

# Understanding Basic Pneumatics

1.5 Day Seminar



## DESCRIPTION:

Pneumatics are typically used in mining, construction and in factories with fixed installations.

This three-day instructor led course includes student handbook, demonstrations of every component and application along with lab exercises using animated programs that reinforce learning.

The course begins with discussions on the basic physical principals of compressed air, all types of industrial compressors, and the air preparation through chillers, desiccant dryers and filters. The student gains knowledge of pneumatic valves, actuators and the sizing of these components.

Several hands-on lab exercises require the students to troubleshoot real world system problems. Every application which is being discussed will be totally dissected in an animated program. This animation program allows the instructor to recalibrate: pressure, flow, torque, load and even upsize and downsize of components.

This course is a pre-requisite for the Programmable Logic Controller (PLC) course.

## Each student receives:

- 1 Published textbook  
"Understanding Basic  
Pneumatics"
- 2 Course Certificate
- 3 Fluid Power Symbol  
Reference Poster

For registration or more information call **303.838.7396**  
or email [armin@deltaparadigm.com](mailto:armin@deltaparadigm.com)

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**a**nalysis

# COURSE OUTLINE:

## Understanding Basic Pneumatics

1.5 Day Seminar

### Basic Pneumatics

- Pneumatic Principles
- Pneumatic Power System
- Force, Weight & Mass
- Pressure
- Standard air and free air
- Work and energy
- Diffusion and dispersion
- Separation of gases and liquids
- Pascal's law
- Boyle's law
- Charles law
- Transmission of pneumatic fluid power
- Flow measurements
- Air flow in pipes
- Bernoulli's principle
- Air vs. electricity
- Air vs. hydraulics

### Air Compressors

- Compressor classification
- Reciprocating piston compressors
- Cooling Requirements
- Compressor lubrication
- Non lubricated compressors
- Compressor control
- Vane Compressors
- Screw compressors
- Liquid ring compressors
- Dynamic compressors
- Sizing of compressors

### Lab Exercise 1

### Pneumatic Actuators

- Linear and rotary actuators
- Air motors
- Single and double acting cylinders
- Cylinder mounting methods
- 3-way directional control valves

### Lab Exercise 2

### Lab Exercise 3

### Lab Exercise 4

### Lab Exercise 5

### Lab Exercise 6

### Shuttle Valve

- Logic "OR" gate
- The need for a shuttle valve

### Lab Exercise 7

### Two Pressure Valve

- Logic "AND" gate
- Directional valves in series
- "AND" function with a 3-way valve

### Lab Exercise 8

### Flow Control

- Variable orifice needle valve
- One way flow control valve, free flow return
- Elbow type flow regulators
- Meter – in speed control
- Meter – out speed control

### Lab Exercise 9

### Lab Exercise 10

### Vacuum Generator

- Venturi principle, based on Bernoulli's law.
- Applications for vacuum generators
- Mechanical vacuum pumps
- Compressed air driven vacuum pumps

### Lab Exercise 11

### Pneumatic Time Delay

- Function of a pneumatic timer
- On-delay and off-delay timers
- Pulse generator and one-shot valve

### Lab Exercise 12

### Pressure Regulator

- Application and function of a pressure regulator in a pneumatic circuit.

### Lab Exercise 13

### Pressure Control valves

- Load sensing applications
- Pressure sequence valve in a pneumatic circuit

### Lab Exercise 14

### Compressed Air Preparation

- How to remove water from a system after compression is completed
- After coolers
- Refrigeration Dryers
- Absorption vs. Adsorption Dryers
- Sizing of air dryers
- Installation and maintenance
- Determine water content in a compressed air system

### Compressed Air Distribution

- Pneumatic piping System
- Dead end or grid system
- Sizing of pipe diameter for compressed air systems
- Cost of air leaks
- Power wasted through leakage

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