446
		Fuel consumption	L/h	3.60	3.65	4.05	4.86	5.04	5.69	5.96
			gal/h	0.95	0.96	1.07	1.28	1.33	1.50	1.57

*1: Gross intermittent SAE J1995

Note 1: at amb. temp. 25 deg. C and 100 kPa

Note 2: Density of diesel fuel 0.84 g/cm³

Fuel Consumption (at maximum torque)

Model				Engine speed (rpm)						
				2300	2400	2600	3000	3200	3400	3600
D902	E2	Rated power*1	kW	12.0	12.1	13.4	15.1	16.1	17.4	18.5
		Engine speed at maximum torque	rpm	1800	1900	2200	2000	2400	2400	2600
		Maximum torque*1	Nm	52.1	54.6	54.3	55.4	56.1	55.0	56.1
		Specific fuel consumption	g/kWh	249	253	250	253	254	257	251
			lb/HPh	0.409	0.416	0.411	0.416	0.418	0.422	0.413
		Fuel consumption	L/h	2.92	3.27	3.72	3.49	4.26	4.23	4.56
			gal/h	0.77	0.86	0.98	0.92	1.13	1.12	1.20
	E3	Rated power*1	kW	12.0	12.1	13.4	15.1	16.1	17.4	18.5
		Engine speed at maximum torque	rpm	1800	1900	2200	2000	2400	2400	2600
		Maximum torque*1	Nm	52.1	54.6	54.3	55.4	56.1	55.0	56.1
		Specific fuel consumption	g/kWh	249	253	250	253	254	257	251
			lb/HPh	0.409	0.416	0.411	0.416	0.418	0.422	0.413
		Fuel consumption	L/h	2.92	3.27	3.72	3.49	4.26	4.23	4.56
			gal/h	0.77	0.86	0.98	0.92	1.13	1.12	1.20
	E4	Rated power*1	kW	12.0	12.1	13.4	15.5	16.1	17.4	18.5
		Engine speed at maximum torque	rpm	1800	1900	2200	2000	2400	2400	2600
		Maximum torque*1	Nm	52.1	54.6	54.3	55.7	56.1	55.0	56.1
		Specific fuel consumption	g/kWh	249	253	250	254	254	257	251
			lb/HPh	0.409	0.416	0.411	0.418	0.418	0.422	0.413
		Fuel consumption	L/h	2.92	3.27	3.72	3.53	4.26	4.23	4.56
			gal/h	0.77	0.86	0.98	0.93	1.13	1.12	1.20

*1: Gross intermittent SAE J1995

Note 1: at amb. temp. 25 deg. C and 100 kPa

Note 2: Density of diesel fuel 0.84 g/cm³

Sound pressure at 1.0 m (3.3 ft)			Engine speed (rpm)		
			No load minimum speed	No load maximum speed	Full load rated speed
D902	E2	dB (A) / rpm	71.5 / 950	91.0 / 3870	92.0 / 3600
	E3	dB (A) / rpm	71.5 / 950	91.0 / 3870	92.0 / 3600
	E4	dB (A) / rpm	71.0 / 950	91.0 / 3870	91.0 / 3600

The data show the average noise level at four points.

Note:

- Measurement conditions: with radiator, cooling fan, air cleaner and muffler.
- Cooling fan, fan drive pulley, and fan pulley specifications

Model	Fan diameter (mm)	Number of blade	Shape	Fan drive pulley diameter (mm)	Fan pulley diameter (mm)
D902	300	4	straight	100	82

Model			Engine speed (rpm)						
			2300	2400	2600	3000	3200	3400	3600
D902	E2	m ³ /min	0.90	0.94	1.02	1.17	1.22	1.30	1.37
		ft ³ /min	31.8	33.2	36.0	41.3	43.1	45.9	48.4
	E3	m ³ /min	0.90	0.94	1.02	1.17	1.22	1.30	1.37
		ft ³ /min	31.8	33.2	36.0	41.3	43.1	45.9	48.4
	E4	m ³ /min	0.90	0.94	1.02	1.17	1.22	1.30	1.37
		ft ³ /min	31.8	33.2	36.0	41.3	43.1	45.9	48.4

Note 1:
at amb. temp. 25 deg. C, and 100 kPa

Note 2:
Combustion air requirements calculating formula

$$Q1 = Vh \times N \times C \times \eta \times k \times 10^{-3}$$

Q1: Amount of intake air (m³/min)

Vh : Total displacement (L)

N : Engine speed (rpm)

C : Coefficient = 0.5

η : Intake efficiency (3000 rpm or less: 0.87, 3600 rpm or less: 0.85)

k : Coefficient : 1.0

Model				Engine speed (rpm)						
				2300	2400	2600	3000	3200	3400	3600
D902	E2	Rated power*1	kW	12.0	12.1	13.4	15.1	16.1	17.4	18.5
		Combustion air requirements	m ³ /min	0.90	0.94	1.02	1.17	1.22	1.30	1.37
		Fuel consumption	L/h	3.60	3.65	4.05	4.73	5.04	5.69	5.96
		Exhaust gas volume	m ³ /min	2.16	2.40	2.60	3.00	3.13	3.40	3.66
			ft ³ /min	76.3	84.8	91.8	106.1	110.7	120.1	129.3
	E3	Rated power*1	kW	12.0	12.1	13.4	15.1	16.1	17.4	18.5
		Combustion air requirements	m ³ /min	0.90	0.94	1.02	1.17	1.22	1.30	1.37
		Fuel consumption	L/h	3.60	3.65	4.05	4.73	5.04	5.69	5.96
		Exhaust gas volume	m ³ /min	2.16	2.40	2.60	3.00	3.13	3.40	3.66
			ft ³ /min	76.3	84.8	91.8	106.1	110.7	120.1	129.3
	E4	Rated power*1	kW	12.0	12.1	13.4	15.5	16.1	17.4	18.5
		Combustion air requirements	m ³ /min	0.90	0.94	1.02	1.17	1.22	1.30	1.37
		Fuel consumption	L/h	3.60	3.65	4.05	4.86	5.04	5.69	5.96
		Exhaust gas volume	m ³ /min	2.16	2.40	2.60	3.01	3.13	3.40	3.66
			ft ³ /min	76.3	84.8	91.8	106.3	110.7	120.1	129.3

*1: Gross intermittent SAE J1995

Note 1: at amb. temp. 25 deg. C and 100 kPa

Note 2: Exhaust gas volume calculating formula

$GL = (AL + 7.1 \times Be \times d / 600) \times (273 + t) / (273 + t_0) \times P_0 / (P_0 + P_s)$

GL: Exhaust gas volume (m³/min),

d: 0.84 (g/cm³),

P_s: Exhaust gas back pressure (kPa),

AL: Combustion air requirements (m³/min),

t: Exhaust gas temperature (deg. C),

P₀: 100 (kPa)

Be: Fuel consumption (L/h),

t₀: 25.0 (deg. C),

Model				Engine speed (rpm)						
				2300	2400	2600	3000	3200	3400	3600
D902	E2	Rated power ^{*1}	kW	12.0	12.1	13.4	15.1	16.1	17.4	18.5
		Specific fuel consumption	g/kWh	252	253	254	263	263	275	271
		Heat rejection to coolant	kW	12.4	12.6	13.8	16.2	17.6	19.3	21.0
			kJ/h	44800	45200	49800	58200	63200	69500	75800
			kcal/h	10700	10800	11900	13900	15100	16600	18100
	E3	Rated power ^{*1}	kW	12.0	12.1	13.4	15.1	16.1	17.4	18.5
		Specific fuel consumption	g/kWh	252	253	254	263	263	275	271
		Heat rejection to coolant	kW	12.4	12.6	13.8	16.2	17.6	19.3	21.0
			kJ/h	44800	45200	49800	58200	63200	69500	75800
			kcal/h	10700	10800	11900	13900	15100	16600	18100
	E4	Rated power ^{*1}	kW	12.0	12.1	13.4	15.5	16.1	17.4	18.5
		Specific fuel consumption	g/kWh	252	253	254	263	263	275	271
		Heat rejection to coolant	kW	12.4	12.6	13.8	16.6	17.6	19.3	21.0
			kJ/h	44800	45200	49800	59900	63200	69500	75800
			kcal/h	10700	10800	11900	14300	15100	16600	18100

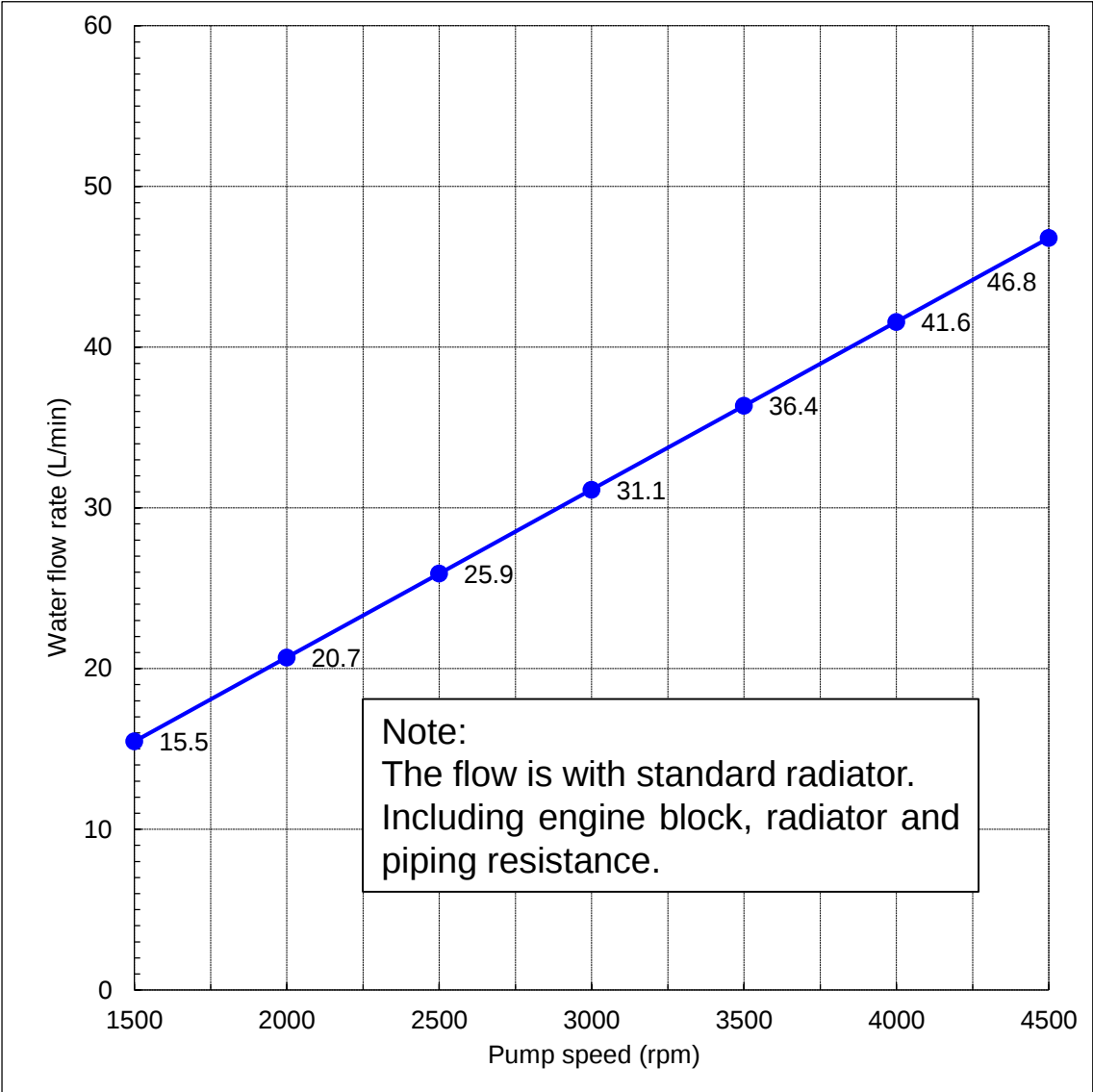
*1: Gross intermittent SAE J1995

Note 1: at amb. temp. 25 deg. C and 100 kPa

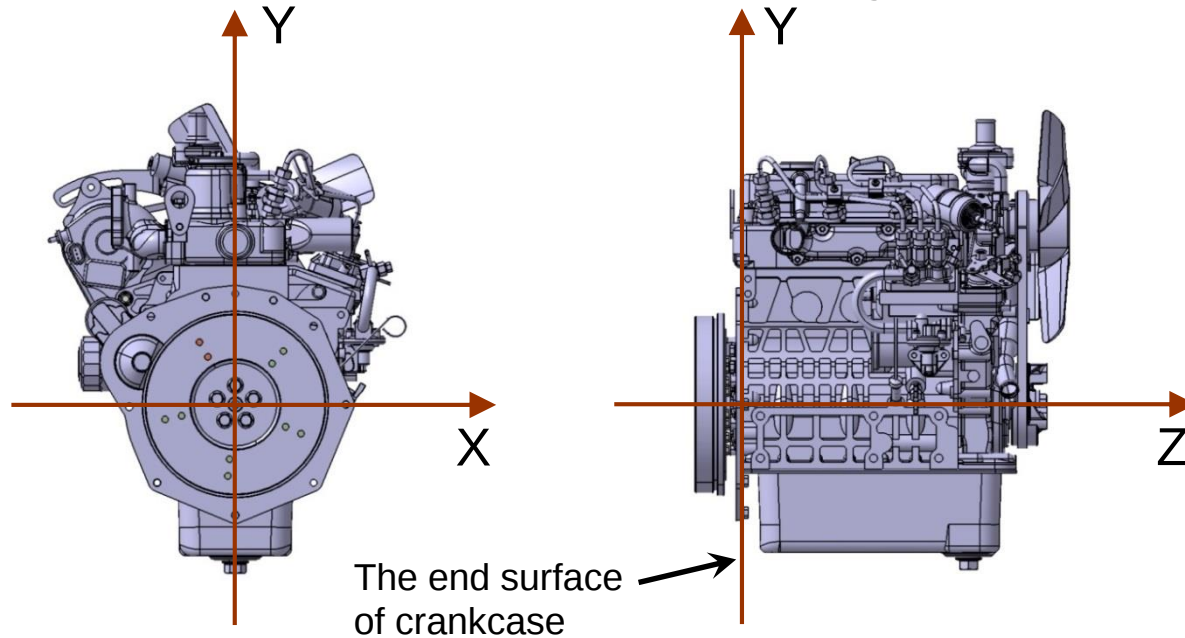
Note 2: Diesel fuel low caloric value: 43074 kJ/kg (10290 kcal/kg)

Water Flow Rate

Water pump	1E051-7303*
Thermostat	19434-7301*



Center of Gravity



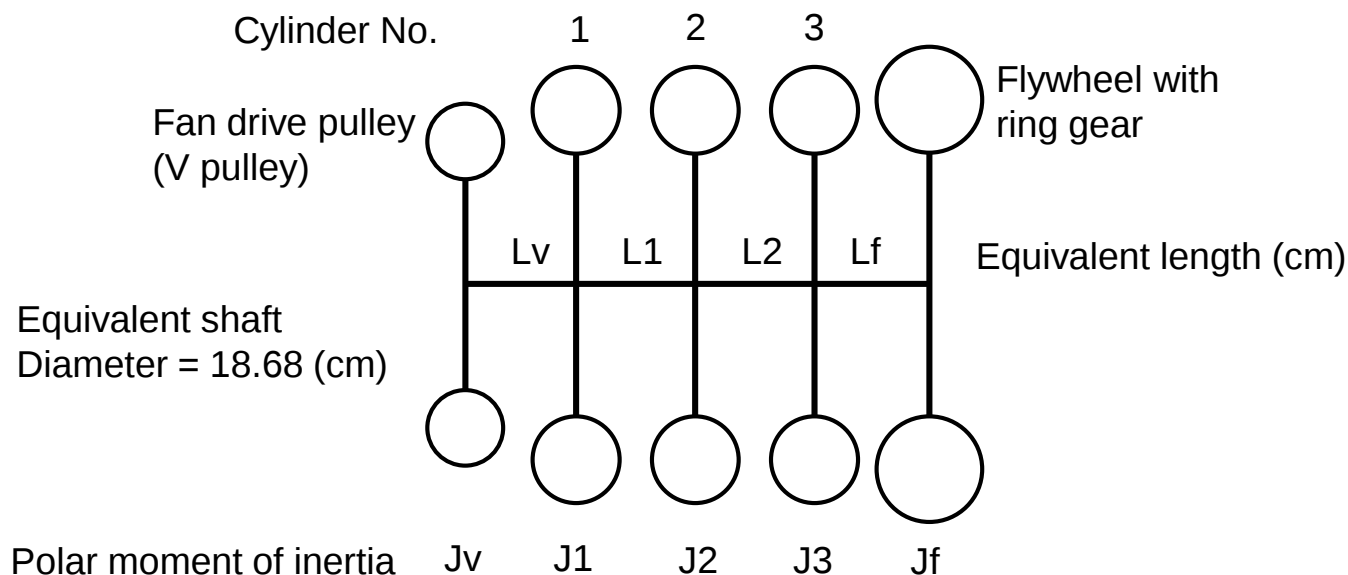
1. With Kubota standard flywheel and rear end plate

Dry weight		Center of gravity					
kg	lb	X		Y		Z	
		mm	in	mm	in	mm	in
72	159	-25.5	-1.00	73.3	2.89	123.5	4.86

2. With SAE No.6-1/2 flywheel and SAE No.5 flywheel housing

Dry weight		Center of gravity					
kg	lb	X		Y		Z	
		mm	in	mm	in	mm	in
94	207	-18.5	-0.73	55.5	2.19	78.0	3.07

Mass Elastic Systems



1. With Kubota standard flywheel

Comp. Flywheel	1J019-2501*
Fan drive pulley	1G952-7428*

Equivalent length (cm)				Polar moment of inertia (kgcm ²)				
Lv	L1	L2	Lf	Jv	J1	J2	J3	Jf
35082	4528	4528	2824	12.7	25.5	25.5	25.5	513

2. With SAE No.6-1/2 flywheel

Comp. Flywheel	16676-2501*
Fan drive pulley	16861-7428*

Equivalent length (cm)				Polar moment of inertia (kgcm ²)				
Lv	L1	L2	Lf	Jv	J1	J2	J3	Jf
35082	4528	4528	2824	12.7	25.5	25.5	25.5	1447

D902

Unbalanced Forces

1. Base data

l (m)	r (m)	L (m)	mp (kg)	Bore (mm)	Stroke (mm)
0.0980	0.0368	0.0800	0.451	72.0	73.6

l = Center distance of connecting rod

r = Crank radius

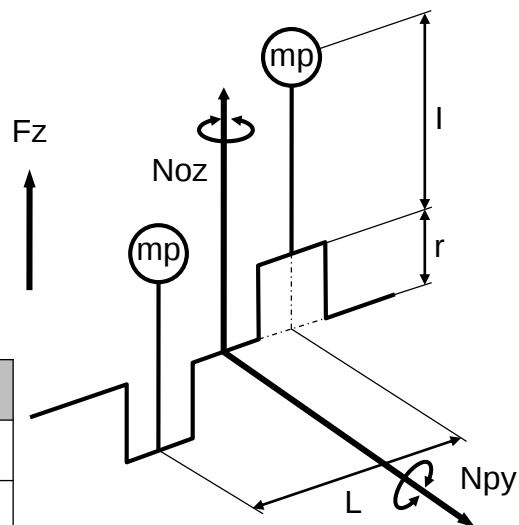
L = Cylinder distance

mp = Reciprocating mass

G = Gravitational acceleration (=9.80665 (m/s²))

2. Unbalanced inertia force and couple

Model	Cylinders	Bore (mm)	Order	Fz (N)	Npy (Nm)	Noz (Nm)
D902	3	72.0	1	0	$0.001147 \times \omega^2$	$0.001147 \times \omega^2$
			2	0	$0.000863 \times \omega^2$	0



Fz = Unbalanced inertia force = 0 (N)

Npy = Unbalanced inertia couple = $\frac{\sqrt{3}}{2} \times mp \times r \times L \times \omega^2 \times \sin\theta + \sqrt{3} \times mp \times r \times L \times (r/l) \times \omega^2 \times \sin 2\theta$ (Nm)

Noz = Unbalanced inertia couple = $\frac{\sqrt{3}}{2} \times mp \times r \times L \times \omega^2 \times \sin\theta$ (Nm)

ω = Angular velocity = $2\pi n/60$ (rad/s), n = Engine speed (rpm)

3. An example of calculation

Calculation condition	ω^2	Fz, Npy, Noz		
			Order	Calculation
Engine model: D902 Engine speed: 3600 rpm	$(2 \times \pi \times 3600/60)^2$ = 142122	Fz (N)	1	0
			2	0
		Npy (Nm)	1	163.1
			2	122.6
		Noz (Nm)	1	163.1
			2	0

Revision History

File Name	Remarks	Date
KORD3_16-123_Technical_information_for_D902.pdf	New release	Sep. 7, 2016
KORD3_17-038_Technical_information_for_D902.pdf	Page 12: Add no load minimum idling speed for E4 model	Mar. 6, 2017
KORD3_17-126_Technical_information_for_D902.pdf	Page 4: Add maximum air intake restriction with dirty air cleaner element	Nov. 30, 2017
KORD3_20-067_Technical_information_for_D902.pdf	Typo correction	Apr. 10, 2020
KORD3_21-032_Technical_information_for_D902.pdf	Page 21:Update for water flow rate	Mar. 18, 2021
KORD3_22-310_Technical_information_for_D902.pdf	Page 6: Correct for performance curves	Oct. 21, 2022
KORD3_22-422_Technical_information_for_D902.pdf	Page 7: Update performance curves	Dec. 13, 2022