

### Description:

The gas compression apparatus consists of one or more commercial compressor / receiver units each with added temperature indicators, flow indicator, power meter and pressure indicating controller. Control valves are provided to provide control of the downstream pressure. The compressors are of similar power demand (5HP) but different design. Pressure, temperature and flow data obtained can be used to calculate compression efficiency.

### Function

The gas compressors use air as the working fluid to demonstrate reciprocal compressor operation. The discharge pressure is automatically controlled to a selected process pressure set point. Trainees select compressor type and flow rate then read and record the flows and temperatures for further analysis.

### Topic: Gas Compression

Sub Topics: Trainees will learn concepts of:

- Reciprocating compressor design (single and two-stage)
- Volumetric and Isothermal Efficiency
- Compressor operation

**Key Objectives:** With this apparatus, students can learn the effect on gas compression of:

- Single and two-stage compressors
- Impact of compression ratio on efficiency
- Operation and control of a simple process



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#### Process Highlights:

- Continuously variable downstream pressure 0 to 140 psig (0 to 965 kPa)
- Typical air flow – up to 16.5 cfm (7.8 l/s)

#### Utility Requirements:

- Three phase electrical power 208/240 VAC 50/60 Hz. Load approx. 14 amps per compressor. Other voltages also available – please specify

#### Optional additions:

- A 5 Hp screw compressor unit can be added with associated instrumentation components.
- Refrigeration style instrument air drier/filter unit
- Cut-away compressors – additional single and two-stage compressors (same model as on the working unit) can be sectioned for internal viewing

#### Equipment Specification Highlights:

- Nominal compressor power - 5Hp (3.7kW)
- Receiver volume – 60 us gallons (225 litres)
- Instrumentation & control includes: (\* indicates on the 2 stage only)
- Inlet, inter-stage\* and discharge temperature transmitters
- Inter-stage\* and discharge pressure transmitters
- Flow transmitter
- Electrical power transmitter
- Data acquisition and PID control by programmable logic controller (PLC)
- Dedicated notebook computer with HMI software (custom configuration)
- Mounted on a steel skid
- Approximate overall dimensions are 183cm L x 153cm W x 143cm H (72" x 60" x 56")

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