Features:

- Investigation of water hammer and pressure waves in pipes 60m long pipe section
- Measuring the velocity of sound in water
- Solenoid valve with adjustable closing time
- Optional software for displaying the pressure curve

Water hammer in pipes is a significant problem in engineering as they can cause severe damage to piping, fittings and system components. Water hammer is caused by the inertia effect of the flowing fluid being subjected to an abrupt changes in velocity, e.g. when rapidly closing a valve. Therefore, knowledge about the emergence of water hammer is an important aspect of designing pipework systems.

Tesca Water Hammer in Pipes Apparatus can be used to study water hammer and pressure waves in long pipelines. Water hammer is generated by closing a valve at the end of the pipe section. The water hammer is then reflected the beginning of the pipe as an inverted wave. A pressure vessel with an air cushion at the start of the pipe section simulates the open beginning of the pipe so that there is a clear reflection of the wave. In order to achieve reflection times that are large enough, a 60m long pipe section has been installed, which is shaped like a coiled tube to save space.

In experiments, the emergence of water hammers is studied as a function of the valve closing times. The trainer, therefore, includes two solenoid valves, one with constant closing time and one with adjustable closing time. Optionally resulting pressure oscillations are measured by a pressure sensor and the pressure

curve is displayed by the software.

A valve is used to adjust the flow rate. System pressure and flow rate are displayed. A safety valve protects the system against overpressure.

Specifications:

1. Investigation of water hammer and pressure waves in pipes
2. Pipe section as a coiled tube to save space
3. Generation of water hammer via solenoid valve with constant closing time
4. Generation of water hammer via solenoid valve with adjustable closing time
5. Pressure vessel with air cushion reflects the wave
6. Safety valve protects against overpressure in the system
7. Instruments: pressure sensor, rotameter, manometer
8. Representation of the pressure curves and the flow rate with software
9. Optional software for data acquisition via USB under Windows

Technical Specifications:

Solenoid valve, constant closing time
- Closing time: 20...30ms
- Operating pressure: 0...10bar

Solenoid valve, adjustable closing time
- Closing time: 1...4s
- Operating pressure: 0,2...12bar

Safety valve: 16bar

Pipe section, copper
- Length: 60m
- Inner diameter: 10mm

Pressure vessel: 5L

Measuring ranges
- Pressure: 0...16bar
- Flow rate: 30...320L/h

Experiments:

- Water hammer as a function of flow rate
- Water hammer as a function of valve closing time
- Display pressure curve
- Determine reflection time
- Calculation of the velocity of sound in water

Mains Power

- 220 – 240V 1Ph, 50Hz

Note: Specifications are subject to change.

Tesca Technologies Pvt. Ltd.