KIPOR®

KIPOR POWER

OPERATION MANUAL

PLEASE READ THIS MANUAL CAREFULLY.
IT CONTAINS IMPORTANT SAFETY INFORMATION.



AIR-COOLED DIESEL ENGINE

KM170F(FA)/FE(FAE)/FS(FAS)/FSE(FASE)

KM178F(FA)/FE(FAE)/FS(FAS)/FSE(FASE)

KM186F(FA)/FE(FAE)/FS(FAS)/FSE(FASE)

KD186F(FE)

KD188F(FE)

Thank you for purchasing our air-cooled diesel engine.
To correctly operate your engine are for your own safety, be sure to read this manual carefully, otherwise the accident will result.
If you have problem about your engine, please contact with your agent.

PREFACE:

- This manual guides you how to operate the air-cooled diesel engine correctly, as well as the warnings. Be sure to read this manual before operating, to keep your engine at the best working condition.
- This manual should be considered as the permanent part of the engine for easy checking up.
- Should this manual missing or destroyed, please make an order from your agent. If you have anything unclear about this manual, please contact your agent.
  This air-cooled diesel engine will meet your requirement if you operate it according to the manual instruction. Otherwise the fire, scald etc serious accident will result.
- So,reconfirm that you must to master this manual before operating the engine.

⚠ WARNING Failure to properly follow these precautions can result in property damage, serious injury or DEATH!

Read all labels and the owner's manual before operating this generator.

Operate only in well ventilated areas. Exhaust gas contains poisonous carbon monoxide, and can be deadly. Always stop engine before refueling. Wait 5 minutes before restarting.

Check for spilled fuel or leaks. Clean or repair before use.

Keep any sources of ignition away from fuel tank, at all times.

⚠ DANGER Indicates that the serious personal injury even death will result if the instructions are not followed.

⚠ WARNING Indicates that the seious personal injury even death will result if the instructions are not followed.

⚠ CAUTION Indicates that the serious personal injury or equipment damage will result if the instructions are not followed.

[OPERATING NOTICE] indicates that you must give special attention while operating the engine.Otherwise the engine performance will decreased even the fault will result. Be sure to follow the **[OPERATING NOTICE]**

SAFETY INFORMATION

(To operate the engine safely, please follow these items strictly.)

⚠ DANGER



To prevent the fire, please pay attention to the follwing items:

- If the gasoline is filled into the engine,the fire will result, so identify the fuel type and model before refilling.
- Be sure to stop the engine before refilling.
- Wipe off the overflowed fuel oil.
- Keep the engine far away from other flammable oils and goods.

⚠ DANGER



Be careful when use the battery:

- The battery will exhaust hydrogen while charging. Do charge the battery at the well ventilated place. Meanwhile, flame and spark are not allowed while charging.
- The electrolyte is heavy acid solution, be sure skin and eyes do not touch it, otherwise, rings with water immediately.

⚠ WARNNING



The exhaust is poisonous, pay attention to the following:

- The exhaust is harmful to the health, do not run the engine at the confined rooms or unventilated places. If you have to run the engine indoors, be sure there is good ventilation equipment.

⚠ WARNNING



Be care no to be involved:

- Do not touch the moving parts while the engine is running, meanwhile, when the engine is linked to the load, please cover the coupler and belt etc parts which have potential danger before running.

⚠ CAUTION



Be care of the hot parts:

- The muffler and the engine body will be very hot during running or just after running, do not touch these parts.

⚠ WARNNING

Other safety information:

- Do not operate the engine after drinking.
- Be sure that the surrounding is safe before starting the enigne.
- Put on the uniform and anti-slippery shoes.

1. MAIN SPECIFICATIONS

1.1 Diesel main specifications

Model		KM170F (A)	KM178F (A)	KM186F (A)
Type		In-line,single cylinder,4-stroke,air-cooled,directed injection		
Borexstroke	mm	70×55 (70×57)	78×62 (78×64)	86×70 (86×72)
Piston displacement	L	0.211 (0.219)	0.296 (0.305)	0.406 (0.418)
Rated power /Rated speed	kW/r/min	2.5/3000	3.68/3000	5.7/3000
		2.8/3600	4/3600	6.3/3600
Max torque/speed	N・m/r/min	-	-	18.7/2880
Max steady speed at zero-load	r/min	≤ 108% of rated speed		
Min steady speed at zero-load	r/min	≤1300		
Fuel consumption/rated speed g/(kW・h)/r/min		280.2/3000	276.1/3000	275.1/3000
		288.3/3600	285.6/3600	281.5/3600
Fuel consumptong/(kW・h)		≤4.08		
Fuel type		0#, -10#, -20#		
Lube oil number		CD grade or SAE 10W-30、15W-40		
Piston average speed /Rotate speed m/s/r/min		5.5/3000 (5.7/3000)	6.2/3000 (6.4/3000)	7.0/3000 (7.2/3000)
		6.6/3600 (6.84/3600)	7.44/3600 (7.68/3600)	8.4/3600 (8.64/3600)
Compression ratio		20		19
Mean effective pressure of 12h power	kPa	474/3000 (457/3000)	497/3000 (482/3000)	562/3000 (546/3000)
		442/3600 (426/3600)	450/3600 (437/3600)	517/3600 (502/3600)
commencement of fuel		3000: BBDC 17° ±1° , 3600: 18° ±1°		
Distribution	Inlet valve	Open at BTDC 8.5°, close at ABDC 44.5°		
	Exhuast valve	Open at BBDC 55.5°, close at ATDC 8.5°		
Rotation direction(face to the flywheel)		Anticlockwise		
valve clearance (cold condition)	mm	0.10~0.15		
Starting type		Recoil start or Electric start		
Lubricating system		Pressure splashed combined type		
Lube oil capacity	L	0.75	1.1	1.65
Fuel tank capacity	L	2.5	3.5	5.5
Exhaust temperature	℃	≤500		
Oil temperature	℃	≤110		
Oil pressure	MPa	0.2~0.6, alarming within the range of 0.06 ±0.1		
Starting motor capacity	(V,kW)	12V 0.8kW		
charging generator capacity	(V,A)	12V 3A		
Battery capacity	(V,Ah)	12V24Ah-36Ah	12V36Ah以上	
Overall dimension(LxWxH)	mm	335×380×415	385×420×450	420×460×495
Net weight	kg	≤27	≤33	≤47

1.2 Marine diesel main specifications:

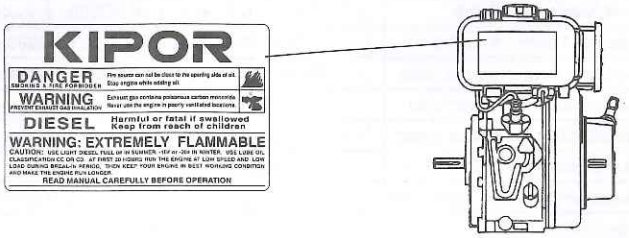
Model		KM170F (A) M	KM178F (A) M	KM186F (A) M
Type		In-line, single cylinder, 4-stroke, air-cooled, directed injection		
Bore × stroke mm		70×55 (70×57)	78×62 (78×64)	86×70 (86×72)
Piston displacement L		0.211 (0.219)	0.296 (0.305)	0.406 (0.418)
Compression ratio		20		19
Rated power kW/r/min		2.3/3000	3.3/3000	5.2/3000
/Rated speed		2.5/3600	3.68/3600	5.7/3600
Min steady speed at zero-load r/min		≤1300		
Riston averate m/s/r/min		5.5/3000 (5.7/3000)	6.2/3000 (6.4/3000)	7.0/3000 (7.2/3000)
speed / Rotate speed		6.6/3600 (6.84/3600)	7.44/3600 (7.68/3600)	8.4/3600 (8.64/3600)
Mean effective kPa/r/min		436/3000 (420/3000)	446/3000 (433/3000)	512/3000 (498/3000)
pressure / speed		395/3600 (381/3600)	415/3600 (402/3600)	468/3600 (455/3600)
Commencement of fuel		BTDC 17° ±1°		
Injection pressure Mpa		20±0.5		
Distribution	Inlet valve	Open at BTDC 8.5° , close at ABDC 44.5°		
	Exhuast valve	Open at BBDC 55.5° ,close at ATDC 8.5°		
Valve clearance (cold condition) mm		0.10~0.15		
Lubricating system		Pressure splashed combined type		
Starting type		Recoil start or Electric start		
Rotation direction (face to the flywheel)		Anticlockwise		
Fuel type		0#、-10#、-20#		
Fuel tank capacity L		2.5	3.5	5.5
Fuel consumotion		280.2/3000	276.1/3000	275.1/3000
g/ (kW · h)/r/min		288.3/3600	285.6/3600	281.5/3600
Lube oil number		CD grade or SAE 10W-30、15W-40		
Lube oil capacity L		0.75	1.1	1.65
Fuel consumption g/(kW · h)		≤4.08		
Exhaust temperature ℃		≤500		
Oil temperature ℃		≤110		
Oil pressure Mpa		0.2~0.6		
Overall dimension (LXWXH) mm		335×380×415	385×420×450	420×460×495
Net weitht kg		≤27	≤33	≤47

1.3 Main Technical Specification

Model		KD186F		KD188F	
Type		Single cylinder, vertical, 4-stroke, air cooled, direct injection			
Bore × Stroke mm		86 × 75		88 × 86	
Displacement L		0.436		0.523	
Rated power/Rated speed kW/r/min		5.7/3000	6.3/3600	6.6/3000	7.35/3600
Max. Torque/Rated speen N · m/r/min		18.7/2880		21.8/2880	
The highest stable speed at zero load r/min		≤108% of rated speed		≤108% of rated speed	
the lowest stable speed at zear load r/min		≤1300		≤1300	
Fuel consumption rate/rated speed		275.1/3000		274/3000	
g/(kW · h)/r/min		281.5/3600		279/3600	
Lube oil consumption rate g/(kW · h)		≤4.08		≤4.08	
Fuel type		0#、-10#、-20#			
Lube oil type		CD级或SAE 10W-30、15W-40			
Piston average speed		7.5/3000		8.6/3000	
/ratation speed m/s/t/min		9.0/3600		10.3/3600	
Compression ratio		19.6		19	
Average effective pressure 12h		523/3000		505/3000	
		481/3600		468/3600	
Advanced angle of oil supplying		3000:BTDC 17° ±1° , 3600:18° ±1°		BTDC 17° ±0.5°	
Distribution	Inlet valve	Open at BTDC 8.5° , Close at ABDC 44.5°		Open at BTDC 14° , Close at ABDC 44°	
phase	Exhaust valve	Close at ATDC 55.5° , Open at BBDC 8.5°		Close at ATDC 44° , Open at BBDC 14°	
Rotation direction (face to output shaft)		Anticlockwise		Anticlockwise	
Valve chearance (cold) mm		0.10~0.15		Intake valve clearance:0.15, Exhaust valve clearance:0.20	
Starting type		Recoil starter or electric starter			
Lubricating type		Pressure splashed			
Lube oil capacity L		1.65		1.65	
Fuel tank capacity L		5.5		5.5	
Wxhaust temperature ℃		≤500		≤560	
Lube oil temperature ℃		≤110		≤115	
Lube oil pressure MPa		0.2~0.6, Alamrm at the range of 0.06±0.01			
Starting motor capacity (V,kW)		12V 0.8kW			
Charging generator capatity (V,A)		12V 3A			
Battery capacity (V,Ah)		Above 12V36Ah			
Overall dimension (LxWxh) mm		420 × 460 × 495		422 × 480 × 530	
Net weight kg		≤47		≤48(Recoil starter) ≤53(Electric starter)	

2. SAFETY LABEL LOCATION

This label guides you how to operate the engine safely. If the label comes off of becomes hard to read, contact your agent for replacement.



3. ASSEMBLING

[OPERATING NOTICE]

- Too much shock during the running will damage the engine and the load, be sure to set the engine tightly.

① Fix the engine base seat tightly to prevent the engine from offset and shock.
② Be sure the PTO shaft centers are in line.

CAUTION

- If the pulley is too tight, the accident will result. Please select the applicable size pulley.

③ If the pulley drives the engine, the pulley size must be in conformance with the load speed. The diameter of the pulley can be calculate by the following format:

$$\text{Engine side pulley} = \frac{\text{Load side pulley X load speed}}{\text{Engine speed(rated speed)}}$$

④ Mark sure that the bearing hole of the pulley, keyway size are in conformance with the PTO shaft. Otherwise the accident will result. Correctly tight the PTO shaft bolt. Do reselect the appropriate diameter pulley, if the engine continually exhaust black smoke during the running.

⑤ Be sure the pulley tension is appropriate. If the belt is too tight, hard starting will result, further more, the belt will worn quickly and the PTO shaft will be bent, so the accident will result.
The torsion of the pulley:Press the central part of the pulley surface. Every 100mm of the pulley, deflection is about 1.6mm. (For example: the clearance of the pulley is 500mm, the deflection will be 8mm.)

⑥ Specified V-belt quantity:

Model	Belt Model X Quantity
KM170	A type X 2
KM178	B type X 3
KM186	B type X 3
KD186	B type X 3
KD188	B type X 3

If you have any question about the assembling of the engine and the connection to the load, contact with your agent.

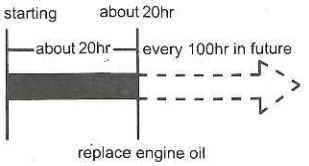
4.ENGINE USAGE

The first 20hrs are the break-in period of the engine, the operator must obey to following items:

- Warm up the engine 5 minutes after the initial starting.
  Run the engine at low speed and zero load before the engine becomes warm. Do not run the engine at high speed and zero load.

- **Do not run the engine with overload.**
  Recommends to run the engine at 3000r/min with 50% load in break-in period.

- **Replace the engine oil on time.**
  Replace the engine oil while the engine is warm after 20-hours-running, the old engine oil will be drained out completely. (Please see 8.1 Replace the Engine Oil)



4-1 Selection and Usage of the Fuel oil

① Selection of the Fuel oil

The solidifying point divides the diesel oil into different grades of which liquidity is bad at condition of low temperature. Please select right fuel according to ambient temperature. To use oil number according to GB252-2000 light diesel oil as follows:

Ambient temperature	Oil number
The lowest temperature is above 4℃	0#
The lowest temperature is above -5℃	-10#
The lowest temperature is above -14℃	-20#

② Diesel usage:

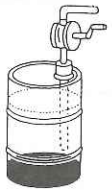
- If diesel is mixed with water and dirty, the abnormal running will result. Seal the diesel in clean drums and store the drums in a dry place away from the rain and dirty.
- If diesel has been stored for several hours, the water and dirty will deposit at the bottom of the drum. You can pump the upper portion of the diesel for usage.

③ Refill the diesel

⚠ DANGER

- It is very dangerous to fill the fuel into the diesel engine. Do identify the fuel oil type and model before refilling.
- Do stop the engine before refilling.
- Wipe off the overflowed diesel.

⚠ DANGER

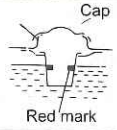


- Water and foreign matter will be sunk into the lower position in the barrel. Put the suction pipe into the barrel at the place with a half depth of the barrel, pump clean oil on the upper position in the barrel..

■ FUEL OIL CAPACITY

Model	Fuel Oil Capacity
KM170	2.5
KM178	3.5
KM186	5.5
KD186	5.5
KD188	5.5

⚠ CAUTION



- Do not let fuel level be higher than Red Mark

4-2 Selection and Usage of the Engine Oil

① Selection of the Engine Oil

If engine oil specification is not appropriate, the inner parts of engine will be seizure or damaged. So the engine life will be shortened.

To select appropriate viscosity oil according to ambient temperature. To use oil number according to the CD grade or SAE of GB/T 11122-1997 diesel engine oil as follows:

Ambient temperature	Engine oil number
-25℃~30℃	10W-30
-15℃~40℃	15W-40

② Check and Refill the Engine Oil

[OPERATING NOTICE]

- Check the engine oil level with the engine on a level surface and the engine stopped.
- Check the engine oil level before tightening the filler cap.

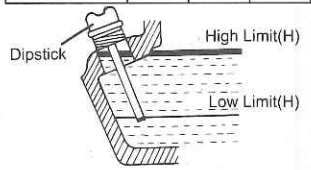
A. Be sure to check the engine oil level before starting the engine.

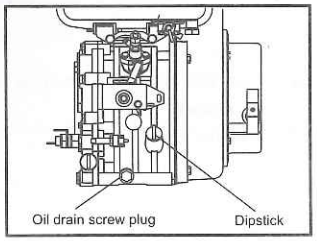
- Check whether the engine oil level is between the upper level and the lower level.
- Wipe off the overflowed engine oil.
- Screw on the oil filler cap after checking.

B. The engine oil level can not beyond the upper level.

C. The following is the engine oil capacity table:

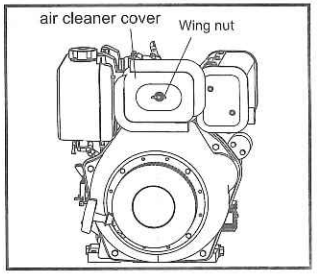
	KM170	KM178	KM186	KD186	KD188
Engine Oil Capacity	0.75	1.1	1.65	1.65	1.65



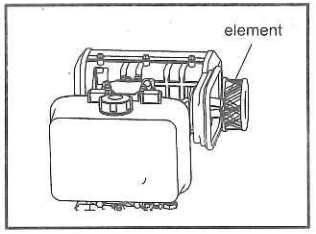


4-3 Replace the Air cleaner

① Screw off the wing nut and remove the air cleaner cover. If the output power of the engine is not sufficient, the exhaust color will be abnormal, then it is necessary to replace the element.

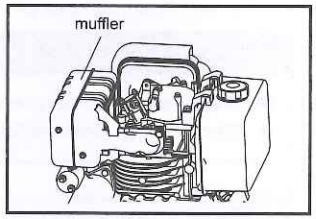


② Reassemble the air cleaner cover and screw on the wing nut after replacement.



4-4 The Exhaust Direction

To prevent the exhaust from flowing into the air cleaner, assemble an exhaust syphon on the case of the muffler.



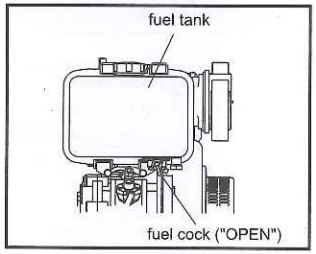
> ⚠ NOTE
>
> ■ Prevent the water from accumulating on the exhaust syphon form flowing into the muffler.

5. START THE ENGINE

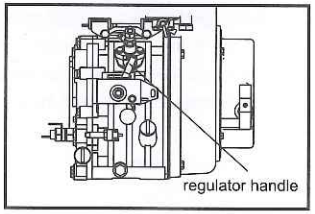
5-1Manual Starting:

■ Start the engine according to the following procedures:

① Open the fuel cock.

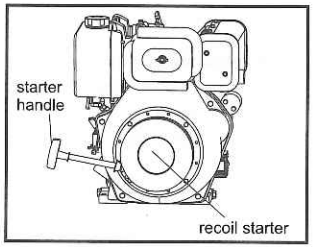


② Turn the governor lever to "STARTING" position

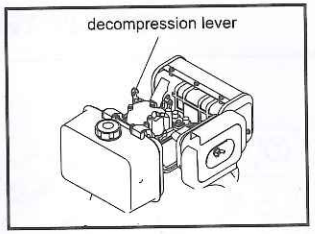


③ Hold the recoil starter handle

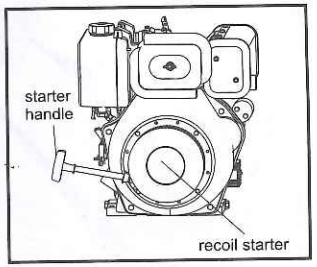
A. Pull the starter handle until you feel the resistance, then return the handle slowly.



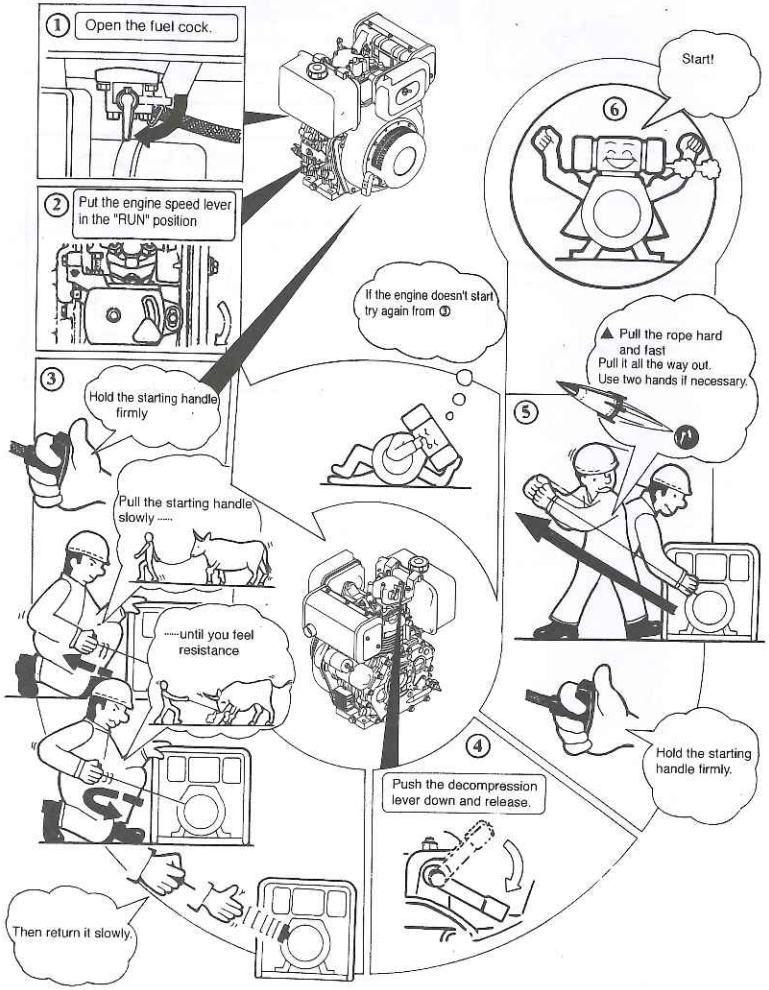
B. Press the decompression lever to "Non-compression" position. The lever will return back automatically after the engine started.



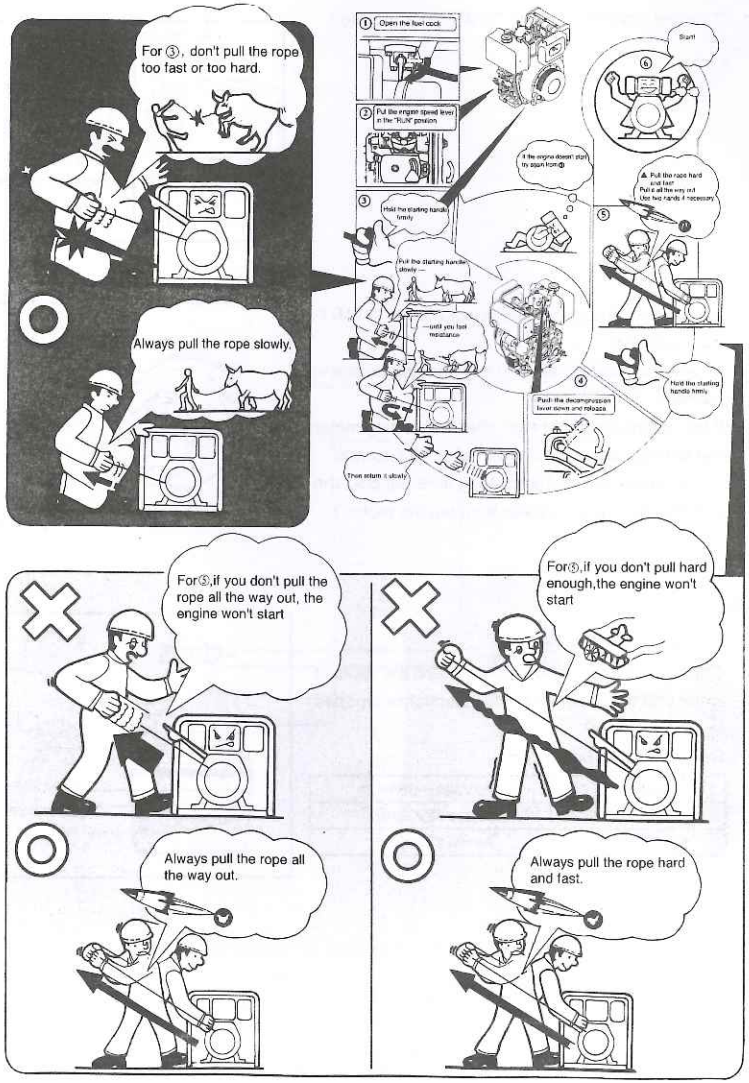
C. Hold the recoil starter handle with two hands and pull it hardly.



START THE DIESEL ENGINE



START THE DIESEL ENGINE

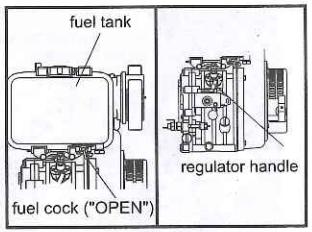


5-2 Electric Starting

① Starting Method:
(Pre-starting check is same as that of manual starting.)

A. Open the fuel cock.

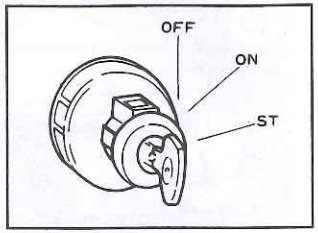
B. Turn the governor lever to "STARTING" position.



C. Turn the electric starting key clockwise to "START-ING" position.

D. Release the electric starting key after the engine is started.

E. If the engine could not start after the starting motor ran ten seconds, start it again after 15 seconds. (Run the starting motor for long time will cost the battery power greatly even burn out the motor.)

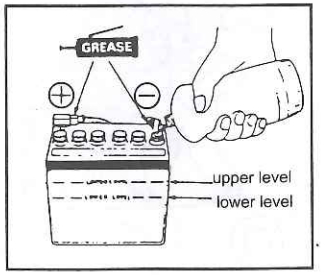


② Maintenance of the battery

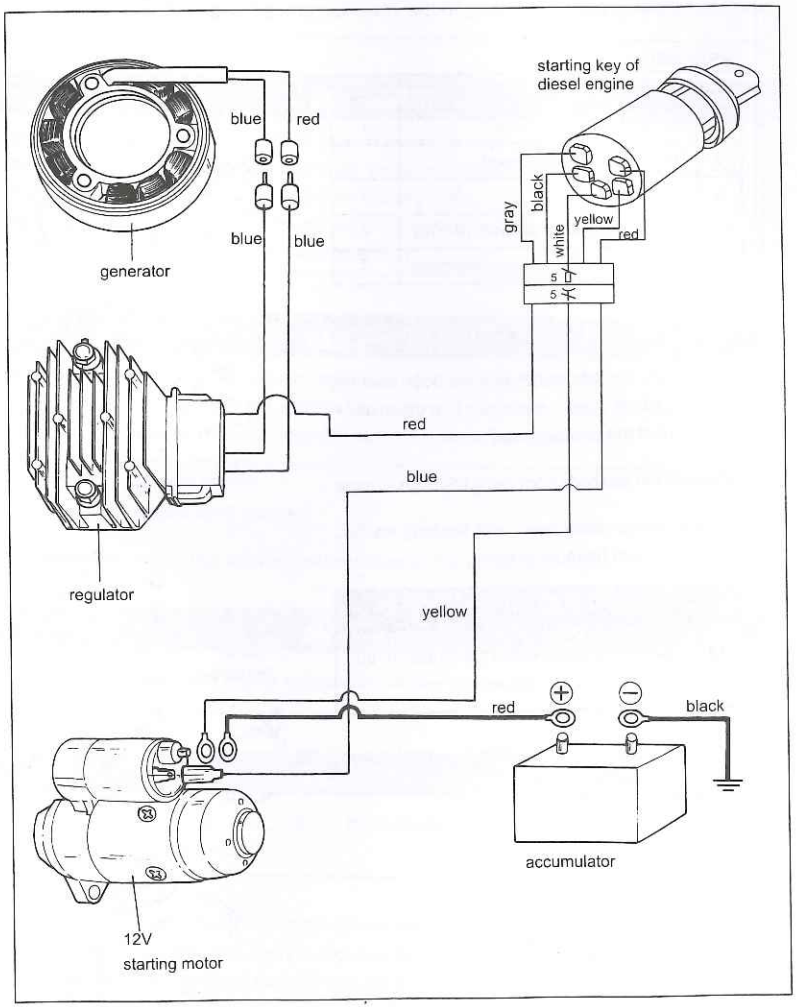
A. Check the battery every month. Refill the distilled water until the upper level if the electrolyte dropped to the lower level.

Recommended battery size:

KM170	12V24AH-36AH
KM178/KM186	Above 12V36AH
KD186/KD188	Above 12V36AH



ELECTRIC WIRING DIAGRAM

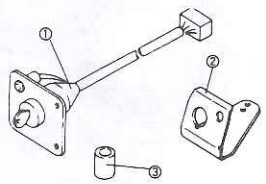


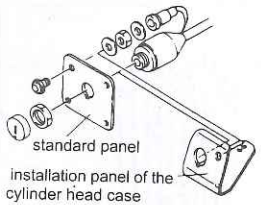
5-3 Assembling the Electric Starting Switch

If the electric starting switch locates on the top of the cylinder head case, assemble it with the following parts according to the specified procedures:

ASSEMBLY:

NO.	Specification	Quantity
1	Electric starting switch body	1
2	Electric strarting switch panel	1
3	Long washer	1
4	Hexagonal bolt M6x70(KM170/KM178)	2
	Hexagonal bolt M6x83(KM186/KD186/KD188)	2





PROCEDURES:

① Remove the electric starting switch body from the standard panel, then reassemble it to the installation panel of the cylinder head case.

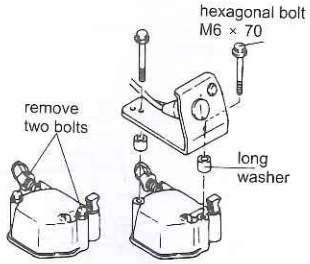
② Screw off the two bolts from the cylinder head case.

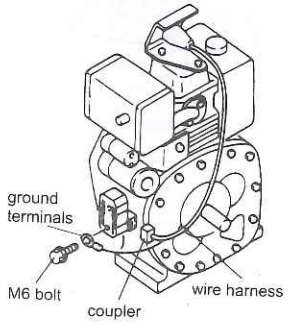
③ Clip the reassembled panel with the long washer, then tight it with hexagonal bolts.

[OPERATING NOTICE]

- If the wire harness touch the muffler or the PTO shaft, the fire will result.

④ Set the earth terminal of the harness with M6 bolt.





6. Run the Engine

⚠ WARNNING

- To prevent the exhaust toxication, be sure to run the engine at ventilated place.
- To prevent personal injury,avoid hands, personal body and cloths from involving into the output shaft, pulley and V pulley etc moving parts.
- Check the moving parts and the surrounding parts after stop the engine. Be sure that there is no tool or cloth inside the engine body.

⚠ CAUTION

- The muffler is very hot during running or just after running, do not touch the muffler.
- The air cleaner will suck the surrounding airflow during the running. To prevent the injury, avoid hands, personal body and cloths approach this part.

① Warm up the engine for 5 minutes.

② If the engine is very hot, set the governor lever to the expected position.

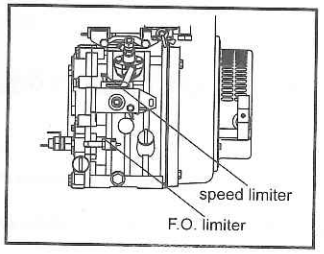
⚠ NOTE

- Be sure to regulate the engine speed with the governor lever.

⚠ NOTE

- Do not screw off the adjusting bolt and the fuel adjusting bolts, otherwise the abnormal speed and output will result.

③ If the engine continually exhaust black smoke during running, which indicates that the engine is running with overload, do adjust the engine pulley and the load pulley.



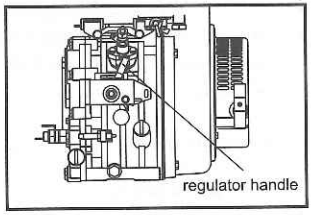
◎ **PLEASE PAY ATTENTION TO THE FOLLOWING ITEMS WHILE RUNNING:**

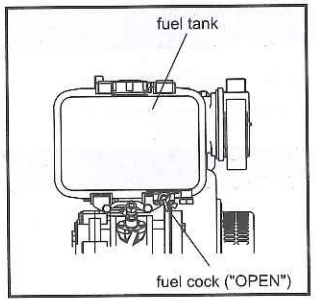
① Whether there is abnormal vibration and sound.
Whether the exhaust is normal.
② Whether the engine continually exhausts white smoke or back smoke.
③ Be sure to shut off the engine when the abnormal phenomenon arouses, and contact with agent.

7. STOP THE ENGINE

[OPERATING NOTICE]

■ If the engine is stopped in emergency, the engine temperature will rise quickly, thus the engine life will be shortened.





① Set the governor lever to the low speed position, then run the engine at zero load five minutes.

② Set the governor lever to the "STOP" position. Do not stop the engine with the decompression lever.

③ Set the fuel cock to "OFF" position.

④ Pull the recoil starter handle slowly, until you feel resistance. (At this point, the decompression just begins and intake/exhaust valves are both closed, thus the cylinder can be prevented from rust.)

⑤ Concerning the electric starting engine, directly turn the starting key to "CLOSE" position.

◎ **PREPARE FOR THE NEXT OPERATION:**

① Fill diesel to the tank.

② Check all the bolts and nuts. Screw on them if necessary.

③ Clean the dirty on th surface of the engine body.

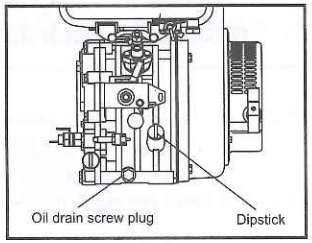
8. Periodical Check and Maintenance

Periodical Check and maintenance are very important for maintaining the performance and life of the engine. The following is the maintenance intervals and items table. The item with "*" require technician or special tools, please contact with agent.
Periodical check and maintenance table:

Items \ Intervals	every day	20 hrs	50 hrs	100 hrs	200 hrs	500 hrs	1000 hrs
Check all the bolts and nuts	○						
Check and refill engine oil	○						
Replace engine oil		○ (First time)	○ (Second time)				
Clean or replace engine oil cleaner		○ (Clean)	○ (Clean)				○ (Replace)
Check oil leakage	○						
Replace air cleaner						○	
Clean fuel oil cleaner				○		○	○ (Replace)
Check nozzle						●	
Check fuel injection pump						●	
Adjust the clearance of the intake/exhaust valve						●	
Check the intake/ exhaust valve							●
Replace the piston ring							●
Check the electrolyte	Check it every month, refill the distilled water if necessary.						

① Replace Engine Oil

Drain out the engine oil while the engine is warm and refill the recommended engine oil.



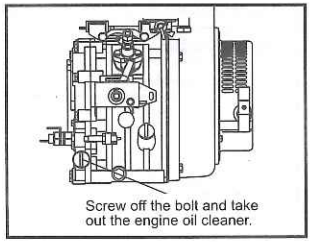
Ambient temperature	Grade	Vicosity
Above 20℃ (Summer)	Beyond CC grade	SAE15W-40
-5℃~20℃(Winter)		SAE10W-30

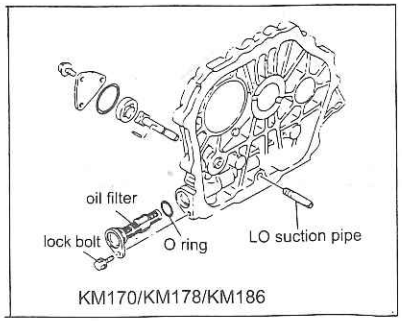
Replace Engine Oil	Intervals
First time	20th hrs
Second time	Every 100 hrs

② Clean Engine Oil Cleaner

Screw off the bolt and take out the engine oil cleaner.

Clean	Every 100 hrs
Replace	Every 1000hrs



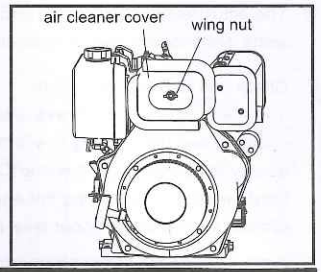


KM170/KM178/KM186

③ Replace the air cleaner element

A. Paper element:

Replace the element every 500 hrs.



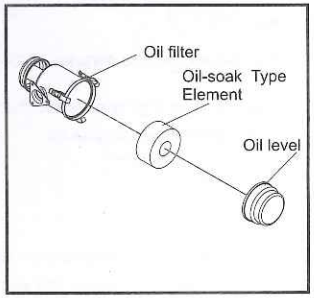
⚠ CAUTION

- If the element is too dirty, the air flow will be blocked and starting will be hard, thus insufficient output will result, further more, it will cost both fuel oil and engine oil, the engine will exhaust black smoke.
- Running engine with worn element or without element is not allowed.

B. Oil-soak Type Element

①Check the engine oil level before run the engine.

② Refill the engine oil until the upper level. Replace if it is too dirty. Often clean the element with kerosene, then soak it in the engine oil and squeeze out the excess engine oil.



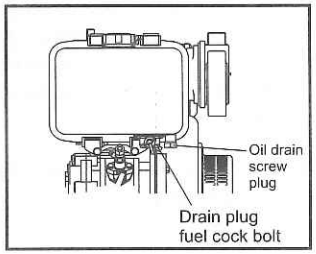
④ Clean the Fuel Oil Cleaner

Remove the fuel oil cleaner from the tank and clean it on time.

Clean	Every 500 hrs
Replace	Every 1000 hrs

A. Completely drain out the fuel oil.

B. Screw off two nuts of the fuel cock and take out the fuel oil cleaner.



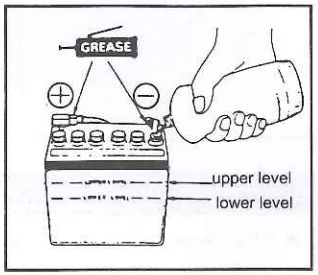
⑤ Screw on the bolts on the cylinder head. This operation requires special tools, please contact with your agent.

⑥ The adjustment of fuel nozzle and fuel injection pump and the replacement of the valve seats, parts require special technology, please contact with your agent.

⑦ Check and Refill the electrolyte

The electrolyte will decrease after many times charging and discharging.(it will decrease more quickly in summer than in winter)Check the electrolyte level before starting the engine. Refill the distilled water until the upper level if necessary.

Check the electrolyte level	Every one month

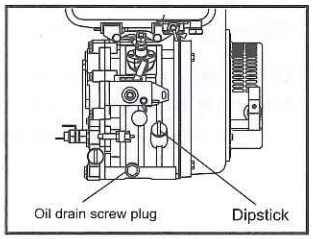


9. LONG-TERM STORAGE

Prepare the following items before long-term storage:

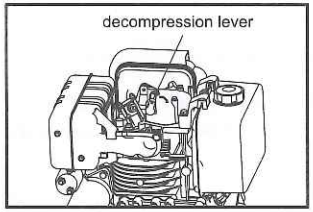
① Run the engine five minutes at low speed.

② Drain out the engine oil while the engine is warm and refill the fresh engine oil.

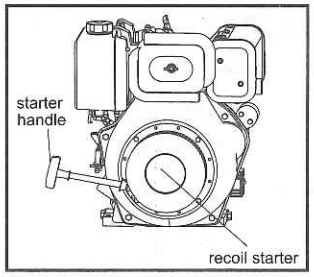


③ Press down the decompression lever and pull the recoil starter 2-3 times(Do not start the engine)

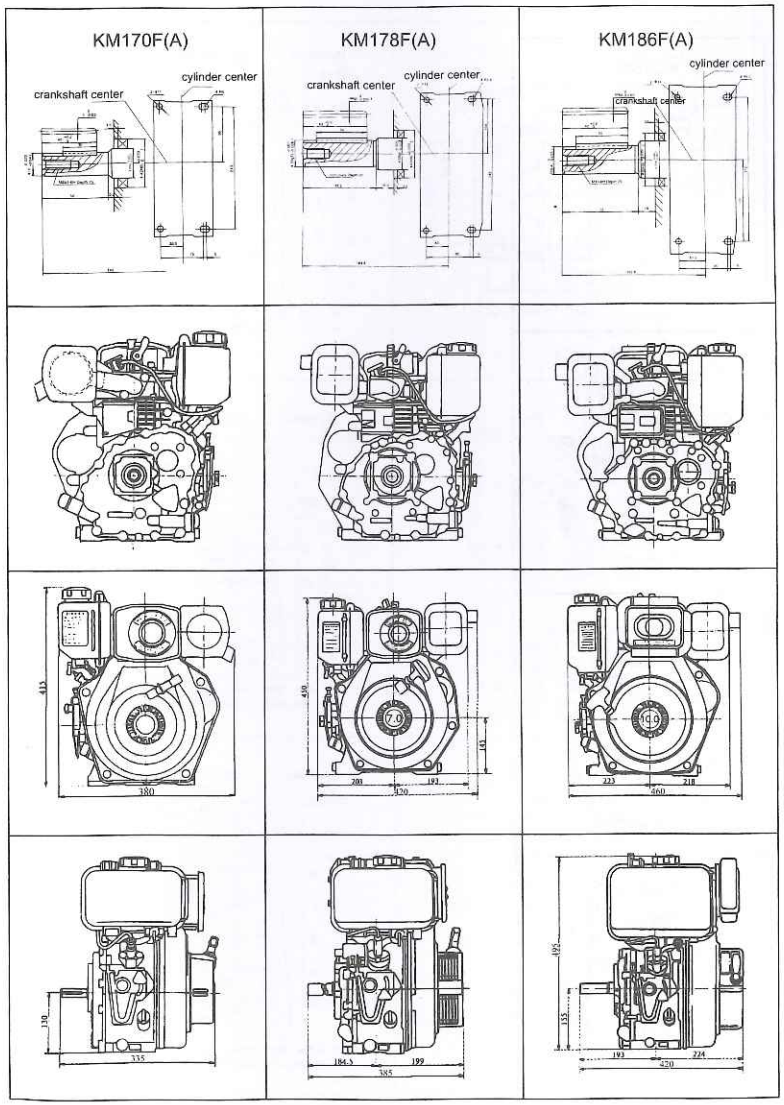
④ Return the decompression lever back to the decompression position, and pull the recoil starter slowly until you feel the resistance.(At this point, both intake/exhaust valves are closed to prevent the engine from rust.)



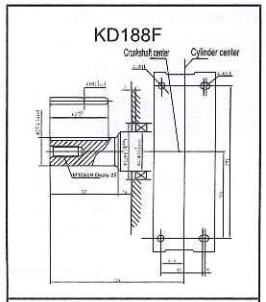
⑤ Clean off the dirty on the engine surface, then store the engine at the dry place.

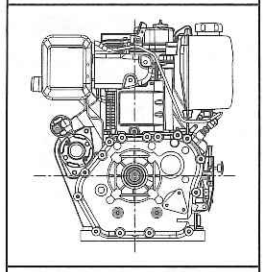


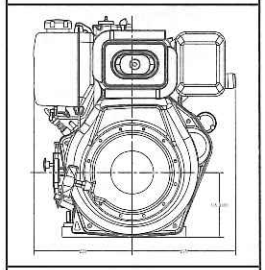
APPENDIX 1. OVERALL AND INSTALLATION DIMENSIONS

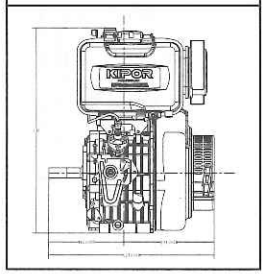


APPENDIX 1.

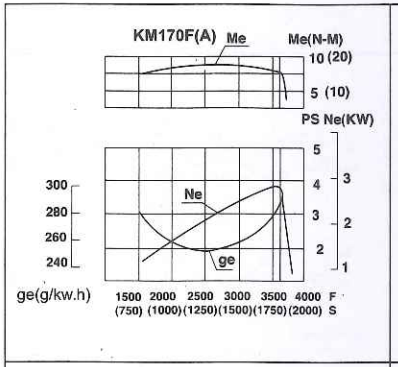


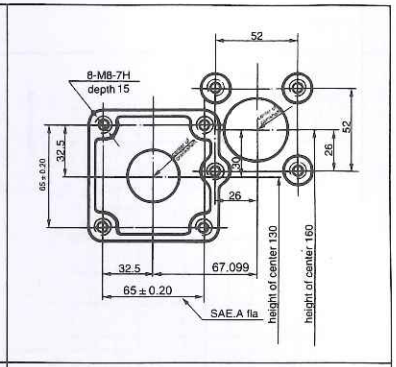


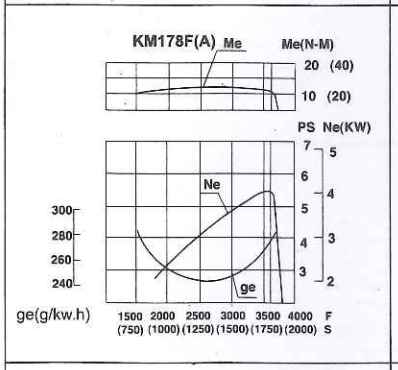


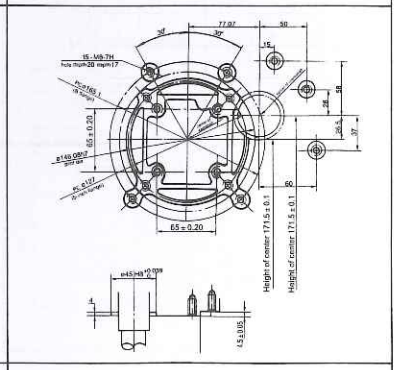


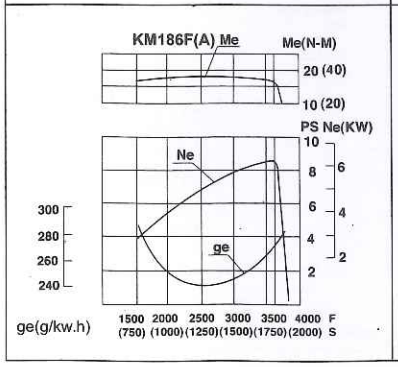
APPENDIX 2. PERFORMANCE CURVE & SIZES OF PTO FLANGES

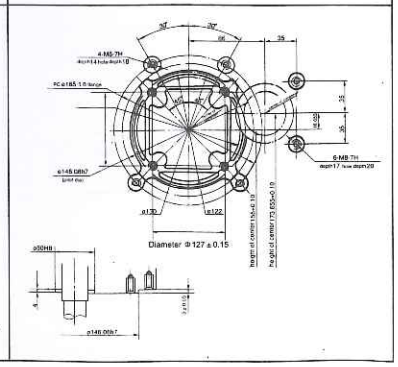




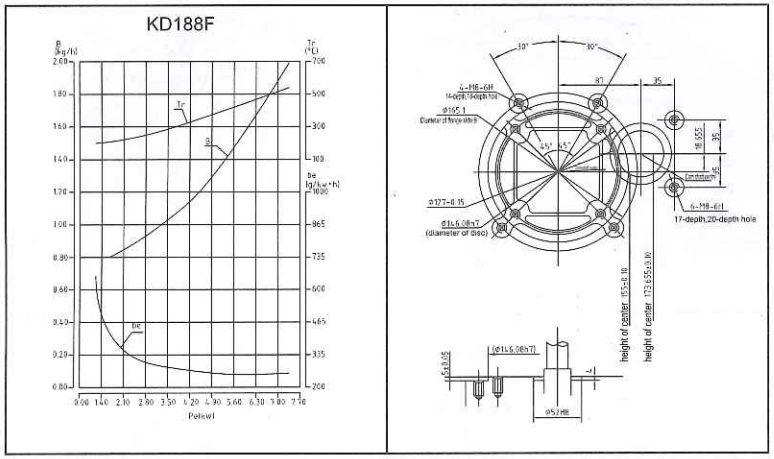




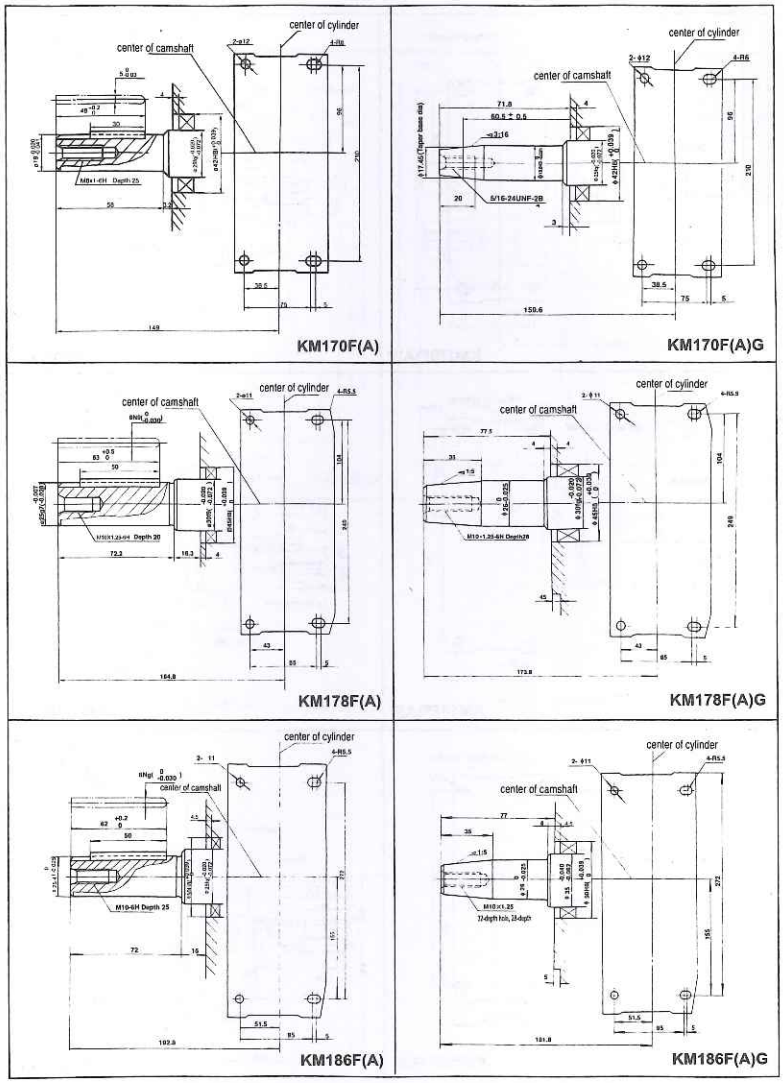


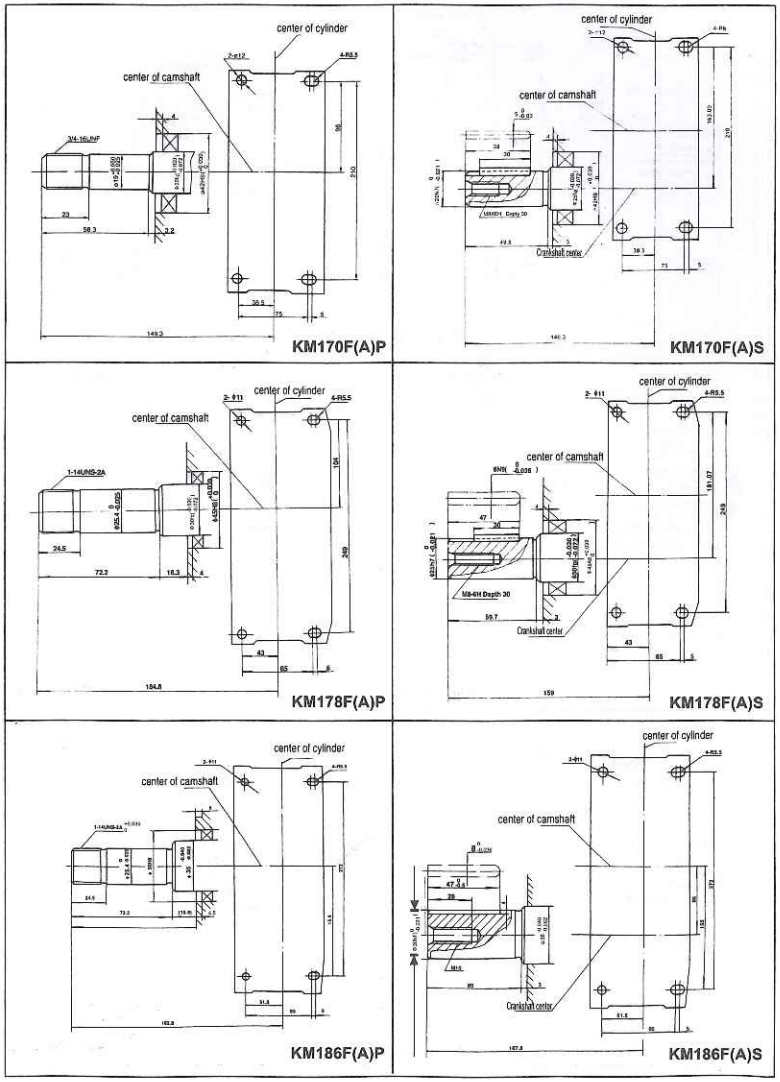


APPENDIX 2.



APPENDIX 3. SIZE OF OUTPUT SHAFT





APPENDIX 3. SIZE OF OUTPUT SHAFT APPENDIX 4. CAMSHAFT OUTPUT DIMENSION

