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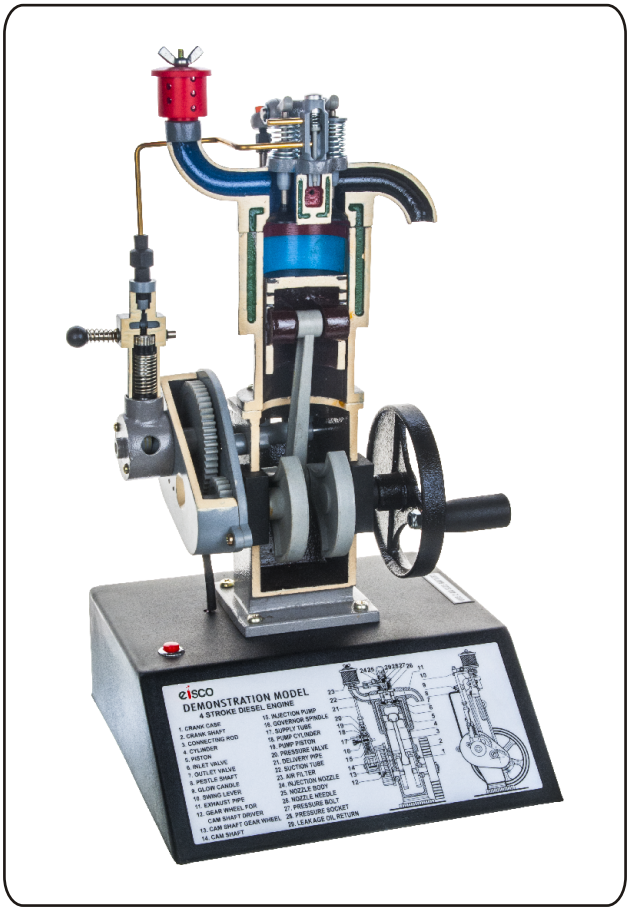
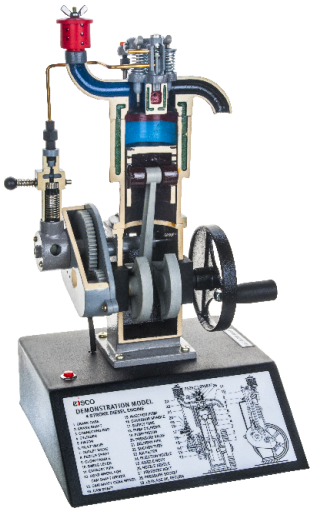
FOUR STROKE DIESEL ENGINE

CAT NO. PH0492



Instruction Manual

INTRODUCTION



A engine is device which transforms one form of energy into another form. If a engine has to work successfully then it has to follow a cycle of operations in sequential manner. The sequence is quite rigid and cannot be changed. The credit of inventing the compression ignition engine goes to RUDOLF DIESEL (1892). Therefore, they are often referred as Diesel Engines.

The four stroke CI engines is similar to four stroke SI engine but it operates at a much higher compression ratio. The compression ratio of an SI engine varies from 6 to 10 while that of CI engine it is from 16 to 20. In the CI engine during suction stroke, air, instead of fuel-air mixture is inducted. Due to high compression ratio employed the temperature at the end of the compression stroke is sufficiently high to self ignite the fuel which is injected into the combustion chamber. In CI engines a high pressure fuel pump and injector are provided to inject the fuel into the combustion chamber.

WORKING

In four stroke engine the cycle of operations is completed in four strokes of the piston or two revolutions of the crankshaft. During the four strokes, there are five events to be completed suction, compression, combustion, expansion and exhaust. The cycle of operation for an ideal four stroke compression ignition engine consists of the following four strokes-

Suction stroke

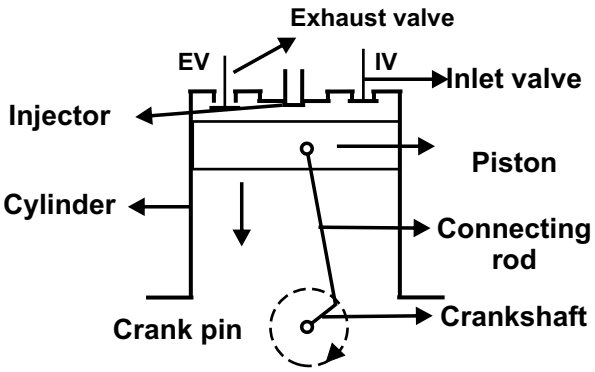
Compression stroke

Combustion stroke

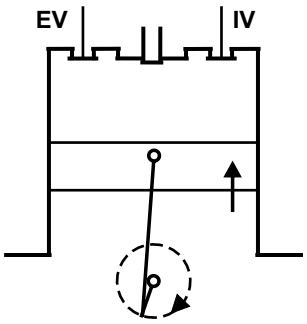
Exhaust stroke

SUCTION STROKE

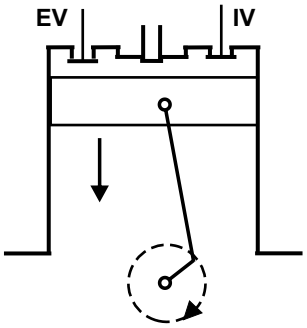
Suction stroke starts when the piston is at the top dead center and about to move downwards. The inlet valve is open at this time and the exhaust valve is closed. Due to the suction created by the motion of the piston towards the bottom dead center, the air is drawn into the cylinder.



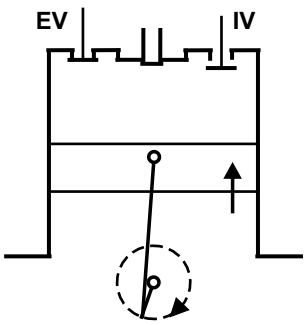
(a) Suction stroke



(b) Compression stroke



(c) Expansion stroke



(d) Exhaust stroke

COMPRESSION STROKE

Air taken into the cylinder is compressed by the return stroke of the piston. During this stroke both inlet and exhaust valves are in the closed position.

EXPANSION STROKE

Fuel injection starts nearly at the end of the compression stroke. The rate of injection is such that the combustion maintains the pressure constant in spite of the piston movement on its expansion stroke increasing the volume. Heat is assumed to have been added at constant pressure. After the fuel injection is complete, the products of combustion expand.

EXHAUST STROKE

At the end of the expansion stroke the exhaust valve opens and the inlet valve remain closed. The piston moves from the bottom dead center to top dead center and sweeps the burnt gases out of the cylinder.

USES

The four stroke diesel engine is one of the most efficient and versatile prime movers. It is manufactured in sizes from 50mm to more than 1000mm of cylinder diameters and with engine speeds ranging from 100 to 4500 rpm.

Small diesel engines are used in pump sets, construction machinery, air compressors, drilling rigs and many miscellaneous applications.

Development is going on in the use of diesel engines in personnel automobiles. This is mainly because, compare to gasoline engines, diesel engines are more efficient. However the vibrations from the engine and the unpleasant odour in the exhaust are the main drawbacks.

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