



Hydraulic Ram Pump Apparatus (SMT-FM-10)

This ESOLS Product of Fluid Mechanics related labs used to study the Hydraulic Ram which describes the Water hammer effect. If flowing water is suddenly brought to rest in a long pipe, a phenomenon known as water hammer occurs, wherein a pressure wave travels along the pipe. This principle is used in the hydraulic ram to pump water.

In this apparatus the water is fed to the ram via a long pipe at a gradient. Above a certain water velocity, the waste valve in the ram closes automatically, due to the flow forces. This happens suddenly, so that the kinetic energy of the water in the pipe is converted into potential pressure energy. The pressure opens a check valve and the water flows into an air vessel. The air cushion in the air vessel dampens the water hammer and ensures a uniform lift into the elevated tank. After the water hammer has subsided, the waste valve opens due to the dead weight, the water in the pipe starts to flow again and the process repeats itself.

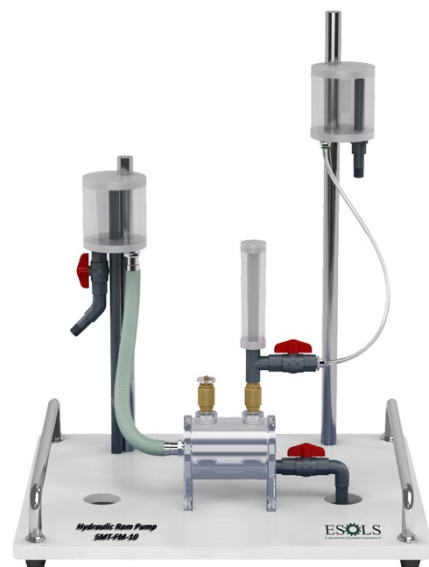
The operation of the waste valve as a function of the weight load, the valve lift and the flow rate are studied. Furthermore, it is possible to show how the volume of air in the air vessel affects the lift. Valves are used to adjust the flow rate. Transparent tank, a visible check valve in the air vessel and the visible movement of the waste valve all permit excellent observation of the function. All components are clearly mounted on a front plate.

This unit can be operated by Laboratory supply of with any Hydraulic Bench.

TECHNICAL SPECIFICATIONS

Specifications:

- Uses water hammer effect to pump water
- Fixed overflow tank is used as a water source, e.g. river, pool
- Elevated tank with variable pump head
- Waste valve with adjustable lift, closes cyclically due to flow force of the water
- Tank with check valve and air volume is used as an air vessel
- Air volume in the air vessel is varied by vent valve
- Flow rate determined by SMT-FM-100 base module.
- Water supply using SMT-FM-100 base module.



Technical Data:

- Ram:
 - Max. Head: 300mm
 - Max. Flow Rate: 50L/hr
 - Supply Head: Transparent PMMA
 - Discharge Head: Transparent PMMA
- LxWxH: 1000x600x1300mm.
- Weight: approx. 45kg.
- Accessories (Included)
 - All necessary Flexible pipes and fittings.
 - Instruction Manual
- Operating Conditions
 - Laboratory Temperature: 5°C to 40°C
- Note:

This product may produce small splashes of water in use, so you must use it at a safe distance from electrical supplies. ESOLS recommends approximately 2.0 m.

Experimental Data:

- Demonstration of the water hammer effect to produce a pumping action.
- Study of principle of a ram
- Study of function of an air vessel
- Study the effect of air volume in the air vessel and the flow velocity on the pump behaviour
- Study the efficiency