Item		Unit	Data	
			DF40T/40QH	DF50T/50TH/50WT/50WQH

POWERHEAD

Recommended operating range	Except E01	r/min	5200 – 5800	5900 – 6500
	E01	r/min	5600 – 6200	
Idle speed		r/min	850 ± 50 (in-gear: approx. 850)	
* Cylinder compression		kPa (kg/cm², psi)	1300 – 1600 (13 – 16, 185 – 228)	
* Cylinder compression max. difference between any other cylinders		kPa (kg/cm², psi)	100 (1.0, 14)	
*Engine oil pressure		kPa (kg/cm², psi)	300 – 380 (3.0 – 3.8, 43 – 54) at 4000 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)	2.2 (2.3/1.9): Oil change only 2.4 (2.5/2.1): Oil filter change	
Thermostat operating temperature		°C (°F)	58 – 62 (136 – 144)	

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

ENGINE OIL PUMP

Radial clearance	Limit	mm (in)	0.31 (0.012)
Side clearance	Limit	mm (in)	0.15 (0.006)

Item		Unit	Data	
			DF40T/40QH	DF50T/50TH/50WT/50WQH

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)	* 37.530 – 37.690 (1.4776 – 1.4839)	38.230 – 38.390 (1.5051 – 1.5114)
		Limit	mm (in)	* 37.430 (1.4736)	38.130 (1.5012)
	EX	STD	mm (in)	37.740 – 37.900 (1.4858 – 1.4921)	37.740 – 37.900 (1.4858 – 1.4921)
		Limit	mm (in)	37.640 (1.4819)	37.640 (1.4819)
Camshaft journal oil clearance		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)	
Camshaft journal outside diameter	Top, 2nd, 3rd, 4th	STD	mm (in)	22.934 – 22.955 (0.9029 – 0.9037)	
		Limit	mm (in)	22.784 (0.8970)	
Camshaft runout		Limit	mm (in)	0.10 (0.004)	
Cylinder head bore to tappet clearance		STD	mm (in)	0.025 – 0.062 (0.0010 – 0.0024)	
		Limit	mm (in)	0.150 (0.0059)	
Tappet outer diameter		STD	mm (in)	26.959 – 26.975 (1.0614 – 1.0620)	
Cylinder head bore		STD	mm (in)	27.000 – 27.021 (1.0630 – 1.0638)	

* On DF40 designated for EU market (E01), specifications of cam height are the same as the specifications for DF50.

Item		Unit	Data	
			DF40T/40QH	DF50T/50TH/50WT/50WQH

VALVE/VALVE GUIDE

Valve diameter		IN	mm (in)	24.6 (0.97)
		EX	mm (in)	21.5 (0.85)
Tappet clearance (Cold engine condition)	IN	STD	mm (in)	0.18 – 0.24 (0.007 – 0.009)
	EX	STD	mm (in)	0.18 – 0.24 (0.007 – 0.009)
Valve seat angle		IN	—	30°, 45°
		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)	5.500 – 5.512 (0.2165 – 0.2170)
Valve guide protrusion	IN, EX	STD	mm (in)	11.0 (0.43)
Valve stem outside diameter	IN	STD	mm (in)	5.465 – 5.480 (0.2152 – 0.2157)
	EX	STD	mm (in)	5.440 – 5.455 (0.2142 – 0.2148)
Valve stem end length	IN, EX	Limit	mm (in)	3.20 (0.126)
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)	1.15 (0.045)
		Limit	mm (in)	0.5 (0.02)
Valve seat contact width	IN	STD	mm (in)	1.80 – 2.20 (0.071 – 0.087)
	EX	STD	mm (in)	1.65 – 2.05 (0.065 – 0.081)
Valve spring free length		STD	mm (in)	33.1 (1.30)
		Limit	mm (in)	31.8 (1.25)
Valve spring tension		STD	N (kg, lbs)	97 – 113 (9.7 – 11.3, 21.4 – 24.9) for 28.5 mm (1.12 in)
		Limit	N (kg, lbs)	89 (8.9, 19.6) for 28.5 mm (1.12 in)
Valve spring squareness		Limit	mm (in)	2.0 (0.08)

Item			Unit	Data	
				DF40T/40QH	DF50T/50TH/50WT/50WQH

CYLINDER/PISTON/PISTON RING

Cylinder distortion		Limit	mm (in)	0.060 (0.0024)
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)	71.000 – 71.020 (2.7953 – 2.7961)
Cylinder measuring position			mm (in)	50 (2.0) from cylinder top surface
Piston skirt diameter		STD	mm (in)	70.970 – 70.990 (2.7941 – 2.7949)
Piston measuring position			mm (in)	19 (0.7) from piston skirt end
Cylinder bore wear		Limit	mm (in)	0.100 (0.0039)
Piston ring end gap	1st	STD	mm (in)	0.10 – 0.25 (0.004 – 0.010)
		Limit	mm (in)	0.70 (0.028)
	2nd	STD	mm (in)	0.25 – 0.40 (0.010 – 0.016)
		Limit	mm (in)	1.00 (0.039)
Piston ring free end gap	1st	STD	mm (in)	Approx. 7.5 (0.30)
		Limit	mm (in)	6.0 (0.24)
	2nd	STD	mm (in)	Approx. 11.0 (0.43)
		Limit	mm (in)	8.8 (0.35)
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)	1.01 – 1.03 (0.040 – 0.041)
	2nd	STD	mm (in)	1.01 – 1.03 (0.040 – 0.041)
	Oil	STD	mm (in)	2.01 – 2.03 (0.079 – 0.080)
Piston ring thickness	1st	STD	mm (in)	0.97 – 0.99 (0.038 – 0.039)
	2nd	STD	mm (in)	0.97 – 0.99 (0.038 – 0.039)
Pin clearance in piston pin hole		STD	mm (in)	0.006 – 0.018 (0.0002 – 0.0007)
		Limit	mm (in)	0.040 (0.0016)
Piston pin outside diameter		STD	mm (in)	17.996 – 18.000 (0.7085 – 0.7087)
		Limit	mm (in)	17.980 (0.7079)
Piston pin hole diameter		STD	mm (in)	18.006 – 18.014 (0.7089 – 0.7092)
		Limit	mm (in)	18.040 (0.7102)
Pin clearance in conrod small end		STD	mm (in)	0.003 – 0.015 (0.0001 – 0.0006)
		Limit	mm (in)	0.050 (0.0020)
Conrod small end bore		STD	mm (in)	18.003 – 18.011 (0.7088 – 0.7091)

Item		Unit	Data	
			DF40T/40QH	DF50T/50TH/50WT/50WQH

CRANKSHAFT/CONROD

Conrod small end inside diameter	STD	mm (in)	18.003 – 18.011 (0.7088 – 0.7091)
Conrod big end oil clearance	STD	mm (in)	0.020 – 0.040 (0.0008 – 0.0016)
	Limit	mm (in)	0.065 (0.0026)
Conrod big end inside diameter	STD	mm (in)	41.000 – 41.018 (1.6142 – 1.6149)
Crank pin outside diameter	STD	mm (in)	37.982 – 38.000 (1.4954 – 1.4961)
Crank pin outside diameter difference (out-of-round and taper)	Limit	mm (in)	0.010 (0.0004)
Conrod bearing thickness	STD	mm (in)	1.486 – 1.502 (0.0585 – 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		0.065 (0.0026)
Crankcase bearing holder inside diameter	STD	mm (in)	49.000 – 49.018 (1.9291 – 1.9298)
Crankshaft journal outside diameter	STD	mm (in)	44.982 – 45.000 (1.7709 – 1.7717)
Crankshaft journal outside diameter difference (out-of- round and taper)	Limit	mm (in)	0.010 (0.0004)
Crankshaft bearing thickness	STD	mm (in)	1.999 – 2.015 (0.0787 – 0.0793)
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)	2.470 – 2.520 (0.0972 – 0.0992)

Item	Unit	Data	
		DF40T/40QH	DF50T/50TH/50WT/50WQH

LOWER UNIT

Design specification thickness for shim & washer

Pinion gear back-up shim	mm (in)	1.0 (0.04)
Forward gear back-up shim	mm (in)	1.0 (0.04)
Forward gear thrust washer	mm (in)	2.0 (0.08)
Reverse gear thrust washer	mm (in)	2.0 (0.08)
Reverse gear back-up shim	mm (in)	1.0 (0.04)

ELECTRICAL

Ignition timing	Except E01	Degrees	ATDC 1 – BTDC 27	ATDC 1 – BTDC 24
	E01	Degrees	ATDC 1 – BTDC 19	ATDC 1 – BTDC 23
Over revolution limiter	Except E01	r/min	6500	6700
	E01	r/min	6800	
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	kΩ at 20 °C	8.1 – 11.1	
Battery charge coil resistance		Ω at 20 °C	0.56 – 0.84	
Battery charge coil output (12 V)		Watt	216	
Standard spark plug	Type	NGK	DCPR6E	
	Gap	mm (in)	0.8 – 0.9 (0.031 – 0.035)	
Fuse amp. rating		A	Main fuse: 30	
Recommended battery capacity (12 V)		Ah (kC)	70 (252) or larger	
Fuel injector resistance		Ω at 20 °C	11.0 – 16.5	
IAC valve resistance		Ω at 20 °C	21.5 – 32.3	
IAT sensor/Cylinder temp. sensor /Ex-mani. temp. sensor (Thermistor characteristic)		kΩ at 25 °C	1.8 – 2.3	
ECM main relay resistance		Ω at 20 °C	145 – 190	
Starter motor relay resistance		Ω at 20 °C	145 – 190	
PTT motor relay resistance		Ω at 20 °C	25 – 37	

Item		Unit	Data	
			DF40T/40QH	DF50T/50TH/50WT/50WQH

STARTER MOTOR

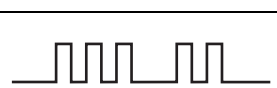
Max. continuous time of use		Sec	30
Motor output		kW	1.4
Brush length	STD	mm (in)	15.5 (0.61)
	Limit	mm (in)	9.5 (0.37)
Commutator undercut	STD	mm (in)	0.5 – 0.8 (0.02 – 0.03)
	Limit	mm (in)	0.2 (0.01)
Commutator outside diameter	STD	mm (in)	29.0 (1.14)
	Limit	mm (in)	28.0 (1.10)
Commutator outside diameter difference	STD	mm (in)	0.05 (0.002)
	Limit	mm (in)	0.40 (0.016)
Pinion to ring gear gap	STD	mm (in)	3.0 – 5.0 (0.12 – 0.20)

PTT MOTOR

Brush length	STD	mm (in)	9.8 (0.39)
	Limit	mm (in)	4.8 (0.19)
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		YES
2	CKP sensor	4 - 2		YES
3	IAC valve/By-pass air screw adjustment	3 - 1		NO
4	CMP sensor	2 - 4		YES
5	CTP switch	2 - 2		NO
6	Cylinder temp. sensor	1 - 4		YES
7	IAT sensor	2 - 3		YES
8	MAP sensor 2 (Sensor hose)	3 - 2		NO
9	Rectifier & regulator (Over-charging)	1 - 1		NO
10	Exhaust manifold temp. sensor	1 - 5		YES
11	Fuel injector (Open circuit)	4 - 3		NO

NOTE:

- *If more than two items fail at once, the self-diagnostic indication appears according to priority order. The indication repeats three times.*
- *On the tiller handle (QH and TH) model, alerts is signaled by a sound from the caution buzzer contained in the tiller handle.*