

Item	Unit	Data					
		DF9.9	DF9.9E	DF9.9R	DF15	DF15E	DF15R

POWERHEAD

Recommended operating range	r/min	4900 – 5500	5400 – 6000
Idle speed	r/min	900 ± 50 (in-gear: approx. 870)	
* Cylinder compression (with decompression system)	kPa (kg/cm ² , psi)	550 – 850 (5.5 – 8.5, 78 – 120) With decompression system: DF9.9/15 820 – 1230 (8.2 – 12.3, 116 – 175): Without decompression system: DF9.9E/R, DF15E/R (Crank with recoil starter)	
* Oil pressure (Oil temp. at 60 °C (140 °F))	kPa (kg/cm ² , psi)	Min. 200 (2.0, 28) at 3000 r/min Max. 500 (5.0, 71)	
Engine oil		API classification SE, SF, SG, SH, SJ Viscosity rating SAE 10W-40	
Engine oil amounts	L (US/Imp. qt)	1.0 (1.1/0.9) Oil change only 1.1 (1.2/1.0) Oil filter change	
Thermostat operating temperature	°C (°F)	58 – 62 (136 – 144)	

* Figures shown are guidelines only, not absolute service limits.

CYLINDER HEAD/CAMSHAFT

Cylinder head distortion	Limit	mm (in)	0.05 (0.002)
Cam height	IN	STD	23.394 – 23.454 (0.9210 – 0.9234)
		Limit	23.294 (0.9171)
	EX	STD	23.397 – 23.457 (0.9211 – 0.9235)
		Limit	23.297 (0.9172)
Camshaft journal oil clearance	STD	mm (in)	0.020 – 0.062 (0.0008 – 0.0024)
	Limit	mm (in)	0.100 (0.0039)
Camshaft holder inside diameter	Upper	STD	25.000 – 25.021 (0.9843 – 0.9851)
	Lower	STD	23.000 – 23.021 (0.9055 – 0.9063)
Camshaft journal outside diameter	Upper	STD	24.959 – 24.980 (0.9826 – 0.9835)
	Lower	STD	22.959 – 22.980 (0.9039 – 0.9047)
Rocker arm shaft to rocker arm clearance	STD	mm (in)	0.016 – 0.045 (0.0006 – 0.0018)
	Limit	mm (in)	0.060 (0.0024)
Rocker arm inside diameter	STD	mm (in)	13.000 – 13.018 (0.5118 – 0.5125)
Rocker arm shaft outside diameter	STD	mm (in)	12.973 – 12.984 (0.5107 – 0.5112)

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VALVE/VALVE GUIDE

Valve diameter	IN	STD	mm (in)	26 (1.0)
	EX	STD	mm (in)	22 (0.9)
Valve clearance (Cold engine condition)	IN	STD	mm (in)	0.18 – 0.22 (0.007 – 0.009)
	EX	STD	mm (in)	0.18 – 0.22 (0.007 – 0.009)
Valve guide to valve stem clear- ance	IN	STD	mm (in)	0.010 – 0.037 (0.0004 – 0.0015)
		Limit	mm (in)	0.070 (0.0028)
	EX	STD	mm (in)	0.035 – 0.062 (0.0014 – 0.0024)
		Limit	mm (in)	0.090 (0.0035)
Valve guide inside diameter	IN	STD	mm (in)	5.500 – 5.512 (0.2165 – 0.2170)
	EX	STD	mm (in)	5.500 – 5.512 (0.2165 – 0.2170)
Valve stem out- side diameter	IN	STD	mm (in)	5.475 – 5.490 (0.2156 – 0.2161)
	EX	STD	mm (in)	5.450 – 5.465 (0.2146 – 0.2152)
Valve guide pro- trusion	IN	Limit	mm (in)	10.0 (0.39)
	EX	Limit	mm (in)	10.0 (0.39)
Valve stem deflection	IN	Limit	mm (in)	0.16 (0.006)
	EX	Limit	mm (in)	0.16 (0.006)
Valve stem runout	IN	Limit	mm (in)	0.05 (0.002)
	EX	Limit	mm (in)	0.05 (0.002)
Valve head radial runout	IN	Limit	mm (in)	0.03 (0.001)
	EX	Limit	mm (in)	0.03 (0.001)
Valve head thickness	IN	Limit	mm (in)	0.5 (0.02)
	EX	Limit	mm (in)	0.5 (0.02)
Valve seat con- tact width	IN	STD	mm (in)	0.9 – 1.1 (0.035 – 0.043)
	EX	STD	mm (in)	0.9 – 1.1 (0.035 – 0.043)
Valve spring free length	STD	mm (in)	32.52 (1.280)	
	Limit	mm (in)	32.40 (1.276)	
Valve spring tension	STD	N (kg, lbs)	90 (9.0, 19.8) for 28.5 mm (1.12 in)	
	Limit	N (kg, lbs)	76 (7.6, 16.8) for 28.5 mm (1.12 in)	

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CYLINDER/PISTON/PISTON RING

Cylinder distortion	Limit	mm (in)	0.05 (0.002)			
Piston to cylinder clearance	STD	mm (in)	0.0276 – 0.0425 (0.0011 – 0.0017)			
	Limit	mm (in)	0.100 (0.0039)			
Cylinder bore	STD	mm (in)	58.000 – 58.015 (2.2835 – 2.2841)			
Cylinder measuring position		mm (in)	50 (2.0) from cylinder top surface			
Piston skirt diameter	STD	mm (in)	57.965 – 57.980 (2.2821 – 2.2827)			
Piston measuring position		mm (in)	15 (0.6) from piston skirt end			
Wear on cylinder bore	Limit	mm (in)	0.055 (0.0022)			
Piston ring end gap	1st	STD	mm (in)	0.10 – 0.25 (0.004 – 0.010)		
		Limit	mm (in)	0.50 (0.020)		
	2nd	STD	mm (in)	0.10 – 0.25 (0.004 – 0.010)		
		Limit	mm (in)	0.50 (0.020)		
Piston ring free end gap	1st	STD	mm (in)	Approx. 5.8 (0.23)		
		Limit	mm (in)	4.6 (0.18)		
	2nd	STD	mm (in)	Approx. 7.4 (0.29)		
		Limit	mm (in)	5.9 (0.23)		
Piston ring to groove clearance	1st	STD	mm (in)	0.02 – 0.06 (0.001 – 0.002)		
		Limit	mm (in)	0.10 (0.004)		
	2nd	STD	mm (in)	0.02 – 0.06 (0.001 – 0.002)		
		Limit	mm (in)	0.10 (0.004)		
Piston ring groove width	1st	STD	mm (in)	1.21 – 1.23 (0.0476 – 0.0484)		
	2nd	STD	mm (in)	1.21 – 1.23 (0.0476 – 0.0484)		
	Oil	STD	mm (in)	2.51 – 2.53 (0.099 – 0.100)		
Piston ring thickness	1st	STD	mm (in)	1.17 – 1.19 (0.046 – 0.047)		
	2nd	STD	mm (in)	1.17 – 1.19 (0.046 – 0.047)		
Pin clearance in piston pin hole	STD	mm (in)	0.002 – 0.013 (0.0001 – 0.0005)			
	Limit	mm (in)	0.040 (0.0016)			
Piston pin outside diameter	STD	mm (in)	13.995 – 14.000 (0.5510 – 0.5512)			
	Limit	mm (in)	13.980 (0.5504)			
Piston pin hole diameter	STD	mm (in)	14.002 – 14.008 (0.5513 – 0.5515)			
	Limit	mm (in)	14.030 (0.5524)			

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CRANKSHAFT/CONROD

Conrod small end inside diameter	STD	mm (in)	14.006 – 14.014 (0.5514 – 0.5517)			
	Limit	mm (in)	14.040 (0.5528)			
Conrod big end oil clearance	STD	mm (in)	0.025 – 0.045 (0.0010 – 0.0018)			
	Limit	mm (in)	0.063 (0.0025)			
Conrod big end inside diameter	STD	mm (in)	29.025 – 29.034 (1.1427 – 1.1431)			
Crank pin outside diameter	STD	mm (in)	28.989 – 29.000 (1.1413 – 1.1417)			
Crank pin outside diameter difference	Limit	mm (in)	0.010 (0.0004)			
Conrod big end side clearance	STD	mm (in)	0.10 – 0.20 (0.004 – 0.008)			
	Limit	mm (in)	0.60 (0.024)			
Conrod big end width	STD	mm (in)	19.95 – 20.00 (0.785 – 0.787)			
Crank pin width	STD	mm (in)	20.10 – 20.15 (0.791 – 0.793)			
Crankshaft thrust clearance	Limit	mm (in)	0.60 (0.024)			
Crankshaft length	STD	mm (in)	126.8 – 126.9 (4.992 – 4.996)			
Crankcase length	STD	mm (in)	127.0 – 127.1 (5.000 – 5.004)			
Crankshaft journal oil clearance	STD	mm (in)	0.020 – 0.047 (0.0008 – 0.0019)			
	Limit	mm (in)	0.060 (0.0024)			
Crankcase bearing holder inside diameter	STD	mm (in)	35.000 – 35.016 (1.3780 – 1.3786)			
Crankshaft journal outside diameter	STD	mm (in)	31.989 – 32.000 (1.2594 – 1.2598)			
Crankshaft journal outside diameter difference	Limit	mm (in)	0.010 (0.0004)			
Crankcase bearing thickness	Limit	mm (in)	1.486 – 1.494 (0.0585 – 0.0588)			

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LOWER UNIT

Gearcase oil amounts	ml (US/Imp. oz)	170 (5.7/6.0)
Gear ratio		2.08 (12:25)
Preliminary gear shim & thrust washer		
Pinion back up shim	mm (in)	1.0 (0.04)
Forward back up shim	mm (in)	1.0 (0.04)
Reverse back up shim	mm (in)	1.0 (0.04)
Forward thrust washer	mm (in)	1.5 (0.06)
Reverse thrust washer	mm (in)	1.5 (0.06)

Initial selection-shim adjustment may be required.

CARBURETOR

Type	KEIHIN	BCM II 23-11.5		BCM II 25-21	
I.D. mark		94J2	94J3	94J6	94J7
Main jet	#	70		115	
Pilot jet	#	38		40	
Pilot screw	Turns open	PRE-SET(1-7/8 ± 1/2)		PRE-SET(2-7/8 ± 1/2)	
Float height	mm	13.5 ± 2		13.5 ± 2	

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ELECTRICAL

Ignition timing		Degrees	ATDC 5 – BTDC 30
Over revolution limiter		r/min	6500
Condenser charge coil resistance		Ω at 20 °C	12.5 – 18.8 [G–B/R]
Pulser coil resistance		Ω at 20 °C	148 – 222 [R/B–B]
Ignition coil resistance (Without spark plug cap)	Primary	Ω at 20 °C	0.2 – 0.4 [O–B]
	Secondary	k Ω at 20 °C	6.8 – 10.2 [H.T. cord – H.T. cord]
Spark plug cap resistance		k Ω at 20 °C	8 – 12
Battery charge coil resistance		Ω at 20 °C	0.9 – 1.3 (DF9.9E/15E,DF9.9/15) [R–Y] 0.3 – 0.4 (DF9.9R/15R) [R–Y]
Battery charge coil output (12 V)		Watt	80: Tiller handle model 120: Remote control model
Standard spark plug	Type	NGK	BKR6E
	Gap	mm (in)	0.7 – 0.8 (0.028 – 0.031)
Fuse amp rating		A	20: Electric start model
Recommended battery capacity (12 V)		Ah (kC)	35 (126) or over: Electric start model
Starter motor relay coil resistance		Ω at 20 °C	145 – 190: Electric start model

STARTER MOTOR (only for Electric start model)

Max. continuous time of use		Sec	30
Motor output		kW	1.4
Brush length	STD	mm (in)	15.5 (0.61)
	Limit	mm (in)	9.5 (0.37)
Commutator undercut	STD	mm (in)	0.5 – 0.8 (0.02 – 0.03)
	Limit	mm (in)	0.2 (0.01)
Commutator outside diameter	STD	mm (in)	29.0 (1.14)
	Limit	mm (in)	28.0 (1.10)
Commutator outside diameter difference	STD	mm (in)	0.05 (0.002)
	Limit	mm (in)	0.40 (0.016)

PEAK VOLTAGE

Requirements for peak voltage measurement

- Remove all spark plugs to eliminate the variables at cranking speed.
- Crank with recoil starter.
- Use a STEVENS peak voltage tester, Model CD-77.
- Use the 6-pin connector test cord (Part No. 09930-89920).

Testing sequence		Tester probe connection		Peak voltage	Tester range	Remarks
		⊕ (Red)	⊖ (Black)			
1	CDI output	Orange	Black	128 V or over	NEG 500	<ul style="list-style-type: none"> • With ignition coil connected • Use the 6-pin connector test cord.
2	Condenser charge coil output	Green	Black/Red	15 V or over	POS 50	With CDI unit disconnected
3	Pulser coil output	Red/Black	Black (Ground)	0.8 V or over	SEN 5	
4	Battery charge coil output	Red	Yellow	5.6 V or over	POS 50	With rectifier disconnected

