

Item	Unit	Data	
		DF90T	DF115T/115WT

POWERHEAD

Recommended operating range	r/min	4500 – 5500	5000 – 6000
Idle speed	r/min	625 ± 25 (in-gear: approx. 625)	
* Cylinder compression	kPa (kg/cm ² , psi)	1300 – 1700 (13 – 17, 185 – 242)	
* Cylinder compression max. difference between any other cylinders	kPa (kg/cm ² , psi)	100 (1.0, 14)	
* Engine oil pressure	kPa (kg/cm ² , psi)	550 – 600 (5.5 – 6.0, 78 – 85) at 3000 r/min (at normal operating temp.)	
Engine oil		API classification SE, SF, SG, SH, SJ Viscosity rating SAE 10W-40	
Engine oil amounts	L (US/Imp. qt)	5.5 (5.8/4.8): Oil change only 5.7 (6.0/5.0): Oil filter change	
Thermostat operating temperature	°C (°F)	58 – 62 (136 – 144)	

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

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CYLINDER HEAD/CAMSHAFT

Cylinder head distortion	Limit	mm (in)	0.05 (0.002)		
Manifold seating faces distortion	Limit	mm (in)	0.10 (0.004)		
Cam height	IN	STD	mm (in)	36.920 – 37.080 (1.4535 – 1.4598)	38.820 – 38.980 (1.5283 – 1.5346)
		Limit	mm (in)	36.820 (1.4496)	38.720 (1.5244)
	EX	STD	mm (in)	36.630 – 36.790 (1.4421 – 1.4484)	38.820 – 38.980 (1.5283 – 1.5346)
		Limit	mm (in)	36.530 (1.4382)	38.720 (1.5244)
Camshaft journal oil clearance	Top, 2nd, 3rd, 4th	STD	mm (in)	0.020 – 0.062 (0.0008 – 0.0024)	
		Limit	mm (in)	0.120 (0.0047)	
	5th	STD	mm (in)	0.045 – 0.087 (0.0018 – 0.0034)	
		Limit	mm (in)	0.120 (0.0047)	
Camshaft journal (housing) inside diameter	Top, 2nd, 3rd, 4th	STD	mm (in)	23.000 – 23.021 (0.9055 – 0.9063)	
		Limit	mm (in)	23.171 (0.9122)	
	5th	STD	mm (in)	26.000 – 26.021 (1.0236 – 1.0244)	
		Limit	mm (in)	26.171 (1.0304)	
Camshaft journal outside diameter	Top, 2nd, 3rd, 4th	STD	mm (in)	22.959 – 22.980 (0.9039 – 0.9047)	
		Limit	mm (in)	22.869 (0.9004)	
	5th	STD	mm (in)	25.934 – 25.955 (1.0210 – 1.0219)	
		Limit	mm (in)	25.844 (1.0175)	
Camshaft runout	Limit	mm (in)	0.10 (0.004)		
Cylinder head bore to tappet clearance	STD	mm (in)	0.025 – 0.066 (0.0010 – 0.0026)		
	Limit	mm (in)	0.150 (0.0059)		
Tappet outer diameter	STD	mm (in)	30.959 – 30.975 (1.2189 – 1.2195)		
Cylinder head bore	STD	mm (in)	31.000 – 31.025 (1.2203 – 1.2215)		

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VALVE/VALVE GUIDE

Valve diameter	IN		mm (in)	33 (1.3)
	EX		mm (in)	28 (1.1)
Tappet clearance (Cold engine condition)	IN	STD	mm (in)	0.23 – 0.27 (0.009 – 0.011)
	EX	STD	mm (in)	0.23 – 0.27 (0.009 – 0.011)
Valve seat angle	IN		—	15°, 45°, 60°
	EX		—	15°, 45°
Valve guide to valve stem clearance	IN	STD	mm (in)	0.020 – 0.047 (0.0008 – 0.0019)
		Limit	mm (in)	0.070 (0.0028)
	EX	STD	mm (in)	0.045 – 0.072 (0.0018 – 0.0028)
		Limit	mm (in)	0.090 (0.0035)
Valve guide inside diameter	IN, EX	STD	mm (in)	6.000 – 6.012 (0.2362 – 0.2367)
Valve guide protrusion	IN, EX	STD	mm (in)	13.5 (0.53)
Valve stem outside diameter	IN	STD	mm (in)	5.965 – 5.980 (0.2348 – 0.2354)
	EX	STD	mm (in)	5.940 – 5.955 (0.2339 – 0.2344)
Valve stem end deflection	IN	Limit	mm (in)	0.14 (0.006)
	EX	Limit	mm (in)	0.18 (0.007)
Valve stem runout	IN, EX	Limit	mm (in)	0.05 (0.002)
Valve head radial runout	IN, EX	Limit	mm (in)	0.08 (0.003)
Valve head thickness	IN	STD	mm (in)	1.0 (0.04)
		Limit	mm (in)	0.7 (0.03)
	EX	STD	mm (in)	1.2 (0.05)
		Limit	mm (in)	0.7 (0.03)
Valve seat contact width	IN	STD	mm (in)	1.1 – 1.3 (0.04 – 0.05)
	EX	STD	mm (in)	1.1 – 1.3 (0.04 – 0.05)
Valve spring free length		STD	mm (in)	42.7 (1.68)
		Limit	mm (in)	41.0 (1.61)
Valve spring tension		STD	N (kg, lbs)	167 – 193 (16.7 – 19.3, 36.8 – 42.5) for 32.6 mm (1.28 in)
		Limit	N (kg, lbs)	151 (15.1, 33.3) for 32.6 mm (1.28 in)
Valve spring squareness		Limit	mm (in)	2.0 (0.08)

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CYLINDER/PISTON/PISTON RING

Cylinder distortion	Limit	mm (in)	0.05 (0.002)
Piston to cylinder clearance	STD	mm (in)	0.020 – 0.040 (0.0008 – 0.0016)
	Limit	mm (in)	0.100 (0.0039)
Cylinder bore	STD	mm (in)	84.000 – 84.020 (3.3071 – 3.3079)
Cylinder measuring position		mm (in)	50 (2.0) from cylinder top surface
Piston skirt diameter	STD	mm (in)	83.970 – 83.990 (3.3059 – 3.3067)
Piston measuring position		mm (in)	26.5 (1.04) from piston skirt end
Cylinder bore wear	Limit	mm (in)	0.100 (0.0039)
Piston ring end gap	1st	STD	0.20 – 0.35 (0.008 – 0.014)
		Limit	0.70 (0.028)
	2nd	STD	0.35 – 0.50 (0.014 – 0.020)
		Limit	1.00 (0.039)
Piston ring free end gap	1st	STD	Approx. 11.3 (0.44)
		Limit	9.0 (0.354)
	2nd	STD	Approx. 11.0 (0.43)
		Limit	8.8 (0.347)
Piston ring to groove clearance	1st	STD	0.030 – 0.070 (0.0012 – 0.0028)
		Limit	0.120 (0.0047)
	2nd	STD	0.020 – 0.060 (0.0008 – 0.0024)
		Limit	0.100 (0.0039)
Piston ring groove width	1st	STD	1.22 – 1.24 (0.048 – 0.049)
	2nd	STD	1.51 – 1.53 (0.059 – 0.060)
	Oil	STD	2.51 – 2.53 (0.099 – 0.100)
Piston ring thickness	1st	STD	1.17 – 1.19 (0.046 – 0.047)
	2nd	STD	1.47 – 1.49 (0.058 – 0.059)
Pin clearance in piston pin hole	STD	mm (in)	0.006 – 0.017 (0.0002 – 0.0007)
	Limit	mm (in)	0.040 (0.0016)
Piston pin outside diameter	STD	mm (in)	20.997 – 21.000 (0.8267 – 0.8268)
	Limit	mm (in)	20.980 (0.8260)
Piston pin hole diameter	STD	mm (in)	21.006 – 21.014 (0.8270 – 0.8273)
	Limit	mm (in)	21.040 (0.8283)
Pin clearance in conrod small end	STD	mm (in)	0.003 – 0.014 (0.0001 – 0.0006)
	Limit	mm (in)	0.050 (0.0020)
Conrod small end bore	STD	mm (in)	21.003 – 21.011 (0.8269 – 0.8272)

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CRANKSHAFT/CONROD

Conrod small end inside diameter	STD	mm (in)	21.003 – 21.011 (0.8269 – 0.8272)
Conrod big end oil clearance	STD	mm (in)	0.030 – 0.050 (0.0012 – 0.0020)
	Limit	mm (in)	0.065 (0.0026)
Conrod big end inside diameter	STD	mm (in)	47.000 – 47.018 (1.8504 – 1.8511)
Crank pin outside diameter	STD	mm (in)	43.982 – 44.000 (1.7316 – 1.7323)
Crank pin outside diameter difference (out-of-round and taper)	Limit	mm (in)	0.010 (0.0004)
Conrod bearing thickness	STD	mm (in)	1.484 – 1.502 (0.0584 – 0.0591)
Conrod big end side clearance	STD	mm (in)	0.100 – 0.250 (0.0039 – 0.0098)
	Limit	mm (in)	0.350 (0.0138)
Conrod big end width	STD	mm (in)	21.950 – 22.000 (0.8642 – 0.8661)
Crank pin width	STD	mm (in)	22.100 – 22.200 (0.8700 – 0.8740)
Crankshaft center journal runout	Limit	mm (in)	0.04 (0.002)
Crankshaft journal oil clearance	STD	mm (in)	0.020 – 0.040 (0.0008 – 0.0016)
	Limit	mm (in)	0.065 (0.0026)
Crankcase bearing holder inside diameter	STD	mm (in)	62.000 – 62.018 (2.4409 – 2.4417)
Crankshaft journal outside diameter	STD	mm (in)	57.994 – 58.012 (2.2832 – 2.2839)
Crankshaft journal outside diameter difference (out-of-round and taper)	Limit	mm (in)	0.010 (0.0004)
Crankshaft bearing thickness	STD	mm (in)	1.990 – 2.006 (0.0783 – 0.0790)
Crankshaft thrust play	STD	mm (in)	0.11 – 0.31 (0.004 – 0.012)
	Limit	mm (in)	0.35 (0.014)
Crankshaft thrust bearing thickness	STD	mm (in)	2.425 – 2.475 (0.0955 – 0.0974)

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ELECTRICAL

Ignition timing	Degrees	BTDC 1 – BTDC 44	BTDC 3 – BTDC 44
Over revolution limiter	r/min	6200	
CKP sensor resistance	Ω at 20 °C	168 – 252	
CMP sensor resistance	Ω at 20 °C	—	
Ignition coil resistance	Primary	Ω at 20 °C	1.9 – 2.5
	Secondary	k Ω at 20 °C	No. 2 – No. 3: 18 – 34 (including H.T. cord and spark plug cap) No. 1 – No. 4: 19 – 36 (including H.T. cord and spark plug cap)
High tension cord resistance	k Ω /m at 20 °C	Approx. 16	
Battery charge coil resistance	Ω at 20 °C	0.16 – 0.24	
Battery charge coil output (12 V)	Watt	480	
Standard spark plug	Type	NGK	BKR6E
	Gap	mm (in)	0.7 – 0.8 (0.028 – 0.031)
Fuse amp. rating	A	Main fuse: 60 Sub fuse: 30	
Recommended battery capacity (12 V)	Ah (kC)	100 (360) or larger	
Fuel injector resistance	Ω at 20 °C	11.0 – 16.5	
IAC valve resistance	Ω at 20 °C	8 – 12	
IAT sensor/Cylinder temp. sensor/Ex- main. temp. sensor (Thermistor characteristic)	k Ω at 25 °C	1.8 – 2.3	
ECM main relay resistance	Ω at 20 °C	145 – 190	
Starter relay coil resistance	Ω at 20 °C	145 – 190	
PTT motor relay coil resistance	Ω at 20 °C	25 – 37	

STARTER MOTOR












Max. continuous time of use	Sec	30	
Motor output	kW	1.4	
Brush length	STD	mm (in)	16.0 (0.63)
	Limit	mm (in)	12.0 (0.47)
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)

PTT MOTOR

Brush length	STD	mm (in)	9.8 (0.39)
	Limit	mm (in)	5.5 (0.22)
Commutator outside diameter	STD	mm (in)	22.0 (0.87)
	Limit	mm (in)	21.0 (0.83)

SELF-DIAGNOSTIC SYSTEM INDICATION

When the abnormality occurs in a signal from sensor, switch, etc., the “CHECK ENGINE” lamp on the monitor-tachometer flashes (lights intermittently) according to the each code pattern with buzzer sounding.

PRIORITY	FAILED ITEM	CODE	LAMP FLASHING PATTERN	FAIL-SAFE SYSTEM ACTIVATING
1	MAP sensor 1	3 – 4	on  off	YES
2	CKP sensor	4 – 2	on  off	YES
3	IAC valve/By-pass air screw adjustment	3 – 1	on  off	NO
4	CMP sensor	2 – 4	on  off	YES
5	CTP switch	2 – 2	on  off	NO
6	Cylinder temp. sensor	1 – 4	on  off	YES
7	IAT sensor	2 – 3	on  off	YES
8	MAP sensor 2 (Pressure detect passage)	3 – 2	on  off	NO
9	Rectifier & regulator (Over-charging)	1 – 1	on  off	NO
10	Exhaust manifold temp. sensor	1 – 5	on  off	YES
11	Fuel injector	4 – 3	on  off	NO

NOTE:

If more than two items fail at once, the self-diagnostic indication appears according to priority order.
The indication repeats three times.