

# Manufacturing

## Industrial Air Controls (Pneumatic) Fundamentals Course Description

### COURSE AGENDA

#### Day 1

- Pneumatic Safety
- Physical vs. Chemical State Change
- Physical States of Matter
  - Water, Relative Humidity and Dew Point
- Pressure Fundamentals
- Pneumatic Terms
- Advantages/Disadvantages of Pneumatics

#### Day 2

- Constituents of Air
- Characteristics of Gases vs. Liquids
- Gas Laws and Concepts
  - Constant Temperature, Boyle's Law
  - Constant Pressure, Charles' Law
  - Constant Volume
  - General Gas Laws
- Compressibility
- Pressure Scales
- Measuring Atmospheric Pressure
- Atmospheric Pressure
- Pressure at Various Altitudes
- "HG/PSI Conversions
  - Comparing "Hg Vacuum to Hg "Absolute
- Pressure Ranges
- Gage Operation
  - Bourdon Tube
  - Plunger Gage
- Gage Reading Basics
- Vacuum Gage
- Pneumatic Transmission of Energy
  - Force Transmission Through Solid, Liquid, Gas
- Pneumatic Transmission of Energy
  - Force Transmission Through Solid, Liquid, Gas



### COURSE NUMBER: MFG202

#### Course Purpose

This course provides the knowledge and skills required during the installation, maintenance and troubleshooting of pneumatic machine controls.

At the completion of this course, you will be able to:

- Demonstrate good safety procedures when working with pneumatic and air controls
- Determine potential pneumatic hazards
- Explain the basics of pneumatic components, functions, and symbols
- Use pneumatic trainers to safely connect, operate, analyze, and troubleshoot sample circuits
- Interpret basic pneumatic symbols

#### Who Should Attend

Maintenance engineers, supervisors or other personnel responsible for operation of pneumatic machine controls should attend this course.

#### Prerequisites

None

## COURSE AGENDA

### *Day 2 (Continued)*

- Force Transmission Through a Fluid
- Primary Air Treatment
- Intake Air Filters
- Air Compressors
  - Common Types of Air Compressors
- Intercoolers
  - Why are Intercoolers Necessary?
- What is Heat?
  - Heat is Energy
- Compressed Air and Temperature
- When Compressed Air Expands, Temperature Falls
  - Aftercoolers
  - Separation
  - Refrigeration Units, Oil Scrubbers, Heatless Desiccant Dryer
  - Absorption

### *Day 3*

- Air Distribution Systems
- Water Traps
- Schematic Symbols
  - Pressure Controls and Operation, Switch and Relief Valve Operation
  - Pressure Regulator Components and Operation
- Common Types of Cylinders
- Directional Control Valves
  - Positions and Schematic Symbols
- Low Pressure Pneumatic Fittings
- Secondary Air Treatment
  - Strainers, Separators, Filters, Lubricators
- Pneumatic Problems

### ***Technology Requirements***

All technology is provided for student use in the classroom by Rockwell Automation. It is not necessary for students to bring any technology with them when attending this course.

### ***Student Materials***

To enhance and facilitate your learning experience, the following materials are provided as part of the course package:

- *Student Manual*, which contains the topical outline, safety precautions, and course related hand-outs
- *Basic Pneumatics*, which contains the fundamental concepts, basic pneumatic components, symbols, valve design information, and hands-on exercises

### ***Hands-On Practice***

Throughout this course, you will have the opportunity to practice the skills you have learned through a variety of instructor led demonstrations and hands-on exercises. These exercises focus on the skills introduced in each lesson.

To complete the exercises, pneumatic training workstations will be used reinforcing safe work practice, connecting, operating, and analyzing simple pneumatic system operations. Because the basic skills taught in the course apply to all pneumatic applications, the hands-on exercises permit you to apply what you have learned in your workplace environment

### ***Course Length***

This is a three-day course.

### ***Course Number***

The course number is MFG202.

### ***To Register***

To register for this or any other Rockwell Automation training course, contact your local authorized Allen-Bradley Distributor or your local Sales/Support office for a complete listing of courses, descriptions, prices, and schedules.

You can also access course information via the Web at <http://www.rockwellautomation.com/training>

**[www.rockwellautomation.com](http://www.rockwellautomation.com)**

### **Power, Control and Information Solutions**

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation SA/NV, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846