Service Manual

F115/FL115

Suzhou Parsun Power Machine Co., Ltd.

Preface

This Manual includes the maintenance instruction for F115 and FL115 outboard motors, which is provided by Parsun to dealers for use in maintaining and repairing Parsun outboard motors. Please read this Manual carefully before maintaining and servicing the outboard motors. When repairing and maintaining the outboard motors, please use the maintenance procedures and tools recommended in the Manual.

If you choose other maintenance procedures and tools, please follow the instructions of experienced maintenance personnel to avoid injuries to personnel and the outboard motor.

The materials, drawings and technical parameters used in this Manual are based on the prototype at the time of publication, so there may be some small differences between the actual motor you purchased and that described in the Manual; If necessary, our Company will distribute the revised part to the dealers in various places.

When the following characters appear in this Manual, please read the Manual carefully and execute the relevant instructions and descriptions correctly and carefully.

⚠ **Warning:**

Failure to comply with the warnings may lead to injury to maintenance personnel and bystanders, and severe cases may result in death.

Note:

"Note" means that preventive measures must be taken to avoid damage to the outboard motor.

Note:

Key information are provided to make your operation steps simpler and clearer.

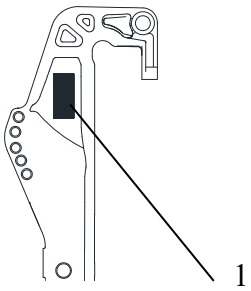
The last part of this Manual describes the common faults and troubleshooting methods of the outboard motor. Please read it carefully; When overhauling the outboard motor, it can help you quickly judge the status of the motor and improve working efficiency.

Contents

Overview

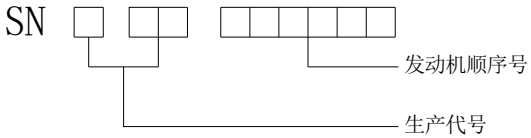
Identification mark

The serial number is printed on a label which is pasted on the port side of the clamp bracket or the upper part of the rotary bracket. The serial number is recorded in the blank of the label to help you order spare parts from dealers or for your reference in case the engine is stolen.



1. Position of the serial number

The numbers are expressed as follows:



Selection of propeller

The performance of the outboard motor is seriously affected by the propeller. Improper selection will have adverse effects on the motor. When the ship runs in full load, the motor will operate at low speed for a long time. At this time, the propeller with smaller pitch should be selected, whereas the propeller with larger pitch should be selected to maintain the normal operation of the engine.

When the engine is running at full throttle, the most suitable propeller for the ship is to refer to the engine speed and fuel performance, which can provide the highest performance.

Propeller dimensions	Material
3-14"×11"	Aluminum alloy
3-13 5/8"×13"	Aluminum alloy
3-13 5/8"×14"	Aluminum alloy
3-13 1/2"×15"	Aluminum alloy
3-13 1/4"×17"	Aluminum alloy
3-13"×19"	Aluminum alloy
3-12 5/8"×21"	Aluminum alloy
3-13"×23"	Aluminum alloy
3-13"×25"	Aluminum alloy
3-13 1/2"×14"	Stainless steel

Continued:

Propeller dimensions	Material
3-13 1/2" ×16"	Stainless steel
3-13"×17"	Stainless steel
3-13"×19"	Stainless steel
3-13"×21"	Stainless steel
3-13"×23"	Stainless steel
3-13"×25"	Stainless steel
3-13 1/2" ×17"	Stainless steel
3-13 1/2" ×19"	Stainless steel
3-13 1/2" ×21"	Stainless steel
3-12 1/2" ×23"	Stainless steel
3-13"×17"	Stainless steel
3-13"×17"	Stainless steel

Backward-rotating propeller:

Propeller dimensions	Material
3-13"×17"	Stainless steel
3-13"×19"	Stainless steel
3-13"×21"	Stainless steel

Note:

Backward-rotating outboard motor must use backward-rotating propeller, otherwise the vessel will not advance in the desired direction, which is likely to cause accidents!

Protection at work

In order to prevent danger or accident during maintenance and improve work quality, please observe the following safety regulations.

1. Fire prevention

   Gasoline and various lubricating oils and greases are easy to burn; Keep away from heat sources, sparks and open flames during operation.

2. Ventilation

   Gasoline vapor and engine exhaust gas are highly toxic. Massive inhalation of such substances can cause shock and even death. When testing the engine indoors, please keep good ventilation conditions.

3. Self-protection

   Wear protective glasses when drilling, grinding or using air compressors. Wear

protective gloves and safety shoes when necessary.

4. Use of lubricants and sealants

Only products provided or recommended by Parsun can be used when maintaining and repairing the outboard motor.

Under normal circumstances, the lubricant mentioned in this Manual will not damage your skin. However, please take protective measures before use to reduce risks.

① Apply protective cream on both hands before overhauling the outboard motor;

② Replace and clean the clothes as soon as possible after they are contaminated by the lubricant;

③ Avoid skin contact;

④ Wash your hands and skin carefully with soap and hot water after contact with the lubricant;

⑤ Wipe the spilled grease with a clean, lint-free rag.

5. Develop good work habits

① Tighten nuts, bolts and screws according to the specified torque from large size to small size, from the center to the outside.

② Use recommended special tools to avoid damage to parts. Use the right tools in the proper way.

Disassembly and assembly

When disassembling and assembling the outboard motor, please follow the following principles:

1. Please use special tools when disassembling and assembling the parts of the outboard motor;
2. Remove dust and dirt before decomposing the parts;
3. Apply engine oil on the contact surface of moving parts before assembly;
4. When installing the bearing, place the manufacturer's mark in the specified direction and fully lubricate it;
5. Before installation, coat a thin layer of waterproof lubricating oil on the protruding part and periphery of the oil seal;
6. After assembly, check whether the moving parts work normally.
7.

Disposable parts

Parts such as gasket, oil seal, O-ring, cotter pin and spring ring are disposable parts, and they must be replaced before reinstalling the outboard motor.

Pre-delivery inspection

To ensure the normal use by customers, please carry out the following inspection before delivery.

1. Check the fuel system.

Check whether the fuel hose is securely connected and whether the fuel tank is full.

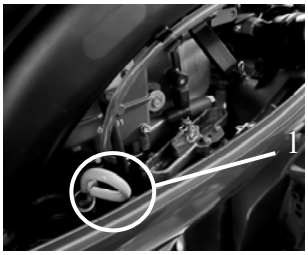
Note:

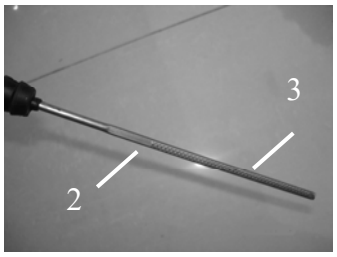
As it is a four-stroke engine, premixed fuel cannot be used.

2. Check the oil level.
3.

① Check engine oil level.

Pull out the oil dipstick and observe the oil level through the dipstick.





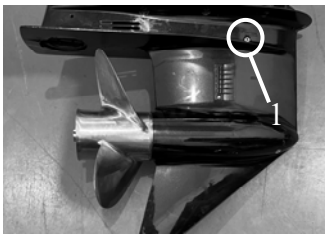
1. Oil dipstick 2. High mark 3. Low mark

Make sure the oil level is between the high mark and the low mark; Drain oil when the oil level is above the high mark and add oil when the oil level is below the low mark.

②Check gear oil level

Unscrew the oil level plug and observe whether the oil overflows in the oil level plug.

If yes, install the oil level plug and tighten it according to the specified torque; If not, fill it with oil.



1. Oil level plug

3. Check the steering system.

Check whether the steering is smooth;

Check whether the steering friction is adjusted correctly.

Turn the locking bolt clockwise to increase the resistance.

Turn the locking bolt counterclockwise to reduce the resistance.

4. Check shift and throttle operation.

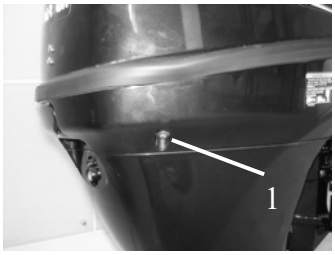
Check whether the shift operation is smooth; Check whether the throttle grip operates smoothly from the full-close position to the full-open position.

5. Check the emergency stop switch assembly.

Check whether the engine stops when the emergency stop switch assembly is pressed and hold or the engine stop safety line is pulled out.

6. Check the cooling water peep door.

When the engine is running, check whether the cooling water flows out of the cooling water observation hole.



1. Cooling water observation hole

7. Running-in operation.

①1st hour: The engine runs at 2000 rpm or about half of the throttle.

②2nd hour: Run the engine at 3000 rpm or about 3/4 of the throttle.

③The next 8 hours: Avoid running at full throttle for 5 minutes continuously.

8. Inspection after running-in operation

①Check the gear oil for water.

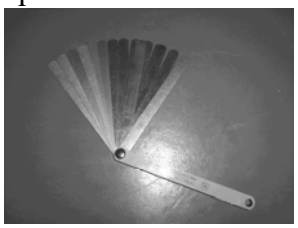
②Check the fuel line for leaks.

③After running-in operation, run the engine at idle speed and use the washing tool to flush the cooling water channel with fresh water.

Special tools and testing equipment

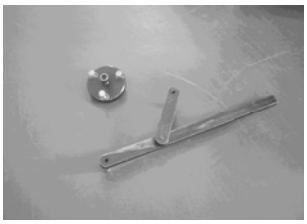
Various special tools and testing equipment will be used when repairing and maintaining the outboard motor. Using these tools and equipment expertly and correctly can improve your work efficiency and effectively avoid injuries to personnel and the outboard motor.

Special tools:



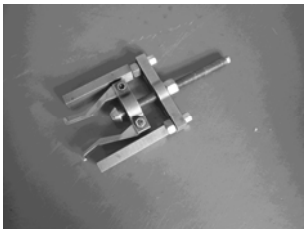
Clearance gauge

Piston slideway



Flywheel gripper and flywheel puller

Oil filter spanner



Bearing puller underwater unit housing cover

Needle bearing installation tool

Underwater unit housing cover bearing installation tool

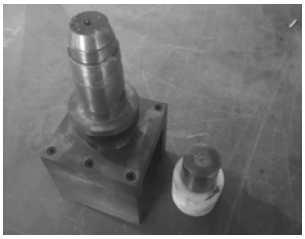
Underwater unit housing cover oil seal installation tool

Underwater unit needle bearing installation tool

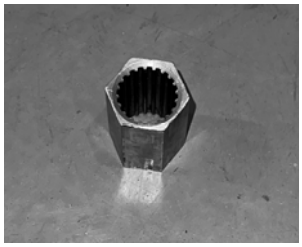
Drive shaft bearing jacket installation tool

Drive shaft bearing installation tool

Drive shaft seal oil seal installation kit



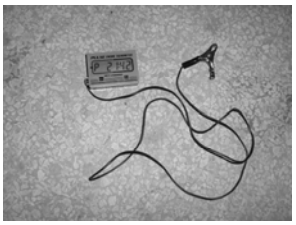
Forward gear bearing casing installation kit



Drive shaft spline sleeve

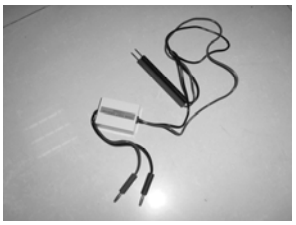
pinion nut spanner

Testing equipment:



Digital tachometer

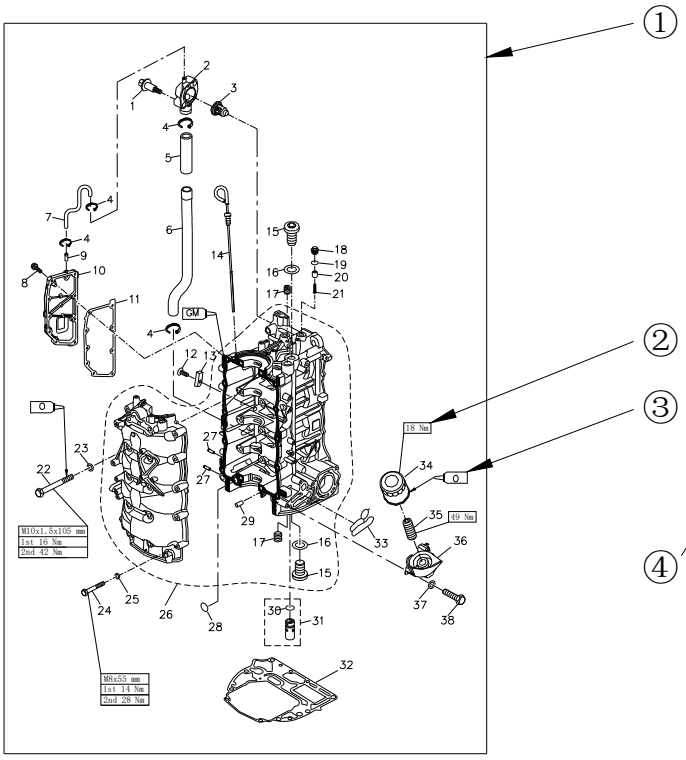
Digital multimeter



Peak voltage adapter

Disassembly schematic diagram and symbol description

Description of disassembly schematic diagram



SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY. 数量					REMARKS 备注
1	F115-00000004	节温器盖螺栓	BOLT, THERMOSTAT COVER	2					
2	F115-00000003	节温器盖	COVER, THERMOSTAT	1					
3	F115-00000002	节温器	THERMOSTAT	1					
4	HT5x200	尼龙扎带 5x200	CLAMP 5x200	4					
5	F115-00000007	水管护套 C(巨龙护套 25x220)	SHEATH C, WATER PIPE	1					
6	F115-00000005	进水管 C	WATER PIPE C	1					
7	F115-00000008	进水管 D	WATER PIPE D	1					
8	GB/T9074.14-M8x25	六角螺栓+垫圈合 M8x25	BOLT M8x25	9					
9	F4-04010102	出水嘴	WATER OUTLET	1					
10	F115-00000011	水道盖板	COVER, WATERCOURSE	1					
11	F115-00000010	水道盖板密封垫	GASKET, WATERCOURSE	1					
12	GB/T818.1-M8x20	十字槽沉头螺钉 M8x20	SCREW M8x20	1					
13	F115-00000029	水道盖板防锈	ANODE, WATERCOURSE	1					
14	F115-00000200	机油尺组件	OIL LEVEL ASSY	1					
15	F115-00010006	堵塞 M18x1.5	JAM M18x1.5	2					
16	F115-00010007	堵塞垫片	WASHER, JAM	2					
17	F25-00010004	堵塞 1/2"	JAM 1/2"	2					
18	F25-00020009	阳极螺栓	BOLT, ANODE	1					
19	GB/T3452.1-13x2	O 形圈 13x2	O-RING 13x2	1					
20	F4-04070003	节温器盖阳极	THERMOSTAT ANODE	1					
21	GB/T818-M5x25	十字槽盘头螺钉 M5x25	SCREW M5x25	1					
22	F115-00010004	六角螺栓 M10x1.5x105	BOLT M10x1.5x105	10					
23	GB/T97.1-10	平垫圈 10	WASHER 10	10					
24	F15-07000029	机体螺栓 M8x55	BOLT M8x55	10					
25	GB/T97.1-8	平垫圈 8	WASHER 8	10					
26	F115-00010000	机体机座组件	CRANKCASE ASSY	1					
27	F4-04010102A	气嘴	GAS NOZZLE	1					
28	GB/T3452.1-19.2x1.9	O 形圈 19.2x1.9	O-RING 19.2x1.9	1					
29	F115-00000006	定位销 φ6x12	DOWEL PIN φ6x12	10					
30	F115-00010204	溢流阀 O 形圈 14.0x2.2	O-RING 14.0x2.2, RELIEF	1					
31	F115-00010200	溢流阀组件	调节阀 VALVE ASSY	1					
32	F115-00000007	发动机密封垫	GASKET, ENGINE	1					
33	F115-00000026	机油滤清器密封圈	RING, OIL FILTER	1					
34	F15-07010023	机油滤清器	OIL FILTER	1					
35	F15-07010003	机座螺栓 M20x1.5x35	BOLT M20x1.5x35	1					
36	F115-00000025	机油滤清器支架	BRACKET, OIL FILTER	1					
37	GB/T97.1-6	平垫圈 6	WASHER 6	3					
38	GB/T5782-M6x40	六角螺栓 M6x40	BOLT M6x40	3					

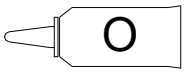
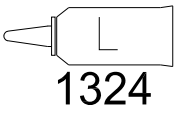
①Exploded view of parts.

②Thread specification and specified torque.

③Points where oil, sealant or locking agent are applied

④Parts list.

Symbol description

				
Apply engine oil	Apply waterproof grease	Apply thread locker 1277	Apply thread locker 1243	Apply sealant

Specification

Outboard motor parameters

Item			Data	Item		Data	
Overall dimensions	Full length		833 mm	Engine	Ignition system	TCI	
	Overall width		517 mm		Spark plug	LKR6E	
	Overall height	L-type	1672 mm				
		X-type	1799 mm		Exhaust system	Through the propeller hub	
	Stem board Height	L-type	510 mm		Lubrication system	Purging-type oil mist lubrication	
		X-type	637 mm	Fuel and oil	Fuel type	Regular unleaded petrol	
Weight	L-type		175kg		Fuel grade	PON86	
	X-type		179kg		Recommended engine oil grade	API: SE, SF, SG,SH, SJ SAE: 10W30, 10W40	
Performance	Maximum output		85Kw@5600r/min		Engine oil level	Total	3.8L
						Do not change the oil filter	3.0L
						Change the oil filter	3.2L
	Full throttle operating range		5300～6300 r/min		Recommended gear oil	Hypoid gear oil SAE # 90	
	Maximum fuel consumption		38.9L/h@5600 r/min		Gear oil level	Forward-rotating	0.760L
						Backward-rotating	0.715L
	Idle (neutral position)		800～900r/min	Bracket	Inclined rising angle (degree)	70	
Engine	Type		4-stroke, DOHC L4, 16 valves				
	Number of cylinders		4		Steering angle (degree)	35+35	
	Displacement		1832cm³	Drive Device	Gear	F-N-R	
	Cylinder bore × stroke		81.0mm×88.9mm		Transmission ratio	2.15	
	Compression ratio		10:1		Gear type	Spiral bevel gear	
	Minimum compression pressure		945kPa		Clutch type	Claw clutch	
	Lubricating oil pressure		440kPa (at idle speed)		Propeller shaft type	Spline	
					Propeller direction	Forward-rotating	Clockwise (rear view)
	Control system		Remote control/steering handle			Backward-rotating	Counterclockwise (rear view)
	Start-up system		Electric starting				

Maintenance information

Engine

Item			Data	Item			Data
Cylinder cover		Warping limit	0.1mm	Valve	Edge thickness	Intake valve	0.8~1.2mm
		Inner diameter of camshaft	25.000~25.021mm			Exhaust valve	1.0~1.4mm
		Camshaft oil clearance	0.020~0.061mm		Stem diameter	Intake valve	5.475~5.490mm
		Oil clearance limit	0.080mm			Exhaust valve	5.460~5.475mm
Cylinder block		Cylinder bore	81.00~81.012mm		Inner diameter of valve guide		5.504~5.522 mm
		Wear limit	81.061mm		Clearance between guide and valve stem	Intake valve	0.014~0.047mm
Piston		Diameter of piston	80.938~80.950mm			Exhaust valve	0.029~0.062mm
		Height of measuring point	14mm		Valve stem runout limit		0.01mm
		Piston to cylinder clearance	0.050~0.074mm	Valve spring	Free length		41.2mm
		Piston pin bore aperture	18.004~18.015		Minimum free length		39.14mm
Outside diameter of piston pin			17.991~18.000mm		Tilt limit		1.8mm
Piston ring	Top ring	Thickness	1.170~1.190mm	Connecting rod	Inner diameter of small end		18.005~18.018mm
		End face width	2.4~2.6mm		Inner diameter of large end		50.025~50.045mm
		End gap	0.15~0.30mm		Oil clearance of large end		0.017~0.040mm
		Lateral clearance	0.04~0.08mm		Thickness of big-end bearing bush	A Blue	1.499~1.504mm
	Second ring	Thickness	1.170~1.190mm			B Green	1.504~1.510mm
		End face width	2.60~2.80mm			C Red	1.510~1.516mm
		End gap	0.7~0.9mm	Crankshaft	Diameter of crankshaft journal		51.982~52.000mm
		Lateral clearance	0.03~0.07mm		Crank pin diameter		46.982~47.000mm
	Oil ring	Thickness	2.380~2.480mm		Crank pin width		21.00~21.1mm
		End face width	2.40mm		Large end backlash of crankshaft		0.15~0.30mm
		End gap	0.20~0.70mm	Thermostat	Open temperature		58~62ºC
		Lateral clearance	0.03~0.15mm		Full open temperature		70ºC

Camshaft	Height	Intake cam	41.011~41.111mm		Valve opening height		4.3mm
		Exhaust cam	41.27~41.37mm	Fuel pump	Displacement		1832L
	Diameter of base circle		32.950～33.050mm		Pressure		196kPa
	Journal diameter		24.96~24.98mm	Crankcase	Crankshaft journal oil clearance		0.014~0.050mm
	Runout limit		0.03mm		Thickness of crankshaft main journal bearing bush	A Blue	2.492~2.497mm
Oil pump	Clearance between outer rotor and shell		0.03~0.12mm			B Green	2.497~2.503mm
	Clearance between outer rotor and inner rotor		0.12~0.16mm			C Red	2.503~2.509mm
	Clearance between rotor and cover		0.03~0.12mm				
Valve	Valve clearance (Cold-state)	Intake valve	0.17~0.24mm				
		Exhaust valve	0.31~0.38mm				
	Contact width with seat ring	Intake valve	1.1~1.5mm				
		Exhaust valve					

Underwater unit

Item			Data	Item		Data
Backlash	Drive gear to forward gear	Forward-rotating	0.15~0.87mm	Backlash	Forward gear shim	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50mm
		Backward-rotating	0.13~0.87mm			
	Drive gear to reverse gear	Forward-rotating	0.74~1.56mm		Reverse gear shim	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50mm
		Backward-rotating	0.75~1.56mm			
	Drive gear shim		0.10,0.12,0.15, 0.18, 0.30, 0.40, 0.50mm			

Electrical system

<table>
<tr><th colspan="2">Item</th><th>Data</th><th colspan="2">Item</th><th>Data</th></tr>
<tr><td colspan="2" rowspan="2">Spark plug clearance</td><td rowspan="2">0.8~0.9mm</td><td colspan="2">Trigger coil resistance*</td><td>290±20% Ω</td></tr>
<tr><td rowspan="3">Ignition coil</td><td>Secondary output voltage</td><td>≥34KV</td></tr>
<tr><td rowspan="3">Output voltage of rectifier regulator</td><td rowspan="2">1500 r/min (Load)</td><td rowspan="2">14.5V</td><td>Primary resistance</td><td>2.2±0.22Ω</td></tr>
<tr><td rowspan="3">Peak output voltage of magneto</td><td>Secondary resistance</td><td>9.84±0.98KΩ</td></tr>
<tr><td rowspan="2">3500 r/min (Load)</td><td rowspan="2">14.5V</td><td>1500 r/min (no-load)</td><td>53V</td></tr>
<tr><td colspan="2">Magneto resistance (green-green)</td><td>0.2Ω～0.3Ω</td><td>3500 r/min (no-load)</td><td>115V</td></tr>
<tr><td colspan="3"></td><td>Peak voltage of trigger coil</td><td>1000 r/min</td><td>≥13V</td></tr>
</table>

* Data for reference only

Seating torque

Specified torque

Mounting position			Name	Specification	Quantity	Torque
Engine	Fixed engine		Bolt	M10X1.25X140	4	42 Nm
				M10X1.25X45	2	42 Nm
				M8X35	4	20 Nm
	Upper shock absorber		Bolt	M14X195	2	74 Nm
	Intake manifold bracket		Bolt	M8X35	2	24 Nm
	Intake manifold		Bolt	M8X35	9	32 Nm
	Spark plug		-	M12X1.25	4	25 Nm
	Coil-on-plug		Bolt	M6X25	4	7 Nm
	Driven pulley		Bolt	M10X1.25X35	2	60 Nm
	Timing belt tensioner assembly		Bolt	M10X1.25	1	39 Nm
	Oil filter stud		-	M20	1	49 Nm
	Oil filter		-	M20	1	18 Nm
	Oil pressure sensor		-	M10	1	9 Nm
	Container body	1st	Bolt	M10X1.5X105	10	16 Nm
		2nd				42 Nm
		1st	Bolt	M8X55	10	14 Nm
		2nd				28 Nm
	Connecting rod	1st	Bolt	M8X1X36	8	13 Nm
		2nd				35 Nm
	Cylinder head	1st	Bolt	M10X1.5X110	10	15 Nm
		2nd				30 Nm
		3rd				80 Nm
	Camshaft cover A	1st	Bolt	M7X48	4	6 Nm
		2nd				13 Nm
	Camshaft cover B	1st	Bolt	M7X37	16	6 Nm
		2nd				13 Nm
	Flywheel	1st	Bolt	M10X1X50	6	50 Nm
		2nd				105 Nm
	Exhaust pipe A	1st	Bolt	M8X70	4	14 Nm
		2nd				21 Nm
	Exhaust pipe B	1st	Bolt	M8X70	2	14 Nm
		2nd				21 Nm
		1st	Bolt	M8X100	2	14 Nm
		2nd				21 Nm
	Temperature sensor		Bolt	M14X1.5	1	23 Nm
	Knock sensor		Bolt	M8	1	18 Nm
	Limber board		Bolt	M6X25	9	12 Nm
	Motor bracket		Bolt	M8X30	3	25 Nm
	Start motor		Bolt	M8X45	3	33 Nm

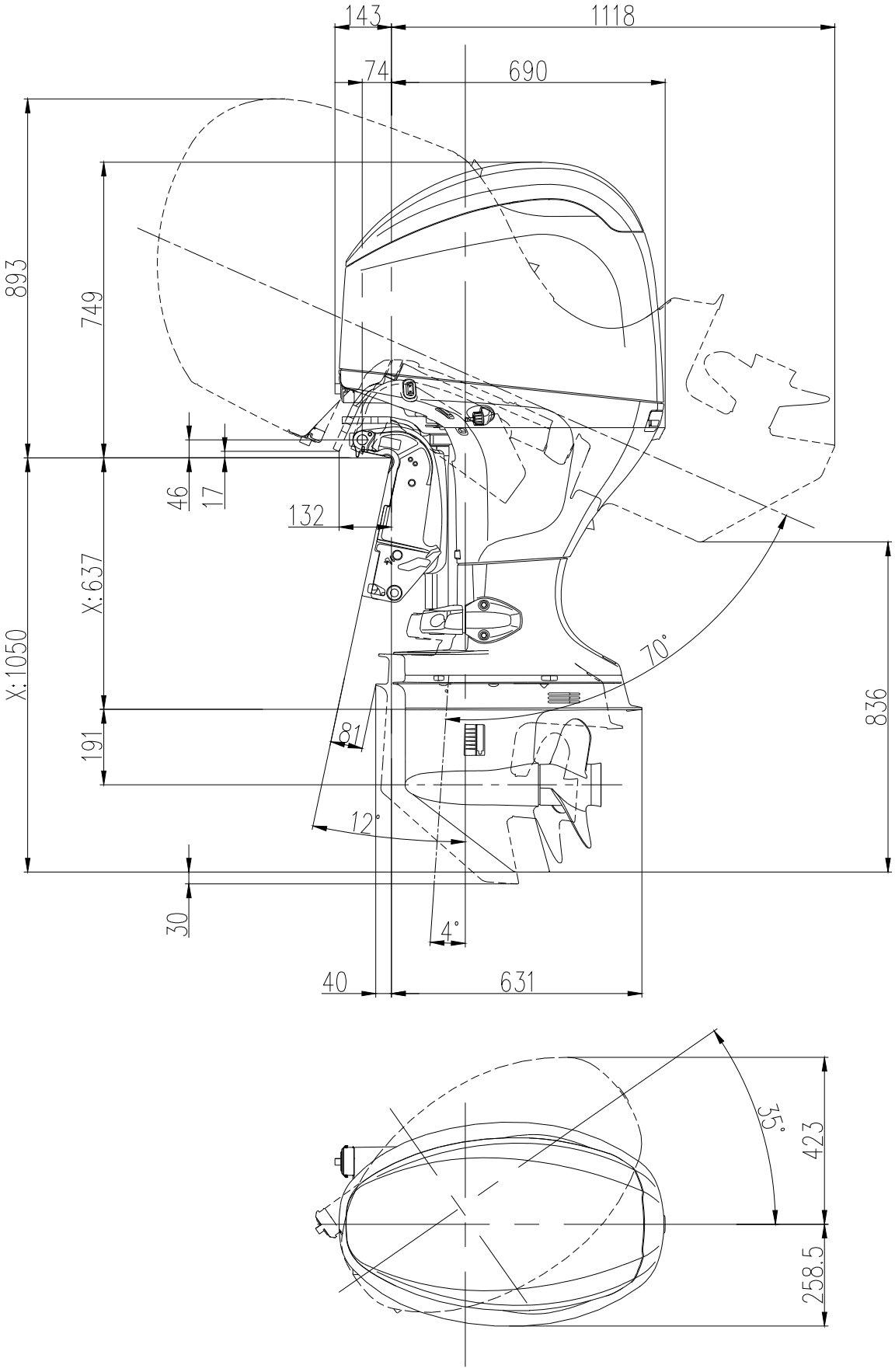
Mounting position		Name	Specification	Quantity	Torque
Underwater unit	Drive bearing house	Bolt	M8x25	4	18 Nm
	Cover nut	-	M102x2	1	103Nm
	Pinion	Nut	M16X1.5		90 Nm
	Propeller nut	Nut	M18X1.5	1	55 Nm
	Course tab	Bolt	M10X1.25X45	1	42 Nm
About water	Upper shock absorber	Nut	M14	2	74 Nm
	Lower shock absorber	Nut	M14	2	74 Nm
	Oil pan exhaust manifold	Bolt	M10X1.25X45	6	42 Nm
	Clamp bracket double nipples	Nut	7/8-14UNF	2	22 Nm
	Oil drain bolt	Bolt	M14X1.5	1	27 Nm
	Coarse filter	Bolt	M6X24	3	12 Nm
	Steering bracket	Double-end bolt	M10X1.25X28	2	20 Nm
		Nut	M10X1.25X28	2	40 Nm

Average torque

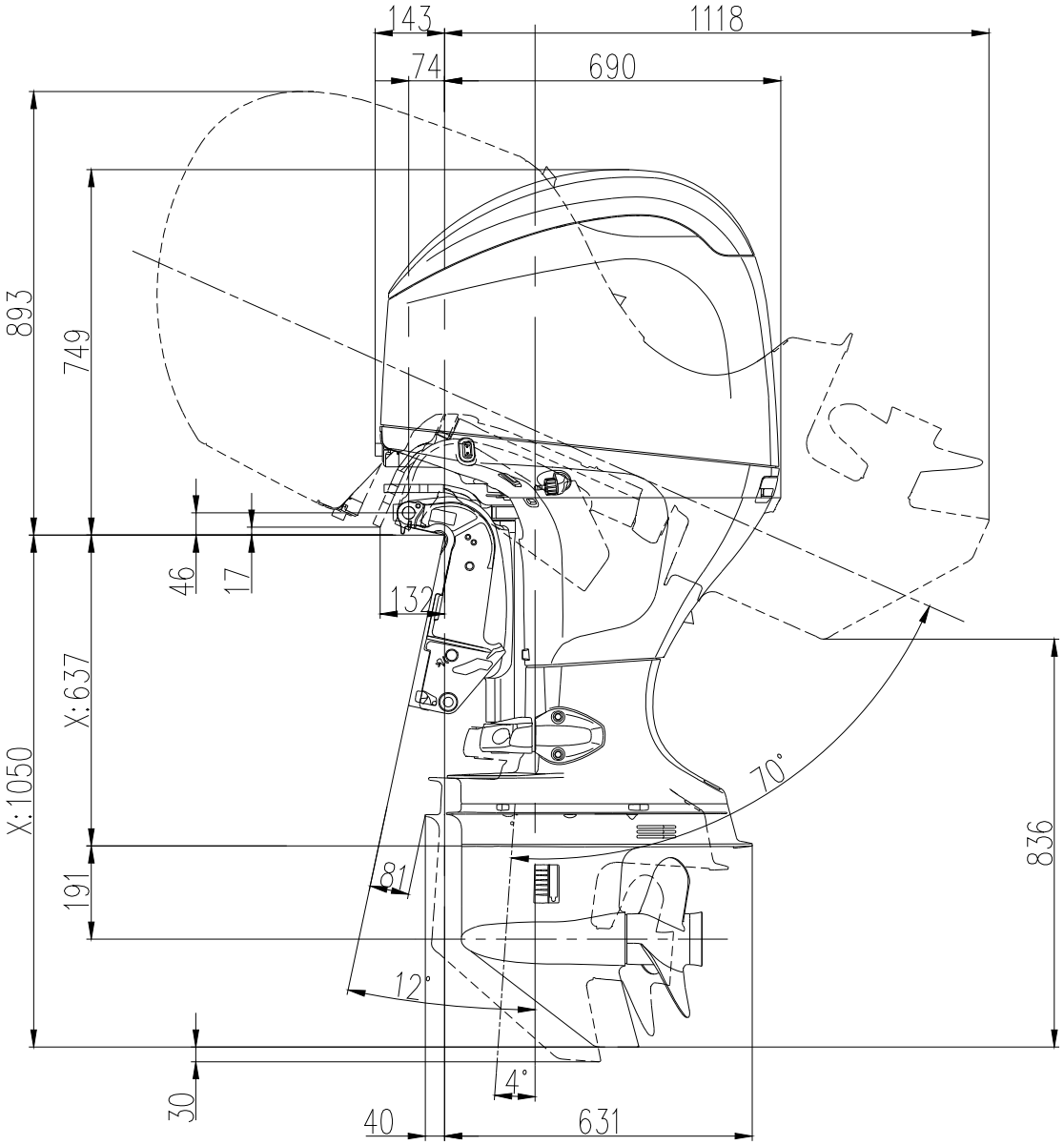
Nut a	Bolt b	Torque
8mm	M5	5 Nm
10mm	M6	8 Nm
12mm	M8	18 Nm
14mm	M10	36 Nm
17mm	M12	43 Nm

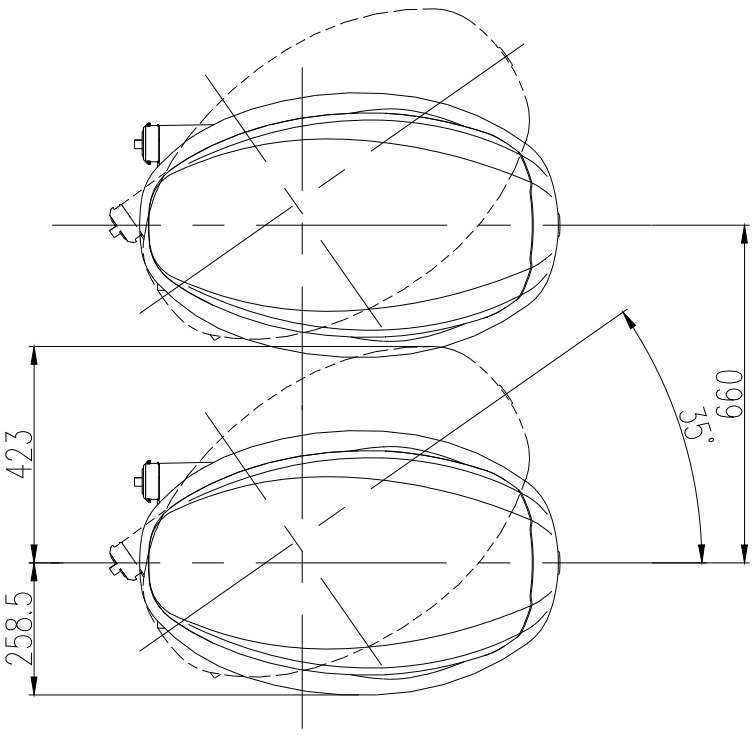
Overall dimensions

X-type:

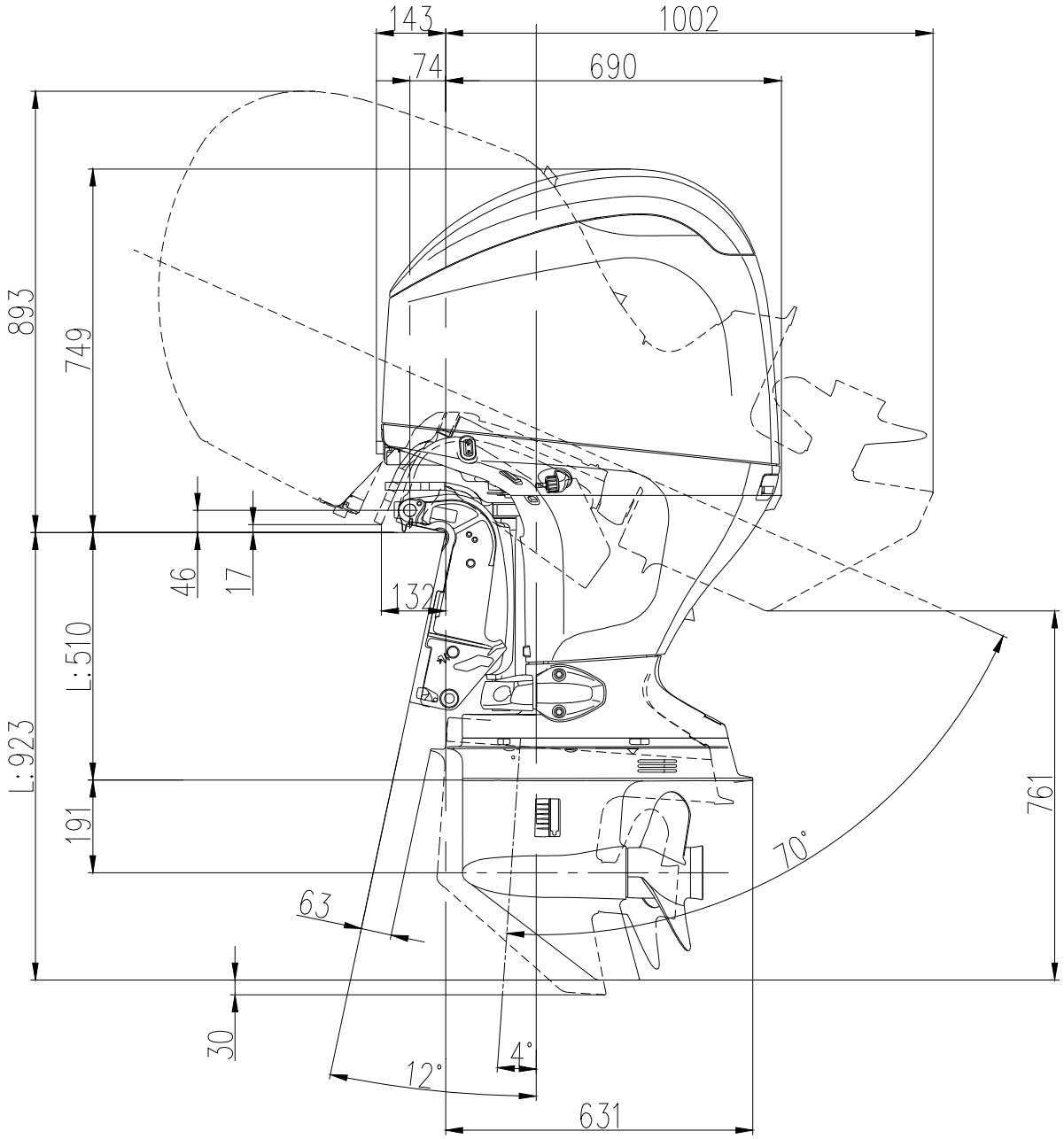


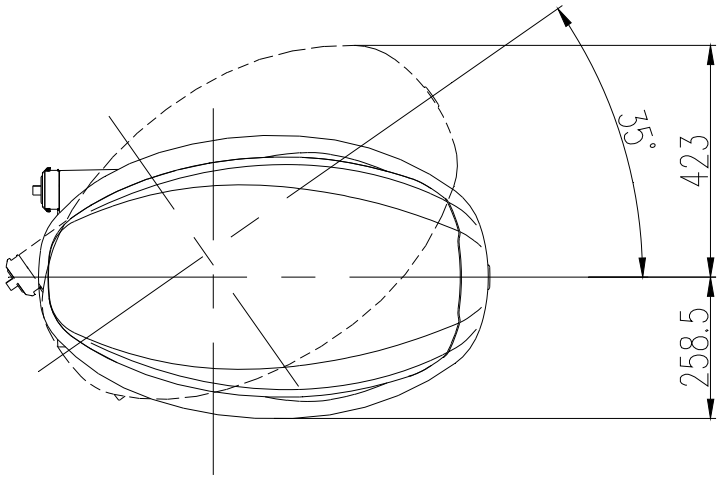
X-type two-engine:


143
1118
74
690
893
749
46
17
132
X:637
X:1050
70°
836
81
191
12°
4°
30
40
631

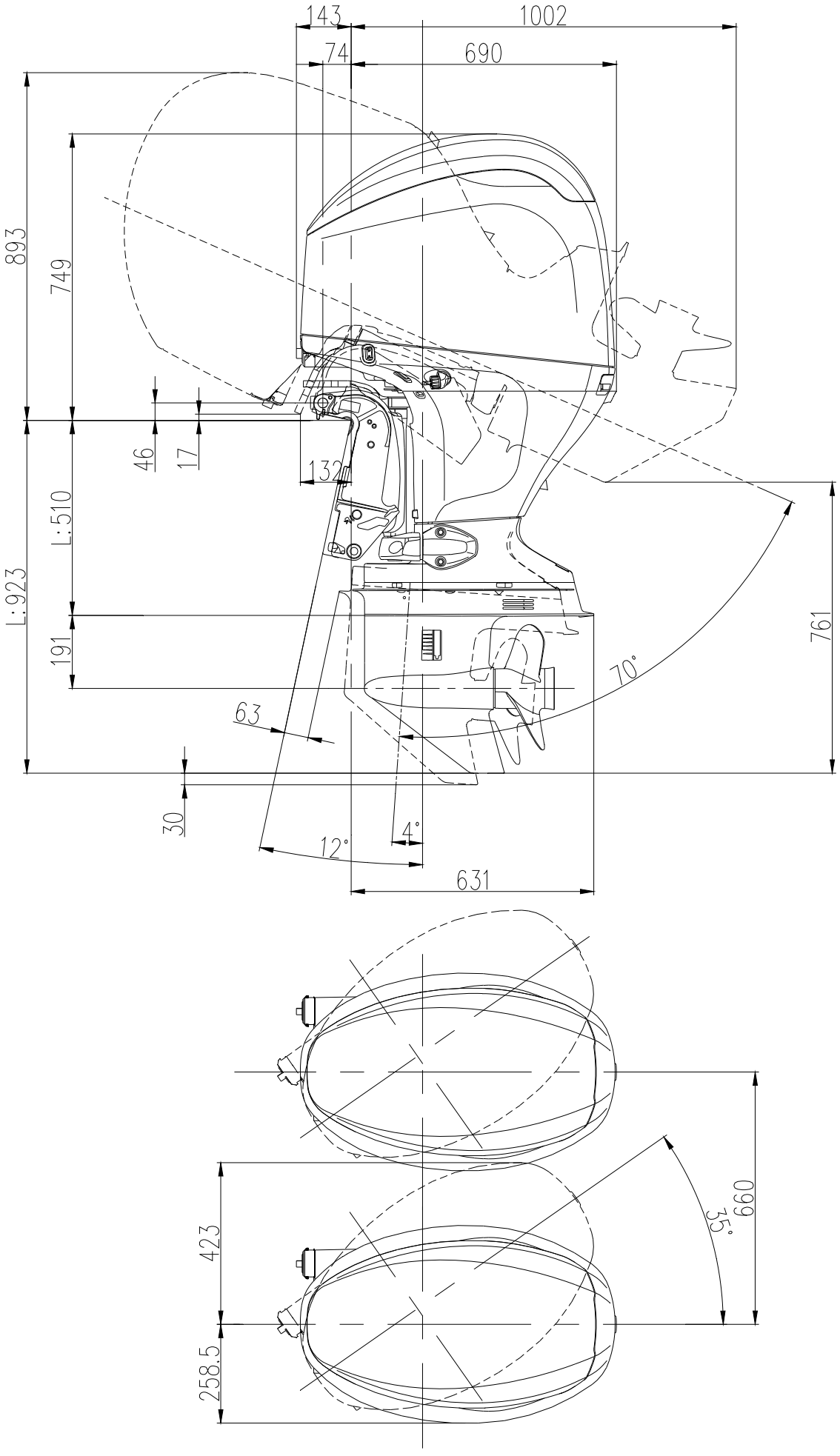

660
35°
423
258.5

L-type:

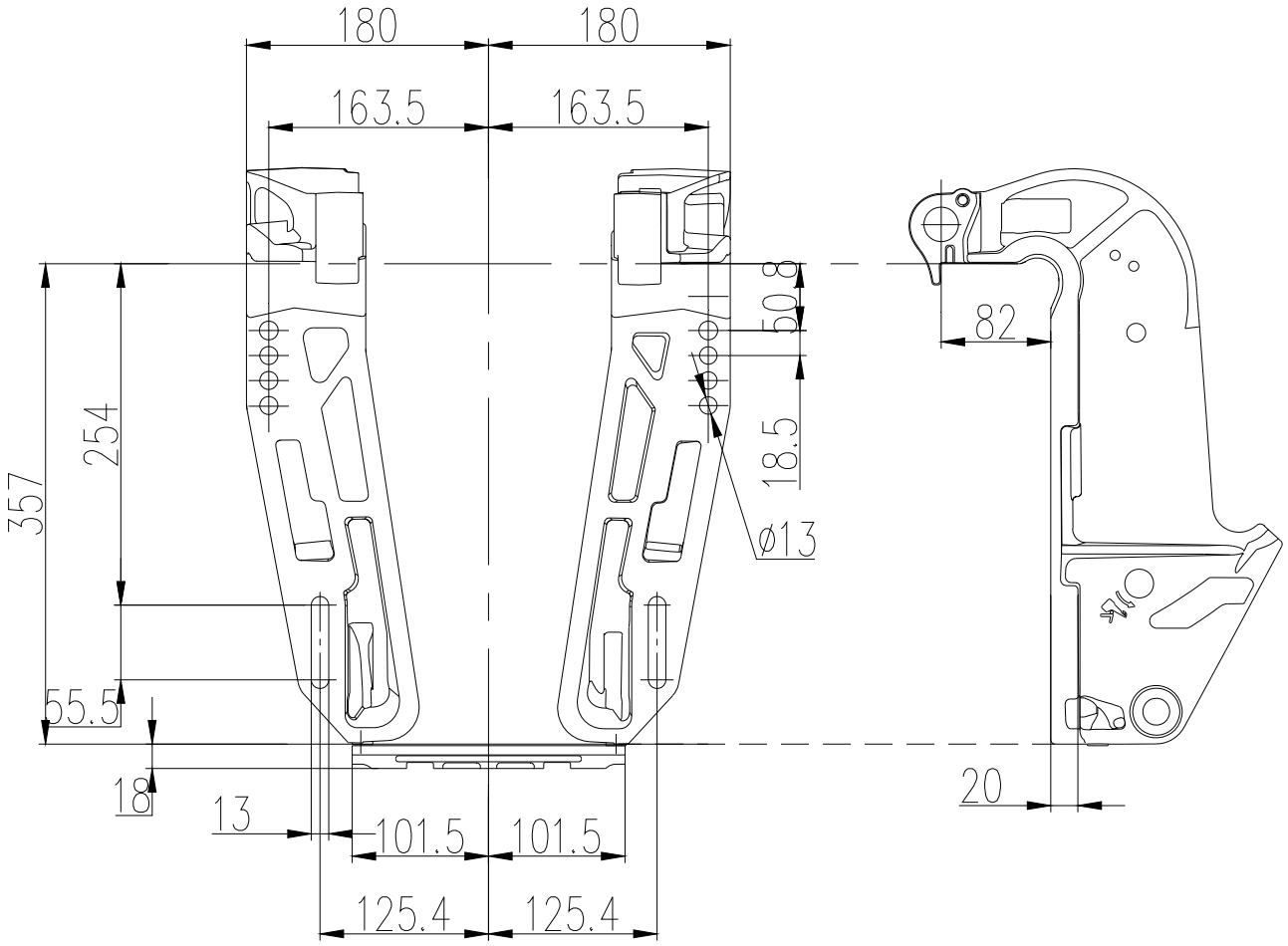




L-type two-engine:



Mounting dimensions:


180
180
163.5
163.5
50.8
18.5
Ø13
82
357
254
55.5
18
13
101.5
101.5
125.4
125.4
20

Basic maintenance

Maintenance Interval Chart

The outboard motor should be maintained regularly, operated in normal environment and maintained correctly, which can effectively prolong the service life of the outboard motor.

The following table gives the general principles of the maintenance intervals, which can be adjusted according to the operating conditions.

"●"refers to the work that can be done by the user.

"○"refers to the work that should be done by the distributor.

Item	Operation	Initial	Interval		
		20 hours (3 months)	100 hours (1 year)	300 hours (3 years)	500 hours (5 years)
Anode (external)	Check/replace		●/○		
Anode (internal)*	Check/replace		○		
Anode (internal)**	Replace				○
Battery (electrolyte, terminal)	Check	●/○	●/○		
Cooling water channel	Clean		○	○	
Top cover clamp handle	Check		●/○		
Engine startup	Check	●/○	●/○		
Engine idle speed	Check	●/○	●/○		
Engine noise	Check	●/○	●/○		
Engine oil	Replace	●/○	●/○		
Oil filter	Replace		●/○		
Fuel filter (decomposable)	Check/clean/replace	●/○	●/○		
Fuel line	Check	●	●		
Fuel line	Replace	○	○		
Fuel pump	Check/replace			○	
Fuel/oil leakage	Check			○	
Gear oil	Replace	●/○	●/○		
Lubricating oil refueling point	Add lubricating oil	●/○	●/○		
Water pump	Check		○		
Water pump impeller/inner shell	Replace			○	
Hydraulic warping device	Check	●/○	●/○		
Propeller/slotted nut/cotter pin	Check/replace	●/○	●/○		
Overflow valve	Check/replace		○		
Shift linkage/shift cable	Check/adjust	○	○		
Thermostat	Check		○		
Spark plug cap/high-tension cable	Check/replace	○	○		
Spark plug	Clean/adjust/replace		●/○		
Throttle linkage/throttle cable	Check/adjust/replace				○
Cooling water observation hole	Check	●/○	●/○		
Cooling water inlet	Check	●/○	●/○		

Main switch/engine stop switch	Check/replace	○	○		
Timing belt	Check/replace		○		
Valve clearance	Check/adjust				○
Electrical circuit	Check/replace	○	○		
Ignition coils and wire	Check/replace	○	○		

Note:

*Cylinder head anode; **Anode at engine body, cooling water channel, exhaust pipe and exhaust manifold.

Flush the outboard motor with fresh water immediately after running in salt water, sewage or muddy water.

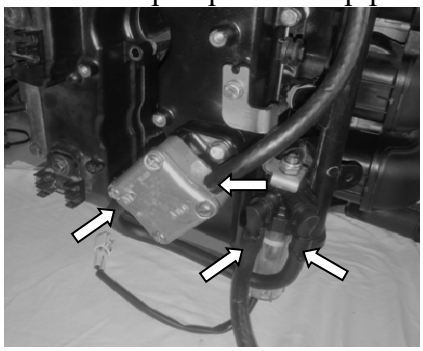
If leaded gasoline is used frequently, check the valve and related parts every 100 hours.

Check the exhaust manifold and exhaust pipe every 1000 hours; Replace them if necessary.

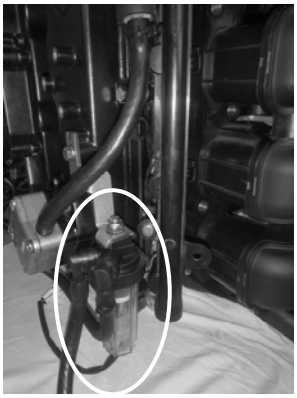
Change the timing belt every 1000 hours.

Fuel system

1. Check the fuel pump and fuel pipe.
   Check the fuel pump and fuel pipe for leakage or damage, and replace them if necessary.



2. Check the fuel filter.
   Check whether the fuel filter is cracked or damaged, and check whether there is dirt in the fuel filter.
   If yes, replace the fuel filter.



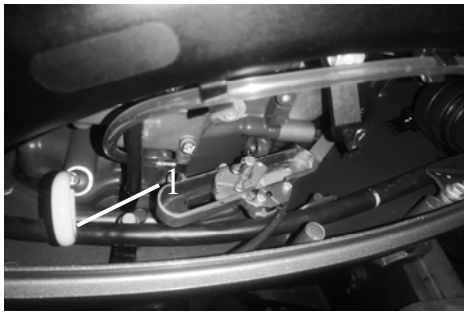
Note:

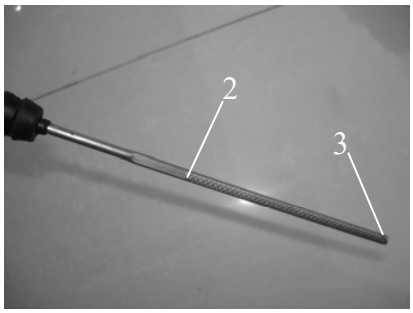
Wipe off the spilled fuel.

Engine

Engine oil level

1. Remove the oil dipstick and check whether the oil level is between the upper and lower marks of the oil dipstick;





1. Oil dipstick 2. High mark 3. Low mark

2. If the oil level is above the high mark, discharge the engine oil; If the oil level is below the low mark, add engine oil.

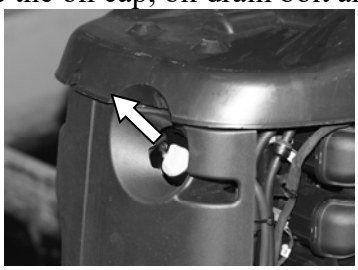
Note:

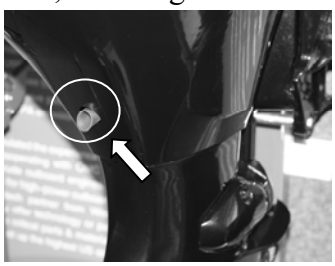
Run and then turn off the engine, and let it stand for several minutes; Check the oil level with the oil dipstick again.

If the oil level is not within the specified range, add/discharge the oil to the specified value.

Change engine oil

1. Remove the oil cap, oil drain bolt and bolt gasket; Discharge the oil.





2. Install new bolt gasket and install oil drain bolt.

3. Add engine oil through the oil port.
   Engine oil level: 3.0 L (oil filter not changed)
   3.2 L (oil filter changed)
   Oil type: API: SG, SH, SJ, SL or SAE: 10W30, 10W40, 5W30
4. Install oil cap.

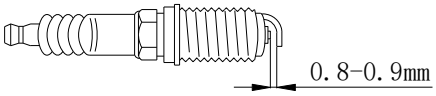
5. Check the oil level.
   Note:
   Before starting the outboard motor for the first time, make sure to fill the engine oil. Otherwise, the engine will be severely damaged.

Spark plug

1. Remove the spark plug cap and then remove the spark plug.

2. Remove carbon deposits from the spark plug electrodes.

3. Check whether the electrodes are corroded, whether there are deposits and whether the gaskets are damaged. If necessary, change the spark plug.
   Spark plug model: NGK LKR6E
4. Check whether the electrode gap meets the specified value; If necessary, replace the spark plug.



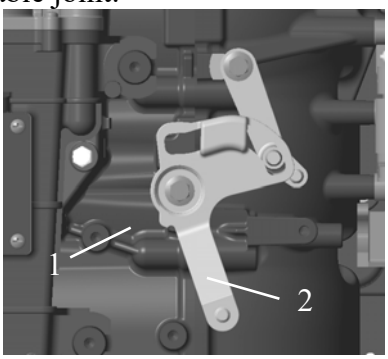
5. Install the spark plug and tighten it with the spark plug wrench according to the specified torque.
   Specified torque: 25 Nm

Control system

Throttle push-pull cable

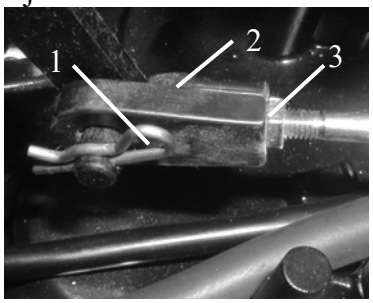
1. Please put the shift lever to the neutral position for the front operating model.

2. Check the contact between the throttle actuator driving pulley and the box. If there is no contact between the throttle actuator and the box, adjust the screw-in length of the control cable joint.



1. Box; 2. Throttle actuator driving pulley.

3. Remove the cotter pin, remove the push-pull cable joint, and loose the lock nut of the push-pull cable joint.



1. Cotter pin 2. Push-pull cable joint; 3. Lock nut

4.Adjust the screw-in depth of the joint so that the joint hole is aligned with the pin of the throttle actuator driving pulley.

Note:

The push-pull cable joint must be screwed in more than 8 mm.

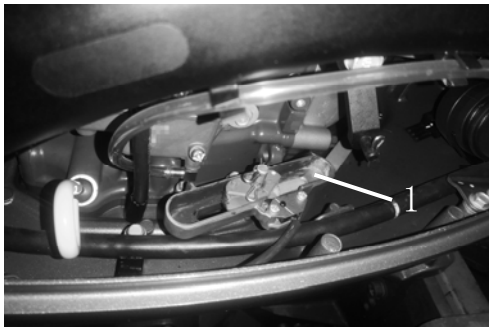
5.Mount the cotter pin and tighten the lock nut.

Shift operation

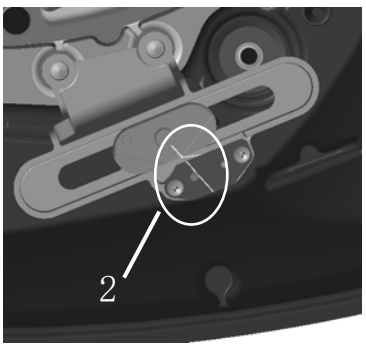
1. Check whether the shift operation is smooth;

2. Please put the shift lever to the neutral position.

3. Observe that the mark on the shift slider of the swing rod is aligned with the mark on the microswitch.



1.Throttle swing rod seat;



2. Mark.

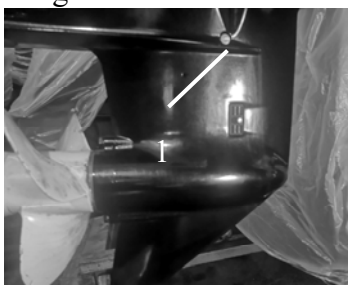
4. If the shift slider is not aligned with the mark on the microswitch, adjust the screw-in depth of the push-pull cable joint. (Refer to the adjustment mode of throttle push-pull cable joint)

Underwater unit

Gear oil

Check the amount of gear oil:

Remove the oil level plug screw, if there is gear oil overflow, the oil amount is correct; If there is no overflow of gear oil, add gear oil.



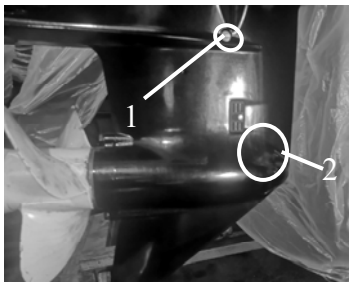
1. Oil level plug screw

Replace gear oil

1. Position the outboard motor vertically.

2. Place a container with sufficient capacity under the outboard motor.

3. Remove the oil drain screw, and then remove the oil level plug screw; Drain gear oil.



1. Oil level plug screw 2. Oil drain screw

4. Use the pressure filling device to inject gear oil into the oil drain screw hole.

5. When gear oil overflows from the oil level plug hole, install the oil level plug screw.

6. Install the oil drain screw; Wipe off the spilled gear oil.

Note:

Check the discharged gear oil. If the gear oil is emulsified, check the seal and replace the oil seal if necessary; If the gear oil contains metal debris, check the gears and bearings.

Note:

A new drain plug gasket must be replaced every time.

Air tightness inspection of underwater unit

Connect the leak detection device to the oil level plug hole to detect the air tightness of the underwater unit. If the pressure drops (the pressure is 0.69kg/cm^3], check the oil seal and other components.

General maintenance

Anode

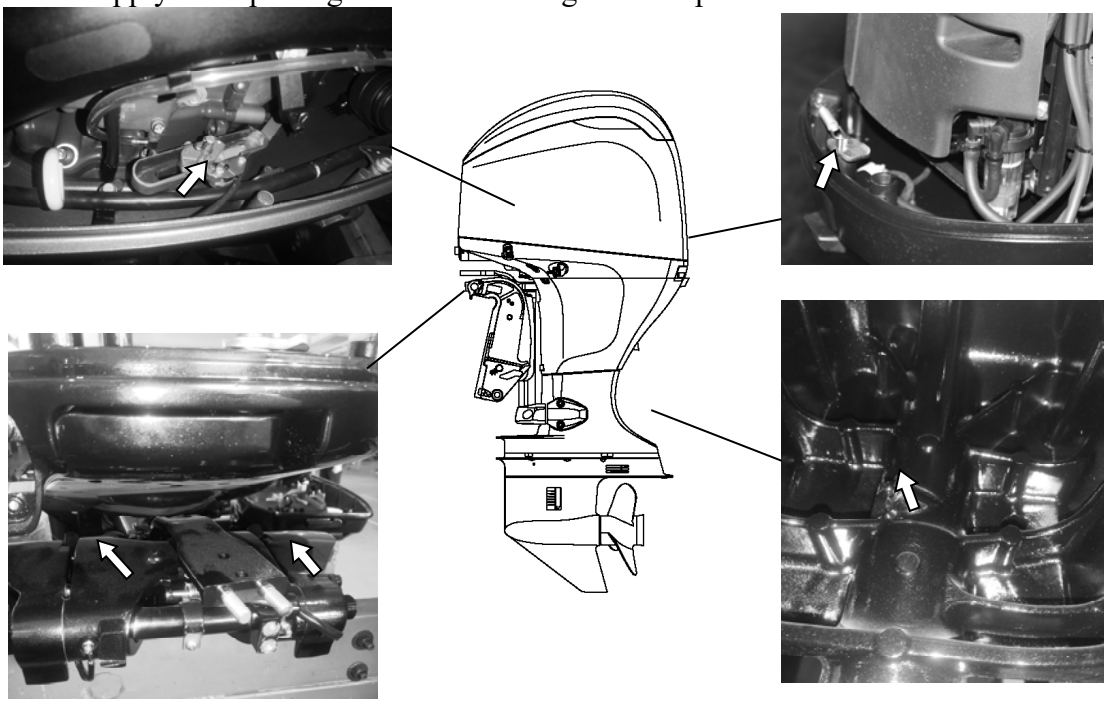
Check the anode of underwater unit and the anode of the engine (mounted on the thermostat cover); Remove oil stains and scale; If damage or corrosion exceeds 1/2, replace the anode.

Note:

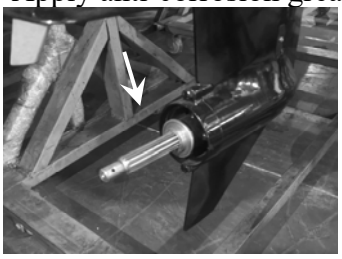
Do not oil or paint the anode to avoid anode failure.

Lubricating point

1. Fill or apply waterproof grease with an oil gun at the position shown.

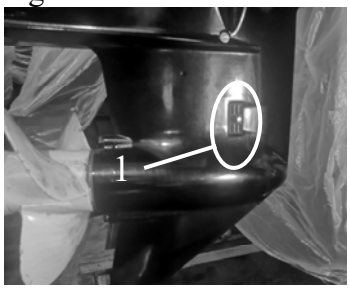


2. Apply anti-corrosion grease to the propeller shaft.



Cooling water channel

1. Check whether the inlet of cooling water channel is blocked. Clean it if necessary.

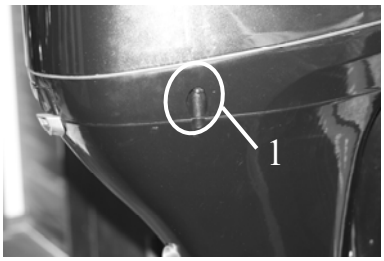


1. Inlet of cooling water channel

2. Place the outboard motor in water, ensure that the water level is above the anti-swirl baffle, and start the engine.

3. Check whether there is water flowing out of the cooling water observation hole. If there is no water flow or the water flow is interrupted, check the cooling water channel in the

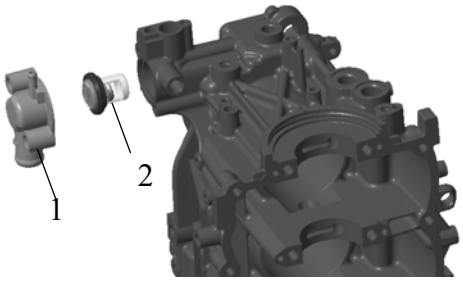
outboard motor.



1. Cooling water observation hole

Thermostat

1. Remove thermostat cover and then remove thermostat.



1. Thermostat cover 2. Thermostat

2. Hang the thermostat in a container containing water.

3. Heat the container.

4. Check the opening of thermostat valve at the specified water temperature; If it does not meet the specifications, replace it.

Water temperature	Valve opening height
Below 58℃	Do not open
Above 70℃	Greater than 4.3mm

5. Install thermostat and thermostat cover, and tighten the bolts to the specified value.

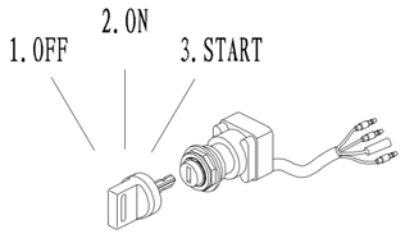
Propeller

Check propeller blades and internal splines for rupture, damage or wear. Replace them if necessary.

Check the main switch/stop switch

1. Check if the engine starts when the startup switch is turned to start (START). If it cannot start, check the startup switch.

2. When the startup switch is turned off (OFF), check if the engine stops. If the engine does not stop, please check the startup switch.



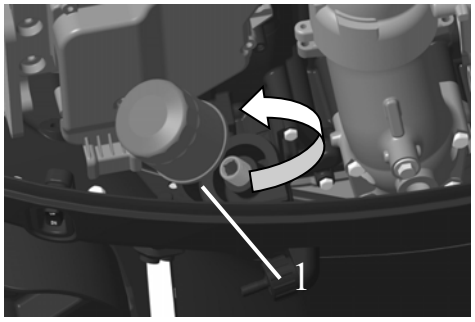
1. Close 2. Open 3. Start

3. When the engine stop safety line is removed from the emergency stop switch, check if the engine stops. If the engine does not stop, please check the emergency stop switch.

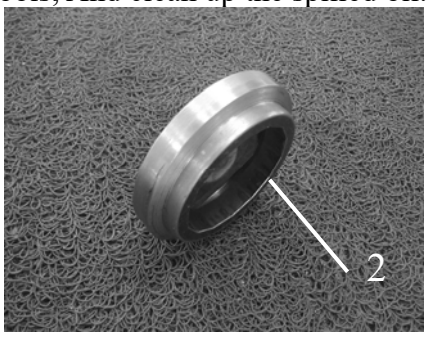
Change the oil filter

1. Drain the engine oil, see "Change engine oil".

2. Remove the oil filter with special tools; And clean up the spilled oil.



1. Oil filter



2. Oil filter spanner

3. Install a new oil filter and tighten it to the specified torque as required. (18Nm)

4. Fill the specified amount of oil through the oil filler.

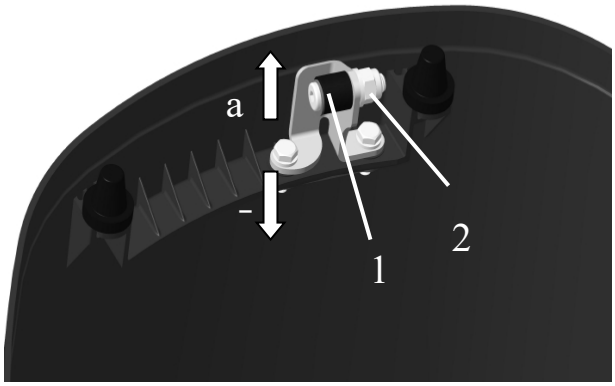
5. Install the oil cover and dipstick, start the engine and run for 5-10 minutes.

6. Turn off the engine and stop the fuel for 5-10 minutes.

7. Check the oil level.

Check the top cover

1. Push the top cover with both hands to check if the top cover is mounted tightly. If it is loose, please adjust it.



2. Loosen the lock nut "2".

3. Move the pulley "1" up or down slightly and adjust it to the appropriate position.
Note:

Move it up in the direction of "a" to loosen the locking device;
Move it down in the direction of “b" to tighten the locking device;

4. Tighten the lock nut "2".

5. Re-check if the top cover is locked tightly. If the tightness cannot be adjusted, please replace the top cover sealing strip.

Check valve clearance

Check the valve clearance with reference to "Engine-Check valve clearance". If the specified value is not met, adjust the valve clearance with reference to “Engine-Adjust valve clearance".

Electrical system

Matters needing attention

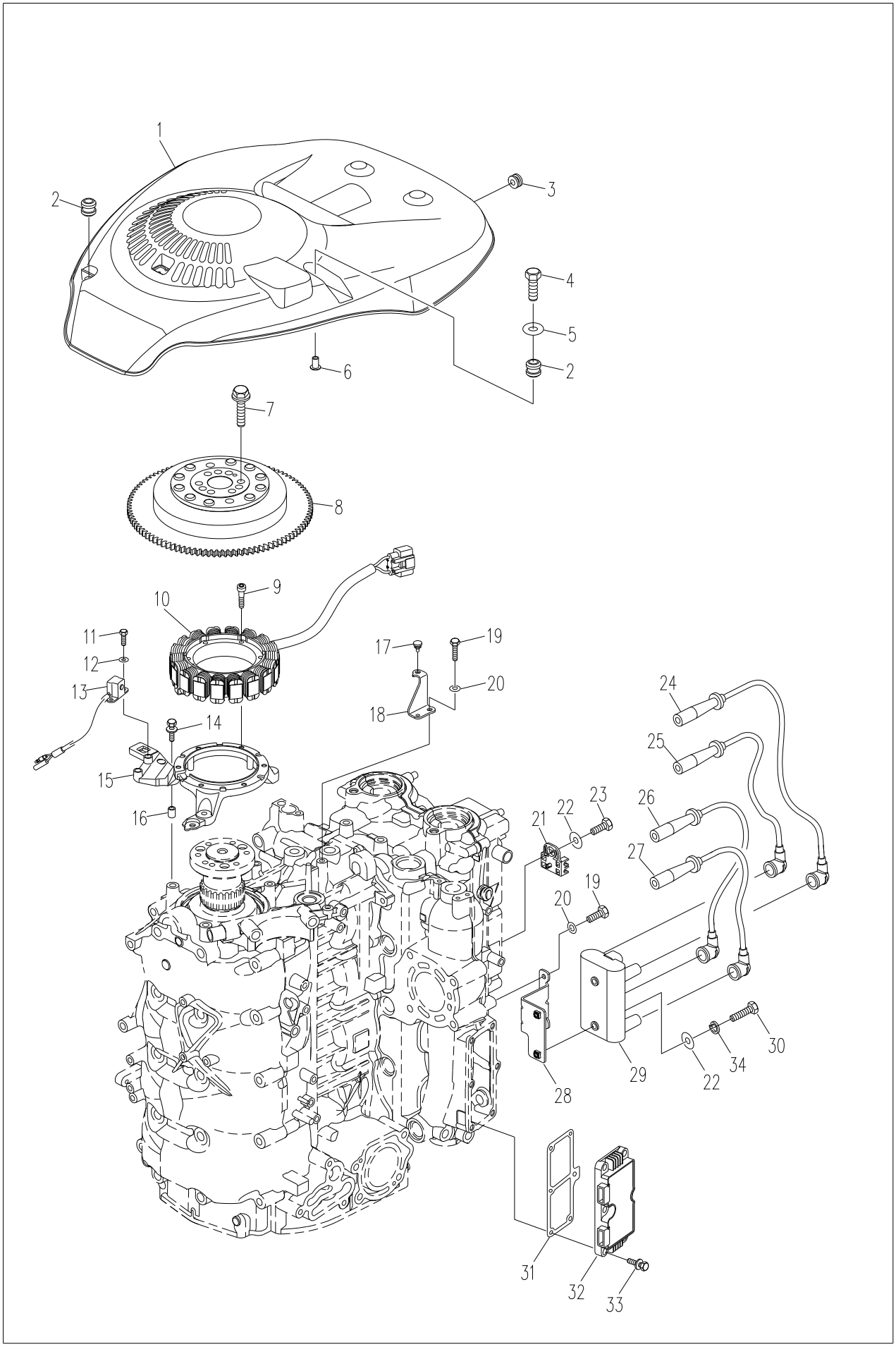
When monitoring and repairing the ignition system, be careful not to put your hands, clothes, hair or accessories close to the running flywheel.

Check the ignition coil on the insulated workbench to prevent electric leakage and electric shock.

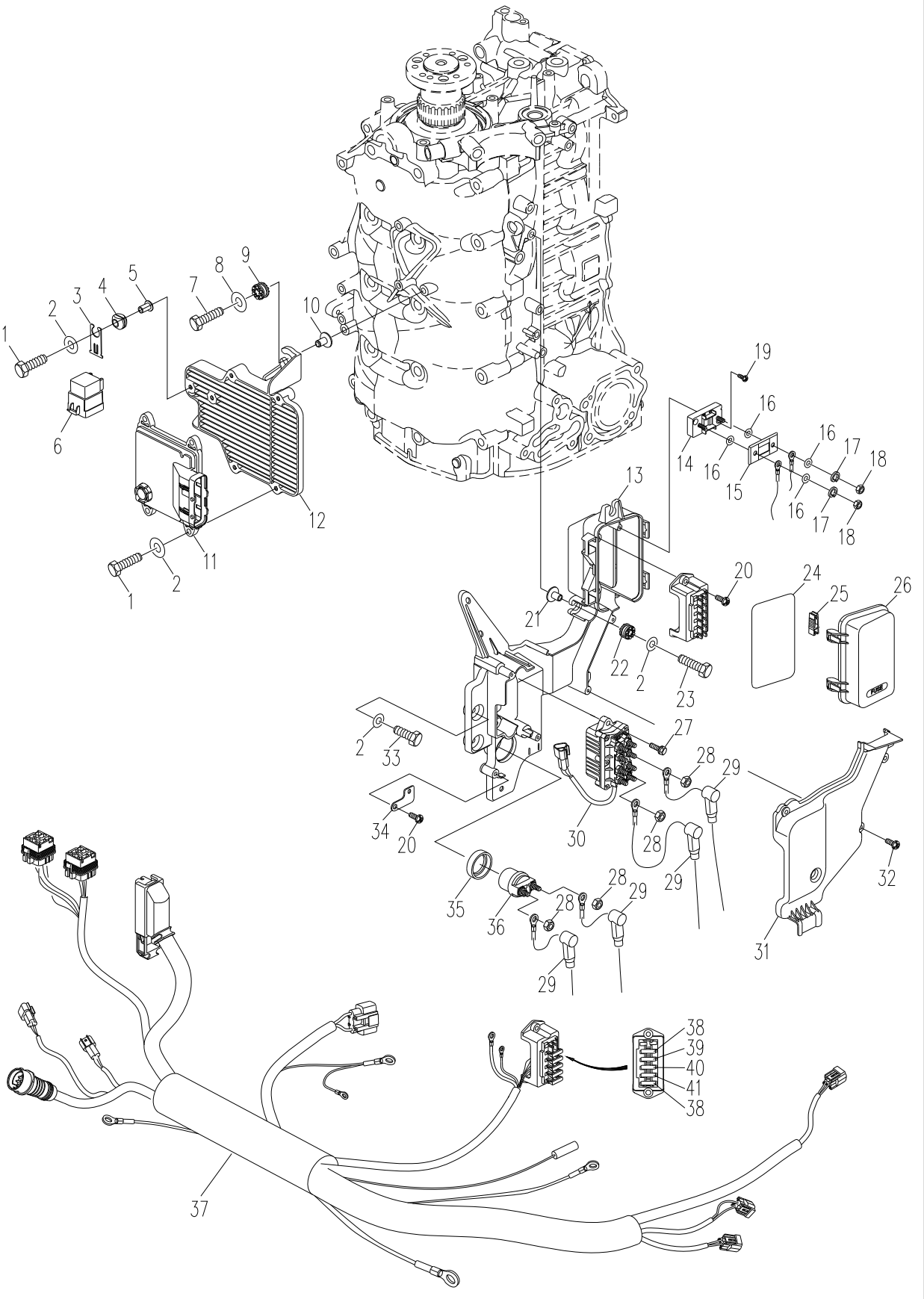
When the engine is running, do not touch the ignition coil or spark plug so as to avoid electric shock. Make sure that the wires are kept away from the running flywheel to avoid cutting off the wires or wearing the insulation of the wires.

When replacing fasteners (nuts, bolts), please use the parts provided by the manufacturer or of the same material and strength, and tighten according to the specified torque.

Disassembly schematic diagram



SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-05001201	飞轮罩	FLYWHEEL COVER	1					
2	T40-05000029	点火器减震圈	ABSORBER, IGNITER	2					
3	F115-05000010	护盖减震圈	ABSORBER, COVER	2					
4	GB/T5783-M6x25	六角螺栓 M6x25	BOLT M6x25	1					
5	GB/T96-6	大垫圈 6	BIG WASHER 6	1					
6	T40-05000028	点火器垫管	BUSH, IGNITER	1					
7	F115-05000113	六角凸缘螺栓 M10x1x50	FLANGE BOLT M10x1x50	6					
8	F115-05001100	飞轮组件	FLYWHEEL ASSY	1					
9	GB/T70.1-M6x35	内六角圆柱头螺钉 M6x35	SOCKET HEAD SCREW M6x35	6					
10	F115-05001000	磁电机线圈组件	MAGNETOR COIL ASSY	1					
11	GB/T5783-M5x12	六角螺栓 M5x12	BOLT M5x12	2					
12	GB/T97.1-5	平垫圈 5	WASHER 5	2					
13	F60-05000200	触发线圈组件	PULSER COIL ASSY	1					
14	GB/T9074.14-M6x30	六角螺栓平垫组合M6x30	BOLT M6x30	3					
15	F115-05000092	磁电机固定架	BRACKET, MAGNETOR	1					
16	F115-05000093	空心定位销 ⌀8x⌀6.5x13	DOWEL PIN ⌀8x⌀6.5x13	2					
17	F20-05000036	针形堵头	NEEDLE PLUG	1					
18	F115-05000104	点火指示器	IGNITION INDICATOR	1					
19	GB/5783-M6x16	六角螺栓 M6x16	BOLT M6x16	3					
20	GB/T97.1-6	平垫圈 6	WASHER 6	3					
21	F115-05000022	线卡A	LINE CLIP A	2					
22	GB/T96-6	大垫圈 6	BIG WASHER 6	4					
23	GB/5783-M6x12	六角螺栓 M6x12	BOLT M6x12	2					
24	F115-05000099-1	高压线(1#缸)	IGNITION COIL LINE(CYLINDER 1)	1					
25	F115-05000099-2	高压线(2#缸)	IGNITION COIL LINE(CYLINDER 2)	1					
26	F115-05000099-3	高压线(3#缸)	IGNITION COIL LINE(CYLINDER 3)	1					
27	F115-05000099-4	高压线(4#缸)	IGNITION COIL LINE(CYLINDER 4)	1					
28	F115-05000098	高压包固定架	PLATE, IGNITION COIL ASSY	1					
29	F60-05000600	集成高压包	IGNITION COIL ASSY	1					
30	GB/5783-M6x35	六角螺栓 M6x35	BOLT M6x35	2					
31	F115-05000027	整流器密封垫	GASKET, RECTIFIER	1					
32	F115-05000400	整流器组件	RECTIFIER ASSY	1					
33	GB/T9074.14-M6x25	六角螺栓平垫组合 M6x25	BOLT M6x25	6					
34	GB/T93-6	弹簧垫圈6	SPRING WASHER 6	2					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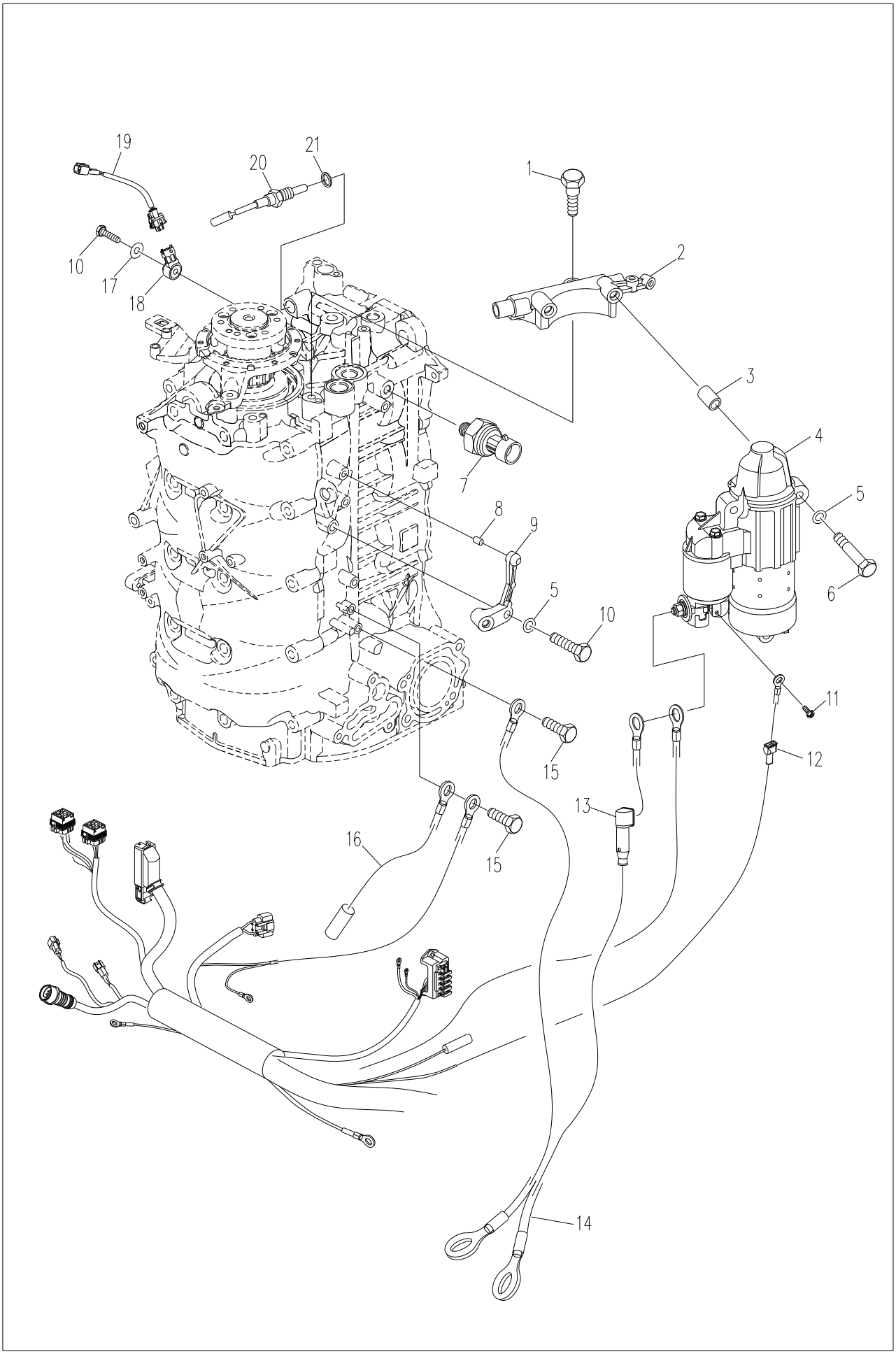
SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	GB/T5783-M6x25	六角螺栓 M6x25	BOLT M6x25	6					
2	GB/T96-6	大垫圈 6	BIG WASHER 6	12					
3	F40-05091401EI	主继电器固定支架	BRACKET, MAIN RELAY	2					
4	F40-05091402EI	主继电器减震圈	DAMPER, MAIN RELAY	2					
5	T40-05000028	点火器垫管	TUBE, IGNITER	2					
6	F40-05091400EI	主继电器	MAIN RELAY	2					
7	GB/T5783-M6x35	六角螺栓M6x35	BOLT M6x35	2					
8	GB/T5287-6	特大垫圈 6	LARGE WASHER 6	2					
9	F115-05000046	油泵减震圈	DAMPER, OIL PUMP	2					
10	F115-05000045	油泵垫管	CUSHION TUBE, OIL PUMP	2					
11	F115-05070100	ECU 模块	ECU	1					
12	F115-05070005	ECU 固定架	ECU BRACKET	1					
13	F115-05070001	电器盒座	BASE, ELECTRICAL BOX	1					
14	F115-05000109	保险丝座（50A）	FUSE BASE(50A)	1					
15	F115-05000109-1	透明保险丝（50A）	FUSE(50A)	1					
16	GB/T97.1-5	铜垫圈 5（镀银）	COPPER WASHER 5	4					HSn62-1
17	GB/T93-5	铜弹簧垫圈5(镀银)	COPPER SPRING WASHER 5	2					HSn62-1
18	GB/T6170-M5	六角铜螺母M5 （镀银）	COPPER NUT M5	2					HSn62-1
19	GB/T845-ST4.2x12 F	十字槽盘头螺钉ST4.2x12 F 型	SCREW ST4.2x12	2					
20	GB/T845-ST6.3x19 F	十字槽盘头螺钉ST6.3x19 F 型	SCREW ST6.3x19	3					
21	F115-05070004	减震器垫管	CUSHION TUBE, DAMPER	4					
22	F115-05070003	支架减震器	DAMPER, BRACKET	4					
23	GB/T5783-M6x30	六角螺栓 M6x30	BOLT M6x30	4					
24	F115-05070006	发泡密封条 ⌀2.5	SEALING STREP	1					
25	F115-05070002-1	保险丝镊子	NIPPERS, FUSE	1					
26	F115-05070002	保险丝盒盖	COVER, FUSE BOX	1					
27	GB/T9074.14-M6x20	六角螺栓平垫组合 M6x20	BOLT M6x20	2					
28	GB/T6170-M6	六角铜螺母M6 （镀银）	COPPER NUT M6	4					HSn62-1
29	F15-07150501W	电机连接线护套	SHEATH, MOTOR CONNECTING LINE	4					
30	T85-05030200	继电器组件	RELAY ASSY	1					
31	F115-05070009	电器盒盖	COVER, ELECTRICAL BOX	1					
32	GB/T845-ST4.8x19 F	十字槽盘头螺钉ST4.8x19 F 型	SCREW ST4.8x19	4					
33	GB/T5783-M6x16	六角螺栓 M6x16	BOLT M6x16	2					
34	F115-05070007	启动继电器压板	STAY, RELAY	1					
35	F115-05070008	启动继电器护套	SHEATH, RELAY	1					
36	F15-07150300W	启动继电器	RELAY	1					
37	F115-05070200	点火线束组件	C.D.I LINE ASSY	1					
38	F40-05001000-1EFI	保险丝40A	FUSE (40A)	2					
39	F40-05001000-3EFI	保险丝7.5A	FUSE (7.5A)	1					
40	F40-05001000-4EFI	保险丝15A	FUSE (15A)	1					
41	F40-05001000-2EFI	保险丝20A	FUSE (20A)	1					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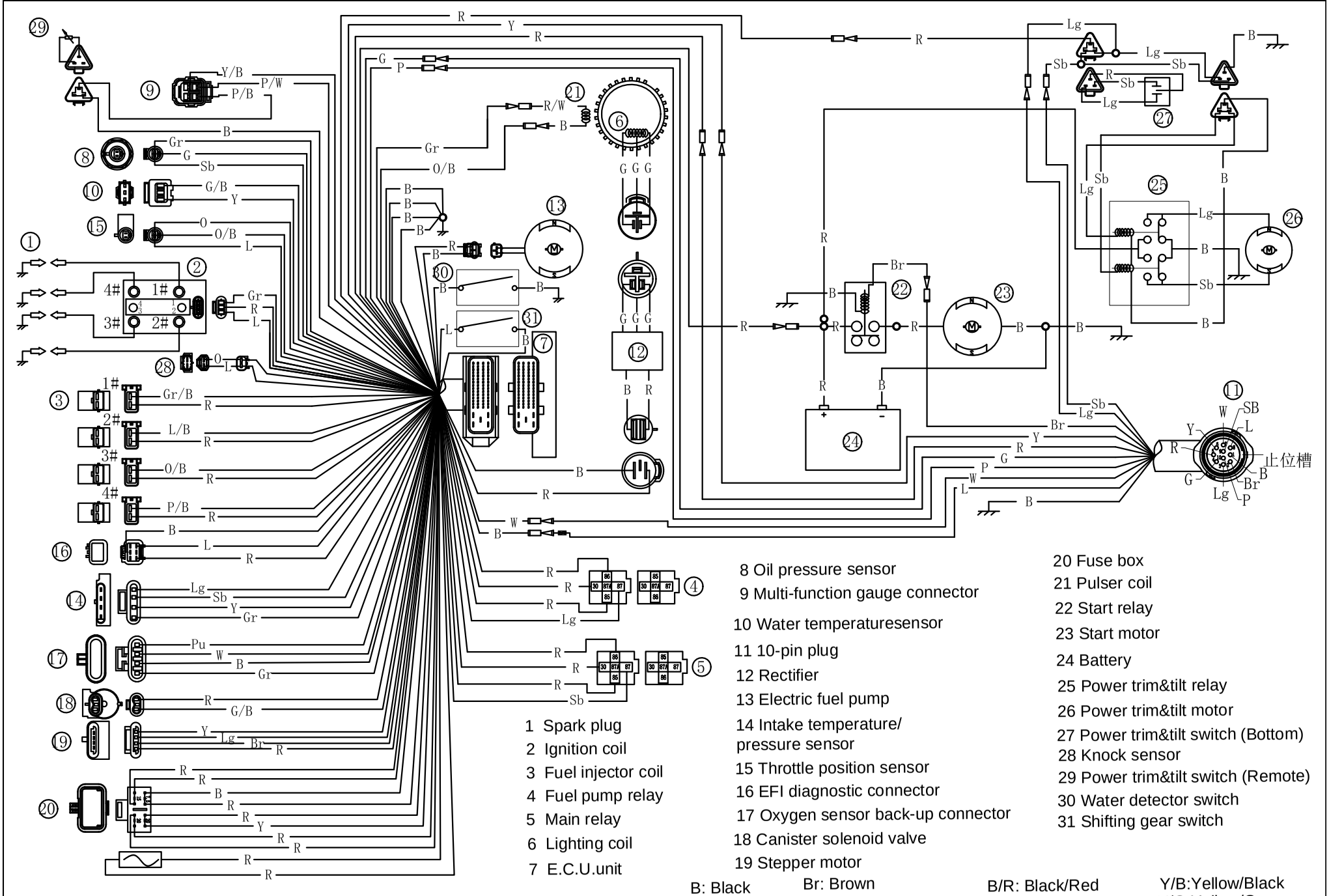
SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-05000043	固定架螺栓	BOLT	2					
2	F115-05000042	电机固定架A	BRACKET A,STARTER MOTOR	1					
3	F20-05000037	空心定位销 ⌀11x⌀8.5x10	HOLLOW PIN ⌀11x⌀8.5x10	2					
4	F115-05000600	启动电机	STARTER MOTOR	1					
5	GB/T97.1-8	平垫圈 8	WASHER 8	4					
6	GB/T5782-M8x45	六角螺栓 M8x45	BOLT M8x45	3					
7	F40-05000042EI	机油压力传感器组件	OIL PRESSURE SENSOR	1					
8	F115-05030020	定位销 ⌀5x10	DOWEL PIN ⌀5x10	1					
9	F115-05000044	电机固定架 B	BRACKET B,STARTER MOTOR	1					
10	GB/T5783-M8x30	六角螺栓 M8x30	BOLT M8x30	1					
11	GB/T818-M4x10	十字槽盘头螺钉 M4x10	SCREW M4x10	1					
12	F115-05000601	导线护套	SHEATH,WIRE	1					
13	F25-05170201W	电源连接线护套A	SHEATH A, POWER CABLES	1					
14	F115-05000112	电源线	POWER CABLES	1					
15	GB/T5783-M6x12	六角螺栓 M6x12	BOLT M6x12	2					
16	T85-05030004	继电器接地导线（黑）	WIRE,EARTH LEAD	1					
17	GB/T96-8	大垫圈 8	BIG WASHER 8	1					
18	F115-05000500	爆震传感器	KNOCK SENEOR	1					
19	F115-05000501	爆震传感器连接线	CONNECTING LINE,KNOCK SENEOR	1					
20	F40-05000400	温控器组件	THERMOSTAT ASSY	1					
21	GB/T3452.1-8x1.9	O形圈 8x1.9	O-RING 8x1.9	1					



1 Spark plug
2 Ignition coil
3 Fuel injector coil
4 Fuel pump relay
5 Main relay
6 Lighting coil
7 E.C.U.unit

8 Oil pressure sensor
9 Multi-function gauge connector
10 Water temperaturesensor
11 10-pin plug
12 Rectifier
13 Electric fuel pump
14 Intake temperature/ pressure sensor
15 Throttle position sensor
16 EFI diagnostic connector
17 Oxygen sensor back-up connector
18 Canister solenoid valve
19 Stepper motor

20 Fuse box
21 Pulser coil
22 Start relay
23 Start motor
24 Battery
25 Power trim&tilt relay
26 Power trim&tilt motor
27 Power trim&tilt switch (Bottom)
28 Knock sensor
29 Power trim&tilt switch (Remote)
30 Water detector switch
31 Shifting gear switch

Power tilt&trim switch state table

	Sb	R	Lg
UP	○	○	
停止			
DOWN		○	○

B: Black
G: Green
L: Blue
O: Orange
P: Pink
R: Red
W: White
Y: Yellow

Br: Brown
Gr: Grey
Pu: Purple
Lg: Pale green
Br/L: Brown/Blue
Gr/B: Grey/Black
B/W: Black/White
G/W: Green/White

B/R: Black/Red
O/B: Orange/Black
G/B: Green/Black
L/B: Blue/Black
P/B: Pink/Black
P/W: Pink/White
L/W: Blue/White
R/W: Red/White

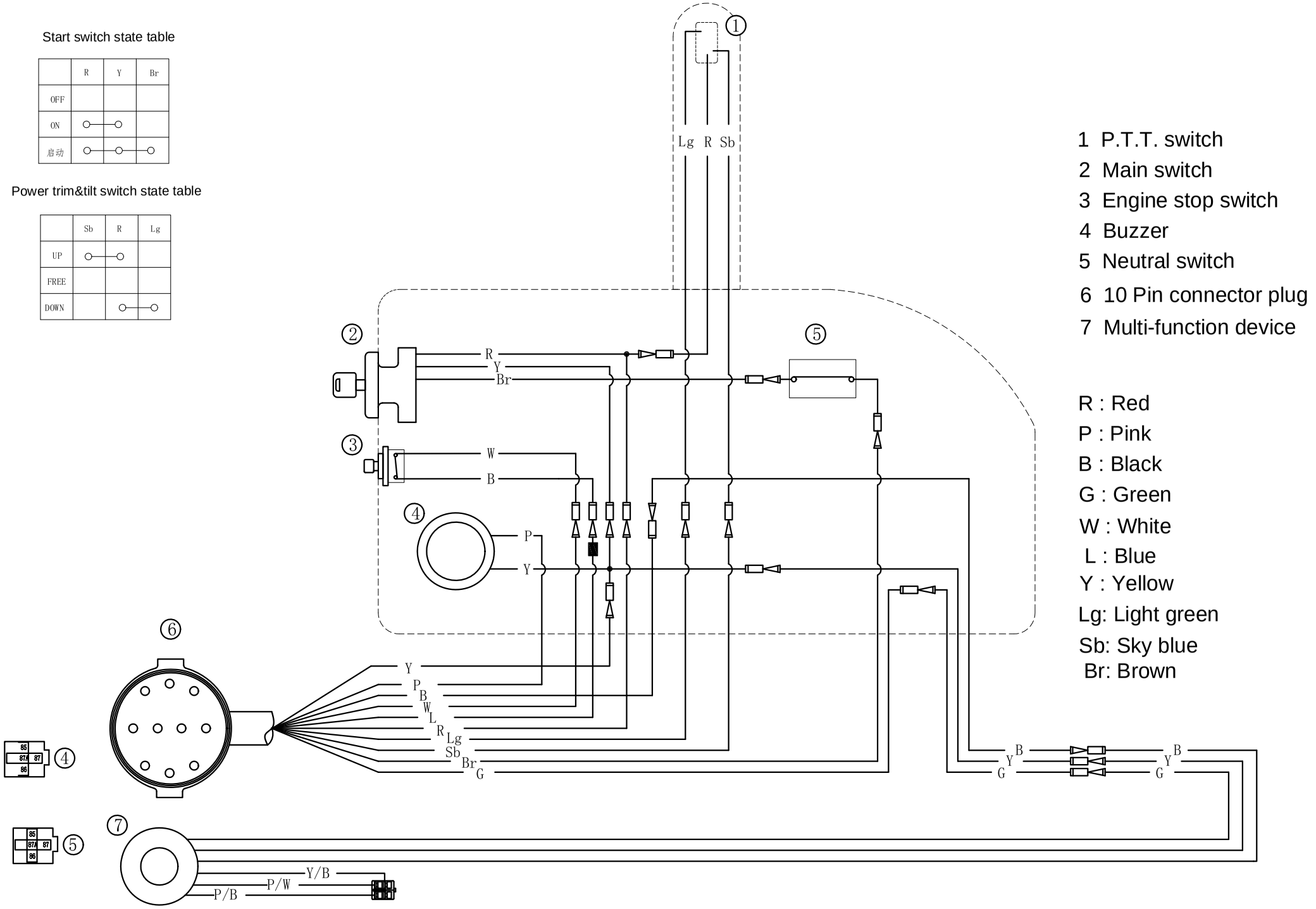
Y/B:Yellow/Black
Y/G:Yellow/Green
Y/R: Yellow/Red

Start switch state table

	R	Y	Br
OFF			
ON	○—○		
启动	○—○	○—○	○—○

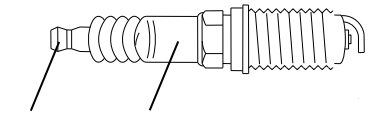
Power trim&tilt switch state table

	Sb	R	Lg
UP	○—○		
FREE			
DOWN		○—○	



Spark plug ignition

1. Remove the spark plug cap from the spark plug.



1. Spark plug cap; 2. Spark plug

2. Connect the ignition detector to the spark plug cap.

3. Start the engine and observe the spark through the discharge window of the detector.
⚠ **Warning:**
Do not touch any connection part of the detector lead.
Keep away from combustible gases or liquids to avoid accidents caused by sparks.

Spark plug cap

1. Remove the spark plug cap. Check the spark plug cap for damage. Replace it if necessary.

2. Install the spark plug cap.

Flywheel maintenance

1. Remove the bolts and nuts fixing the flywheel and remove the flywheel.

2. Check whether the flywheel is damaged and whether the permanent magnet is firm. Replace it if necessary.

Ignition coil detection

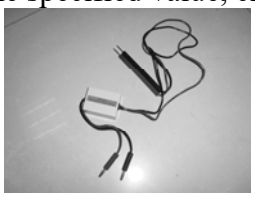
1. Remove the ignition coil and the spark plug cap.

2. Measure the resistance of the ignition coil. If the specified value is not met, replace it.
Primary resistance: 2.2±0.22Ω
Secondary resistance 9.84±0.98kΩ

Trigger coil detection

1. Peak voltage of trigger coil
Use digital multimeter and peak voltage adapter to measure the peak output voltage of the coil. If it is lower than the specified value, check the trigger coil resistance.


Digital multimeter


peak voltage adapter

Peak voltage of pulse coil: ≥13 V@1000 r/min (load)

2. Trigger coil resistance
Measure coil resistance. If the specified value is not met, replace it.
Resistance: 260～290Ω (detector positive pole is connected with red/white wire,

negative pole with black wire)

Note: The data are for reference only.

Check engine startup switch

Check the conductivity of the engine startup switch. If it is not conductive, replace it.
Note: See wiring diagram for startup switch status,

Check engine stop switch

Check the conductivity of the engine stop switch. If it is not conductive, replace it.
Remove the locking plate: Conducting
Install locking plate: Non-conducting
Press the button: Conducting

Detection of starting relay

1. Connect the brown lead to the positive electrode of the battery.

2. Connect the black lead to the negative electrode of the battery.

3. Check the conductivity between relay terminals. If it is not conductive, replace the relay.

4. Disconnect the lead connection with the battery and check the conductivity between the relay terminals. If it is conductive, replace the relay.

Detection of magneto coil

Measure the peak voltage of magneto coil (between green wires).

Use digital multimeter and peak voltage adapter to measure the peak output voltage of the coil. If it is lower than the specified value, replace the magneto coil.

Peak voltage of magneto coil	1500 r/min (no-load)	53V
	3500 r/min (no-load)	115V

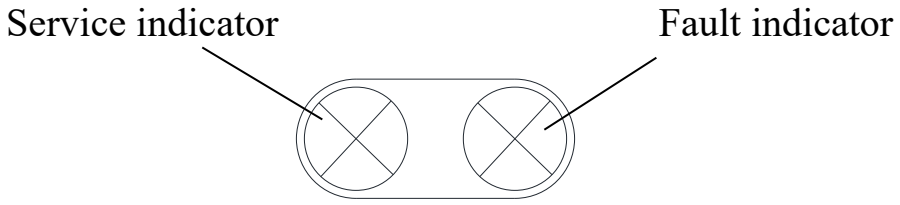
Detection of rectifier regulator

Measure the peak voltage (DC) of the rectifier regulator.
Open the rectifier output (red wire and black wire) and use a digital multimeter to measure the voltage between the red wire and black wire at the rectifier regulator output.
If it is lower than the specified value, check the peak output voltage of magneto coil. If the peak output voltage of magneto coil is higher than the specified value, replace the rectifier regulator.

Peak voltage of rectifier regulator	1500 r/min (load)	14.5V
	3500 r/min (load)	14.5V

Use fault diagnosis tester

When the engine is running, if the fault indicator or service indicator on the handle or multifunction tester is always on/buzzer is always on, it indicates that there is a fault in the engine. At this time, connect the fault diagnosis tester with the corresponding detection port on the engine, and display the running parameters and fault codes of the engine on the mobile phone through the APP. Then check the fault code table to determine the engine fault and replace the faulty electrical components.



Fault code table

Fault type	Fault item	Code
Intake pressure fault	Short circuit to ground or open circuit of intake pressure sensor line	107
	Short circuit to high level of intake pressure sensor line	108
Intake temperature fault	Short circuit to high level of intake temperature sensor line	112
	Short circuit to ground or open circuit of intake temperature sensor line	113
Water temperature fault	Short circuit to ground of coolant temperature sensor line	117
	Short circuit to high level of coolant temperature sensor	118
Throttle fault	Short circuit to ground of throttle position sensor	122
	Short circuit to high level of throttle position sensor	123
Oxygen sensor fault	Short circuit to ground of oxygen sensor	131
	Short circuit to high level of oxygen sensor	132
Oxygen sensor heating fault	Oxygen heater fault	135
Fuel injector fault	Cylinder 1 nozzle line fault	201
	Cylinder 2 nozzle line fault	202
	Cylinder 3 nozzle line fault	203
	Cylinder 4 nozzle line fault	204
Fuel pump fault	Oil pump relay fault	230
Crankshaft position sensor fault	Signal interference of crankshaft position sensor line	336
	No signal of crankshaft position sensor line	337
Ignition coil fault	Cylinder 1/4 ignition coil fault	351
	Cylinder 2/3 ignition coil fault	352

Idle fault	Excessive idle speed fault	507
	Low idle speed fault	506
System voltage fault	Low system voltage	562
	High system voltage	563

Continued:

Fault type	**Fault item**	**Code**
Fault indicator	Fault indicator fault	650
Oil pressure fault	Short circuit to ground of oil pressure sensor line	523
	Short circuit to high level of oil pressure sensor	522
Carbon canister solenoid valve fault	Short circuit to ground of carbon canister solenoid valve	443
Main relay fault	Main relay fault	685
Water detection switch fault	Water detection switch fault	534
Knock sensor fault	Knock sensor fault	327
Knock system fault	Knock system fault	325

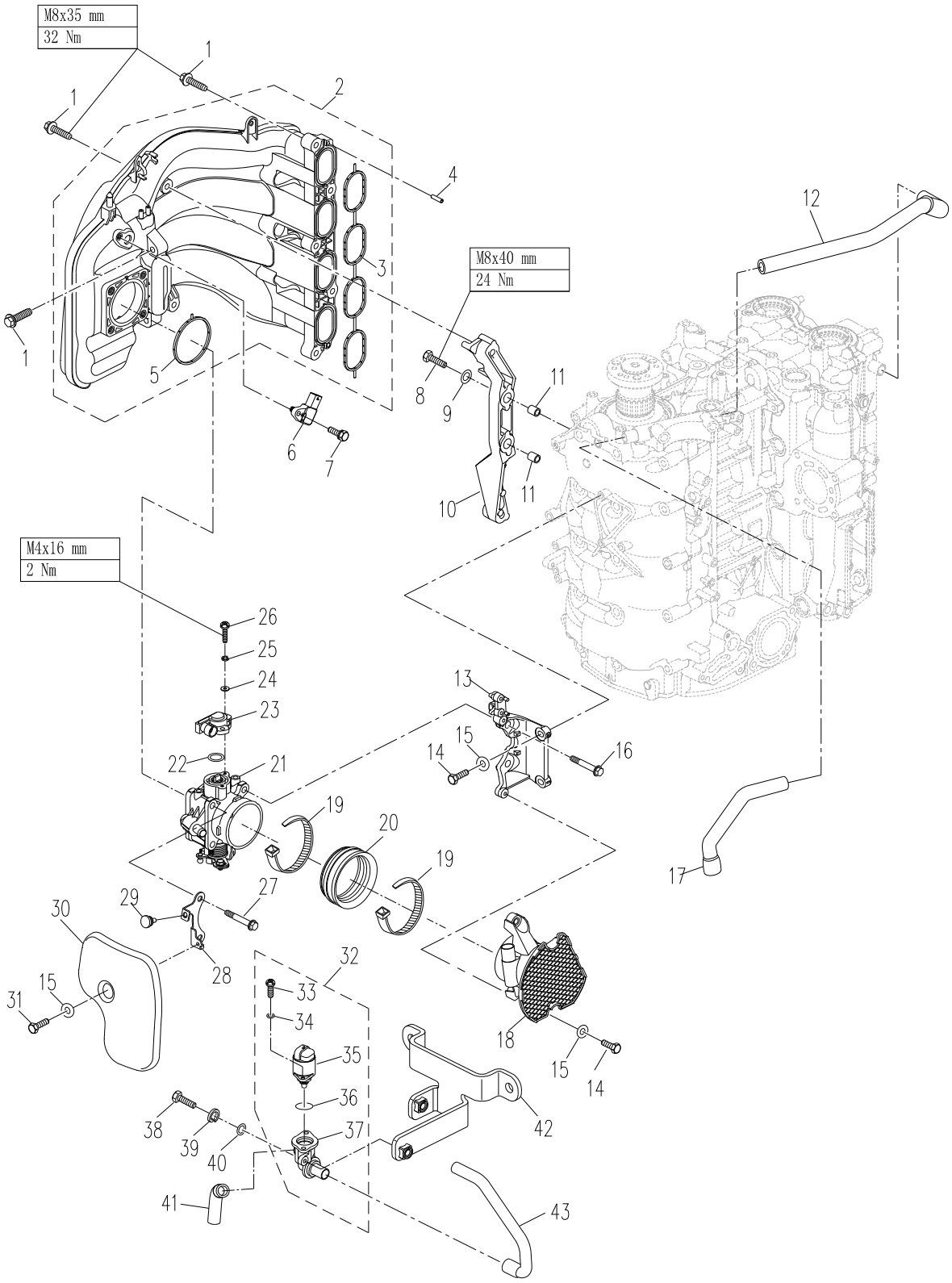
Fuel system

Matters needing attention

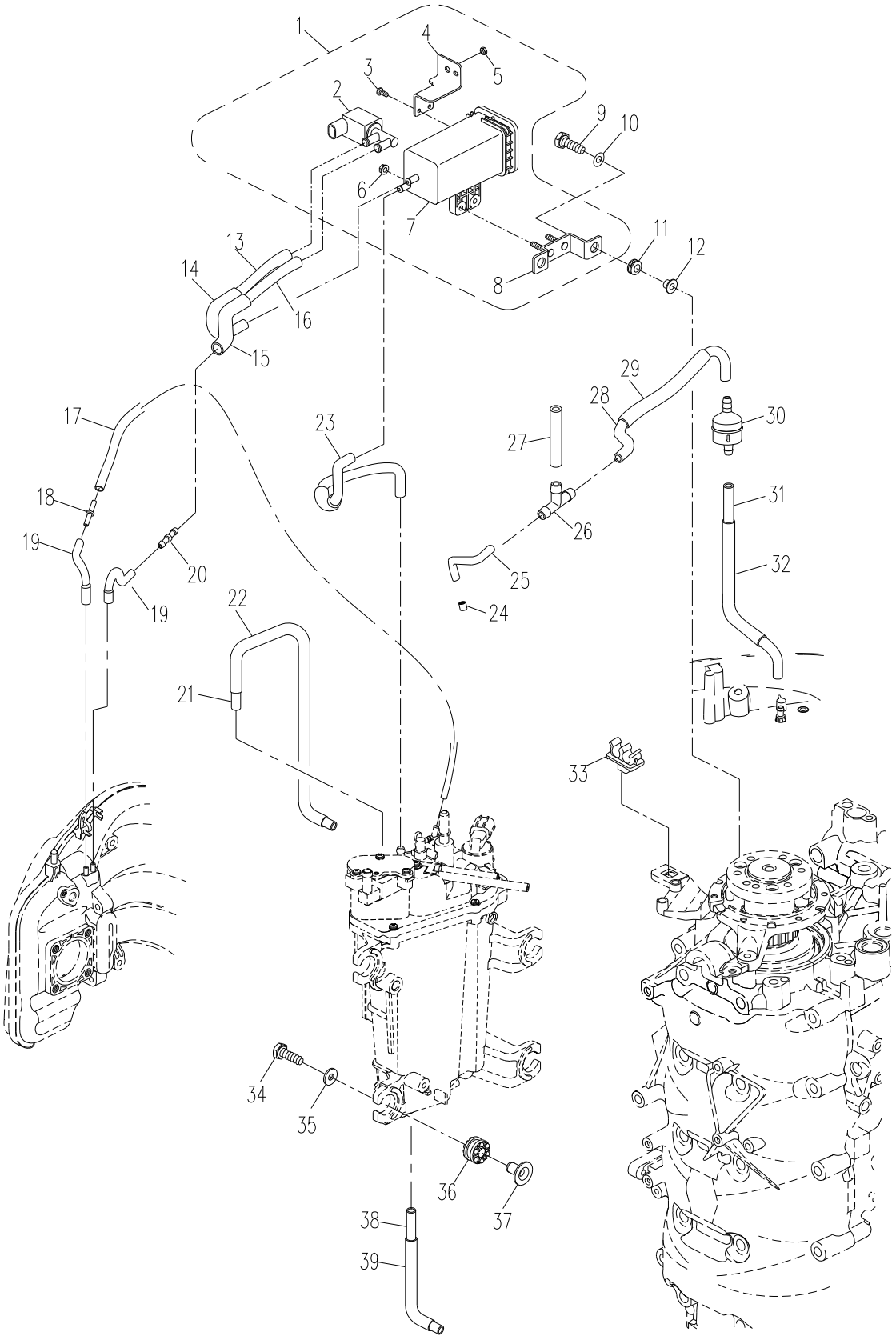
Fuel oil is a highly flammable and volatile liquid, and fuel oil leakage can cause fire and explosion.

Do not attempt to start the engine until the fuel system components are connected or installed. After completing all maintenance steps, apply pressure to the fuel system for a short time to check for leakage.

Disassembly schematic diagram



SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-05000077	六角凸缘螺栓 M8x35	BOLT M8x35	9					
2	F115-05060000	进气消音器组件	INTAKE SILENCER ASSY	1					
3	F115-05060002	进气消音器密封圈	SEAL, INTAKE SILENCER	1					
4	F25-05050016	定位销 5x13.8	DOWEL PIN 5x13.8	2					
5	F115-05060004	节气门体密封圈	SEAL, THROTTLE VALVE	1					
6	F40-05090600	进气歧管温度压力传感器	SENSOR, INTAKE TEMPERATURE	1					
7	GB/T9074.14-M6x35	六角螺栓平垫组合 M6x35	BOLT M6x35	1					
8	GB/T5782-M8x40	六角螺栓 M8x40	BOLT M8x40	2					
9	GB/T97.1-8	平垫圈 8	WASHER 8	2					
10	F115-05000049	进气消音器支架	BRACKET	1					
11	T20-06000030	空心定位销 10x8.4x14	LOCATING PIN 10x8.4x14	2					
12	F115-05000096	缸头回气管 B	RETURN AIR PIPE B	1					
13	F115-05060005	节气门支架	THROTTLE BRACKET	1					
14	GB/T5783-M6x25	六角螺栓 M6x25	BOLT M6x25	2					
15	GB/T96-6	大垫圈 6	BIG WASHER 6	3					
16	GB/T5787-M8x65	六角法兰面螺栓 M8x65	BOLT M8x65	2					
17	F115-05000095	缸头回气管 A	RETURN AIR PIPE A	1					
18	F115-05000089	节气门导管	CONDUIT, THROTTLE VALVE	1					
19	HT5x300	尼龙扎带 5x300	CLAMP 5x300	2					
20	F115-05000090	节气门橡胶套	RUBBER BOOT, THROTTLE VALVE	1					
21	F115-05060100	节气门体组件	THROTTLE VALVE ASSY	1					
22	F115-05060101	节气门位置传感器密封垫	GASKET, SENSOR	1					
23	F40-05090401EFI	节气门位置传感器	SENSOR, THROTTLE POSITION	1					
24	GB/T96-4	大垫圈 4	BIG WASHER 4	2					
25	GB/T93-4	弹性垫圈 4	SPRING WASHER 4	2					
26	GB/T818-M4x16	十字槽盘头螺钉 M4x16	SCREW M4x16	2					
27	GB/T5787-M8x60	六角法兰面螺栓 M8x60	BOLT M8x60	2					
28	F115-05060006	节气门支撑板	SUPPORTING PLATE	1					
29	F20-05000039	针形堵头	NEEDLE PLUG	1					
30	F115-05070010	怠速阀盖板	COVER, IDLE VALVE	1					
31	GB/T5783-M6x20	六角螺栓 M6x20	BOLT M6x20	1					
32	F40-05090500EI	怠速控制阀	CONTROL VALVE, IDLE	1					
33	GB/T818-M4x10	十字槽盘头螺钉 M4x10	SCREW M4x10	2					
34	GB/T97.1-4	平垫圈 4	WASHER 4	2					
35	F40-05090503EI	步进电机	STEP MOTOR	1					
36	F40-05090503-1EI	步进电机 O 形圈	O-RING, STEPPER MOTOR	1					
37	F40-05090501EI	怠速阀体	IDLE CONTROL	1					
38	GB/T818-M5x20	十字槽盘头螺钉 M5x20	SCREW M5x20	2					
39	GB/T93-5	弹性垫圈 5	SPRING WASHER 5	2					
40	GB/T97.1-5	平垫圈 5	WASHER 5	2					
41	F115-05000108	怠速阀定型管 A	SETTING TUBE A	1					
42	F115-05000107	步进电机固定架	FIXED RACK, STEPPER MOTOR	1					
43	F115-05000111	怠速阀定型管 B	SETTING TUBE B	1					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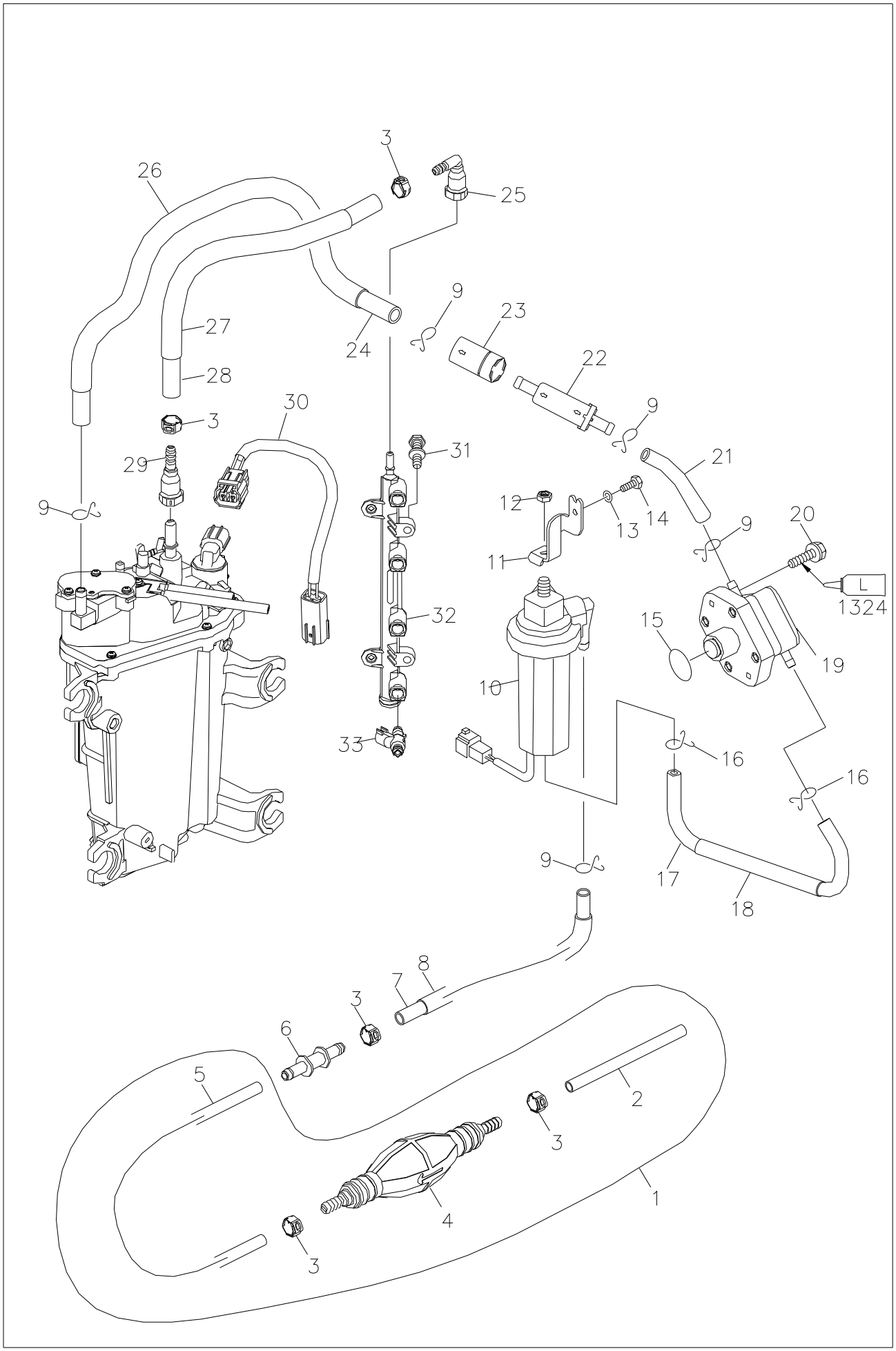
SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-05000700	碳罐组件	CARBON CANISTER ASSY	1					
2	F115-05000054	碳罐电磁阀	SOLENOID VALVE	1					
3	JB2501-ST4.2x8	平头带垫自攻螺钉 ST4.2x8	SCREW ST4.2x8	2					
4	F115-05000056	电磁阀固定架	FIXED PLATE, SOLENOID VALVE	1					
5	GB/T6177.1-M6	六角法兰面螺母 M6	NUT M6	1					
6	GB/T6177.1-M5	六角法兰面螺母 M5	NUT M5	2					
7	F115-05000053	碳罐	CARBON CANISTER	1					
8	F115-05000050	碳罐固定架	PLATE, CARBON CANISTER	1					
9	GB/T5783-M6x20	六角螺栓 M6x20	BOLT M6x20	2					
10	GB/T96-6	大垫圈 6	BIG WASHER 6	2					
11	F115-05000041	碳罐减震圈	DAMPER, CARBON CANISTER	2					
12	F20-05000903W	减震圈垫管	CUSHION TUBE, DAMPER	2					
13	F115-05000057	回气定型管 B（EPA）	AIR PIPE B	1					
14	F115-05000058	回气定型管 B 护套	SHEATH, AIR PIPE B	1					
15	F115-05000060	回气定型管 C 护套	SHEATH, AIR PIPE C	1					
16	F115-05000059	回气定型管 C（EPA）	AIR PIPE C	1					
17	F115-05000082	压力阀蒸发管 4x8x340(EPA)	PIPE 4x8x340	1					
18	F115-05000061	塑料接头 A	PLASTIC JOINT A	1					
19	F115-05000062	回气定型管 D	AIR PIPE D	2					
20	F115-05000013	塑料接头 B	PLASTIC JOINT B	1					
21	F115-05000070	定型水管 A	WATER PIPE A	1					
22	F115-05000071	定型水管 A 护套（尼龙护套 5x330）	SHEATH, WATER PIPE A	1					
23	F115-05000055	回气定型管 A（EPA）	AIR PIPE A	1					
24	T6-05000300	单向阀组件	CHECK VALVE ASSY	1					
25	F115-05000064	回气定型管 E（EPA）	AIR PIPE E	1					
26	F60-05000051	塑料三通 6.5	PLASTIC TEE JOINT 6.5	1					
27	F115-05000063	回气管 A 6x11x35（EPA）	AIR PIPE A 6x11x35	1					
28	F115-05000065	回气管 B 5x10x200（EPA）	AIR PIPE B 5x10x200	1					
29	F115-05000066	回气管 B 护套	SHEATH, AIR PIPE B	1					
30	T5-04000200	单向阀组件	CHECK VALVE ASSY	1					
31	F115-05000068	回气管 C 5x10x380（EPA）	AIR PIPE C 5x10x380	1					
32	F115-05000069	回气管 C 护套	SHEATH, AIR PIPE C	1					
33	F115-05000076	线卡 C	CLIP C	1					
34	GB/T5783-M6x35	六角螺栓 M6x35	BOLT M6x35	4					
35	GB/T5287-6	特大垫圈 6	LARGE WASHER 6	4					
36	F115-05000046	油泵减震圈	DAMPER , OIL PUMP	4					
37	F115-05000045	油泵垫管	BUSHING , OIL PUMP	4					
38	F115-05000072	定型水管 B	WATER PIPE B	1					
39	F115-05000073	定型水管 B 护套（尼龙护套 5x100）	SHEATH, WATER PIPE B	1					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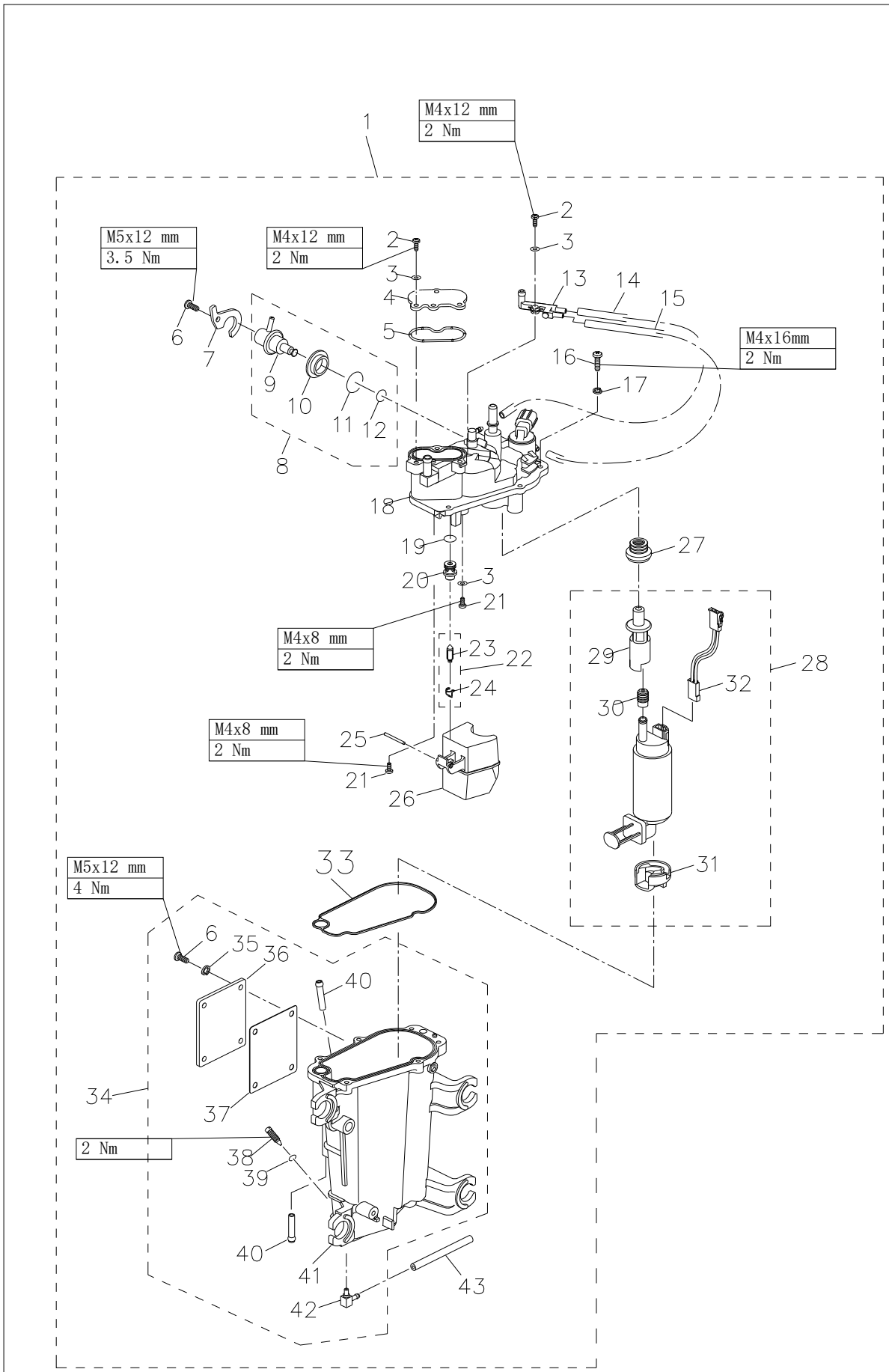
SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-10000000	油管总成	OIL PIPE ASSY	1					
2	F115-10000002	油管B(φ7.5xφ14.3x2080)	OIL PIPE B(⌀7.5x⌀14.3x2080)	1					
3	S7140-14.5	卡箍 A	CLAMP A	4					
4	F115-10010000-A	手动油泵组件	PRIMER BULB ASSY	1					EPA
5	F115-10000001	油管A(φ7.5xφ14.3x1530)	OIL PIPE A(⌀7.5x⌀14.3x1530)	1					
6	F115-05000016	燃油管接头组件	FUEL FITTING ASSY	1					
7	F115-05000014	燃油管A φ7.5x φ14.3x850	OIL PIPE A ⌀7.5x⌀14.3x850	1					EPA
8	F115-05000015	燃油管A护套（Φ12x800 ）	SHEATH A(⌀12x800)	1					
9	F4-05000010	油管夹簧 A	CLAMP SPRING A,FUEL PIPE	5					
10	F115-05001300	滤油杯组件	FILTER CUP ASSY	1					
11	F115-05000011	滤油杯支架	BRACKET,FILTER CUP	1					
12	GB/T6170-M8	六角螺母 M8	NUT M8	1					
13	GB/T97.1-6	平垫圈 6	WASHER 6	1					
14	GB/T5783-M6x16	六角螺栓 M6x16	BOLT M6x16	1					
15	GB/T3452.1-30x3	O形圈 30x3	O-RING 30x3	1					
16	F4-04000030	油管夹簧 B	CLAMP SPRING B,FUEL PIPE	2					
17	F115-05000017	燃油定型管 A	FUEL PIPE A	1					EPA
18	F115-05000018	燃油定型管A护套	SHEATH,FUEL PIEP A	1					
19	F115-05040000	燃油泵组件	FUEL PUMP ASSY	1					
20	GB/T9074.14-M6x30	六角螺栓平垫组合 M6x30	BOLT M6x30	2					
21	F115-05000021	燃油管B φ7.5x φ14.3x150	OIL PIPE B ⌀7.5x⌀14.3x150	1					EPA
22	F115-05000019	燃油过滤器组件	FUEL FILTER ASSY	1					
23	F115-05000020	燃油过滤器护套	SHEATH,FUEL FILTER	1					
24	F115-05000074	油泵进油管 φ7.5x φ14.3x500	OIL PIPE ⌀7.5x⌀14.3x500	1					EPA
25	F40-05000041EI	燃油过滤器接头B	JOINT B,FUEL FILTER	1					
26	F115-05000075	进油管护套(尼龙护套7x430 ）	SHEATH(7x430)	1					
27	F115-05000079	油泵定型管（出）护套	SHEATH	1					
28	F115-05000078	油泵定型管（出）	SHAPING TUBE(OUT)	1					
29	F40-05000040EI	燃油过滤器接头A	JOINT A,FUEL FILTER	1					
30	F115-05050017	油泵电源连接线	POWER LINE,OIL PMP	1					
31	GB/T9074.14-M6x25	六角螺栓平垫组合 M6x25	COMBINATION BOLT M6x25	2					
32	F115-05000048	共轨	COMMON RAIL,FUEL OIL	1					
33	F115-05000047	燃油喷射器	FUEL INJECTOR	4					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SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-05050000	电动燃油泵组件	OIL PUMP ASSY	1					
2	GB/T818-M4x12	十字槽盘头螺钉 M4x12	SCREW M4x12	4					
3	GB/T96-4	大垫圈 4	BIG WASHER 4	5					
4	F115-05050006	面板	PLATE	1					
5	F115-05050007	面板密封圈	SEAL, PLATE	1					
6	GB/T818-M5x12	十字槽盘头螺钉 M5x12	SCREW M5x12	5					
7	F115-05050013	压力阀压板	PLATE, PRESSURE VALVE	1					
8	F115-05050008	压力阀组件	PRESSURE VALVE ASSY	1					
9	F115-05050009	压力阀	PRESSURE VALVE	1					
10	F115-05050012	压力阀衬圈	BUSHING, PRESSURE VALVE	1					
11	F115-05050010	压力阀 O 型圈 A	O-RING A, PRESSURE VALVE	1					
12	F115-05050011	压力阀 O 型圈 B	O-RING B, PRESSURE VALVE	1					
13	F115-05050014	油泵三通	THREE WAY, OIL PUMP	1					
14	F115-05050015	油泵回气管 A(EPA)	AIR PIPE A	1					
15	F115-05050016	油泵回气管 B(EPA)	AIR PIPE B	1					
16	GB/T818-M4x16	十字槽盘头螺钉 M4x16	SCREW M4x16	6					
17	GB/T93-4	弹性垫圈 4	SPRING WASHER 4	6					
18	F115-05050100	电动燃油泵本体组件	BODY ASSY, OIL PUMP	1					
19	F115-05050002	针阀座密封圈 8.8x1.5	SEAL, NEEDLE VALVE SEAT	1					
20	F115-05050001	针阀座	NEEDLE VALVE SEAT	1					
21	GB/T818-M4x8	十字槽盘头螺钉 M4x8	SCREW M4x8	2					
22	F115-05050200	针阀组件	NEEDLE VALVE ASSY	1					
23	F115-05050201	针阀	NEEDLE VALVE	1					
24	F115-05050202	针阀卡簧	CLAMP SPRING, NEEDLE VALVE	1					
25	F40-05100002EI	浮子销	PIN, FLOATER	1					
26	F115-05050003	浮子	FLOATER	1					
27	F115-05050301	油泵口胶套	RUBBER SLEEVE, OIL PUMP	1					
28	F115-05050300	油泵组件	OIL PUMP ASSY	1					
29	F115-05050303	油泵连接件	LINKER, OIL PUMP	1					
30	F115-05050304	连接件胶套	RUBBER SLEEVE, LINKER	1					
31	F115-05050302	油泵橡胶垫块	RUBBER PAD, OIL PUMP	1					
32	F115-05050305	油泵连接线	CONNECTION LINE, OIL PUMP	1					
33	F115-05050402	油杯密封圈	SEAL, OIL CAP	1					
34	F115-05050400	电动燃油泵油杯组件	OIL CAP ASSY, ELECTRIC PUMP	1					
35	GB/T93-5	弹性垫圈 5	SPRING WASHER 5	4					
36	F115-05050407	冷却器盖板	COOLER COVER	1					
37	F115-05050408	冷却器盖板密封垫	GASKET, COOLER COVER	1					
38	F115-05050406	油杯放油螺钉	DRAIN BOLT, OIL CUP	1					
39	F115-05050409	放油螺钉 O 型圈	O-RING, DRAIN BOLT	1					
40	F115-05050403	冷却器接头	JOINT, COOLER COVER	2					
41	F115-05050401	电动燃油泵油杯	OIL CAP, ELECTRIC PUMP	1					
42	F115-05050404	油杯放油嘴	OIL NIPPLE, OIL CUP	1					
43	F115-05050405	放油软管	CONDUIT TUBE	1					

Reduce fuel pressure

⚠ **Warning:**

Make sure to reduce the fuel pressure in the fuel line before maintaining the fuel line or high-pressure fuel pump. Otherwise, high-pressure fuel will be sprayed out, causing injury or accident.

1. Disconnect the joint of oil pump power supply connection line.

2. Start the engine.
   Note:
   Run at idle speed until the engine is cut off.

3. After the engine is turned off, turn the flywheel to rotate the crankshaft 2 or 3 times.
   ⚠ **Warning:**
   Do not turn the flywheel counterclockwise to avoid damage to the valve mechanism.

4. Turn the outboard motor startup switch to OFF.

5. Connect the joint of oil pump power supply connection line.

Check the oil filter cup

Before removing the oil filter cup, place a rag at the lower part to prevent spilled fuel from flowing around.

1. Disconnect the joint of water detection switch.

2. Disconnect fuel line.

3. Remove the nuts securing fuel filter assembly.

4. Remove the oil filter cup.

5. Remove oil filter cup holder.

6. Use a vacuum manometer to check whether the oil filter cup leaks.
   Specified pressure: 80kPa

7. Check whether the filter screen is blocked or there are sundries in it, and check whether the filter cup is damaged or leaked.
   Note:
   If necessary, clean it with gasoline or replace it

8. Re-mount the oil filter cup
   Note:
   Before reassembling the filter cup, apply engine oil to the O-ring.

Removal and inspection of fuel pump

1. Remove the bolts securing the fuel pump.

2. Remove the fuel pump.

3. Connect a vacuum manometer to the fuel pump inlet.

4. Plug the outlet of the oil pump and apply the specified positive pressure. Check for air leakage.
   Specified pressure: 50kPa

5. Apply a specified negative pressure. Check for air leakage.
   Specified pressure: 30kPa

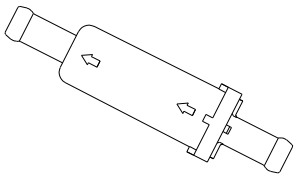
6. Connect a vacuum manometer to the fuel pump outlet.

7. Apply a specified negative pressure. Check for air leakage. If necessary, disassemble the oil pump and check it.
   Specified pressure: 50kPa

8. Remove the 4 bolts and separate the fuel pump cover and from the fuel pump seat.

Check the fuel filter

1. Remove the fuel filter from the fuel line.



2. Connect a vacuum manometer to the fuel filter.

3. Plug the outlet of the fuel filter and apply the specified positive pressure. Check for air leakage.
   Specified pressure: 200kPa

Remove and check the fuel injector

1. Reduce fuel pressure

2. Wrap a rag around the quick connector to prevent fuel spraying.

3. Remove the quick connector from the common rail.
   Note:
   Cover the quick connector and fuel rail with a plastic bag to prevent damage and protect them from dust.

4. Disconnect the joint of the fuel injector.

5. Remove the fuel injector and the common rail.

6. Check the fuel common rail. If there is crack or deformation, please replace it.

7. Check the electrical characteristics of the fuel injector.

8. Re-mount the common rail and fuel injector.

Check throttle body

1. Check the exterior of the throttle body. If there is crack, please replace it.

2. Turn the throttle valve manually and check its smooth movement.

3. Check the electrical characteristics of the throttle position sensor.

Check the intake manifold

1. Check the intake manifold. If there is crack or deformation, please replace it.

2. Check the exterior of the intake manifold air temperature and pressure sensor. If there is crack, please replace it.

3. Check the electrical characteristics of the intake manifold air temperature and pressure sensor.

Disassemble and check the carbon canister and carbon canister solenoid valve

1. Disconnect the line to the carbon canister.

2. Disconnect the power connector of the canister solenoid valve.

3. Remove the canister solenoid valve.

4. Remove the carbon canister and the bracket.

5. Remove the bracket from the carbon canister.

6. Check the carbon canister. If there are cracks, please replace it.

7. Connect a vacuum gauge to the atmospheric communication port and block the two ports on the other side.

8. Apply the specified positive pressure and check for air leakage. If there is leakage, please replace the carbon canister.
   Specified pressure: 19.6kPa

9. Check the exterior of the carbon canister solenoid valve. If there is crack, please replace it.

10. Check the functional characteristics of the carbon canister solenoid valve.

11. Assemble the carbon canister and carbon canister solenoid valve in reverse order according to the disassembly sequence.

Disassemble and check the electric fuel pump

Cover the fuel parts with a rag to prevent the fuel from overflowing.

1. Release the pressure in the fuel line.

2. Loosen the oil drain screw of the oil cup and drain the fuel in the electric fuel pump through the oil drain hose.

3. Disconnect the fuel line connected to the electric fuel pump, and disconnect the cooling water pipe and power cable connector.

Note:

Mark them before disconnecting the fuel line and the cooling water line to avoid connection error when re-mounting them.

4. Remove the oil cup drain screw and oil drain hose.

5. Remove the oil pump return pipe and oil pump tee.

6. Remove the pressure valve switch and the pressure valve.

7. Remove the cooler cover.

8. Remove the panel.

9. Remove the electric fuel pump body assembly.

10. Disconnect the oil pump connection line and remove the oil pump assembly.

11. Remove the screws fixing the float pin, remove the float pin and float.

12. Remove the screws fixing the needle valve assembly and remove the needle valve assembly.

13. Check the electrical characteristics of the high-pressure fuel pump. See section "Check the high-pressure fuel pump" (5-24).

14. Check the needle valve. If it is bent or worn, replace the needle valve assembly.

15. Check the float. If it is damaged or corroded, please replace it.

16. Check the screen filter on the rubber pad of the oil pump. If there is fuel colloid or other residues, please clean them.

17. Mount the float and invert the electric fuel pump body, and measure the float height.

Note:

When measuring the height of the float, the float should be placed on the needle valve. Do not pressurize the float.

Float height:

67.5 mm

18. Install the electric fuel pump assembly in reverse order of removing it.

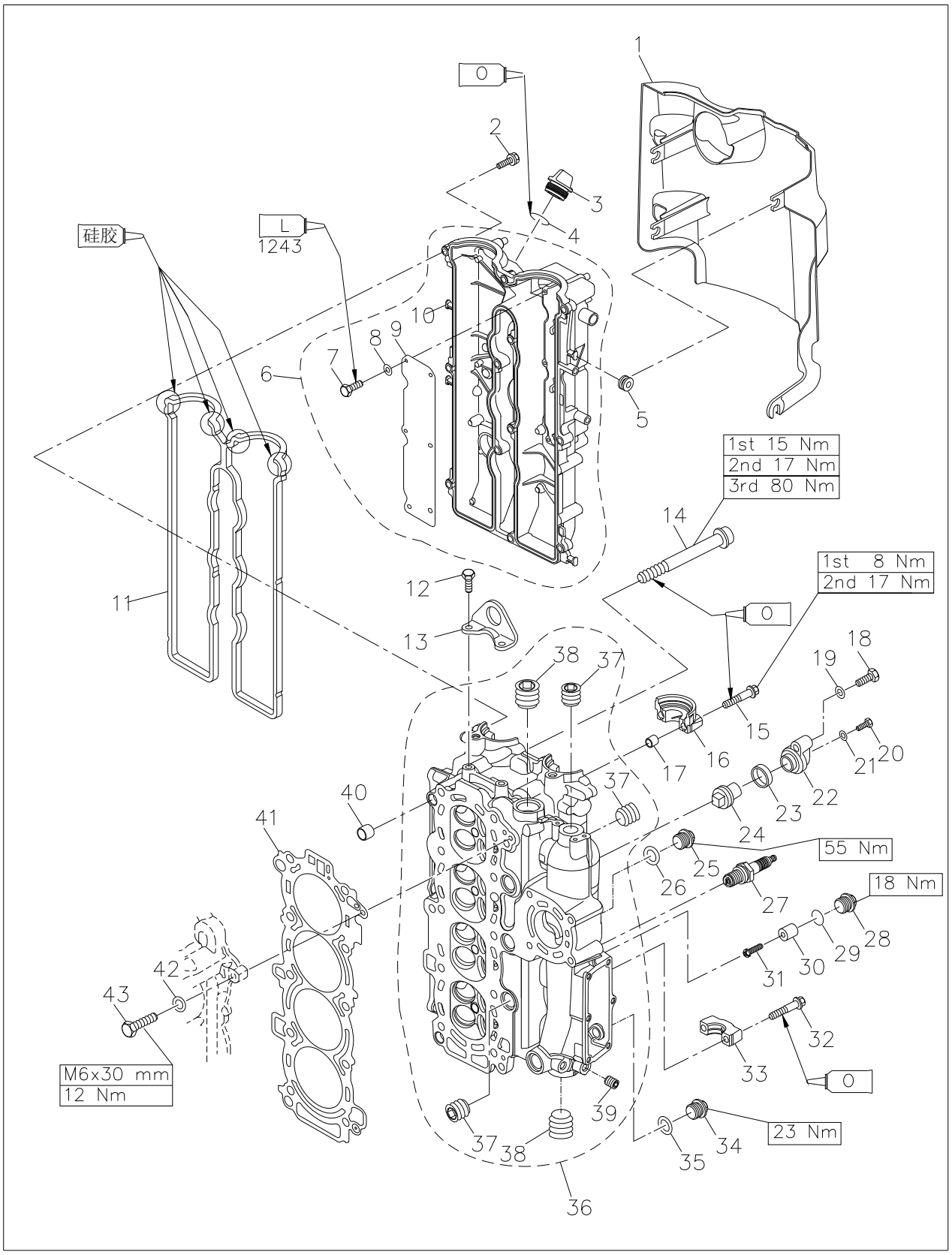
19. Connect the fuel line, the cooling water line and the power connection line according to the previous marks.

Engine

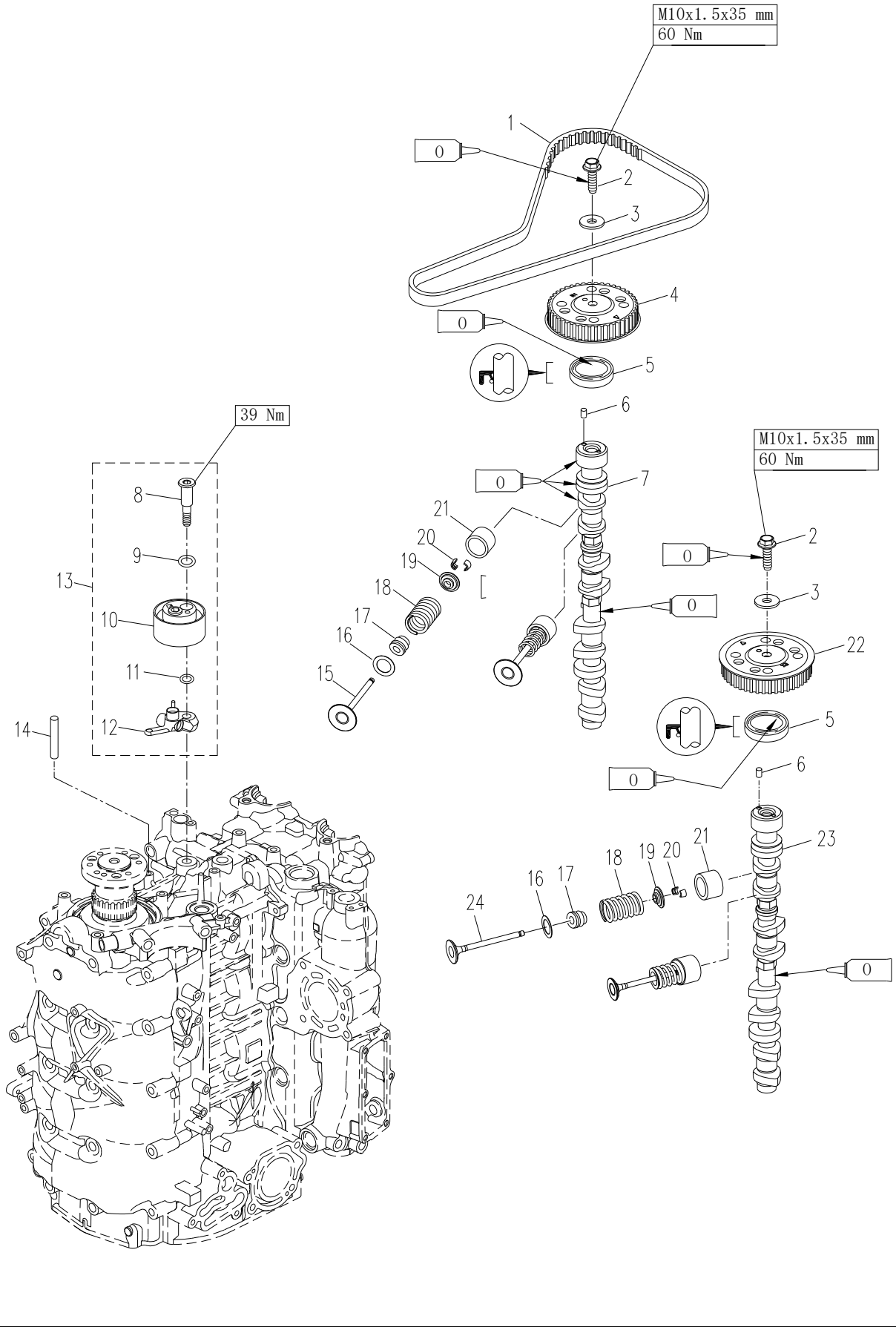
Matters needing attention

In order to avoid accidental start during engine maintenance, please take adequate protective measures to disconnect the ignition system. For example, remove the engine stop safety line from the emergency stop switch assembly, remove the spark plug cap from the spark plug.

Disassembly schematic diagram



SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-05000105	缸头罩护盖	COVER, CYLINDER HEAD	1					
2	GB/T9074.14-M6x30	六角螺栓平垫组合 M6x30	BOLT M6x30	12					
3	F15-07050004	加油口盖	FILLER CAP, ENGINE OIL	1					
4	JASO F404 31-025	加油口盖 O 形圈 24.4x3.1	O-RING 24.4x3.1	1					
5	F115-05000010	护盖减震圈	DAMPER, COVER	4					
6	F115-05000200	气缸头罩组件	COVER ASSY, CYLINDER HEAD	1					
7	GB/T5783-M4x8	六角螺栓 M4x8	BOLT M4x8	6					
8	GB/T97.1-4	平垫圈 4	WASHER 4	6					
9	F115-05000202	呼吸器盖板	PLATE, BREATHER	1					
10	F115-05000201	气缸头罩	COVER, CYLINDER HEAD	1					
11	F115-05000009	气缸头罩密封圈	SEAL RING	1					
12	GB/T5783-M8X25	六角螺栓 M8x25	BOLT M8x25	2					
13	F115-05000103	发动机悬挂钩	POTHOOK, ENGINE	1					
14	F115-05000008	六角花形凸缘螺栓 M10x1.5x110	FLANGE BOLT M10x1.5x110	10					
15	F115-05030012	盖板带垫螺栓 A	BOLT A	4					
16	F115-05030011	凸轮轴盖板 A	COVER A, CAMSHAFT	2					
17	F115-05030010	空心定位销 Φ9x7.5x8	HOLLOW PIN ⌀9x7.5x8	4					
18	GB/T5783-M8x40	六角螺栓 M8x40	BOLT M8x40	1					
19	GB/T97.1-8	平垫圈 8	WASHER 8	1					
20	GB/T5783-M6x20	六角螺栓 M6x20	BOLT M6x20	1					
21	F115-05030017	密封垫片 6	GASKET 6	1					
22	F115-05030015	阳极盖板	PLATE, ANODE	1					
23	F115-05030018	阳极密封圈	SEAL RING, ANODE	1					
24	F115-05030016	阳极	ANODE	1					
25	F40-05000037	堵塞	JAM	1					
26	F40-05000038	堵塞垫片	WASHER, JAM	1					
27	NGK LKR6E	火花塞 LKR6E	SPARK PLUG	4					
28	F20-05030009	阳极螺栓	ANODE BOLT	1					
29	GB/3452.1-13x2	O 型圈 13x2	O-RING 13x2	1					
30	F4-04070003	节温器盖阳极	ANODE	1					
31	GB/T818-M5x25	十字槽盘头螺钉 M5x25	SCREW M5x25	1					
32	F115-05030014	盖板带垫螺栓 B	BOLT B	16					
33	F115-05030013	凸轮轴盖板 B	COVER B, CAMSHAFT	8					
34	F15-04000002	放油螺栓	BOLT	1					
35	T85-05000003	放油螺栓密封垫	GASKET, BOLT	1					
36	F115-05030100	气缸头组件	CYLINDER HEAD ASSY	1					
37	F25-05010104A	堵塞 1/2″	PLUG 1/4″	8					
38	F115-05030019	堵塞 Rc3/4″	PLUG Rc3/4″	2					
39	F15-07010004	堵塞 1/8″	PLUG 1/8″	7					
40	F115-05000007	空心定位销 14x10.8x15.8	HOLLOW PIN 14x10.8x15.8	2					
41	F115-05000100	气缸垫组件	CYLINDER GASKET ASSY	1					
42	GB/T97.1-6	平垫圈 6	WASHER 6	1					
43	T3.6-04000017	缸头螺栓 M6x30	BOLT M6x30	1					


M10x1.5x35 mm
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39 Nm
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M10x1.5x35 mm
60 Nm
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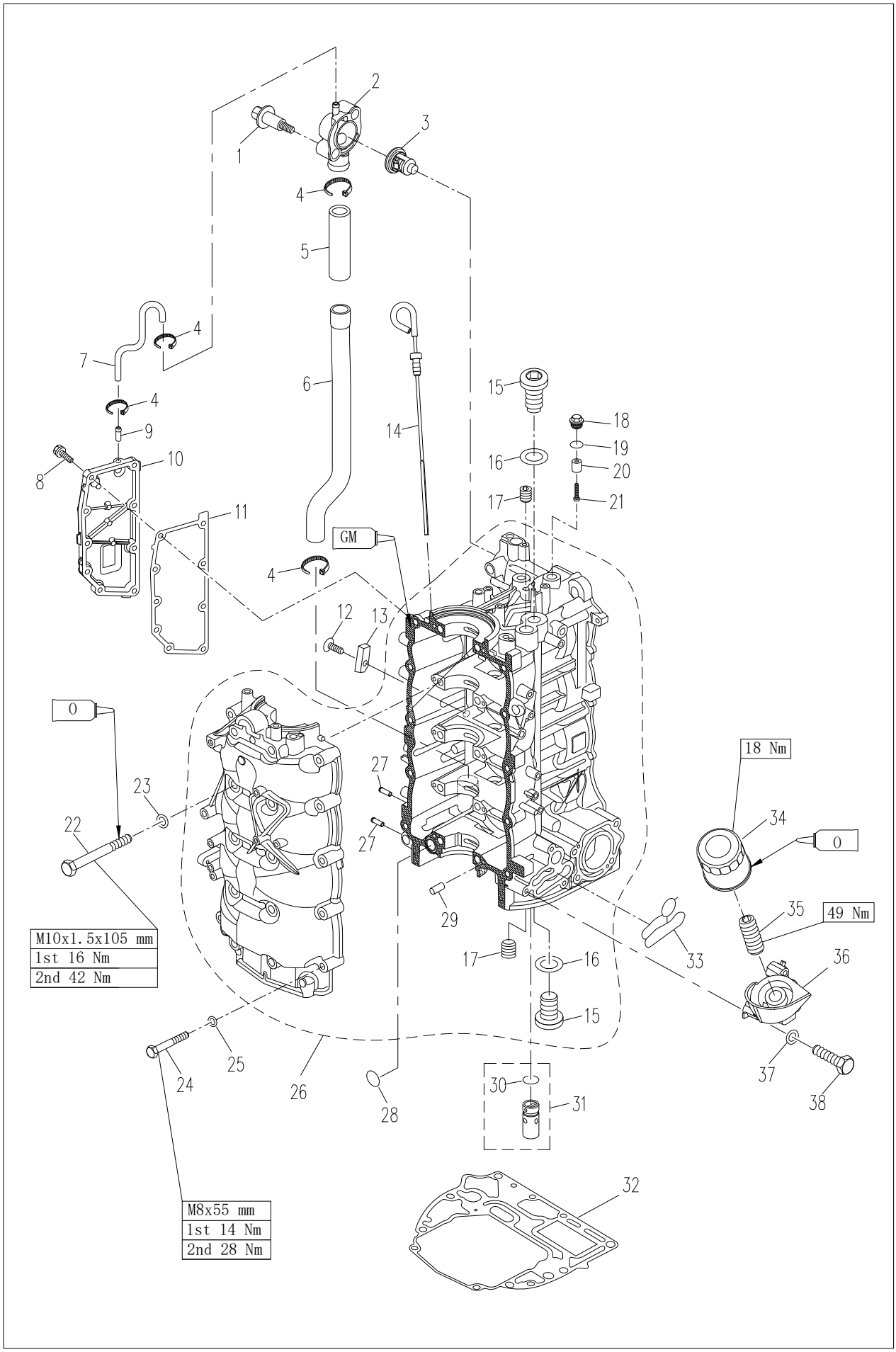
SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-05000091	正时皮带	TIMING BELT	1					
2	GB/T5783-M10x1.5x35	六角螺栓 M10x1.5x35	BOLT M10x1.5x35	2					
3	F25-05050018	从动轮垫圈	WASHER	2					
4	F115-05030021	从动轮 A	DRIVEN WHEEL A	1					
5	F115-05030009	凸轮轴油封 38x52x6	OIL SEAL 38x52x6	2					
6	F115-05030020	定位销 5x10	LOCATING PIN 5x10	2					
7	F115-05030007	进气凸轮轴	INTAKE CAMSHAFT	1					
8	F115-05000910	涨紧轮螺栓	BOLT, TIGHTENING WHEEL	1					
9	F115-05000908	螺栓垫片	BOLT WASHER	1					
10	F115-05000912	涨紧轮轴承组件	BEARING ASSY, TIGHTENING WHEEL	1					
11	F115-05000909	涨紧轮垫片	WASHER, TIGHTENING WHEEL	1					
12	F115-05000902	涨紧器	TENSIONER	1					
13	F115-05000900	皮带涨紧轮组件	TIGHTENING WHEEL ASSY	1					
14	F115-05000903	涨紧轮定位销	PIN, TIGHT ROUND	1					
15	F115-05030001	进气门	INTAKE VALVE	8					
16	F25-05050003	气门弹簧垫圈	WASHER, VALVE SPRING	16					
17	PS-2700.04.03	气门油封	OIL SEAL, VALVE	16					
18	F115-05030005	气门弹簧	VALVE SPRING	16					
19	F15-07040006	气门弹簧座圈	SEAT RING, VALVE SPRING	16					
20	F15-07040007	气门弹簧卡圈	CIRCLIP, VALVE SPRING	32					
21	F115-05030006	气门挺柱	TAPPET , VALVE	16					
22	F115-05030022	从动轮 B	DRIVEN WHEEL B	1					
23	F115-05030008	排气凸轮轴	EXHAUST CAMSHAFT	1					
24	F115-05030002	排气门	VALVE, EXHAUST	8					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35
36
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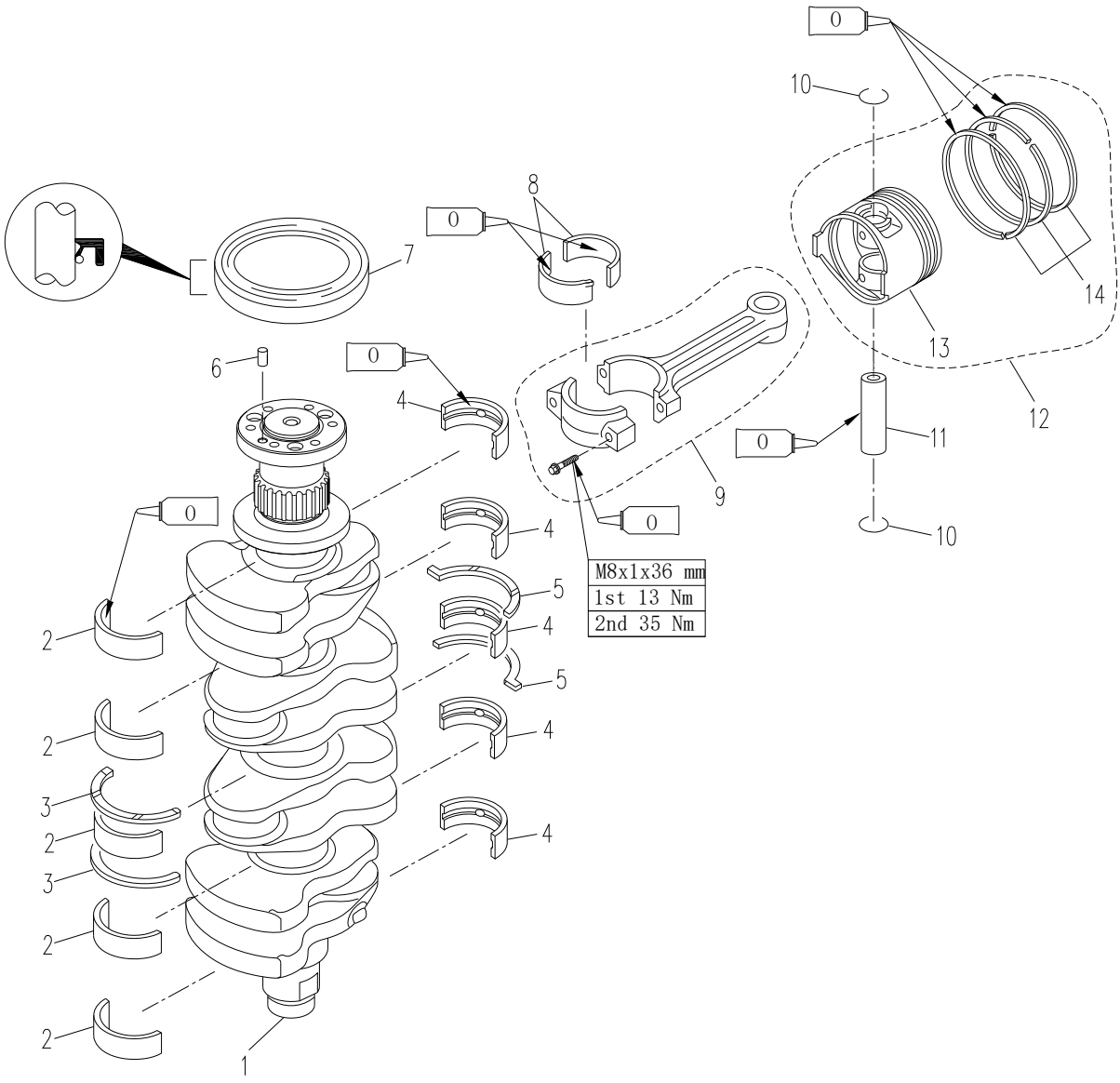
18 Nm
49 Nm
M10x1.5x105 mm
1st 16 Nm
2nd 42 Nm
M8x55 mm
1st 14 Nm
2nd 28 Nm

SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-05000034	节温器盖螺栓	BOLT, THERMOSTAT COVER	2					
2	F115-05000033	节温器盖	COVER, THERMOSTAT	1					
3	F115-05000032	节温器	THERMOSTAT	1					
4	HT5x200	尼龙扎带 5x200	CLAMP 5x200	4					
5	F115-05000037	水管护套 C(尼龙护套 25x320)	SHEATH C, WATER PIPE	1					
6	F115-05000035	定型水管 C	WATER PIPE C	1					
7	F115-05000038	定型水管 D	WATER PIPE D	1					
8	GB/T9074.14-M6x25	六角螺栓平垫组合 M6x25	BOLT M6x25	9					
9	F4-04010102	出水嘴	WATER OUTLET	1					
10	F115-05000031	水道盖板	COVER, WATERCOURSE	1					
11	F115-05000030	水道盖板密封垫	GASKET, WATERCOURSE	1					
12	GB/T819.2-M6x20	十字槽沉头螺钉 M6x20	SCREW M6x20	1					
13	F115-05000029	水道盖板阳极	ANODE, WATERCOURSE	1					
14	F115-00000200	机油尺组件	OIL LEVEL ASSY	1					
15	F115-05010006	堵塞 M18x1.5	JAM M18x1.5	2					
16	F115-05010007	堵塞垫片	WASHER, JAM	2					
17	F25-05010104A	堵塞 1/2″	JAM 1/2″	2					
18	F20-05030009	阳极螺栓	BOLT, ANODE	1					
19	GB/T3452.1-13x2	O 型圈 13x2	O-RING 13x2	1					
20	F4-04070003	节温器盖阳极	THERMOSTAT ANODE	1					
21	GB/T818-M5x25	十字槽盘头螺钉 M5x25	SCREW M5x25	1					
22	F115-05010004	六角螺栓 M10x1.5x105	BOLT M10x1.5x105	10					
23	GB/T97.1-10	平垫圈 10	WASHER 10	10					
24	F15-07000029	机体螺栓 M8x55	BOLT M8x55	10					
25	GB/T97.1-8	平垫圈 8	WASHER 8	10					
26	F115-05010000	机体机座组件	CRANKCASE ASSY	1					
27	F4-04010102A	气嘴	GAS NOZZLE	1					
28	GB/T3452.1-19.2x1.9	O 形圈 19.2x1.9	O-RING 19.2x1.9	1					
29	F115-00000006	定位销 ⌀6x12	DOWEL PIN ⌀6x12	10					
30	F115-05010204	溢流阀 O 形圈 14.8x2.2	O-RING 14.8x2.2, RELIEF VALVE	1					
31	F115-05010200	溢流阀组件	RELIEF VALVE ASSY	1					
32	F115-00000007	发动机密封垫	GASKET, ENGINE	1					
33	F115-05000026	机油滤清器密封圈	RING, OIL FILTER	1					
34	F25-05000100	机油滤清器	OIL FILTER	1					
35	F15-07010003	机滤螺柱 M20x1.5x35	BOLT M20x1.5x35	1					
36	F115-05000025	机油滤清器支架	BRACKET, OIL FILTER	1					
37	GB/T97.1-6	平垫圈 6	WASHER 6	3					
38	GB/T5782-M6x40	六角螺栓 M6x40	BOLT M6x40	3					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11
12
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9
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M8x1x36 mm
1st 13 Nm
2nd 35 Nm
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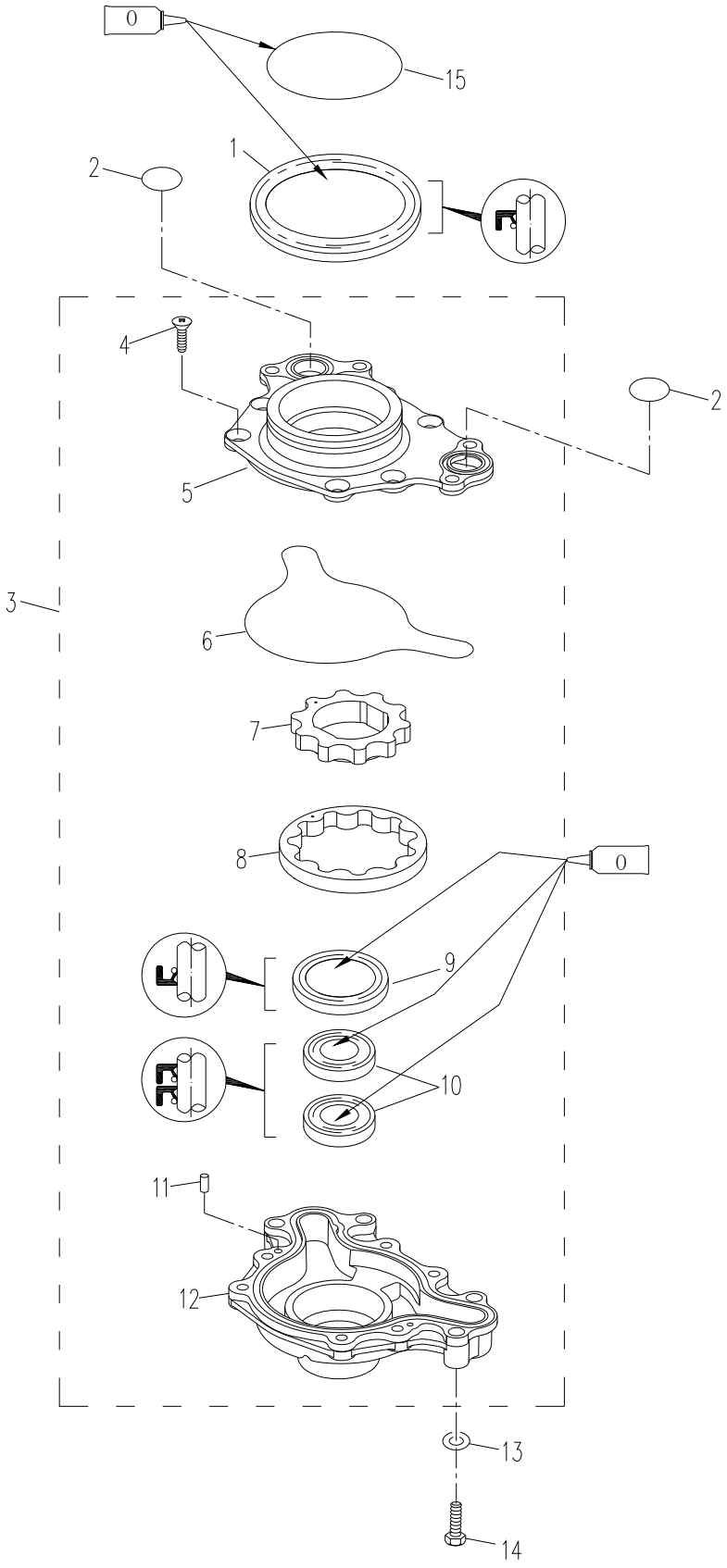
1

SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-05000001	曲轴	CRANKSHAFT	1					
2	F115-05010003-1	曲轴轴瓦B(蓝色)	BEARING SHELL B, CRANKSHAFT	5					BLUE
	F115-05010003-2	曲轴轴瓦B(绿色)	BEARING SHELL B, CRANKSHAFT						GREEN
	F115-05010003-3	曲轴轴瓦B(红色)	BEARING SHELL B, CRANKSHAFT						RED
3	F115-05000005	曲轴定位片B	SPACER A, CRANKSHAFT	2					
4	F115-05010002-1	曲轴轴瓦A(蓝色)	BEARING SHELL A, CRANKSHAFT	5					BLUE
	F115-05010002-2	曲轴轴瓦A(绿色)	BEARING SHELL A, CRANKSHAFT						GREEN
	F115-05010002-3	曲轴轴瓦A(红色)	BEARING SHELL A, CRANKSHAFT						RED
5	F115-05000004	曲轴定位片A	SPACER A, CRANKSHAFT	2					
6	F15-00000006	定位销 φ6x12	DOWEL PIN φ6x12	1					
7	F115-05000003	曲轴油封A φ85xφ103x7	OIL SEAL A φ85xφ103x7	1					
8	F115-05020203-1	连杆轴瓦(蓝色)	BEARING SHELL, CONNECTING ROD	8					BLUE
	F115-05020203-2	连杆轴瓦(绿色)	BEARING SHELL, CONNECTING ROD						GREEN
	F115-05020203-3	连杆轴瓦(红色)	BEARING SHELL, CONNECTING ROD						RED
9	F115-05020200	连杆组件	CONNECTING ROD ASSY	4					
10	F115-05020104	活塞销挡圈	CIRCLIP, PISTON PIN	8					
11	F115-05020103	活塞销	PIN, PISTON	4					
12	F115-05020100	活塞组件	PISTON ASSY	4					
13	F115-05020101	活塞	PISTON	4					
14	F115-05020102	活塞环组件	PISTON RING ASSY	4					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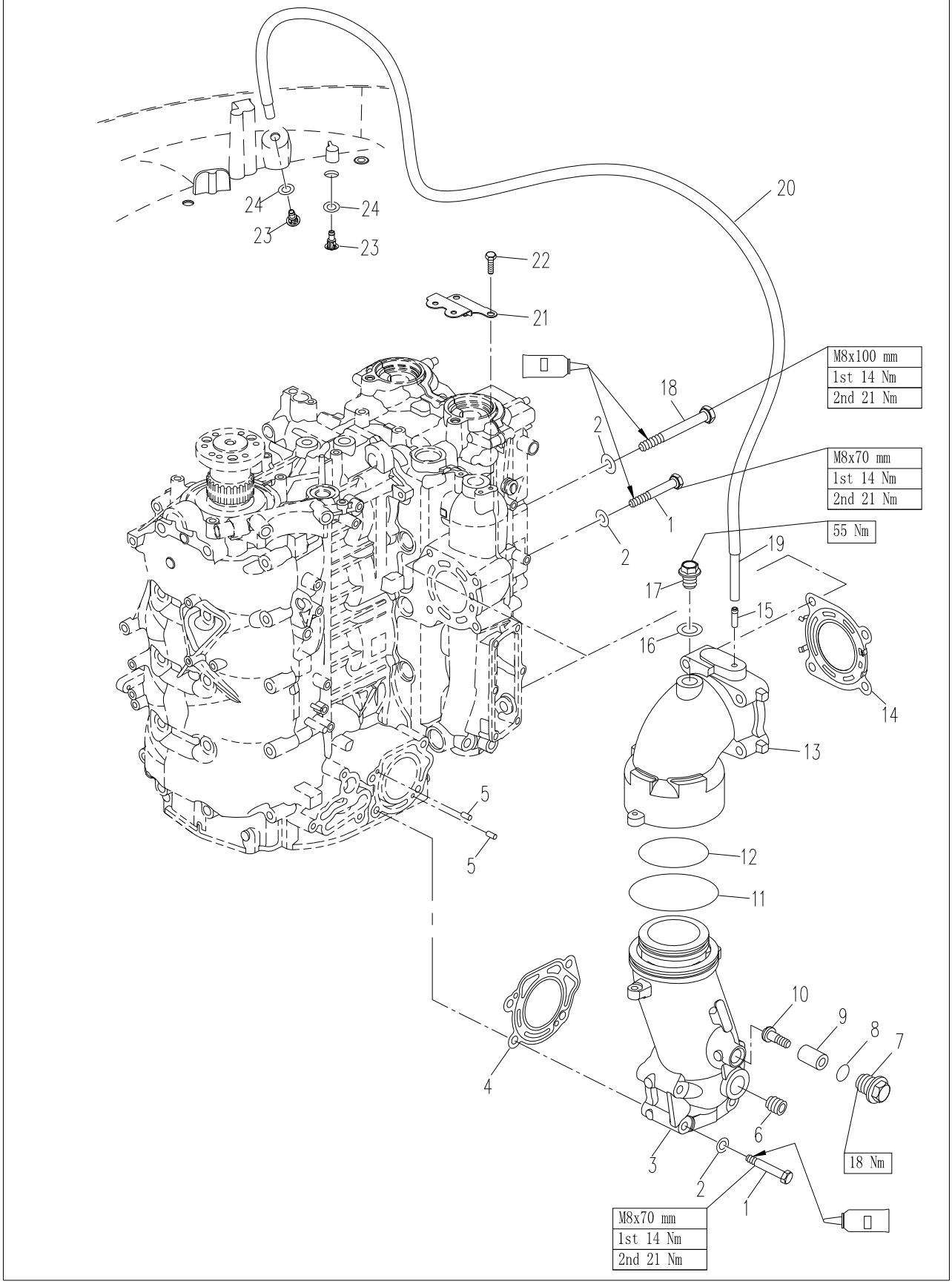
SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-05080009	机油泵油封	OIL SEAL,OIL PUMP	1					
2	JASO F404 19-019	O 形圈 19x1.9	O-RING 19x1.9	2					
3	F115-05080000	机油泵组件	OIL PUMP ASSY	1					
4	GB/T819.1-M6x14	十字槽半沉头螺钉 M6x14	SCREW M6x14	6					
5	F115-05080008	机油泵盖	COVER,OIL PUMP	1					
6	F115-05080004	异形密封圈	SEAL RING	1					
7	F115-05080006	油泵内转子	INNER ROTOR,OIL PUMP	1					
8	F115-05080007	油泵外转子	OUTER ROTOR,OIL PUMP	1					
9	F115-05080003	油封 B 34x45x6.5	OIL SEAL B 34x45x6.5	1					
10	F115-05080002	油封 A 22.4x33x5	OIL SEAL A 22.4x33x5	2					
11	F115-05080005	定位销 3x8	LOCATING PIN 3x8	2					
12	F115-05080001	机油泵体	BODY,OIL PUMP	1					
13	GB/T97.1-6	平垫圈 6	WASHER 6	4					
14	GB/T5782-M6x40	六角螺栓 M6x40	BOLT M6x40	4					
15	GB/T3452.1-64x2	O 形圈 64x2	O-RING 64x2	1					


M8x100 mm
1st 14 Nm
2nd 21 Nm
M8x70 mm
1st 14 Nm
2nd 21 Nm
55 Nm
18 Nm
M8x70 mm
1st 14 Nm
2nd 21 Nm
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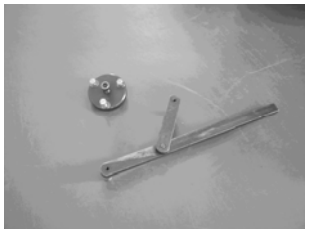
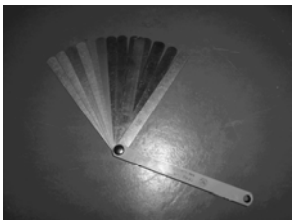
SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	GB/T5782-M8x70	六角螺栓 M8x70	BOLT M8x70	6					
2	GB/T97.1-8	平垫圈 8	WASHER 8	8					
3	F115-05000301	排气管 A	EXHAUST A	1					
4	F115-05000023	排气管密封垫 A	GASKET A, EXHAUST PIPE	1					
5	F115-05030020	定位销 Φ5x10	DOWEL PIN Φ5x10	2					
6	F25-05010104A	堵塞 1/2″	JAM 1/2″	1					
7	F20-05030009	阳极螺栓	BOLT, ANODE	1					
8	GB/T3452.1- ⌀13x ⌀2	O 型圈 ⌀13x ⌀2	O-RING⌀13x ⌀2	1					
9	F4-04070003	节温器盖阳极	ANODE	1					
10	GB/T818-M5x25	十字槽盘头螺钉 M5x25	SCREW M5x25	1					
11	GB/T3452.1- ⌀85x ⌀	301型圈 ⌀85x ⌀3.1	O-RING⌀85x ⌀3.1	1					
12	GB/T3452.1- ⌀65x ⌀	301型圈 ⌀65x ⌀3.1	O-RING⌀65x ⌀3.1	1					
13	F115-05000304	排气管 B	EXHAUST B	1					
14	F115-05000024	排气管密封垫 B	GASKET B, EXHAUST PIPE	1					
15	F4-04010102A	气嘴	GAS NOZZLE	1					
16	F40-05000038	堵塞垫片	GASKET, JAM	1					
17	F40-05000037	堵塞 M18x1.5	JAM M18x1.5	1					
18	GB/T5782-M8x100	六角螺栓 M8x100	BOLT M8x100	2					
19	F115-05000101	回水管 ⌀5x ⌀10x915	WATER PIPE ⌀5x ⌀10x915	1					
20	F115-05000102	回水管护套	SHEATH, WATER PIPE	1					
21	F115-05000040	回气管固定板	FIXED PLATE, EXHAUST PIPE	1					
22	GB/T5783-M6x12	六角螺栓 M6x12	BOLT M6x12	2					
23	F115-03000014	塑料出水嘴	WATER NOZZLE, PLASTIC	2					
24	F115-03000014-1	出水嘴垫圈	WASHER, WATER NOZZLE	2					

Special tool

Piston slideway



Flywheel gripper and flywheel puller



Clearance gauge

Oil filter spanner

Check the compression pressure

1. Start the outboard motor, warm it up at idle speed for 5 minutes, and then turn it off.

2. Remove the spark plug and connect the pressure gauge to the spark plug hole.
Note:
Before removing the spark plug, clean the pit where the spark plug is installed with compressed air to prevent dust or other sundries from entering the cylinder.

3. Fully open the throttle, turn the crankshaft (start), and check the cylinder pressure when the reading on the pressure gauge is stable.
Note:
When checking cylinder pressure, do not change throttle opening.

4. If the detected pressure is lower than the specified value or there is a difference between cylinders, add a small amount of oil into the cylinders and then detect it again.
5. Compression pressure: 945 kPa
Note:
If the cylinder pressure continues to increase, check whether the piston and piston ring are damaged. Replace it if necessary.
If cylinder pressure does not increase, check valve clearance, valve, valve seat, cylinder liner, cylinder head and cylinder head seal ring. Adjust or replace them if necessary.

Check oil pressure

1. Start the engine, warm it up for 5 minutes, and then shut it down.

2. Remove the oil pressure sensor and connect the pressure gauge.
Note:
Use a pressure gauge with 1/8 pitch thread adapter.

3. Test oil pressure
Oil pressure (reference data): 440kpa (at idle speed)
660kpa（@3000 r/min）
Note:
The actual oil pressure varies according to temperature and oil viscosity.

Check valve clearance

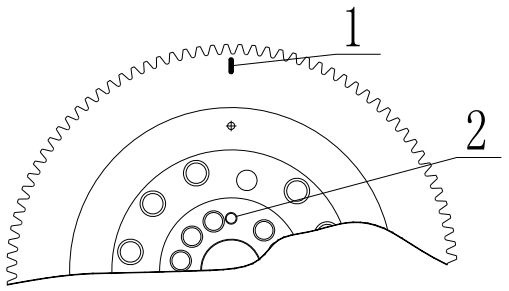
Please measure the valve clearance when the engine is cold.

Note:

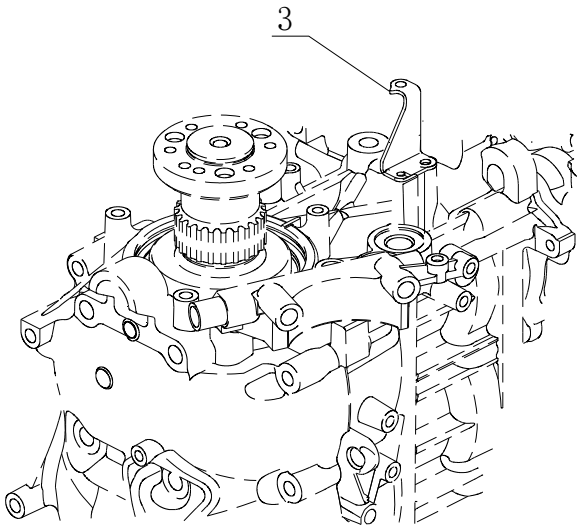
Don't turn the flywheel counterclockwise. Otherwise, the valve mechanism will be damaged.

1. Remove the spark plug.

2. Turn the flywheel clockwise until the mark on the flywheel is aligned with the indicator mounted on the box, making sure that the " " marks on the two driven pulleys are opposite.



1. Timing mark; 2. Pin hole.

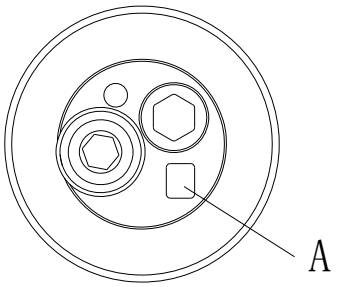


3. Ignition indicator

3. Turn the timing belt tensioner with a hexagon wrench clockwise and insert a 5mm pin into hole A
on the tensioner.

Note:

Turn the tensioner with a force less than 15Nm.



4. Remove the timing belt.

5. Remove the tensioner assembly.

Note:

Do not pull out the 5mm pin

6. Remove the bolts that hold the driven pulley with the flywheel gripper and remove the driven pulley.

7. Remove cylinder head cover.

8. Mount the driven pulley and fasten the pulley bolts with the flywheel gripper.

9. Screw the timing belt in the order of crankshaft end, driven pulley B ("EX") and driven pulley A ("IN" mark).

Note:

Do not apply oil or grease to the timing belt.

Ensure that the characters on the belt are mounted upwards

10. Tighten the timing belt and keep the belt and pulley in meshing.

11. Mount the belt tensioner assembly.

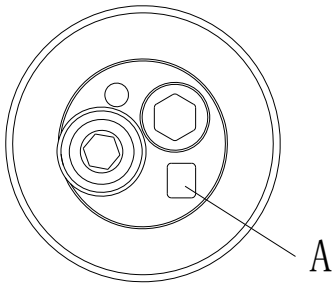
12. Align the swing arm hole of the tensioner in the tensioner assembly with the positioning hole on the body, and insert the tensioner positioning pin.

13. Tighten the bolts of the tensioner.

14. Turn the tensioner gradually clockwise with a hexagon wrench and remove the 5mm pin previously inserted from hole A.

Note:

Turn the tensioner with a force less than 15Nm.



15. Turn the timing belt tensioner gradually counterclockwise until the timing belt is in tightened position.

16. Measure and record the clearance between the specified cylinder cam and the valve tappet with a clearance gauge.

Valve clearance (cold state) Intake valve clearance 0.17~0.24 mm

Exhaust valve clearance 0.31~0.38 mm

17. Designated cylinder.

	No.1	No.2	No.3	No.4
IN (intake)	√	√	×	×
EX (exhaust)	√	×	√	×

x: Unmeasurable valve clearance

√: Measurable valve clearance

18. Turn the flywheel clockwise until the mark on the flywheel is aligned with the indicator mounted on the box, making sure that the “EX" and “IN” marks on the two driven pulleys are opposite.

19. Measure and record the clearance between the specified cylinder cam and the valve tappet with a clearance gauge.

	No.1	No.2	No.3	No.4
IN (intake)	×	×	√	√
EX (exhaust)	×	√	×	√

x: Unmeasurable valve clearance

√: Measurable valve clearance

20. Remove the two driven pulleys according to the aforementioned method and steps.

21. Mount the cylinder head cover.

Note:

Use a new cylinder head cover sealing ring and apply silica gel as shown in the exploded view.

22. Mount the driven pulley and fasten the pulley bolts with the flywheel gripper.

Specified torque: 60 Nm

23. Screw the timing belt in the order of crankshaft end, driven pulley B ("EX”) and driven pulley A ("IN" mark).

Note:

Do not apply oil or grease to the timing belt.

Ensure that the characters on the belt are mounted upwards

24. Tighten the timing belt and keep the belt and pulley in meshing.

25. Mount the belt tensioner assembly.

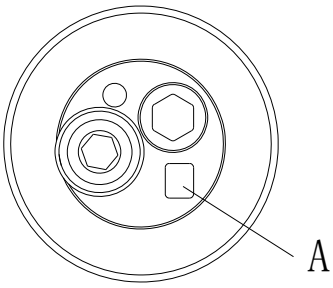
26. Align the swing arm hole of the tensioner in the tensioner assembly with the positioning hole on the body, and insert the tensioner positioning pin.

27. Slightly tighten the tensioner bolts.

28. Turn the tensioner gradually clockwise with a hexagon wrench and remove the 5mm pin previously inserted from hole A.

Note:

Turn the tensioner with a force less than 15Nm.



29. Turn the timing belt tensioner gradually counterclockwise until the timing belt is in tightened position.

30. Tighten the bolts of the tensioner at specified torque.
Specified torque: 39 Nm

31. Adjust the timing belt height so that it is located in the middle of the pulley.

32. When the mark on the flywheel is aligned with the indicator mounted on the box, make sure that the "▲" marks on the two driven pulleys are opposite.

33. Turn flywheel 2 a circle clockwise and check that the "▲" mark on the driven pulley is aligned.

34. Mount the spark plug and lock it at the specified torque.
Specified torque: 25 Nm

Adjust valve clearance

If the measured valve clearance exceeds the specified range, the valve tappet needs to be replaced.

Valve clearance (cold state) Intake valve clearance 0.17~0.24 mm
Exhaust valve clearance 0.31~0.38 mm

Note:

When the engine is cold, adjust the valve clearance.

Do not turn the flywheel magnet counterclockwise. Otherwise, the pump impeller will be damaged.

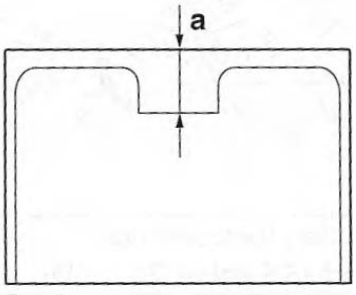
The steps are as follows:

1. Remove cylinder head cover. Refer to steps 1-15 in the section "Check the valve clearance".

2. Check the valve clearance. Refer to steps 16-19 in the section "Check the valve clearance".

3. Remove the camshaft cover plate A&B, remove the camshaft; Remove the valve tappet of the valve where the valve clearance does not conform to the regulations.

4. Measure the thickness a of the valve tappet shown in the figure below.



5. Calculate the required thickness of the replaced valve tappet based on the formula.
Formula:
Required thickness of the valve tappet = a + measured valve clearance -specified valve clearance

6. Load the selected valve tappet into the cylinder head, then mount the camshaft and camshaft cap.

7. Mount the cylinder head cover with reference to steps 20-34 in the section "Check the valve clearance".

Remove the engine

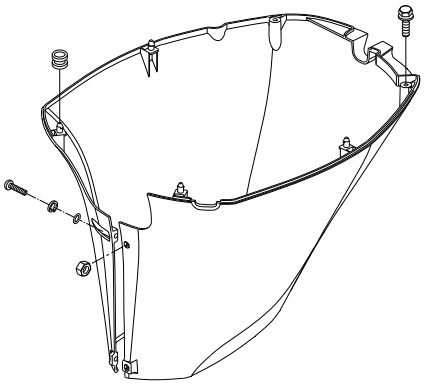
1. Open the top cover.

2. Remove the flywheel cover.

3. Disconnect the oil line, cooling water line and electrical wiring harness connector.

4. Remove the electrical parts and fuel system components with reference to the two sections Electrical System and Fuel System.

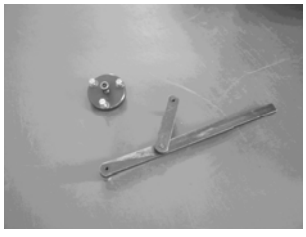
5. Remove the housing of the water unit.



6. Remove the bolts connecting the engine and the water unit.

7. Lift the engine with a crane and remove the engine locating pin.

8. Remove the flywheel with special tools, remove the flywheel locating pin and keep it well.



Flywheel gripper and flywheel puller

9. Remove relevant parts according to the exploded view of the two sections Electrical System and Fuel System.

10. Disconnect the control system with reference to the exploded view on page P85.

Pulley and timing belt

1. Remove the timing belt and driven pulley with reference to steps 1-4 in the section "Check the valve clearance".

2. Check pulley and timing belt for cracks, damage or wear. Replace it if necessary.

3. Check the tooth profile of crankshaft-end pulley for cracks, damage or wear. Replace it if necessary

4. Mount the timing belt and driven pulley with reference to steps 22-33 in the section "Check the valve clearance"

Disassembly and inspection

Cylinder cover
disassembly

1. Remove the timing belt and driven pulley with reference to steps 1-4 in the section "Check the valve clearance".

2. Remove the bolts of the cylinder head cover and remove the cylinder head cover.

3. Remove the cylinder head bolts in reverse order according to the numerical symbols on the cylinder head.

4. Remove the cylinder head.

5. Turn the driven pulley 90° counterclockwise with the flywheel gripper.

6. Remove the camshaft cover A&B.
Note:
Arrange the removed camshaft cover plates in sequence to avoid confusion during installation.

7. Remove the valve tappet.
Note:
Arrange the removed valve tappet in sequence to avoid confusion during installation.

8. Remove the intake and exhaust valves using the valve spring compressor.

Check the valve tappet

Check the outer diameter and appearance of the valve tappet. Replace it if damaged, scratched or worn.

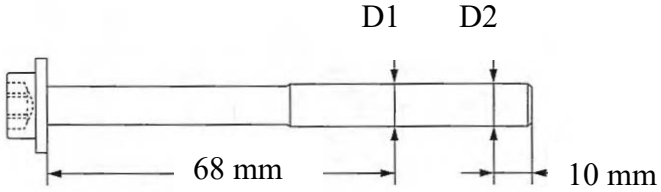
Outer diameter of valve tappet: 27.965～27.375 mm

Check the driven pulley

Check whether the driven pulley is deformed, cracked and worn; If yes, replace it.

Check the cylinder head bolts

Measure D1 and D2 at specified measuring points. Calculate the value of D2 minus D1. If it is greater than 0.17mm, replace it.



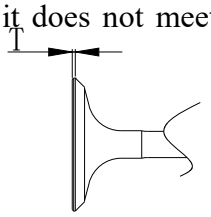
Valve and valve guide

1. Check the width of valve sealing surface; If it is not within the prescribed scope, Trim the valve seat ring.

Width of sealing surface:

Intake valve	1.10～1.50 mm
Exhaust valve	1.10～1.50 mm

2. Check the valve edge thickness T; Replace the valve if it does not meet the specified value.



Valve edge thickness:

Intake valve	0.8～1.2 mm
Exhaust valve	1.0～1.4 mm

3. Check valve stem diameter. If it is not within the prescribed scope, replace the valve.

Valve stem diameter:

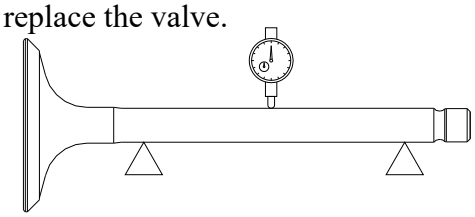
Intake valve	5.475～5.490mm
Exhaust valve	5.460～5.475mm

Note:

When replacing the valve, be sure to use new valve guide and valve oil seal.

4. Check valve stem runout. If it is beyond the limit, replace the valve.

Valve stem runout limit: 0.01mm



5. Check the inner diameter of the valve guide.

Valve guide inner diameter: 5.504～5.522mm

6. Calculate the clearance between valve stem and valve guide hole. If it exceeds the clearance range, please replace it

Intake valve	0.014～0.047mm
Exhaust valve	0.029～0.062mm

Valve spring

1. Check the free length of valve spring; Replace it if it is less than the specified value.

Minimum free length: 41.2 mm

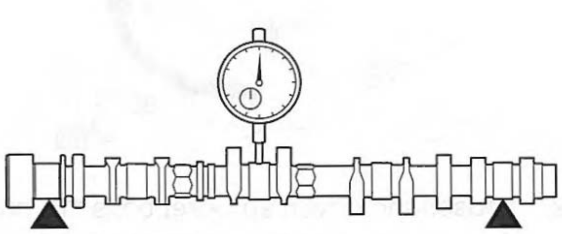
2. Check the inclination of the valve spring; Replace it if it is beyond the limit.
   Inclination limit: 1.8 mm

Camshaft

1. Check the cam dimensions.
   Replace the camshaft if necessary.

Intake cam height	41.011~41.111 mm
Exhaust cam height	41.260~41.360 mm

2. Check camshaft radial runout.
   Replace it if necessary.
   Runout limit: 0.03mm



3. Check camshaft bearing journal diameter and camshaft cover inner diameter. Replace it if necessary.
   Diameter of camshaft bearing journal: 24.960~24.980 mm
   Inner diameter of camshaft cover: 25.000~25.021mm

Replace valve guide

1. Knock off the valve guide from the combustion chamber side.

2. Knock in the new valve guide from the top surface of the cylinder head.
   Mounting height: 11.3～11.7 mm
   Note:
   Apply oil to the surface of the valve guide before installation.

3. Hinge the inner diameter of the guide to the specified value with a reamer.
   Valve guide inner diameter: 5.504～5.522mm
   Note:
   When reaming, turn the reamer clockwise;
   Do not rotate the reamer counterclockwise when taking it out;
   Make sure that metal debris generated by reaming is removed.

Check valve seat ring

1. Remove carbon deposit from the valve.

2. Coat a thin layer of dye evenly on the sealing surface of the valve seat ring.

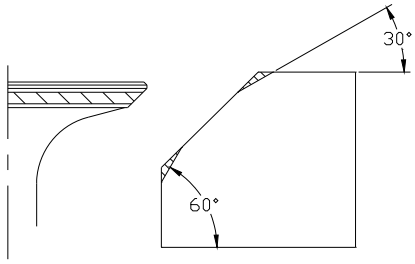
3. Grind the valve on the valve seat with the valve grinding tool.

4. Measure the width of valve sealing surface.
   Dye will stick to the valve sealing surface.
   If the valve and valve seat ring fit incorrectly or the sealing surface width does not meet the specified value, trim the valve seat.
   If the contact surface is uneven, replace the valve guide.
   Width of valve sealing surface: 1.1～1.5 mm

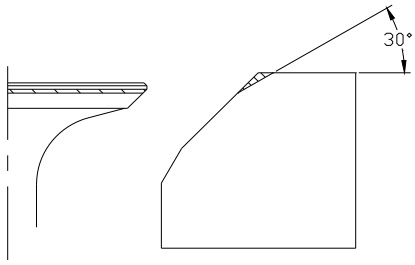
Trim the valve seat ring

1. Trim the valve with a 45° valve seat ring cutter and adjust the width of the sealing surface. Turn the cutter clockwise until the surface of the seat ring is smooth.

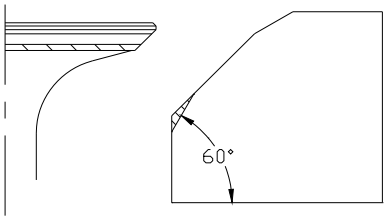
2. If the valve sealing surface is too wide and in the middle of the valve surface, trim the top edge of the seat ring with a 30° cutter and trim the bottom edge of the seat ring with a 60° cutter, and adjust the width of the sealing surface.



3. If the valve sealing surface is too narrow and at the top edge of the valve surface, trim the top edge of the seat ring with a 30° cutter, and adjust the width of the sealing surface with a 45 tool.



4. If the valve sealing surface is too narrow and at the bottom edge of the valve surface, trim the bottom edge of the seat ring with a 60° cutter, and adjust the width of the sealing surface with a 45° cutter (if any).



5. Apply a thin layer of abrasive evenly to the valve seat ring, and grind the valve with a valve grinding tool.

6. Remove the residual abrasive.

7. Check the width of valve sealing surface again.

Note:

Do not excessively cut the valve, and turn the cutter evenly with a downward force of 40 ~ 50N.

Do not stick the abrasive on the valve stem and valve guide.

Assemble and mount the cylinder head

1. Install a new valve oil seal and apply engine oil to the valve guide.

2. Install the valve, valve spring plate, valve spring and spring seat in sequence.

3. Compress the valve spring with the valve spring compressor and install the valve spring retainer.

4. Tap the valve spring seat with a plastic or rubber hammer to secure the retainer.

5. Install the valve tappet.

6. Install the camshaft and tighten the camshaft cover bolts at the specified torque and in sequence.

Specified torque: First time 6 Nm

13 Nm for the second time

Tightening sequence: Cylinder No.1 position -Cylinder No.3 position-Cylinder No.4 position-Cylinder No.2 position-Driven pulley end position

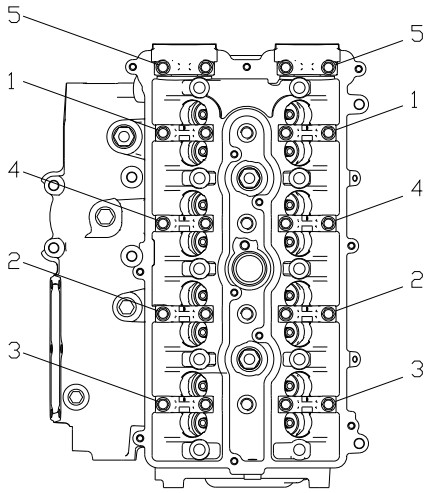
7. Turn the driven pulley with the flywheel gripper, and align the "▲" marks on the two driven pulleys for next mounting steps.

8. Install cylinder head bolts and tighten them in the specified order and torque.

Specified torque: 15 Nm for the first time

30 Nm for the second time

80 Nm for the third time



9. Mount the cylinder head cover.

Note:

Use a new sealing ring and apply silica gel at the position shown in the exploded view.

10. Mount the driven pulley and tighten it at the specified torque.

Specified torque: 60 Nm

Crankcase

Disassembly

1. Remove the oil filter using a special
Remove the filter bracket.

Note:

Place a cloth under the oil filter.

Oil filter spanner

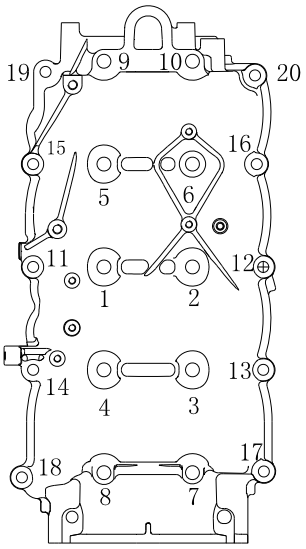
2. Remove the exhaust pipe A&B.

3. Remove the thermostat cover and the limber board.

Clean the anode surface, inspect the anode, and replace the anode if the corrosion exceeds half.

Check the exhaust cover for cracks, deformation or corrosion. Replace it if necessary.

4. Remove the box bolts and the engine base in the order shown in the figure.



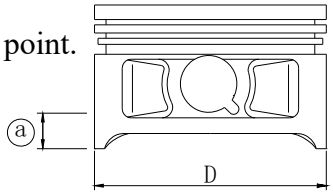
5. Remove the connecting rod bolts and connecting rod cover, remove the crankshaft, and then remove the connecting rod and piston assembly.

6. Remove piston pin clamp spring with pliers, then remove the piston pin and piston.

7. Remove the oil seal, locating pin and bearing bush.

Piston

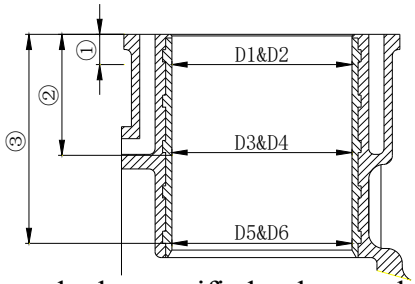
1. Measure the outside diameter of piston at the specified measuring point. If it does not meet the specified value, replace it.
   Diameter of piston: 80.938～80.950 mm
   Measuring point ⓐ: 14 mm



2. Check the inner diameter of piston pin. If it does not meet the specified value, replace it.
   Inner diameter of piston pin seat: 18.004～18.015mm

Cylinder bore

1. Measure the piston outer diameter at specified measuring points ①②③. At each measuring point, measure the diameters parallel to the crankshaft directions D1, D3 and D5 and perpendicular to the crankshaft directions D2, D4 and D6.
   Height of measuring point: ①5 mm;
   ②35 mm;
   ③94 mm
   Cylinder bore: 81.000～81.012 mm



2. Calculate the taper limit and roundness limit. If it exceeds the specified value, replace the crankcase.
   Taper limit: 0.08 mm (D1-D5, D2-D6)
   Roundness limit: 0.05 mm (D2-D1, D6-D5)

Outside diameter of piston pin

Check the outside diameter of piston pin; If it does not meet the specified value, replace it.
Outside diameter of piston pin: 17.991～18.000 mm

Piston ring

1. Push the piston ring into the cylinder in parallel with the piston to the specified measuring point (10mm from the joint surface).

2. Measure the clearance of piston ring end face with a clearance gauge; If it does not meet

the specified value, replace it.
End face clearance (during installation): Top ring 0.15～0.30 mm
Second ring 0.70～0.90 mm
Oil ring 0.20～0.70 mm

3. Install the piston ring on the piston, and measure the clearance between the piston ring and the piston ring groove with a clearance gauge; If it does not meet the specified value, replace it.
Specified clearance: Top ring 0.04~0.08 mm
Second ring 0.03~0.07 mm
Oil ring 0.03~0.15 mm

Inner diameter of connecting rod small end

Measure the inside diameter of the small end. If it does not meet the specified value, replace it.

Inner diameter of small end: 18.005～18.018 mm

Inner diameter of connecting rod large end

Measure the inner diameter of the large end. If it does not meet the specified value, replace it.

Inner diameter of the large end: 50.025～50.045 mm

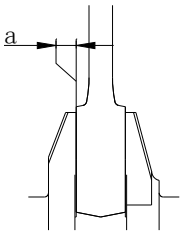
Note:

Tighten the connecting rod bolt at the specified torque before measurement

Specified torque: 13 Nm for the first time
35 Nm for the second time

Connecting rod large end backlash

Measure the large end backlash.
If it does not meet the specified value,
replace the connecting rod or crankshaft or both.
Large end backlash: 0.15～0.30 mm

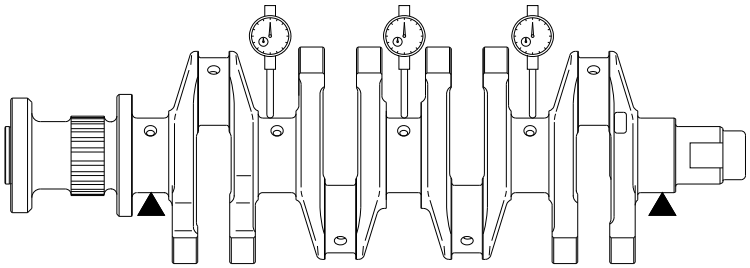


Crankshaft

1. Measure crankshaft journal diameter, crank pin diameter and crank pin width. If they do not meet the specified value, replace the crankshaft.

Diameter of crankshaft journal	51.982~52.000mm
Crank pin diameter	46.982~47.000mm
Crank pin width	21.000~21.100mm

2. Check the crankshaft runout; If it exceeds the specified value, replace it.



Crankshaft runout limit: 0.04mm

Crank pin oil clearance

1. Place a plastic clearance gauge on the crank pin and make it parallel to the crankshaft.

2. Fit the connecting rod and bearing bush on the crank pin.

3. Tighten the connecting rod bolts according to the specified torque.
   Seating torque: 13 Nm for the first time
   35 Nm for the second time

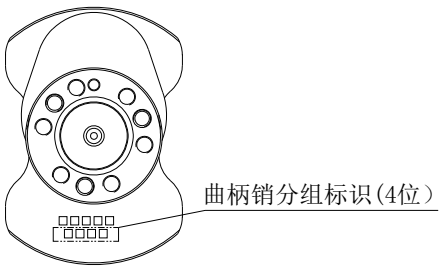
4. Remove the connecting rod and measure the compressed width of the plastic clearance gauge; If it exceeds the specified value, replace the connecting rod bearing bush.
   Oil clearance: 0.017～0.040mm
   Note:
   Do not turn the connecting rod until the measurement is completed.

Selection of connecting rod bearing bush

Select the appropriate connecting rod bearing bush according to the group number on the connecting rod and crankshaft.

One side of the big end of the connecting rod is engraved with the pairing number of the connecting rod, and the other side is divided into three groups 1, 2 and 3 according to the inner diameter of the big end hole from small to large.

The group number of crank pins of crankshaft is engraved on the first fan plate of crankshaft, and it is divided into three groups 1, 2 and 3 according to the diameter from large to small.



Examples of pairing:

If the group numbers of connecting rod and crank pin are the same, then 1. select the blue-marked bearing bush, 2. select the green-marked bearing bush, and 3. select the red-marked bearing bush. If the group numbers of corresponding positions of the connecting rod and crank pin are different, the bearing bush is selected according to the larger number; For example, if the group numbers of the two are 1 and 3 respectively, the red-marked bearing bush will be selected according to 3.

Main journal oil clearance

1. Clean the bearing bush, main journal, and the mounting surface of the engine body and engine base.

2. Install the bearing bush and crankshaft to the engine body.

3. Place a plastic clearance gauge on the main journal and parallel it to the crankshaft
   Note:
   Do not place the plastic clearance gauge on the oil hole of the main journal.

4. Install the bearing bush on the engine base and the engine base on the engine body.

5. Tighten bolts with specified torque in the order of numerical symbols on the engine base.
   Seating torque:

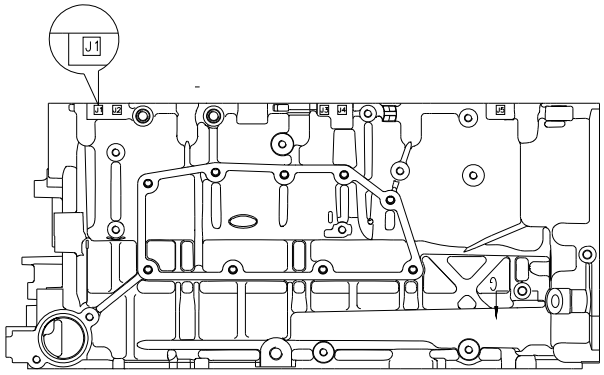
Frist tightening	M10×1.5	16 Nm
Second tightening		42 Nm
Frist tightening	M8	14 Nm
Second tightening		28 Nm

6. Remove the engine base and measure the compressed width of each plastic clearance gauge; If it exceeds the specified value, replace the bearing bush.
   Oil clearance: 0.012～0.044mm
   Note:
   Do not turn the crankshaft until the measurement is completed.

Selection of crankshaft bearing bush

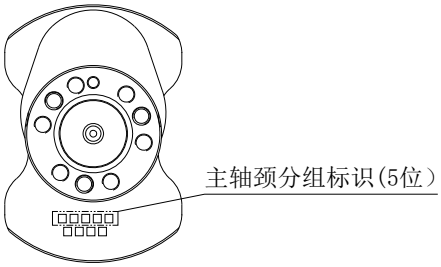
Select the corresponding crankshaft bearing bush according to the group number on the engine body and crankshaft.

The group numbers on the engine body are engraved on the side of the body, and are divided into three groups 1, 2 and 3 according to the bore diameter from small to large.



There are 5 in total, and each one corresponds to the shaft hole group at the point.

The group number of bearing journal of crankshaft is engraved on the first fan plate of crankshaft, and it is divided into three groups 1, 2 and 3 according to the diameter from large to small.



Crankshaft bearing bushes are divided into three groups according to their thickness. From thin to thick, blue, green and red marks are painted on the side of the bushes to distinguish them.

Examples of pairing:

If the group numbers of the corresponding positions of the engine body and the crankshaft are the same, then 1 select the blue-marked bearing bush, 2 select the green-marked bearing bush, 3 select the red-marked bearing bush,

If the group numbers of the corresponding positions of the engine body and the crankshaft are different, the bearing bush is selected according to the larger number; For example, if the group numbers of the two are 1 and 3 respectively, the red-marked bearing bush will be selected according to 3.

Body and engine base

1. Check whether the engine body and base are cracked, damaged and corroded; If yes, replace it.

2. Check the cooling water channel for grease content or blockage; If yes, clean it.

Check the oil pump

1. Remove the screws and the oil pump.

2. Remove the screws fixing the oil pump cover and remove the oil pump cover.

3. Check the clearance of oil pump rotor. If it does not meet the specified value, replace it.

Clearance between outer rotor and shell	0.12～0.16 mm
Clearance between outer rotor and inner rotor	0.1～0.2 mm
Clearance between rotor and oil pump cover	0.03~0.12mm

Check and mount exhaust pipe

1. Remove the exhaust assembly.

2. Disassemble the exhaust pipe assembly

3. Check the anode

If the anode has been corroded by more than half, please replace it

If there is scale, peeling or oil stain on the anode surface, please clean it.

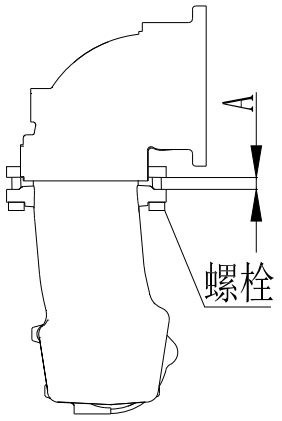
Note:

Do not apply grease, oil or paint to the anode.

4. Re-mount the exhaust pipe assembly.

Alternately tighten the bolts (M6x30mm) to mount the exhaust pipe A&B and control the clearance shown in the figure to the specified value.

Specified clearance: 9.5 mm



Note:

Use a new O-ring.

5. Remove the bolts (M6x30mm).

6. Use new exhaust pipe gasket A and exhaust gasket B.

7. Mount the exhaust pipe assembly and tighten the bolts twice at the specified torque.

Seating torque: 14 Nm for the first time

21 Nm for the second time

Reinstallation

Assemble piston connecting rod

Install piston, connecting rod, piston pin and piston pin clip clutch.

Note:

When installing, make sure that the mark on the connecting rod and the mark on the top of the piston are on the same side.

Installing the piston rings

1. Install piston rings in the order of oil ring, second ring and top ring.

Note:

When installing the second ring, ensure that the mark faces the top of the piston.

2. Schematic diagram of piston ring notch position.

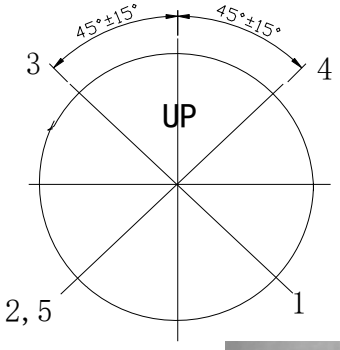
Oil ring lower retaining ring 1

Oil ring elastic ring 2

Oil ring upper retaining ring 3

Second ring 4

Top ring 5



Installing piston

Install piston with piston slideway,

Make sure that the " ● " mark on the top of the piston faces the flywheel.

Note:

When installing, apply oil to the sides of the piston and piston ring.

Installing crankshaft

1. Install crankshaft bearing bushes on the body separately.

2.Install the crankshaft to the engine body and install the oil seal.

Note:

Apply oil on the inside of the oil seal before installation.

3. Install the connecting rod bearing bush on the connecting rod.

4. Install the connecting rod cover to the connecting rod according to the connecting rod pairing number and tighten the connecting rod bolts at the specified torque.
   Seating torque: 13 Nm for the first time
   35 Nm for the second time

5. Fit crankshaft locating plate A.
   Note:
   Face the notched side towards the crankshaft.

Assemble the engine base

1. Install the bearing bush on the engine base.

2. Install crankshaft locating plate B.
   Note:
   Face the notched side towards the crankshaft.

3. Coat sealant on the joint surface of the engine base, and install the locating pin and the engine base.
   Tighten the bolts twice in the order shown in the figure.
   Seating torque:

Frist tightening	M10×1.5	16 Nm
Second tightening		42 Nm
Frist tightening	M8	14 Nm
Second tightening		28 Nm

   Note:
   Before installation, apply oil to the moving surface.
   Apply oil to the bolts before installation.

4. Install oil filter bracket.
   Note:
   Use new rubber sealing rings.

5. Install oil filter with special tools and tighten it at specified torque.
   Seating torque: 18 Nm

Note:
Before installation, inject oil into the oil channel.

6. Install the anode, exhaust cover plate, thermostat and thermostat cover plate.

7. Install the exhaust pipe.
   Seating torque: 13 Nm for the first time
   35 Nm for the second time

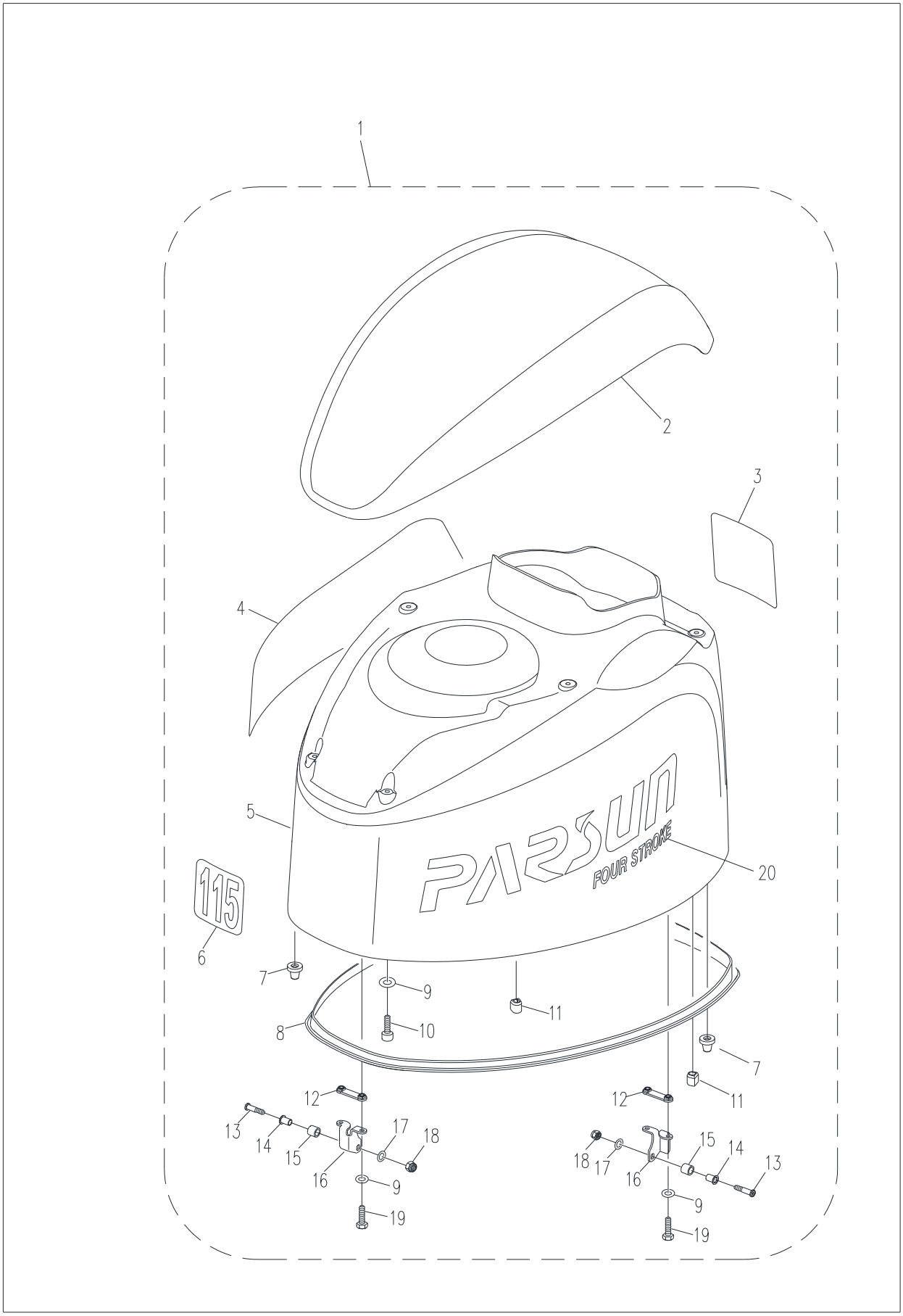
8. Install the flywheel temporarily and turn the crankshaft clockwise until the piston of cylinder 1 is in the top dead center position.

9. Remove the flywheel for further installation.

About water

Top cover

Disassembly schematic diagram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SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-07000000	顶罩组件	TOP COWLING ASSY	1					
2	F115-07000003	顶罩盖	COVER,TOP COWLING	1					
3	F115-09000004	顶罩标贴(后)	STICKER(BACK),TOP COWLING	1					
4	F115-09000002	顶罩标贴(右)	STICKER(RIGHT),TOP COWLING	1					
5	F115-07000001	顶罩	TOP COWLING	1					
6	F115-09000003	顶罩标贴(前)	STICKER(FRONT),TOP COWLING	1					
7	F115-07000004	减震支脚 A	DAMPER A	4					
8	F115-07000002	顶罩密封橡胶条	COVER,TOP COWLING	1					
9	GB/T97.1-6	平垫圈 6	WASHER 6	10					
10	GB/T70.1-M6x20	内六角圆柱头螺钉 M6x20	BOLT M6x20	6					
11	F115-07000005	减震支脚 B	DAMPER B	2					
12	F115-07000200	锁紧滑轮固定板组件	FIXED PLATE ASSY	2					
13	F115-07000103	滑轮固定螺钉	BOLT	2					
14	F115-07000102	滑轮垫管	CUSHION TUBE,PULLEY	2					
15	F115-07000101	锁紧滑轮	LOCKING PULLEY	2					
16	F115-07000104	锁紧滑轮固定架	PLATE,LOCKING PULLEY	2					
17	GB/T97.1-8	平垫圈 8	WASHER 8	2					
18	GB/T889.1-M8	非金属嵌件六角锁紧螺母 M8	LOCK NUT M8	2					
19	GB/T5783-M6x16	六角螺栓 M6x16	BOLT M6x16	4					
20	F115-09000001	顶罩标贴(左)	STICKER (LEFT),TOP COWLING	1					

1. Remove the sealing rubber strips.

2. Remove the top cover screws.

3. Remove the top cover.

4. Remove the locking pulley retaining plate screws and remove the front and rear locking pulley assemblies.

5. Check the top cover for cracks or damage. Replace it if necessary.

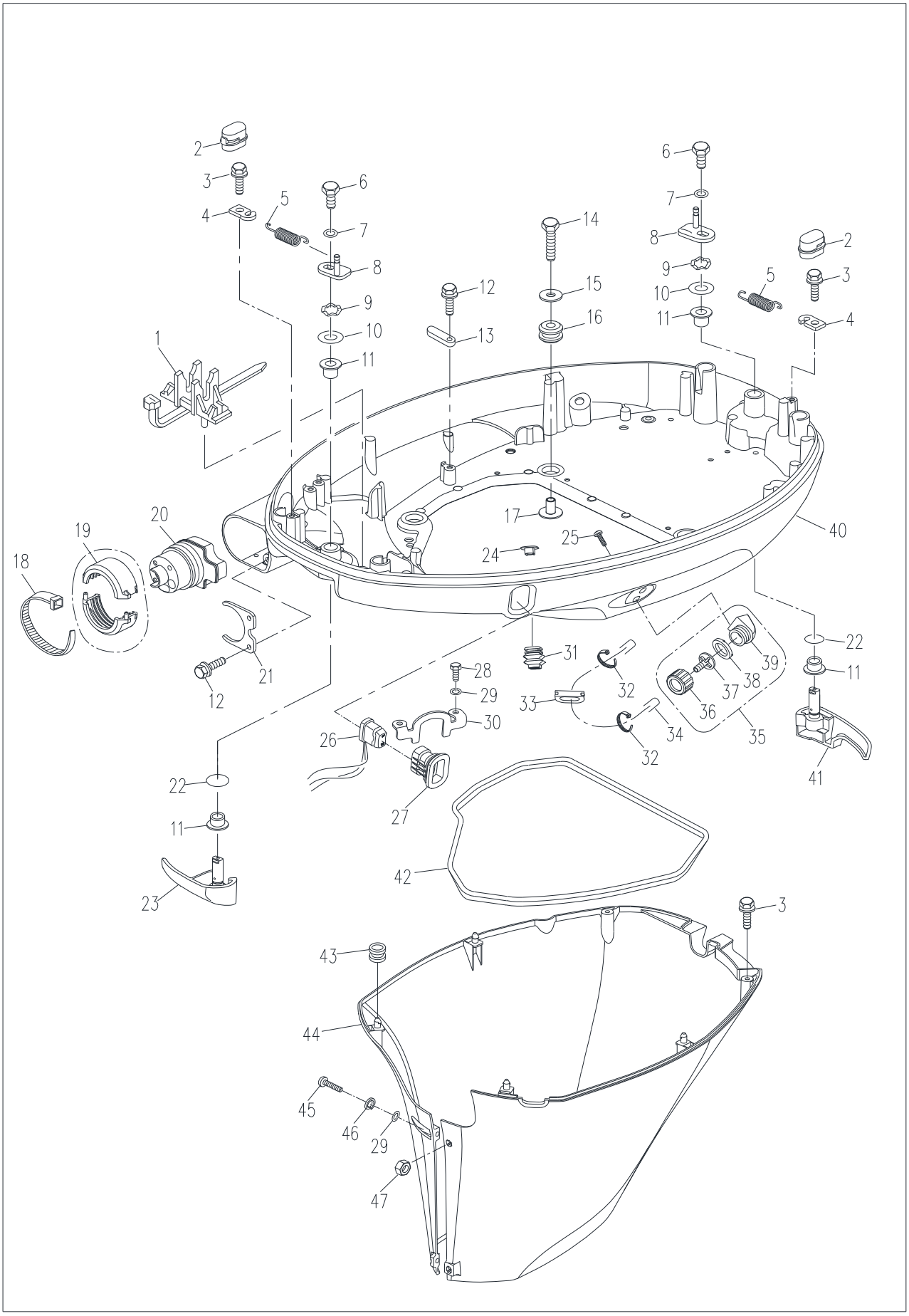
6. Check the sealing rubber strip for cracks or damage. Replace it if necessary.

7. Check the top cover muffler cover for cracks or damage. Replace it if necessary.

8. Check the locking pulley assembly for cracks, deformation or damage. Replace it if necessary.

Bottom cover

Disassembly schematic diagram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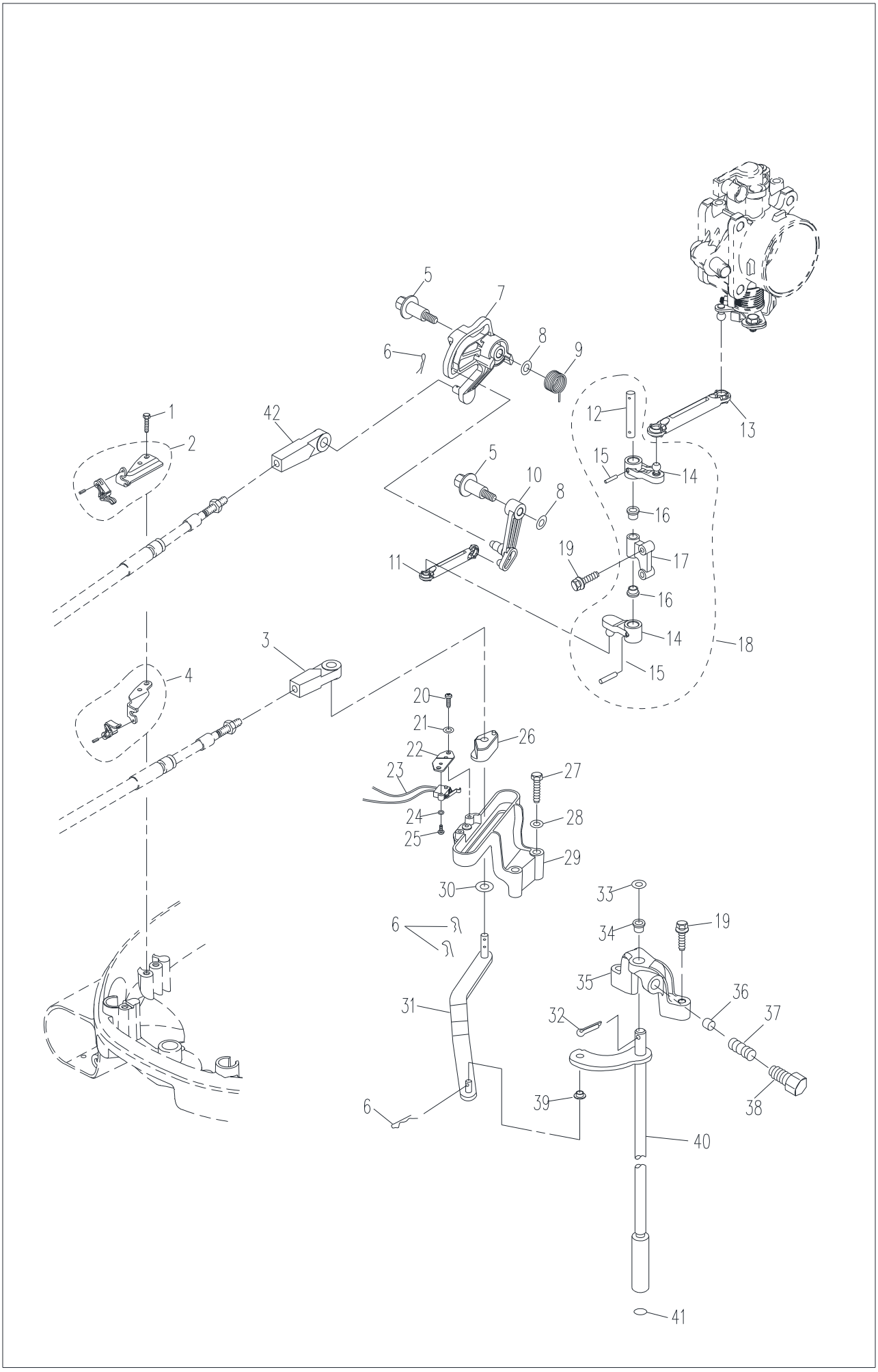
SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	T85-03000006	点火线卡	CABLE CLIP ， IGNITION	1					
2	F115-03000013	拉簧支架橡胶套	RUBBER SLEEVE	2					
3	GB/T9074.14-M6x20	六角螺栓平垫组合 M6x20	BOLT M6x20	4					
4	F115-03000010	拉簧支架	BRACKET,TENSION SPRING	2					
5	F115-03000007	顶罩锁紧手柄拉簧	TENSION SPRING	2					
6	GB/T5783-M8x12	六角螺栓 M8x12	BOLT M8x12	2					
7	GB/T97.1-8	平垫圈 8	WASHER 8	2					
8	F115-03000500	顶罩锁紧块组件	LOCKING BLOCK ASSY	2					
9	F115-03000022	手柄波形垫圈	WAVE WASHER	2					
10	F115-03000006	手柄垫圈	WASHER,HANDLE	2					
11	F115-03000005	手柄衬套	BUSHING,HANDLE	4					
12	GB/T9074.14-M6x25	六角螺栓平垫组合 M6x25	BOLT M6x25	3					
13	F115-03000011	导线压板	PLATE ， WIRE	1					
14	GB/T5783-M8x35	六角螺栓 M8x35	BOLT M8x35	4					
15	F15-00000016	特大垫圈 8	OVERSIZE WASHER 8	4					
16	F115-03000002	减震圈	DAMPER	4					
17	F115-03000003	减震圈垫管	BUSHING,DAMPER	4					
18	HT5x200	尼龙扎带5x200	CLAMP 5x200	1					
19	F115-03000030	波纹管护套	SHEATH	1					
20	F115-03000016	控制线索橡胶护套	RUBBER SHEATH	1					
21	F115-03000017	护套固定板	FIXED PLATE	1					
22	GB/T3452.1-13x2	O 型圈 13x2	O-RING 13x2	2					
23	F115-03000300	顶罩锁紧手柄A 组件	LOCKING A ASSY,TOP COWLING	1					
24	F115-03000018	塑料衬圈	LINING RING,PLASTIC	1					
25	GB/T84.5-ST5.5x19	十字槽盘头自攻螺钉ST5.5x19	SCREW ST5.5x19	2					
26	F40-03000600W	起翘开关组件	SWITCH ASSY,TILT	1					
27	F40-03000008	起翘开关护套	SHEATH,SWITCH	1					
28	GB/T5783-M6x12	六角螺栓 M6x12	BOLT M6x12	2					
29	GB/T97.1-6	平垫圈 6	WASHER 6	4					
30	F115-03000021	起翘开关压板	PLATE,SWITCH	1					
31	F40-03000014W	水管波纹护套	WAVE SHEATH	1					
32	HT2.5x60	尼龙扎带 2.5x60	CABLE TIES	2					
33	F115-03000009	水管橡胶护套	RUBBER SHEATH	1					
34	F115-03000008	清洗定型管	CLEANING TUBE	1					
35	F25-03000100W	水管堵塞组件	JAM ASSY	1					
36	F25-03000104W	堵塞螺母	NUT,JAM	1					
37	F25-03000103W	堵塞接头	JOINT,JAM	1					
38	F25-03000102W	堵塞橡胶圈	RUBBER RING,JAM	1					
39	F25-03000101W	堵塞本体	JAM	1					
40	F115-03000001	底罩	BOTTOM COWLING	1					
41	F115-03000400	顶罩锁紧手柄B 组件	LOCKING B ASSY,TOP COWLING	1					
42	F115-03000004	底罩密封圈	SEAL RING,BOTTOM COWLING	1					
43	F2.6-05000006	底罩减震圈	BUMPER,BOTTOM COWLING	4					
44	F115-00000009	水上装置罩壳	SHIELD,UPPER CASING	1					
45	GB/T818-M6X40	十字槽盘头螺钉 M6x40	SCREW M6x40	2					
46	GB/T93-6	弹簧垫圈6	SPRING WASHER 6	2					
47	GB/T6170-M6	六角螺母M6	NUT M6	2					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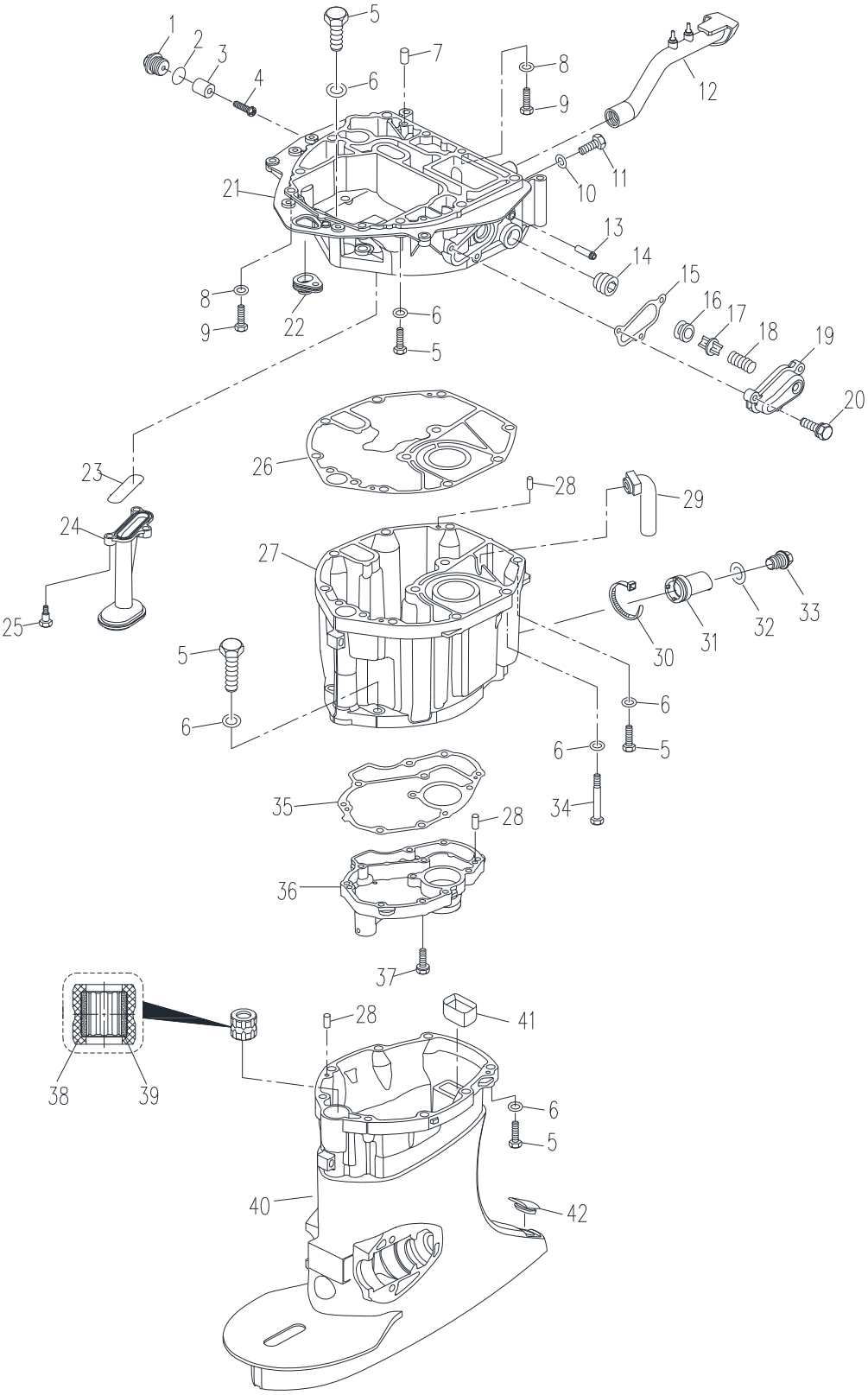
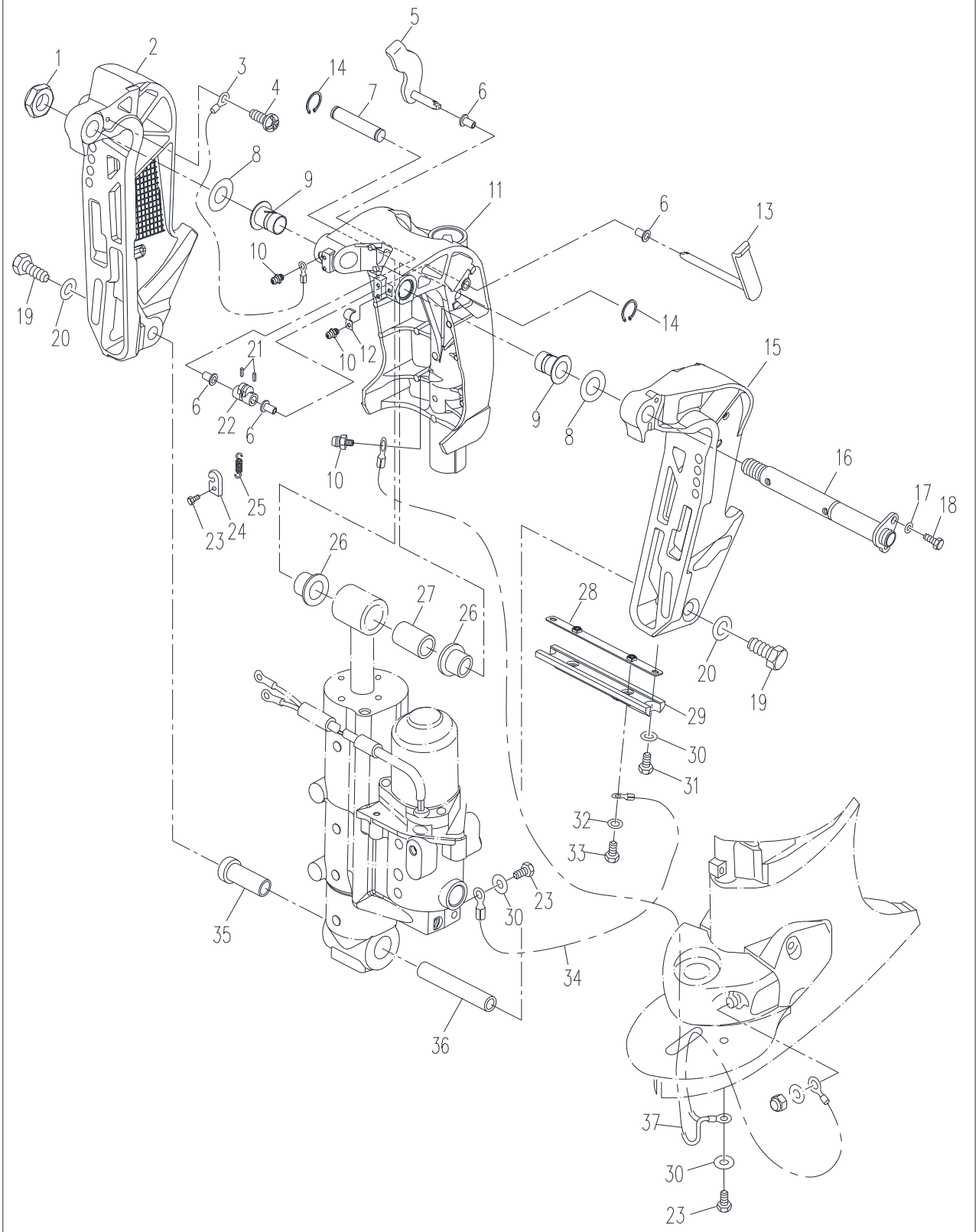
SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	GB/T9074.14-M6x25	六角螺栓平垫组合M6x25	BOLT M6x25	2					
2	F115-03000100	钢索固定架组件	FIXING FRAME A ASSY,CABLE	1					
3	F115-08000002	操控钢索接头A	CABLE TIE A	1					
4	F115-03000200	钢索固定架B组件	FIXING FRAME B ASSY,CABLE	1					
5	F115-05000085	油门执行器螺钉	BOLT, PULLEY DRIVE	2					
6	F15-00000012	夹簧 1.8	COLLET 1.8	4					
7	F115-05000083	油门执行器主动滑轮	PULLEY DRIVE	1					
8	GB/T96-6	大垫圈 6	BIG WASHER 6	2					
9	F115-05000084	油门执行器扭簧	TROSIONAL SPRING	1					
10	F115-05000086	油门执行器摇臂A组件	ROCKER ARM A ASSY	1					
11	F115-05000087	摇臂连杆A	CONNECTING ROD A	1					
12	F115-05000802	摇臂轴	ROCKER ARM SHAFT	1					
13	F115-05000088	摇臂连杆B	CONNECTING ROD B	1					
14	F115-05000804	油门执行器摇臂B	ROCKER ARM B	2					
15	GB/T879.2-3x16	轻型直槽弹性圆柱销3x16	PIN 3x16	2					
16	F115-05000803	摇臂衬套	BUSHING	2					
17	F115-05000801	摇臂固定架	FIXED RACK	1					
18	F115-05000800	油门执行器摇臂B组件	ROCKER ARM B ASSY	1					
19	GB/T9074.14-M6x30	六角螺栓平垫组合M6x30	BOLT M6x30	4					
20	GB/T818-M4x16	十字槽盘头螺钉 M4x16	BOLT M4x16	2					
21	GB/T93-4	弹性垫圈4	SPRING WASHER 4	2					
22	F115-00010007	微动开关压板	PLATE,MICROSWITCH	1					
23	F115-00010004	微动开关	MICROSWITCH	1					
24	GB/T97.1-3	平垫圈3	WASHER 3	1					
25	GB/T818-M3x8	十字槽盘头螺钉M3x8	BOLT M3x8	1					
26	F115-00010006	变档滑块	SHIFT SLIDER	1					
27	GB/T5783-M6x40	六角螺栓M6x40	BOLT M6x40	2					
28	GB/97.1-6	平垫圈 6	WASHER 6	4					
29	F115-00010301	变档摆杆座	SEAT,SWING LEVER	1					
30	F115-00010005	尼龙垫圈	WASHER,NYLON	1					
31	F115-00010200	变档摆杆B组件	SHIFT ROD B ASSY	1					
32	GB/T91- Ø2x16	开口销Ø2x16	PIN Ø2x16	1					
33	F115-00010003	变档摆杆垫圈	WASHER,SHIFT ROD	1					
34	F115-00010002	变档衬套	BUSHING	1					
35	F115-00010001	变档支座	SHIFTING SUPPORT	1					
36	T20-03000006	变档凸轮柱塞	PLUNGER,SHIFT CAM	1					
37	T60-00010003	柱塞弹簧	SPRING PLUNGER	1					
38	T60-00010004	变档柱塞螺母	NUT,PLUNGER	1					
39	T85-00010001	小轴衬套	BUSHING	1					
40	F115-00010100	变档摆杆A组件	SHIFT ROD A ASSY	1					X
	F115-00010100L	变档摆杆A组件	SHIFT ROD A ASSY						L
41	GB/T3452.1-Φ8.8x2	O型圈8.8x2	O-RING 8.8x2	1					
42	F115-08000004	操控钢索接头B	CABLE TIE B	1					

Water unit and bracket

Disassembly schematic diagram



SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F20-05030009	阳极螺栓	BOLT, ANODE	1					
2	GB/3452.1-13x2	O型圈 13x2	O-RING 13x2	1					
3	F4-04070003	节温器盖阳极	ANODE	1					
4	GB/T818-M5x25	十字槽盘头螺钉 M5x25	SCREW M5x25	1					
5	F115-00000016	六角螺栓 M10x1.25x45	BOLT M10x1.25x45	18					
6	GB/T97.1-10	平垫圈 10	WASHER 10	22					
7	F25-00000014	定位销 Φ8x12	PIN ⌀8x12	2					
8	GB/T97.1-8	平垫圈 8	WASHER 8	4					
9	GB/T5783-M8x35	六角螺栓 M8x35	BOLT M8x35	4					
10	F4-04000006	放油螺栓密封垫	GASKET	1					
11	GB/T5783-M8x14	六角螺栓 M8x14	BOLT M8x14	1					
12	F115-02010014	排气橡胶管	RUBBER PIPE	1					
13	F115-02010002	水嘴	WATER NOZZLE	1					
14	F25-05010104A	堵塞 1/2 ”	PLUG 1/2 ”	1					
15	F115-02010004	压力阀密封垫	GASKET ，PRESSURE VALVE	1					
16	T85-05000007	压力阀密封圈	SEAL ，PRESSURE VALVE	1					
17	T85-05000008	压力阀芯	PRESSURE SPOOL	1					
18	F115-02010003	压力阀弹簧	SPRING ，PRESSURE VALVE	1					
19	F115-02010005	压力阀盖	CAP ，PRESSURE VALVE	1					
20	GB/T9074.14-M6x25	六角螺栓平垫组合 M6x25	BOLT M6x25	3					
21	F115-02010001	排气歧管座	SEAT, OUTLET MANIFOLD	1					
22	F115-02010015	变档波纹护套	WAVE SHEATH, SHIFT	1					
23	F115-02010104	粗滤器密封圈	SEAL RING, STRAINER	1					
24	F115-02010100	粗滤器组件	COARSE FILTER ASSY	1					
25	F115-02010006	粗滤器固定螺钉	BOLT	3					
26	F115-02010200	油底壳密封垫组件	GASKET ASSY ，OIL PAN	1					
27	F115-02010008	油底壳	OIL PAN	1					
28	F15-00000006	定位销 Φ6x12	PIN ⌀6x12	6					
29	F115-02010007	排气橡胶弯管	RUBBER PIPE ，EXHAUST	1					
30	HT2.5x60	尼龙扎带 2.5x60	CABLE TIES 2.5x60	1					
31	F115-02010009	放油口胶套	JACKET, OIL DRAIN	1					
32	F15-04000003	放油螺栓垫片	WASHER, BOLT	1					
33	F15-04000002	放油螺栓	BOLT, OIL DRAIN	1					
34	F115-00000008	六角螺栓 M10x1.25x140	BOLT M10x1.25x140	4					
35	F115-02010010	排气隔板密封垫	GASKET	1					
36	F115-02010011	排气隔板	EXHAUST BAFFLE	1					
37	GB/T9074.14-M6x30	六角螺栓平垫组合 M6x30	COMBINATION BOLT M6x30	11					
38	F115-02000003	衬套橡胶套	RUBBER SHESTH	1					
39	F115-02000002	驱动轴衬套	BUSHING, DRIVE SHAFT	1					X
40	F115-02000001	水上装置壳体	UPPER CASING	1					
	F115-02000001L	水上装置壳体	UPPER CASING						L
41	F115-02000006	排气岐管橡胶圈	RUBBER RING	1					
42	F115-00000014	水上装置橡胶堵塞	RUBBER BLOCKING	1					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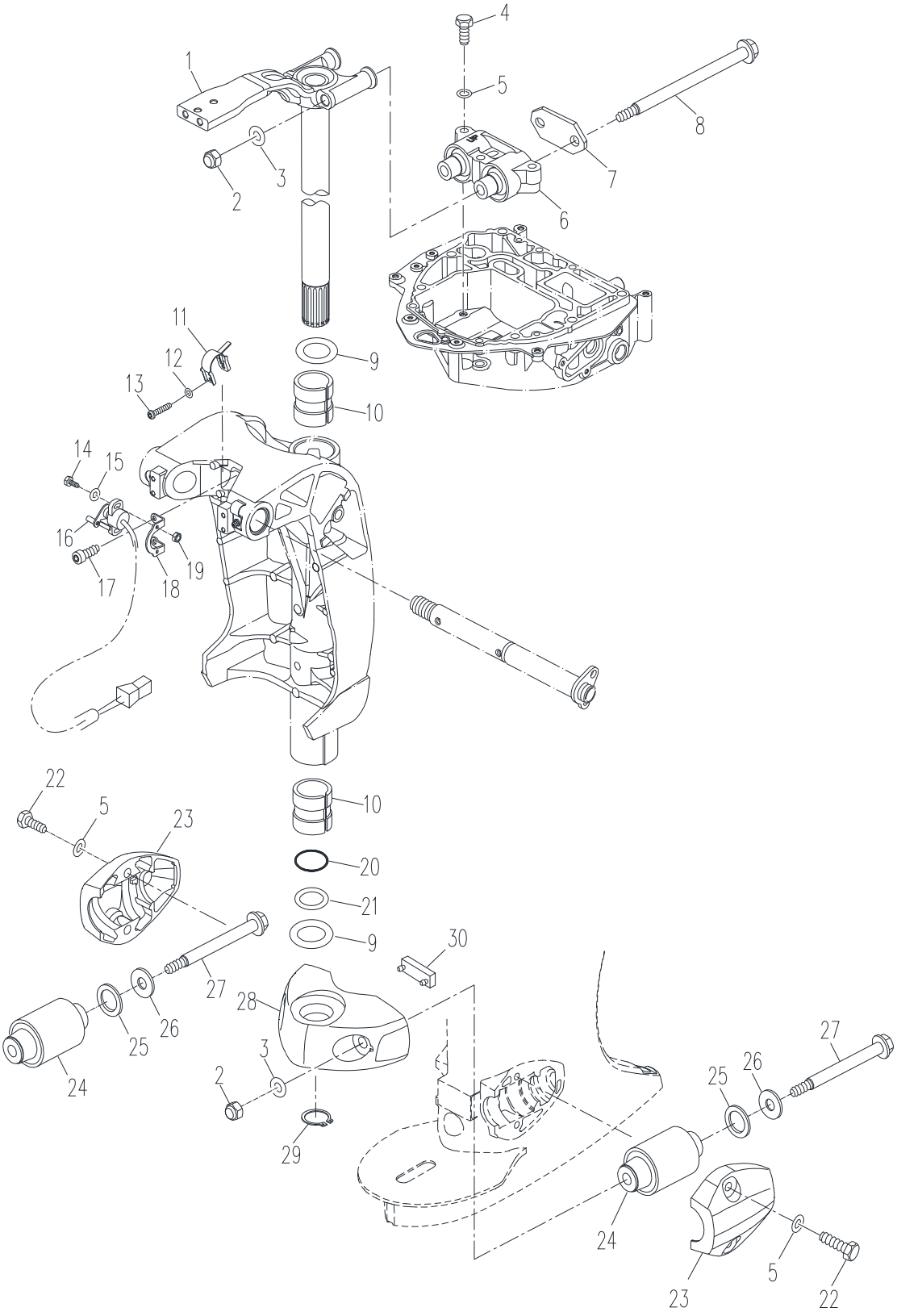
SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F15-01010007	托架夹紧螺母	NUT	1					
2	F115-01010002	右夹紧托架	BRACKET,CLAMP(RIGHT)	1					
3	T85-01010003	接地钢索A	WIRE,LEAD A	1					
4	GB/T818-M6x12	十字槽盘头螺钉M6x12	SCREW M6x12	1					
5	F115-01010102	支撑架组件A	SUPPORT ASSY A	1					
6	T85-01010203	支撑架尼龙衬套	BUSHING,NYLON	4					
7	F115-00000017	起翘销轴	PIN UPPER SHOCK MOUNT	1					
8	F115-01010003	螺管衬圈	STUD LINER	2					
9	F115-01010004	螺管尼龙衬套	BUSHING	2					
10	JB/T7940.1-M6	直通压注油杯M6	NOPPLE,GREASE	3					
11	F115-01010101	旋转支架	BRACKET	1					X
	F115-01010101L	旋转支架	BRACKET						L
12	F115-01010105	线卡B	LINE CLIP B	1					
13	F115-01010104	支撑架组件B	SUPPORT ASSY B	1					
14	GB/T894.1-18	轴用弹性挡圈18	CIRCLIP 18	2					
15	F115-01010001	左夹紧托架	BRACKET,CLAMP(LEFT)	1					
16	F115-01010200	夹紧托架双头螺管组件	DOUBLE-EDGED TUBE ASSY	1					
17	GB/97.1-8	平垫圈 8	WASHER 8	1					
18	GB/T5783-M8x20	六角螺栓 M8x20	BOLT M8x20	1					
19	GB/T5787-M10x1.25x30	六角螺栓 M10x1.25x30	BOLT M10x1.25x30	2					
20	F60-00000015	厚垫圈 10	THICK WASHER 10	2					
21	GB/T879.3-3x16	重型卷制弹性圆柱销 ⌀3x16	PIN ⌀3x16	2					
22	T85-01010206	支撑架摆杆组件	COLLAR,DISTANCE ASSY	1					
23	GB/T5783-M6x10	六角螺栓 M6x10	BOLT M6x10	3					
24	T85-01010208	拉簧支架	TENSION SPRING,BRACKET	1					
25	T85-01010207	摆杆拉簧	TENSION SPRING	1					
26	T85-00000017	销轴衬套A	BUSH A	2					
27	F115-00000010	销轴衬套B	BUSH B	1					
28	T85-01010004	阳极固定板组件	FIXING PLATE ASSY,ANODE	1					
29	T85-01010005	托架阳极	ANODE	1					
30	GB/T97.1-6	平垫圈 6	WASHER 6	4					
31	GB/T5783-M6x12	六角螺栓 M6x12	BOLT M6x12	2					
32	GB/T96-6	大垫圈 6	BIG WASHER 6	2					
33	GB/T5783-M6x16	六角螺栓 M6x16	BOLT M6x16	2					
34	T85-01010209	接地钢索B	WIRE,LEAD B	1					
35	F115-00000011	定位轴衬套	BUSHING	1					
36	F115-00000012	液压起翘定位轴	LOCATING SHAFT	1					
37	F115-02000005	接地钢索C	WIRE,LEAD C	1					X
	F115-02000005L	接地钢索C	WIRE,LEAD C						L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SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-01020100	操舵托架组件	BRACKET ASSY	1					X
	F115-01020100L	操舵托架组件	BRACKET ASSY						L
2	F115-00000013	组合式盖型螺母 M14x1.5	COVER NUT M14x1.5	4					
3	GB/T848-14	小垫圈 14	SMALL WASHER 14	4					
4	GB/T5782-M10x1.25x60	六角螺栓 M10x1.25x60	BOLT M10x1.25x60	3					
5	GB/T97.1-10	平垫圈 10	WASHER 10	12					
6	F115-02000100	双孔减震器组件	SHOCK ABSORBER ASSY,DOUBLE HOLE	1					
7	F115-02000007	减震器垫板	PLATE,ABSORBER	1					
8	F115-02000008	长螺栓	LONG BOLT	2					
9	F115-01000001	旋转支架上垫圈	UPPER WASHER	2					
10	F115-01000002	旋转支架上衬套	UPPER BUSHING	2					
11	F115-01010006	螺管卡箍	CLAMP	1					
12	GB/T97.1-5	平垫圈 5	WASHER 5	1					
13	GB/T818-M5x35	十字槽盘头螺钉 M5x35	SCREW M5x35	1					
14	GB/T5783-M4x14	六角螺栓 M4x14	BOLT M4x14	2					
15	GB/T97.1-4	平垫圈 4	WASHER 4	2					
16	F115-01010300	起翘传感器组件	TILT SENSOR ASSY	1					
17	GB/T70.1-M6x16	内六角圆柱头螺钉 M6x16	BOTL M6x16	2					
18	F115-01010301	起翘传感器固定架	FIXED FRAME,TILT SENSOR ASSY	1					
19	GB/T6170-M4	六角螺母 M4	NUT M4	2					
20	F115-01000003	旋转支架O型圈37.3x5.6	O-RING 37.3x5.6	1					
21	F115-01000004	旋转支架内衬套	INNER BUSHING,BRACKET	1					
22	F115-00000015	六角螺栓 M10x1.25x40	BOLT M10x1.25x40	4					
23	F115-00000004	减震器外盖	COVER,ABSORBER	2					
24	F115-00000100	左右减震器组件	ABSORBER ASSY(LEFT,RIGHT)	2					
25	F115-00000003	橡胶垫圈	RUBBER WASHER	2					
26	F115-00000002	减震器垫圈	WASHER,ABSORBER	2					
27	F115-00000001	减震器螺钉	BOLT,ABSORBER	2					
28	F115-01000005	减震器固定块	ABSORBER BLOCK	1					
29	GB/T894.1-37	轴用弹性挡圈37	CIRCLIP 37	1					
30	F115-01000006	固定块橡胶垫	RUBBER PAD	1					

Disassembly and inspection of bracket

1. Remove the left and right absorber covers, and remove the left and right absorbers and double-hole absorber fixing nuts. Remove the left and right absorbers

2. Remove the water unit, oil pan and exhaust manifold seat as a whole from the bracket.

3. Remove the screw of the anode retaining plate and remove the bracket anode.

4. Remove the elastic retainer ring for shaft and remove the warping pin shaft. Remove the screw of hydraulic warping positioning shaft and the hydraulic warping positioning shaft, and remove the hydraulic warping assembly.

5. Remove the solenoid clamp, the bracket clamping nut and clamping bracket twin-headed thread assembly. Remove the grounding cable and left and right clamp brackets.

6. Remove the retainer ring, pull off the fixed block of the shock absorber, pull out the steering bracket assembly, and remove the inner bushing, upper bushing and O-ring.

7. Remove the tension spring bracket and swing rod spring. Remove the elastic cylindrical pin, and remove the swing rod assembly of the support frame and the A and B assemblies of the support frame.

8. Remove the warping sensor retaining plate screw and remove the warping sensor assembly.

9. Check the rotary bracket and clamp bracket for cracking or damage. Replace it if necessary.

10. Check the inner bushing and upper bushing; Replace it if damaged or cracked.

11. Check the support frame assembly for deformation or damage. Replace it if necessary.

12. Check the left and right absorber rubber for aging, cracking, or degumming. Replace it if necessary.

13. Check whether the anode is seriously corroded. Replace it if necessary.

Disassembly and inspection of water unit

1. Drain the oil.

2. Remove the mounting bolts on the water and underwater, and remove the water unit.

3. Remove the exhaust manifold set and oil pan.

4. Remove the coarse filter assembly from the exhaust manifold seat, and remove the double-hole shock absorber, pressure valve assembly and exhaust rubber pipe.

5. Remove the exhaust partition, oil drain bolt and oil drain rubber sleeve and exhaust rubber elbow from the oil pan.

6. Check the water unit housing and oil pan for cracking or damage. Replace it if necessary.

7. Check the exhaust manifold for cracking or damage. Replace it if necessary.

8. Check the exhaust rubber pipe and exhaust rubber elbow for aging and cracking. Replace it if necessary.

Hydraulic warping device

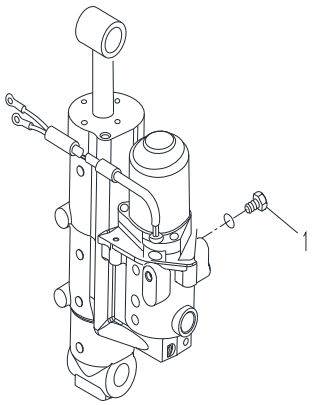
Check the oil level.

1. Position the hydraulic warping device vertically and fix it.

2. Connect the lead of the warping motor of the hydraulic warping device to the battery.

3. Extend the push rod completely, remove the oil screw, and observe the oil level.
   Note:

   The oil level should be at the edge of the oil hole,



1. Oil drain screw

4. If necessary, add oil to the edge of the oil hole.

5. Install the oil drain screw and tighten it.
   Specified torque: 6.5 Nm

Exhaust the air in the oil line of the hydraulic warping device. After adding oil, discharge the excess air in the oil.

1. Connect the lead of the warping motor of the hydraulic warping device to the battery.

2. Extend the push rod completely.

3. Exchange the positive and negative wire connections.

4. Completely compress the push rod.

5. Repeat steps 1~4 to make the push rod move up and down 4~5 times.

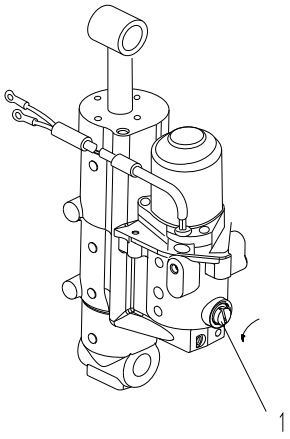
6. Extend the push rod completely, remove the oil screw, and observe the oil level.

7. If necessary, repeat the above steps until the oil level is correct.

8. Install the oil drain screw and tighten it.
   Specified torque: 6.5 Nm

If the hydraulic warping device is installed on the outboard motor and exhausting is required, please follow the following steps.

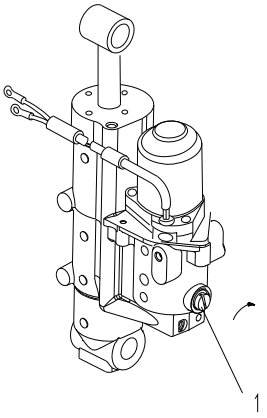
1. Turn the manual valve counterclockwise until it cannot turn.



1. Manual valve.

2. Tilt the outboard motor completely upward, and then lower it downward by its own gravity; Repeat 4~5 times.

3. Turn the manual valve clockwise until it cannot turn.



1. Manual valve.

4. Wait for 5 minutes to stabilize the oil.

5. Press and hold the warping switch until the outboard motor is completely warped.

6. Wait for 5 minutes to stabilize the oil.

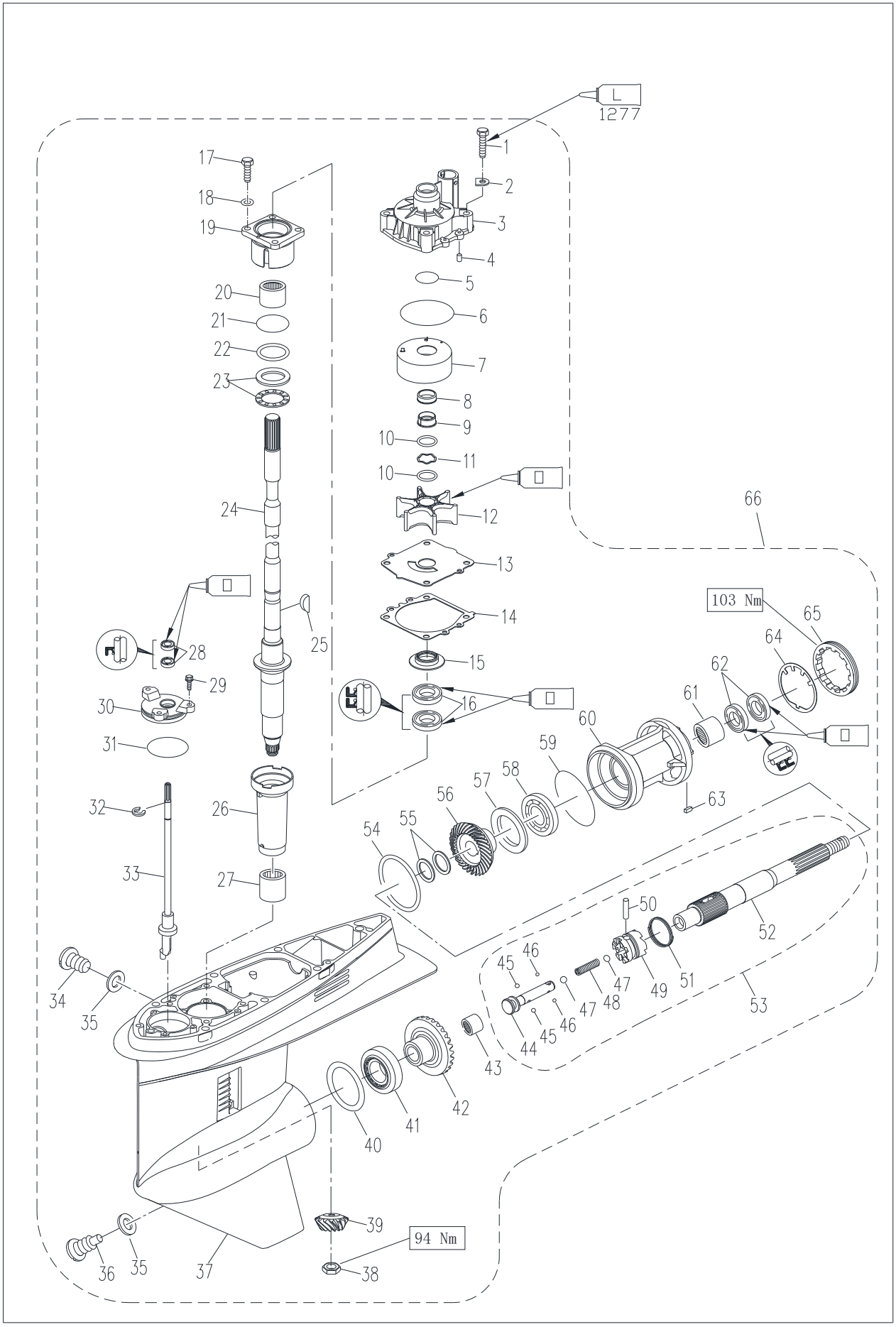
7. Remove the oil drain screw and observe the oil level.

8. If necessary, repeat the above steps until the oil level is correct.

9. Install the oil drain screw and tighten it.
   Specified torque: 6.5 Nm

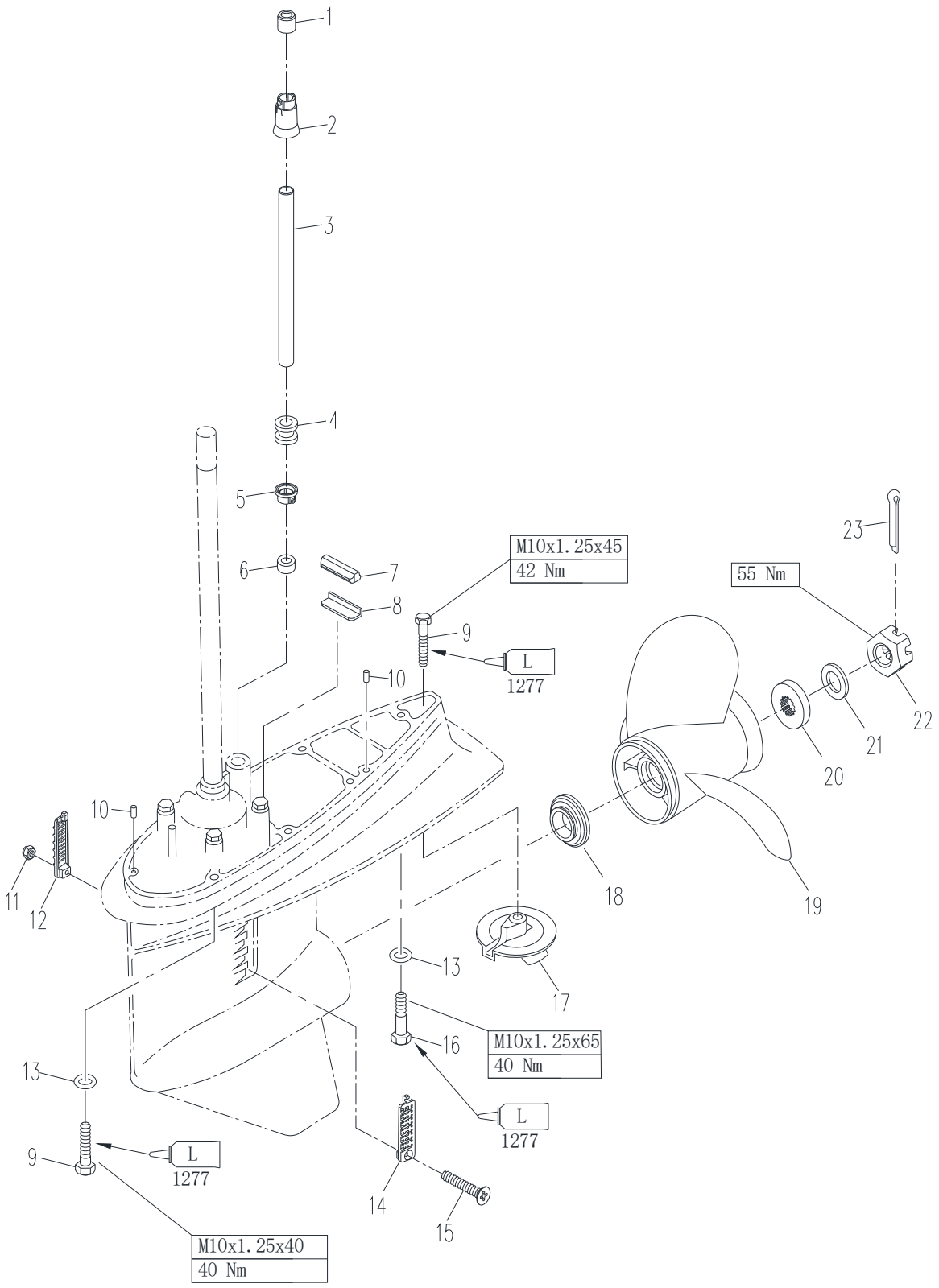
Underwater part

Disassembly schematic diagram



SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	GB/T5783-M8x45	六角螺栓 M8x45	BOLT M8x45	4					
2	T40-04000012	水泵壳体压板	PLATE,WATER PUMP	4					
3	F115-04000601	水泵壳体	WATER PUMP HOUSING	1					
4	F15-00000006	定位销 Φ6x12	DOWEL PIN Φ6x12	2					
5	F115-04000604	水泵壳体密封圈 B	O －RING B,WATER PUNP	1					
6	F115-04000603	水泵壳体密封圈 A	O －RING A,WATER PUNP	1					
7	F115-04000602	水泵内壳	INNER SHELL,WATER PUMP	1					
8	F115-04000015	衬套护盖	COVER,BUSHING	1					
9	F115-04000014	叶轮定位衬套	LOCATING BUSHING,IMPELLER	1					
10	F115-04000012	叶轮垫圈	WASHER,IMPELLER	2					
11	F115-04000013	波形垫圈	WASHER,WAVE	1					
12	F115-04000011	叶轮组件	IMPELLER ASSY	1					
13	F115-04000009	外挡板	OUTER PLATE	1					
14	F115-04000008	外挡板密封垫	GASKET,OUTER PLATE	1					
15	F115-04000203	驱动轴座防尘圈	DUST SEAL,DRIVE SHAFT SEAT	1					
16	F115-04000202	驱动轴座油封 A 28x43x7	OIL SEAL 28x43x7	2					
17	GB/T5783-M8x25	六角螺栓 M8x25	BOLT M8x25	4					
18	GB/T97.1-8	平垫圈 8	WASHER 8	4					
19	F115-04000201	驱动轴座	BASE,DRIVE SHAFT	1					
20	KOYO 30BTM3720	滚针轴承 30BTM3720	QUILL BEARING	1					
21	GB/T3452.1-Φ55x3	驱动轴座 O 型圈 55x3	O －RING 55x3	1					
22	F115-04000003-1	驱动轴填隙片 (t:0.10 毫米)	SHIM(t:0.10mm)	1					
	F115-04000003-2	驱动轴填隙片 (t:0.12 毫米)	SHIM(t:0.12mm)						
	F115-04000003-3	驱动轴填隙片 (t:0.15 毫米)	SHIM(t:0.15mm)						
	F115-04000003-4	驱动轴填隙片 (t:0.18 毫米)	SHIM(t:0.18mm)						
	F115-04000003-5	驱动轴填隙片 (t:0.30 毫米)	SHIM(t:0.30mm)						
	F115-04000003-6	驱动轴填隙片 (t:0.40 毫米)	SHIM(t:0.40mm)						
	F115-04000003-7	驱动轴填隙片 (t:0.50 毫米)	SHIM(t:0.50mm)						
23	F115-04000100	平面推力轴承	THRUST BEARING	1					
24	F115-04010000	驱动轴组件	DRIVE SHAFT ASSY	1					X
	F115-04010000L	驱动轴组件	DRIVE SHAFT ASSY						L
25	F115-04000010	叶轮半圆键	WOODRUFF KEY	1					
26	F115-04000002	长尼龙套管	BUSHING,NYLON	1					
27	KOYO BH-1820	滚针轴承 BH-1820	QUILL BEARING	1					
28	T85-04000011	变档凸轮油封 9x19x5	OIL SEAL 9x19x5,CAM SHAFT	2					
29	GB/T9074.14-M6x20	六角螺栓平垫组合 M6x20	BOLT M6x20	3					
30	F115-04000501	变档凸轮盖板	PLATE,CAM SHAFT	1					
31	GB/T3452.1-58.8x3.1	O型密封圈 58.8x3.1	O-RING 58.8x3.1	1					
32	GB/T896-8	开口挡圈 8	CIRCLIP 8	1					
33	F115-04000400	变档凸轮组件	CAMSHAFT ASSY	1					
34	F4-03000023	注油孔螺塞	PLUG,HOLE OIL	1					
35	F4-03000024	注油孔螺塞垫	GASKET	2					
36	F25-04000031	放油螺塞	PLUG,OIL RELEASE	1					

SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
37	F115-04000001	水下装置壳体	LOWER CASING	1					
38	T85-04000006	小齿轮螺母 M16x1.5	NUT, PINION	1					
39	F115-04000005	小齿轮	PINION	1					
40	F115-04000004-1	正档齿轮填隙片 (T=0.10 毫米)	SHIM(t:0.10mm)						
	F115-04000004-2	正档齿轮填隙片 (T=0.12 毫米)	SHIM(t:0.12mm)						
	F115-04000004-3	正档齿轮填隙片 (T=0.15 毫米)	SHIM(t:0.15mm)						
	F115-04000004-4	正档齿轮填隙片 (T=0.18 毫米)	SHIM(t:0.18mm)						
	F115-04000004-5	正档齿轮填隙片 (T=0.30 毫米)	SHIM(t:0.30mm)						
	F115-04000004-6	正档齿轮填隙片 (T=0.40 毫米)	SHIM(t:0.40mm)						
	F115-04000004-7	正档齿轮填隙片 (T=0.50 毫米)	SHIM(t:0.50mm)						
41	KOYO HICAP 25520/25580	圆锥滚子轴承 25520/25580	ROLLER BEARING	1					
42	F115-04000300	正档齿轮组件	FORWARD GEAR ASSY	1					
43	KOYO BM-2526	滚针轴承 BM-2526	ROLLER BEARING BM-2526	1					
44	F115-04020003	变档柱塞	PLUNGER, SHIFT	1					
45	F115-04020007	轴承钢珠 7/32(5.5562)	STEEL BALL 7/32(5.5562)	2					
46	F60-06000204	轴承钢珠 3/16(4.7625)	STEEL BALL 3/16(4.7625)	2					
47	F115-04020005	轴承钢珠 11/32(8.731)	STEEL BALL 11/32(8.731)	2					
48	F115-04020006	离合器弹簧	SPRING, CLUTCH	1					
49	F115-04020002	爪型离合器	CLAW CLUTCH	1					
50	F115-04020008	离合器销	PIN, CLUTCH	1					
51	F115-04020009	离合器簧环	RING, CLUTCH	1					
52	F115-04020001	螺旋桨轴	SHAFT, PROPELLER	1					
53	F115-04020000	螺旋桨轴组件	PROPELLER SHAFT ASSY	1					
54	F115-04000021-1	倒档齿轮填隙片 (T=0.10 毫米)	SHIM(t:0.10mm)						
	F115-04000021-2	倒档齿轮填隙片 (T=0.12 毫米)	SHIM(t:0.12mm)						
	F115-04000021-3	倒档齿轮填隙片 (T=0.15 毫米)	SHIM(t:0.15mm)						
	F115-04000021-4	倒档齿轮填隙片 (T=0.18 毫米)	SHIM(t:0.18mm)						
	F115-04000021-5	倒档齿轮填隙片 (T=0.30 毫米)	SHIM(t:0.30mm)						
	F115-04000021-6	倒档齿轮填隙片 (T=0.40 毫米)	SHIM(t:0.40mm)						
	F115-04000021-7	倒档齿轮填隙片 (T=0.50 毫米)	SHIM(t:0.50mm)						
55	F115-04000020	倒档齿轮垫圈	GASKET, REVERSE GEAR	2					
56	F115-04030005	倒档齿轮	GEAR, REVERSE	1					
57	F115-04030004	倒档齿轮垫块	SPACER, REVERSE GEAR	1					
58	KOYO 6208C3	深沟球轴承 6208C3	DEEP GROOVE BALL BEARING	1					
59	F115-04030003	水下壳体盖 O型圈 87x5.5	O-RING 87x5.5	1					
60	F115-04030001	水下装置壳体盖	COVER, LOWER CASING	1					
61	KOYO 30BM3726	滚针轴承 30BM3726	QUILL BEARING 30BM3726	1					
62	F115-04030002	油封 30x45x7	OIL SEAL 30x45x7	2					
63	T85-04000027	壳盖定位件	PIECE, ORIENTATION	1					
64	T85-04000020	锁止垫圈	WASHER, LOCKED	1					
65	T85-04000021	壳盖螺母	CROWN NUT	1					
66	F115-04000000	水下装置组件	LOWER CASING ASSY	1					X
	F115-04000000L	水下装置组件	LOWER CASING ASSY						L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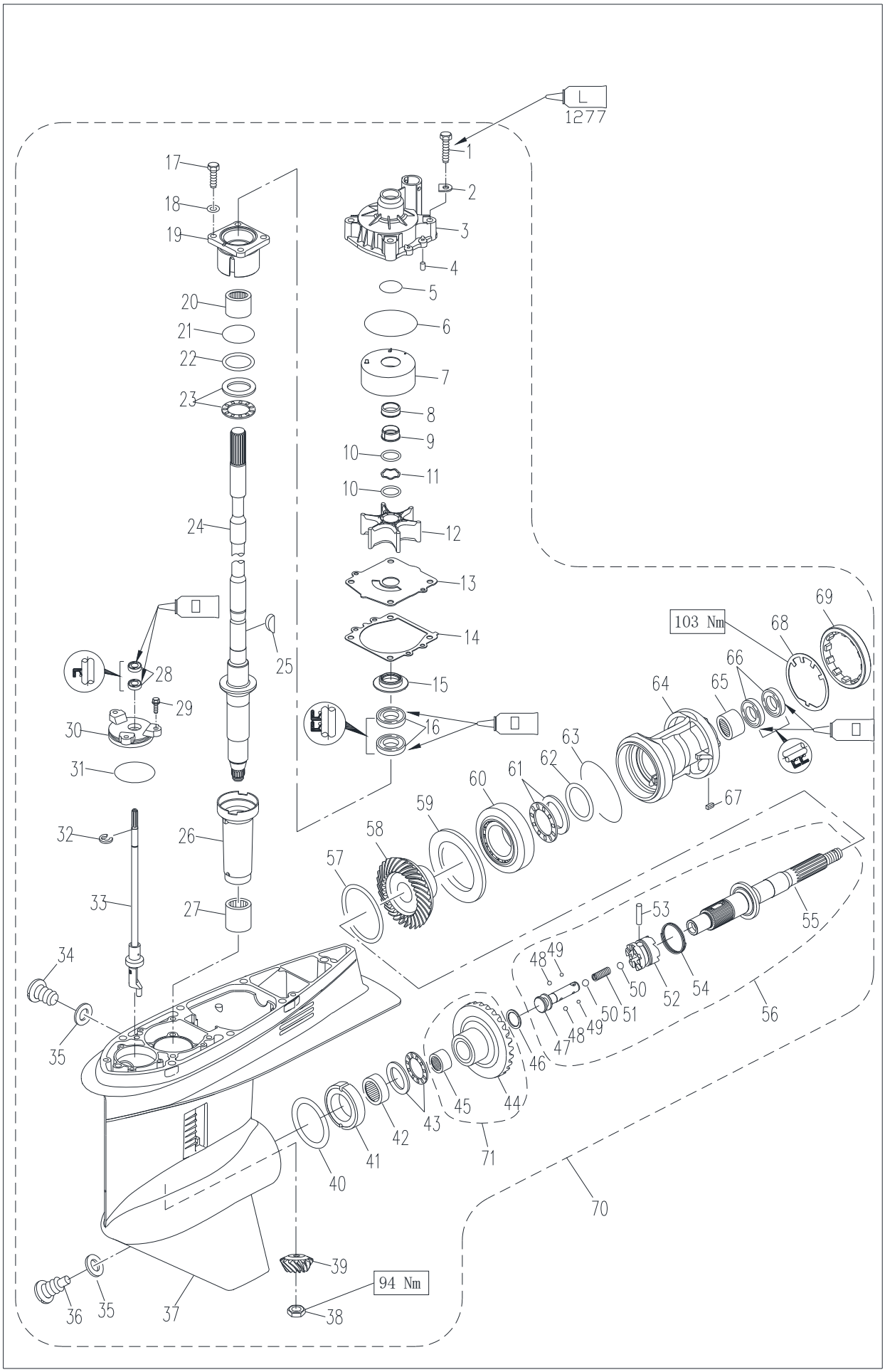
SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	F115-02010012	水管上密封圈	UPPEER SEAL,WATER PIPE	1					
2	F115-02010013	水管尼龙导向套A	BUSHING A,WATER PIPE	1					
3	F115-02010016	进水管	WATER PIPE	1					X
	F115-02010016L	进水管	WATER PIPE						L
4	F115-02000004	水管导向套	GUIDE BUSHING,WATER PIPE	1					
5	F115-04000017	水管尼龙导向套B	BUSHING B,WATER PIPE	1					
6	F115-04000016	水管下密封圈	LOWER SEAL,WATER PIPE	1					
7	T85-04000013	水封	WATER ENVELOP	1					
8	T40-04000013	水封垫板	PLATE,WATER ENVELOP	1					
9	F115-00000016	六角螺栓　M10x1.25x45	BOLT　M10x1.25x45	7					
10	F25-00000014	定位销　Φ8x12	DOWEL PIN Φ8x12	2					
11	GB/T889.1-M5	非金属嵌件六角锁紧螺母　M5	LOCK NUT M5	1					
12	F115-04000026	进水口 B	WATER INLET B	1					
13	GB/T97.1-10	平垫圈　10	WASHER 10	7					
14	F115-04000025	进水口 A	WATER INLET A	1					
15	GB/T820-M5x52	十字槽半沉头螺钉　M5x52	BOLT M5x52	1					
16	F115-00000005	六角螺栓　M10x1.25x70	BOLT　M10x1.25x70	1					
17	F115-00000006	航向调整片	COURSE ADJUSTER	1					
18	F115-04000022	螺旋桨垫块	BLOCK,PROPELLER	1					
19	F115-04040000	螺旋桨体组件	PROPELLER ASSY	1					
20	F115-04000023	花键垫块	SPLINE BLOCK	1					
21	GB/T97.1-18	平垫圈　18	WASHER 18	1					
22	F115-04000024	开槽六角螺母	NUT	1					
23	GB/T91-Φ4x30	开口销　Φ4x30	COTTER PIN ϕ4x30	1					

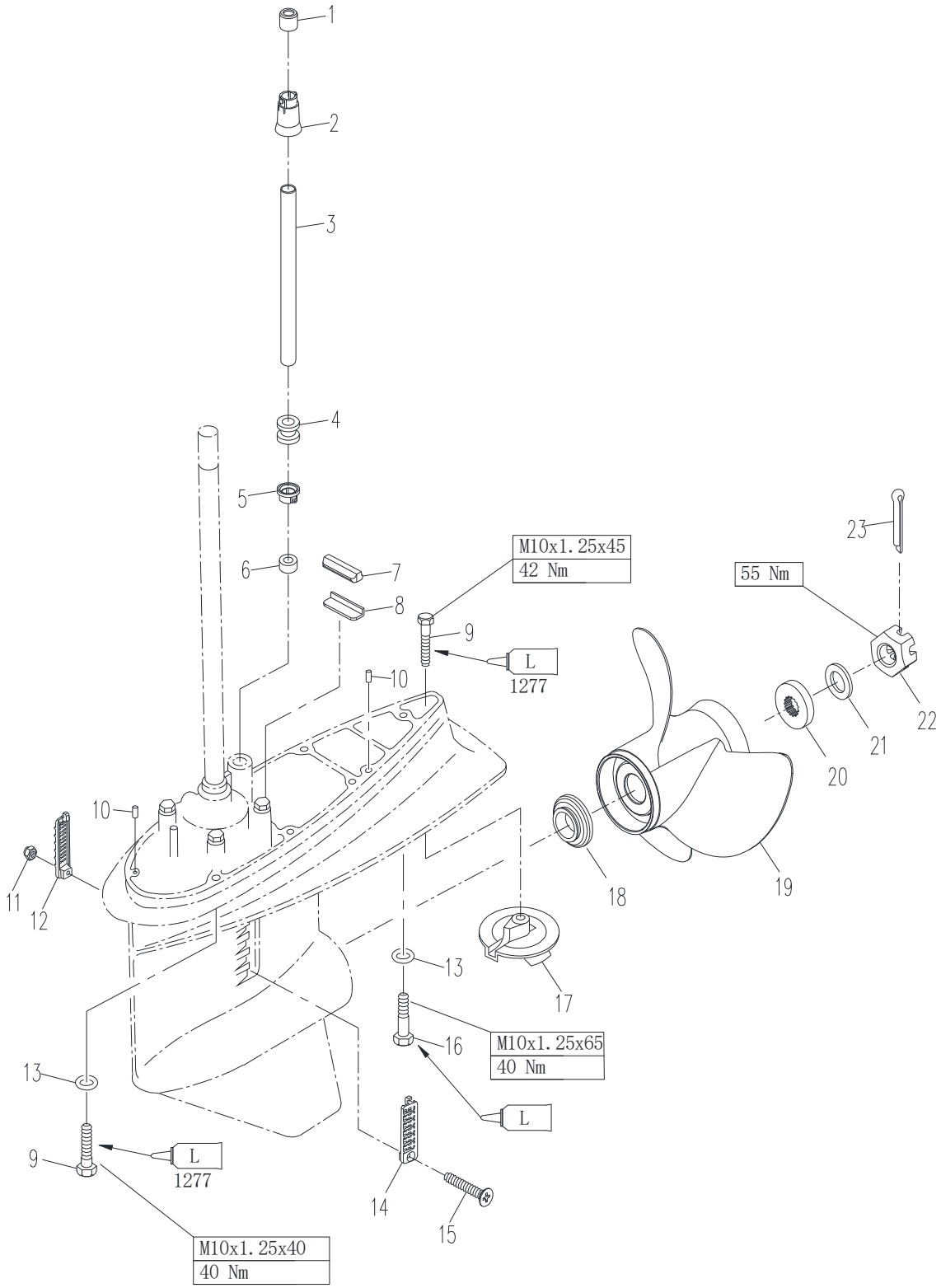
FL115 rotates backward：



SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
1	GB/T5783-M8x45	六角螺栓 M8x45	BOLT M8x45	4					
2	T40-04000012	水泵壳体压板	PLATE,WATER PUMP	4					
3	F115-04000601	水泵壳体	WATER PUMP HOUSING	1					
4	F15-00000006	定位销 Φ6x12	DOWEL PIN Φ6x12	2					
5	F115-04000604	水泵壳体密封圈 B	O －RING B,WATER PUNP	1					
6	F115-04000603	水泵壳体密封圈 A	O －RING A,WATER PUNP	1					
7	F115-04000602	水泵内壳	INNER SHELL,WATER PUMP	1					
8	F115-04000015	衬套护盖	COVER,BUSHING	1					
9	F115-04000014	叶轮定位衬套	LOCATING BUSHING,IMPELLER	1					
10	F115-04000012	叶轮垫圈	WASHER,IMPELLER	2					
11	F115-04000013	波形垫圈	WASHER,WAVE	1					
12	F115-04000011	叶轮组件	IMPELLER ASSY	1					
13	F115-04000009	外挡板	OUTER PLATE	1					
14	F115-04000008	外挡板密封垫	GASKET,OUTER PLATE	1					
15	F115-04000203	驱动轴座防尘圈	DUST SEAL,DRIVE SHAFT SEAT	1					
16	F115-04000202	驱动轴座油封 A 28x43x7	OIL SEAL 28x43x7	2					
17	GB/T5783-M8x25	六角螺栓 M8x25	BOLT M8x25	4					
18	GB/T97.1-8	平垫圈 8	WASHER 8	4					
19	F115-04000201	驱动轴座	BASE,DRIVE SHAFT	1					
20	KOYO 30BTM3720	滚针轴承 30BTM3720	QUILL BEARING	1					
21	GB/T3452.1-Φ55x3	驱动轴座 O 型圈 55x3	O －RING 55x3	1					
22	F115-04000003-1	驱动轴填隙片 (t:0.10 毫米)	SHIM(t:0.10mm)	1					
	F115-04000003-2	驱动轴填隙片 (t:0.12 毫米)	SHIM(t:0.12mm)						
	F115-04000003-3	驱动轴填隙片 (t:0.15 毫米)	SHIM(t:0.15mm)						
	F115-04000003-4	驱动轴填隙片 (t:0.18 毫米)	SHIM(t:0.18mm)						
	F115-04000003-5	驱动轴填隙片 (t:0.30 毫米)	SHIM(t:0.30mm)						
	F115-04000003-6	驱动轴填隙片 (t:0.40 毫米)	SHIM(t:0.40mm)						
	F115-04000003-7	驱动轴填隙片 (t:0.50 毫米)	SHIM(t:0.50mm)						
23	F115-04000100	平面推力轴承	THRUST BEARING	1					
24	F115-04010000	驱动轴组件	DRIVE SHAFT ASSY	1					X
	F115-04010000L	驱动轴组件	DRIVE SHAFT ASSY						L
25	F115-04000010	叶轮半圆键	WOODRUFF KEY	1					
26	F115-04000002	长尼龙套管	BUSHING,NYLON	1					
27	KOYO BH-1820	滚针轴承 BH-1820	QUILL BEARING	1					
28	T85-04000011	变档凸轮油封 9x19x5	OIL SEAL 9x19x5,CAM SHAFT	2					
29	GB/T9074.14-M6x20	六角螺栓平垫组合 M6x20	BOLT M6x20	3					
30	F115-04000501	变档凸轮盖板	PLATE,CAM SHAFT	1					
31	GB/T3452.1-58.8x3.1	O 型密封圈 58.8x3.1	O-RING 58.8x3.1	1					
32	GB/T896-8	开口挡圈 8	CIRCLIP 8	1					
33	FL115-04000200	变档凸轮组件	CAMSHAFT ASSY	1					
34	F4-03000023	注油孔螺塞	PLUG,HOLE OIL	1					
35	F4-03000024	注油孔螺塞垫	GASKET	2					
36	F25-04000031	放油螺塞	PLUG,OIL RELEASE	1					

SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
37	F115-04000001	水下装置壳体	LOWER CASING	1					
38	T85-04000006	小齿轮螺母 M16x1.5	NUT,PINION	1					
39	F115-04000005	小齿轮	PINION	1					
40	F115-04000004-1	正档齿轮填隙片 (T=0.10 毫米)	SHIM(t:0.10mm)						
	F115-04000004-2	正档齿轮填隙片 (T=0.12 毫米)	SHIM(t:0.12mm)						
	F115-04000004-3	正档齿轮填隙片 (T=0.15 毫米)	SHIM(t:0.15mm)						
	F115-04000004-4	正档齿轮填隙片 (T=0.18 毫米)	SHIM(t:0.18mm)						
	F115-04000004-5	正档齿轮填隙片 (T=0.30 毫米)	SHIM(t:0.30mm)						
	F115-04000004-6	正档齿轮填隙片 (T=0.40 毫米)	SHIM(t:0.40mm)						
	F115-04000004-7	正档齿轮填隙片 (T=0.50 毫米)	SHIM(t:0.50mm)						
41	FL115-04000001	倒档齿轮垫块	SPACER,REVERSE GEAR	1					
42	NSK F-4520	滚针轴承 F-4520	QUILL BEARING F-4520	1					
43	FL115-04000002	倒档平面推力轴承（60x84.5x4.5	THRUST BEARING	1					
44	FL115-04000101	倒档齿轮	GEAR,REVERSE	1					
45	KOYO BM-2526	滚针轴承 BM-2526	ROLLER BEARING BM-2526	1					
46	FL115-04000003	螺旋桨轴垫圈	WASHER,PROPELLER SHAFT	1					
47	F115-04020003	变档柱塞	PLUNGER,SHIFT	1					
48	F115-04020007	轴承钢珠 7/32(5.5562)	STEEL BALL 7/32(5.5562)	2					
49	F60-06000204	轴承钢珠 3/16(4.7625)	STEEL BALL 3/16(4.7625)	2					
50	F115-04020005	轴承钢珠 11/32(8.731)	STEEL BALL 11/32(8.731)	2					
51	F115-04020006	离合器弹簧	SPRING,CLUTCH	1					
52	F115-04020002	爪型离合器	CLAW CLUTCH	1					
53	F115-04020008	离合器销	PIN,CLUTCH	1					
54	F115-04020009	离合器簧环	RING,CLUTCH	1					
55	FL115-04010001	螺旋桨轴	SHAFT,PROPELLER	1					
56	FL115-04010000	螺旋桨轴组件	PROPELLER SHAFT ASSY	1					
57	F115-04000021-1	倒档齿轮填隙片 (T=0.10 毫米)	SHIM(t:0.10mm)						
	F115-04000021-2	倒档齿轮填隙片 (T=0.12 毫米)	SHIM(t:0.12mm)						
	F115-04000021-3	倒档齿轮填隙片 (T=0.15 毫米)	SHIM(t:0.15mm)						
	F115-04000021-4	倒档齿轮填隙片 (T=0.18 毫米)	SHIM(t:0.18mm)						
	F115-04000021-5	倒档齿轮填隙片 (T=0.30 毫米)	SHIM(t:0.30mm)						
	F115-04000021-6	倒档齿轮填隙片 (T=0.40 毫米)	SHIM(t:0.40mm)						
	F115-04000021-7	倒档齿轮填隙片 (T=0.50 毫米)	SHIM(t:0.50mm)						
58	FL115-04010101	正档齿轮	FORWARD GEAR	1					
59	FL115-04010004	正档齿轮垫块	SPACER,FORWARD GEAR	1					
60	NSK HR 32010XJ	圆锥滚子轴承 HR 32010XJ	ROLLER BEARING	1					
61	FL115-04010002	平面推力轴承	THRUST BEARING 40x60x6.5	1					
62	FL115-04010003-1	螺旋桨轴填隙片 (T=0.10 毫米)	SHIM(t:0.10mm)						
	FL115-04010003-2	螺旋桨轴填隙片 (T=0.12 毫米)	SHIM(t:0.12mm)						
	FL115-04010003-3	螺旋桨轴填隙片 (T=0.15 毫米)	SHIM(t:0.15mm)						
	FL115-04010003-4	螺旋桨轴填隙片 (T=0.18 毫米)	SHIM(t:0.18mm)						
	FL115-04010003-5	螺旋桨轴填隙片 (T=0.30 毫米)	SHIM(t:0.30mm)						
	FL115-04010003-6	螺旋桨轴填隙片 (T=0.40 毫米)	SHIM(t:0.40mm)						

SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称(中文)	DESCRIPTION 零件名称(英文)	QTY 数量					REMARKS 备注
	FL115-04010003-7	螺旋桨轴填隙片 (T=0.50 毫米)	SHIM(t:0.50mm)						
63	F115-04030003	水下壳体盖 O型圈 87x5.5	O-RING 87x5.5	1					
64	FL115-04010201	水下装置壳体盖	COVER,LOWER CASING	1					
65	NSK F-3026R	滚针轴承 F-3026R	QUILL BEARING F-3026R	1					
66	F115-04030002	油封 30x45x7	OIL SEAL 30x45x7	2					
67	T85-04000027	壳盖定位件	PIECE,ORIENTATION	1					
68	T85-04000020	锁止垫圈	WASHER,LOCKED	1					
69	T85-04000021	壳盖螺母	CROWN NUT	1					
70	FL115-04000000	水下装置组件	LOWER CASING ASSY	1					X
71	FL115-04000000L	水下装置组件	LOWER CASING ASSY						L
	FL115-04000100	倒档齿轮组件	GEAR ASSY,REVERSE	1					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55 Nm
M10x1.25x45
42 Nm
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1277

SN. 参照号码	PART NO. 零件编号	DESCRIPTION 零件名称中文	DESCRIPTION 零件名称英文	QTY 数量					REMARKS 备注
1	F115-02010012	水管上密封圈	UPPEER SEAL,WATER PIPE	1					
2	F115-02010013	水管尼龙导向套A	BUSHING A,WATER PIPE	1					
3	F115-02010016	进水管	WATER PIPE	1					X
	F115-02010016L	进水管	WATER PIPE						L
4	F115-02000004	水管导向套	GUIDE BUSHING,WATER PIPE	1					
5	F115-04000017	水管尼龙导向套B	BUSHING B,WATER PIPE	1					
6	F115-04000016	水管下密封圈	LOWER SEAL,WATER PIPE	1					
7	T85-04000013	水封	WATER ENVELOP	1					
8	T40-04000013	水封垫板	PLATE,WATER ENVELOP	1					
9	F115-00000016	六角螺栓 M10x1.25x45	BOLT M10x1.25x45	7					
10	F25-00000014	定位销 Φ8x12	DOWEL PIN Φ8x12	2					
11	GB/T889.1-M5	非金属嵌件六角锁紧螺母M5	LOCK NUT M5	1					
12	F115-04000026	进水口B	WATER INLET B	1					
13	GB/T97.1-10	平垫圈 10	WASHER 10	7					
14	F115-04000025	进水口A	WATER INLET A	1					
15	GB/T820-M5x52	十字槽半沉头螺钉 M5x52	BOLT M5x52	1					
16	F115-00000005	六角螺栓 M10x1.25x70	BOLT M10x1.25x70	1					
17	F115-00000006	航向调整片	COURSE ADJUSTER	1					
18	F115-04000022	螺旋桨垫块	BLOCK,PROPELLER	1					
19	FL115-04020000	螺旋桨体组件	PROPELLER ASSY	1					3-13x17L
20	F115-04000023	花键垫块	SPLINE BLOCK	1					
21	GB/T97.1-18	平垫圈 18	WASHER 18	1					
22	F115-04000024	开槽六角螺母	NUT	1					
23	GB/T91-Φ4x30	开口销 Φ4x30	COTTER PIN ϕ4x30	1					

Disassembly and inspection

1. Drain the gear oil; remove the cotter pin.

2. Place a piece of wood between the anti-swirl baffle and the propeller to prevent the propeller from rotating freely. Remove the slotted hexagon nut and the water inlet.

3. Remove the propeller and cushion block.

4. Remove the anode.

5. Remove the connecting bolts of the underwater unit and remove the underwater unit.

6. Remove the water pipe.

7. Remove pump casing, impeller and pump inner casing.

8. Remove the semicircular key and outer plate.

9. Place the shift cam assembly in a neutral position; Remove shift cam cover plate and pull out shift cam assembly.

10. Check the shift cam assembly for cracks, twists, or damage. Replace it if necessary.

11. Check the pump casing and outer plate for cracks, distortions or damage. Replace it if necessary.

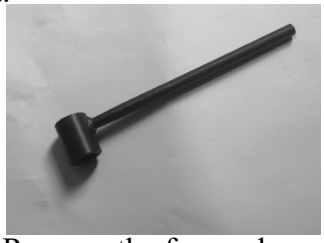
12. Check the pump inner shell and impeller for cracking, deformation, burning or wear. Replace it if necessary.

13. Remove the housing cover of the underwater unit.
F115: Remove the reverse gear and the cushion block of reverse gear, remove the deep groove ball bearing, needle roller bearing and oil seal.
FL115 rotates backward： Remove the forward gear and the cushion block of the forward gear, and remove the plane thrust bearing, propeller shaft shim and needle roller bearing; Remove the oil seal.

14. Remove the propeller shaft assembly.

15. Remove the clutch ring, clutch pin and claw clutch from the propeller shaft assembly. Remove shift plunger, clutch spring and bearing ball.

16. Remove the drive shaft seat.
Remove the pinion nut using an internal spline wrench and remove the pinion and drive shaft.



17. F115: Remove the forward gear, remove the bearing on the forward gear.
FL115 rotates backward： Remove the reverse gear assembly and the reverse gear washer.

18. Remove the needle bearing from the underwater unit.

19. Remove the oil seal and plane thrust bearing of the drive shaft seat, and remove the drive shaft shim and needle roller bearing.

Propeller shaft and clutch block

1. Check the claw clutch; If broken or damaged, replace it.

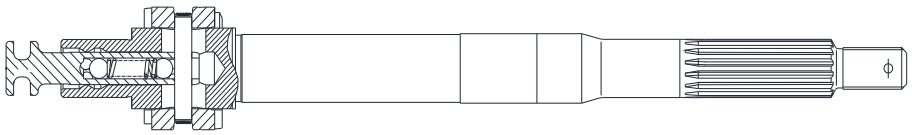
2. Check the propeller shaft; Replace it if worn or bent.

Install the claw clutch

1. Fit the bearing ball (large) and clutch spring into the hole of shift plunger.

2. Place four bearing balls (small) in the corresponding holes of the shift plunger and insert them into the propeller shaft.

3. Install the claw clutch. "F" or "●" faces the forward direction of the engine. Fix the clutch pin.



Note:

The figure shows the propeller shaft of forward-rotating model; The claw clutch installation method of the backward-rotating model is the same as that of the forward-rotating model.

4. Install clutch spring ring.

Housing cover of underwater unit

1. Check the bearing for rust and whether there is noise during rotation; If so, replace it.

2. Remove the bearing and oil seal with bearing puller.

Note:

Do not remove the bearing unless it needs to be replaced.

3. Remove the needle bearing with special tool.

Note:

When reinstalling the oil seal and needle bearing, please use new parts to replace them.

4. Clean the housing cover with a soft brush and solvent.

5. Check the housing cover; Replace it if cracked or damaged.

Install the oil seal and bearing of the housing cover

1. Install the oil seal.

2. Fit the new bearing on the reverse gear.

Note:

Use special tools to install the oil seal and bearing.

Pay attention to the installation direction and depth.

Make sure that the manufacturer's mark of the bearing faces the reverse gear.

Mounting depth:

Needle roller bearing		24.75～25.25 mm
Oil seal	Depth 1	4.75～5.25 mm
	Depth 2	11.75～12.25 mm

Underwater unit housing cover bearing installation tool

Underwater unit housing cover oil seal installation tool

Underwater unit housing cover needle bearing installation tool

3. Install reverse gear and shim.

Note:

Shim adjustment is required when installing new reverse gears and bearings.

Install forward gear and shim (FL115 backward-rotating model).

Note:

When installing new forward gear and cushion block of the forward gear, please adjust the shim.

Drive shaft

Check the drive shaft for bending or wear. Replace it if necessary.

Shift cam

Check whether the shift cam is worn or deformed. Replace it if necessary.

Gear

Check the forward gear, reverse gear and pinion for wear or damage. Replace it if necessary.

Forward gear bearing

Check whether the bearing is corroded and whether there is noise when rotating; Replace it if necessary.

Note:

Do not remove the bearing unless it needs to be replaced.

When installing a new bearing, it is required to adjust the shim.

Check the housing of the underwater unit

Check whether the housing of underwater unit is cracked or damaged, and check whether the cooling water inlet is blocked; Replace them if necessary.

Check the water pipe

Check the water pipe for corrosion or bending. Replace it if necessary.

Assemble underwater unit

1. Use special tools to install the needle bearing.

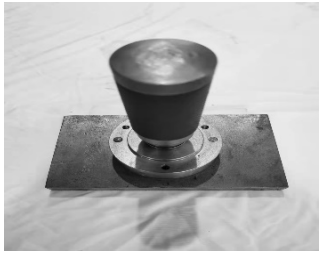
Needle bearing installation tool kit

2. Install the new forward gear bearing. (Replace it if necessary)

Forward gear bearing jacket installation kit

3. Install the oil seal for drive shaft seat and the needle bearing

Drive shaft seat oil seal installation tool kit



Drive shaft seat needle bearing installation tool

Mounting depth:

Needle roller bearing		5.75～6.25 mm
Oil seal	Depth 1	0.25～0.75 mm
	Depth 2	7.25～7.75 mm

4. F115 forward-rotating model:
Install forward gear, long nylon sleeve, drive shaft, plane thrust bearing, shim, install drive shaft seat, pinion and shift cam.
F115 backward-rotating model:
Install shift cam, drive shaft, shim, install reverse gear, drive shaft seat, long nylon sleeve, plane thrust bearing and pinion.
Note:
When installing a new drive shaft, it is required to adjust the shim.

5. Tighten the pinion nut.
Specified torque: 94 Nm

6. Install the propeller shaft assembly.

7. Install the underwater unit housing cover.

8. Tighten the housing cover nut and pry up a tongue piece on the locking washer.
   Specified torque: 103 Nm

Cover nut installation tool

9. Check whether the gear shift is working properly.

10. Install the water pump assembly.

11. Install the anode and water inlet.

12. Install the propeller and slotted hexagon nut, place a piece of wood between the anti-swirl baffle and the propeller, and tighten the nut at the specified torque.
   Specified torque: 55 Nm
   Note:
   If the groove on the nut is not aligned with the cotter pin hole on the propeller shaft, tighten the nut further until they are aligned.

Install the underwater unit

1. Install the locating pin.

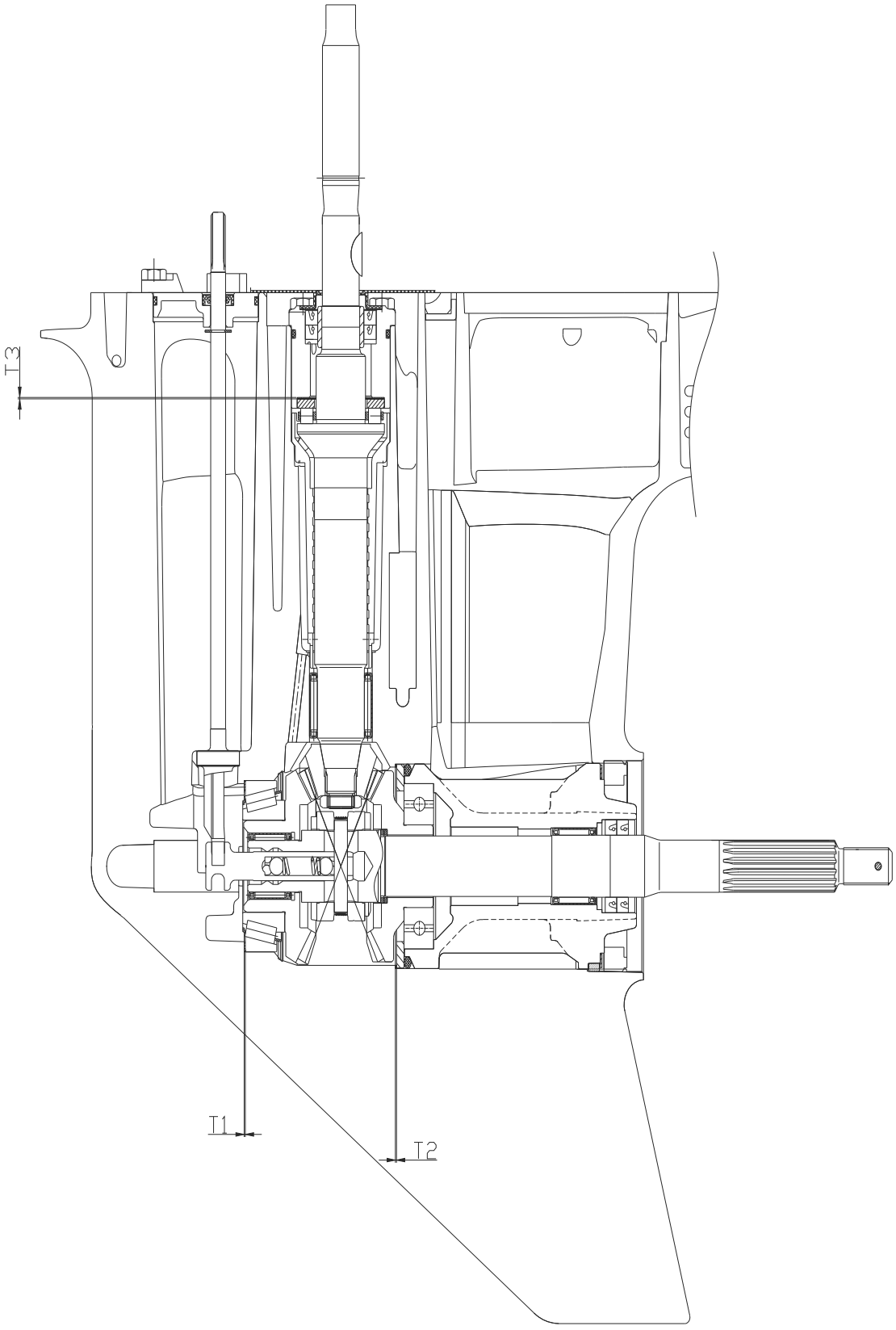
2. Please put the shift cam to the neutral position. Install the underwater unit to the housing of the water unit and tighten the bolts to the specified value.
   Specified torque: 40 Nm

3. Perform shift operation and check whether it is operating normally.

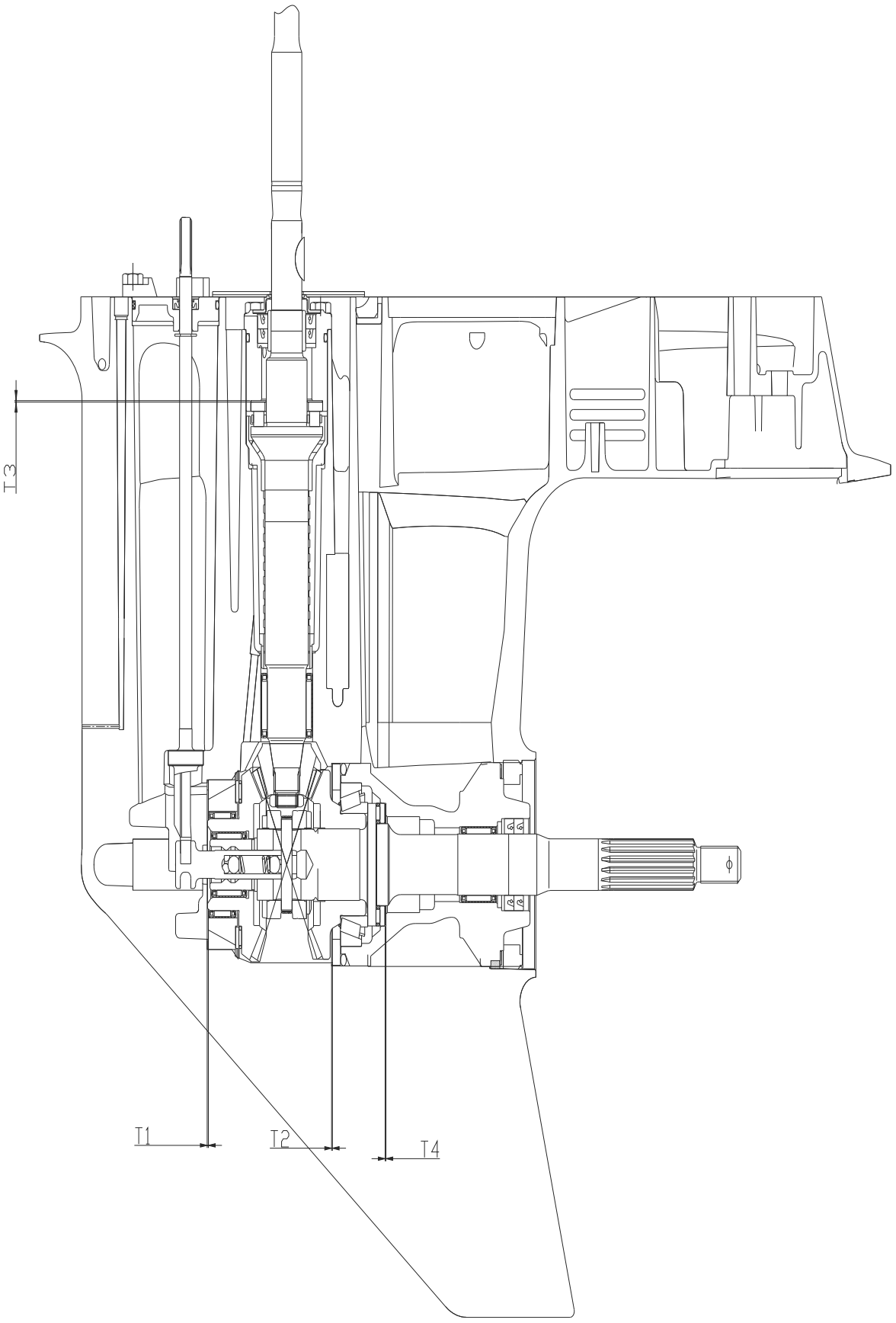
4. Add gear oil with pressure filling device.

Selection of shim

When replacing the internal parts of the underwater unit or assembling a new underwater unit, it is required to adjust the shim.



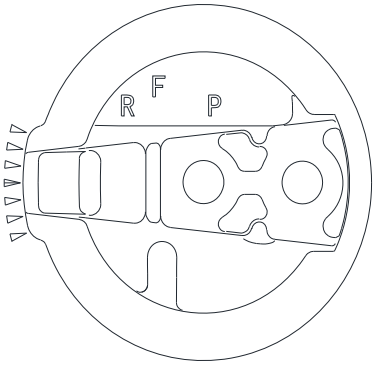
FL115 rotates backward：



Deviation value mark

The installation surface of the anode/heading tab of the underwater unit is engraved with deviation value marks, which are F, R and P respectively; they represent the difference between the actual size and the theoretical size on the housing of the underwater unit.

For example, the mark P is followed by +3, which means that the actual size is 0.03 mm more than the theoretical size; If no number is engraved after the deviation value, then P is regarded as 0.

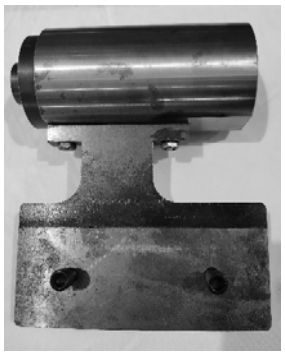


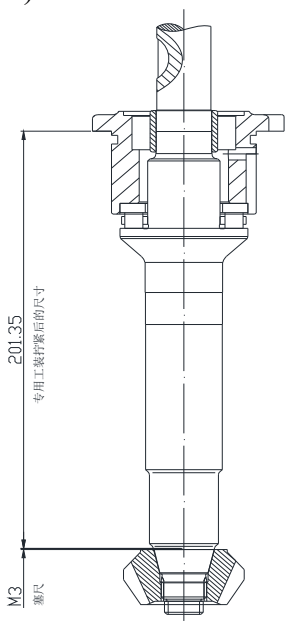
Pinion shim

1. Attach the drive shaft to the special tool. Install the pinion and lock the pinion nut according to the specified torque.

Specified torque: 94 Nm

Special tooling for pinion shim (201.35)





2. Measure the clearance M3 between the special tooling and the pinion with a filler gauge. According to M3, look up the table to get the temporary value T3 of the shim.
According to M3, look up the table to get the temporary value t3 of the shim
According to M3

3. Pinion shim calculation formula: T3=t3+P/100

4. The shim can be reduced by 0~0.05mm compared with T3 (try to choose the most similar size as possible)

For example, T3=0. 3, 0.17 shim should be selected, and the actual value should be 0.15.

5. Optional shim.

0.10, 0.12, 0.15, 0.18, 0.3, 0.4, 0.5 mm

Forward gear shim

1. Use standard block to calibrate the special tooling, ensure a compression of 0.5-0.8 mm, push the standard block several times, and clear zero position.

2. Turn tapered roller bearing 25580/25520 outer ring two or three times so that the rollers fall completely into the bearing outer ring.

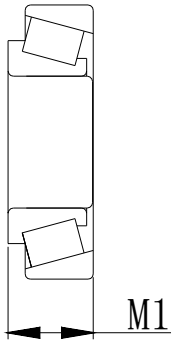
3. Measure the bearing thickness with special tooling, measure three points and calculate the average value, as shown in the figure: (Reference size M1=23.95)

4. The formula T1=24.65 + (F/100)-M1

5. The shim can be reduced by 0~0.05mm compared with T1 (try to choose the most similar size as possible)

6. Forward gear shims (T1) that can be selected.

0.10, 0.12, 0.15, 0.18, 0.3, 0.4, 0.5 mm



Reverse gear shim

1. Check the R value marked on the housing of the underwater unit.

2. Formula: T2=0.7＋(R/100)

3. The shim can be increased by 0-0.05mm compared with T2 (try to choose the most similar size as possible)

4. Reverse gear shims (T2) that can be selected

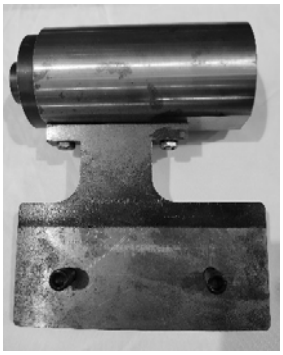
0.10, 0.12, 0.15, 0.18, 0.3, 0.4, 0.5 mm

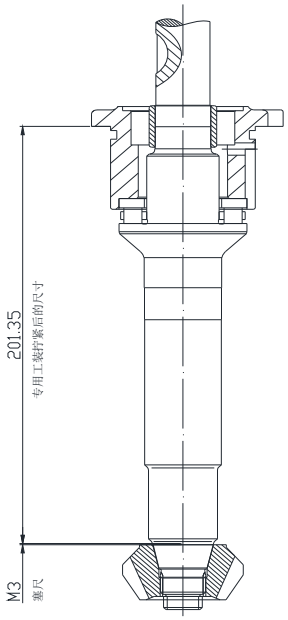
Backward-rotating pinion shim

1. Attach the drive shaft to the special tool. Install the pinion and lock the pinion nut according to the specified torque.

Specified torque: 94 Nm

Special tooling for pinion shim (201.35)





2. Measure the clearance M3 between the special tooling and the pinion with a filler gauge. According to M3, look up the table to get the temporary value T3 of the shim.
According to M3, look up the table to get the temporary value t3 of the shim
According to M3

3. Pinion shim calculation formula: T3=t3+P/100

4. The shim can be reduced by 0~0.05mm compared with T3 (try to choose the most similar size as possible)

For example, T3=0. 3, 0.17 shim should be selected, and the actual value should be 0.15.

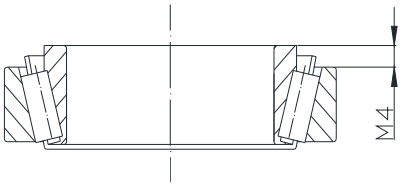
5. Shims that can be selected.

0.10, 0.12, 0.15, 0.18, 0.3, 0.4, 0.5 mm

Propeller shaft shim

1. Turn tapered roller bearing 32010JR outer ring two or three times so that the rollers fall completely into the bearing outer ring.

2. Measure the bearing thickness with special tooling, measure three points and calculate the average value, as shown in the figure:



3. Formula: T4=18-6-6.5-0.3-M4=5.2-M4

The shim can be reduced by 0~0.05mm compared with T4 (try to choose the most similar size as possible).

4. Propeller shaft shims (T4) that can be selected:

0.10, 0.12, 0.15, 0.18, 0.3, 0.4, 0.5 mm

Reverse gear shim

1. Check the F size marked on the housing of the underwater unit.

2. Formula: T1=58.7-20-4.5-33.3＋(F/100)=0.9+(F/100)

3. The shim can be reduced by 0~0.05mm compared with T1 (try to choose the most similar size as possible)

4. Reverse gear shims (T1) that can be selected

0.10, 0.12, 0.15, 0.18, 0.3, 0.4, 0.5 mm

Forward gear shim

1. Check the R size marked on the housing of the underwater unit.

2. Formula: T2=39.8-33.2-6+(R/100)=0.6+(R/100)

3. The shim can be increased by 0~0.05mm compared with T2 (try to choose the most similar size as possible).

4. Forward gear shims (T2) that can be selected:

0.10, 0.12, 0.15, 0.18, 0.3, 0.4, 0.5 mm

Common faults and solutions

Fault type	Fault cause	Solution
Engine fails to start	There is no fuel in the fuel tank	Fill the fuel tank with clean new fuel
	Contaminated or obsolete fuel oil	
	Fuel filter blocked	Replace the fuel filter
	Fuel pump failure	Overhaul or replace it
	Vent screw of fuel tank cap not loosened	Loosen the vent screw
	The spark plug is contaminated or the model is incorrect	Check the spark plug. Clean it or replace with the correct spark plug
	Incorrect installation of spark plug cap	Check and reinstall the spark plug cap
	Ignition circuit failure	Check the wiring. Tighten the loose wire and replace the old or broken wire.
	Ignition component failure	Replace it
	The engine stop safety line is not connected to the emergency stop switch assembly.	Connect the line to the switch
	Internal parts failure of the engine	Repair it
Engine idle is abnormal or stalls	The spark plug is contaminated or the model is incorrect	Clean it or replace with the correct spark plug
	Fuel system blocked	Check the fuel line for extrusion, entanglement or blockage
	Fuel oil polluted or obsoleted	Fill the fuel tank with clean new fuel
	Fuel filter blocked	Replace the fuel filter
	Incorrect spark plug gap	Adjust the gap to the specified value
	Ignition circuit failure	Check the wiring. Tighten the loose wire and replace the aging or broken wire.
	Incorrect engine oil grade	Change it to the specified oil grade
	Thermostat failure	Replace it
	Fuel pump failure	Replace it
	Vent screw of fuel tank cap not loosened	Loosen the vent screw
	The fuel joint is not connected correctly	Connect it correctly
	The angle of the outboard motor is too high	Return it to its normal running position
The engine is weak.	Propeller damaged	Repair or replace the propeller
	Incorrect trim angle	Adjust the trim angle to the appropriate angle
	Incorrect installation height of outboard motor	Adjust it to the correct height

Continued：

Fault type	Fault cause	Solution
The engine is weak.	The bottom of the ship is polluted by underwater organisms	Clean the bottom of the ship
	Gear box twined by aquatic plants or foreign matters	Remove the foreign matters and clean it
	The spark plug is contaminated or the model is incorrect	Clean it or replace with the correct spark plug
	Fuel system blocked	Check the fuel line for extrusion, entanglement or blockage
	Fuel filter blocked	Replace the fuel filter
	Fuel oil polluted or obsoleted	Fill the fuel tank with clean new fuel
	Incorrect spark plug gap	Adjust the gap to the specified value
	Ignition circuit failure	Check the wiring. Tighten the loose wire and replace the old or broken wire.
	Ignition component failure	Replace it
	Incorrect engine oil grade or excessive oil	Change to the specified oil grade or add it to the proper position of the oil dipstick
	Thermostat failure	Replace it
	Fuel pump failure	Replace it
	The fuel joint is not connected correctly	Connect it correctly
	Incorrect spark plug specification	Replace it with the correct model
Excessive vibration of outboard motor	Propeller damaged	Repair or replace the propeller
	Propeller shaft damaged	Replace it
	Propeller twined by aquatic plants or foreign matters	Remove the foreign matters and clean it
	Mounting bolts of outboard motor loosened	Tighten the bolts
	Steering shaft loosened	Tighten the shaft
	Steering shaft damaged	Replace it