HVAC INSTANT ANSWERS –
The indespensable on-the-job problem-solver that covers it all!

Chapter 1. Introduction and Overview
How Buildings Work

Chapter 2. Air and Ducts
Air Thermodynamics/ Ducts/ Air-Compressors

Chapter 3. Water, Steam, and Pipes
Water/ Steam/ Pipes and Tubing/ Iron and Steel Pipes/ Copper Tubing/ Plastic Piping/ Support and Insulation/ Heat Exchangers/ Performance of Heat Exchangers

Chapter 4. Electricity and Wiring
DC Circuits/ AC Circuits/ AC/DC/ Wye/ Delta Circuits/ Variable Speed Drives/ Transformers/ Circuit Breakers/ and Fuses/ Electric Switches/ Wires/ Power Measurement and Electric Rates/ Consumption/ Demand/ Cost Adjustments and Other Charges

Chapter 5. Measurement and Control

Chapter 6. Pumps and Valves
Theory of Operation/ Centrifugal Pumps/ Pump and System Curves/ Positive Displacement Pumps/ Valves/ Valve Types/ Controls/ Safety/ Deadheading/ Cavitation/ Personnel Safety/ Valve Disassembly and Repairing/ Troubleshooting/ Electric Pump/ Practical Considerations/ Pump Bearings/ Pump Seals/ Pump Motors/ Control Valves

Chapter 7. Water Distribution Systems
Theory of Operation/ Two and Four Pipe Systems/ Parallel, Series, and Variable-Speed Pumping/ Control/ Primary/ Secondary Loop/ Secondary/Asynchronous Loop/ Differential Pressure/ Control/ Static Pressure Control/ Safety/ Troubleshooting

Chapter 8. Chillers
Theory of Operation/ Vapor Compression/ Cycle/ Compressors/ Rejection and Shielding/ Chiller Safety and Flow Interlocks/ DX Control/ Current Limiting/ Safety/ Troubleshooting/ Practical Considerations/ Staging Multiple Chillers/ RX Units/ Noisy Compressors/ Keep it Clean/ Keep it Under Control

Chapter 9. Air-Cooled Condensers and Cooling Towers
Theory of Operation/ Controls/ Air-Cooled Condensate Fan Staging/ Condenser Tower Capacity Control/ Heat Recovery/ Safety/ Troubleshooting/ Cooling Towers/ Practical Considerations/ Maintenance/ Free Cooling/ Controls

Chapter 10. Thermal Energy Storage Systems
Theory of Operation/ Cooling Storage/ Heating Storage/ Control/ Cooling Storage/ Safety/ Troubleshooting/ Practical Considerations

Chapter 11. Boilers
Theory of Operation/ Boiler Rating/ Ignition/ Controls/ Boiler Safety/ Hot Water Reset/ Safety/ Boiler Controllers/ Troubleshooting/ Practical Considerations/ Water Treatment

Chapter 12. Steam Distribution Systems

Chapter 13. Fans and Dampers
Theory of Operation/ Fans/ Dampers/ Fire Dampers/ Face/ Bypass Dampers/ Control/ Safety/ Troubleshooting/ Fan

Chapter 14. Air-Handling Units
Theory of Operation/ Filters/ Dampers/ Airflow/ Humidifiers and Dehumidifiers/ Controls/ Dampers Control/ Temperature/ Safety/ Troubleshooting/ Mixed Air Temperature (Too Hot or Too Cold)/ AHU Supply Air Temperature is Not at Setpoint or Varies Too Much/ Airflow Too Low/ Fan Doesn’t Start/ Practical Considerations/ Installation Considerations/ Bearing Lubrication/ Freeze Protection

Chapter 15. Air Distribution Systems
Theory of Operation/ Return Fans/ Exhaust Fans/ and Relief Fans/ Run-Around Loops/ Humidification and Dehumidification/ Controls/ Duct Pressure Control/ Building Warm-Up/ Cool-Down/ Economizer and Night Purging/ HVAC and VAV System Control/ Safety/ Troubleshooting/ Supply Air Flow Rate/ Static Pressure Too Low/ Supply Air Row Rate/ Static Pressure Too High/ Supply Air Too Cold or Too Hot/ Supply Air is Too Humid or DIY/ Too Much Noise from Supply Air Duct/ Practical Considerations

Chapter 16. Zone Terminal Systems
Theory of Operation/ Single Duct/ VAV Boxes/ Double-Duct Boxes/ Induction Boxes/ Diffusers/ FanCoil Units and Radiant Heating/ Thermostats/ Control/ Safety/ Troubleshooting/ Zone Too Hot/ Zone Too Cold/ Practical Considerations/ Zone Pressurization

Chapter 17. Evaporative Cooling
Theory of Operation/ Controls/ Safety/ Troubleshooting/ Practical Considerations/ Chemical Treatment and Dirt Buildup

Chapter 18. Residential Systems
Theory of Operation/ Heat Pumps/ Controls/ Safety/ Troubleshooting/ Furnace Cycles Too Much/ Space is Too Hot or Too Cold/ Furnace is Too Noisy/ Practical Considerations

Appendix A. Tools for the Technician
Appendix B. Using Multimeters

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Details Inside...

With this handy portable guide along on every job, you’ll know instantly how to...

- Troubleshoot HVAC problems correctly and efficiently
- Get calculations right every time with valuable look-up tables
- Follow succinct, step-by-step procedures for working with ducts... water, steam, and pipes...electricity and wiring...pumps and valves... sensors, actuators and controllers...
- Benefit from hundreds of savvy money-saving techniques and tips
- Ensure the safety of facilities personnel and building residents
- Avoid damage to expensive equipment and systems

MORE!
Find the HVAC information you need

IN A FLASH!

HVAC instant answers

✧ Handy portable size (5” x 8”) – for on-the-job answers where and when you need them
✧ Formatted to help you quickly find what you need by category
✧ Tried-and-tested step-by-step instructions
✧ Special boxed material in each section, called fastfacts, alert you to critical details
✧ Hundreds of crystal-clear photos, illustrations, and always-right calculation tables and checklists

HVAC INstant ANSWERS TELLS YOU EXACTLY WHAT STEPS TO TAKE WHEN PROBLEMS OCCUR WITH:

- Air distribution systems
- Central cooling plants
- Compressors
- Condensers and cooling towers
- Converters
- Fans and pumps
- Rooftop units
- Water and steam distribution systems
- Thermal energy storage systems
- Valves and dampers
- Water loops
- Zones

Packed with schematic diagrams, system layouts, flowcharts, and graphics, HVAC Instant Answers is a reliable, convenient, “answers-at-your-fingertips” resource. If you’re just entering the field, it’s a great learning tool that will quickly and smoothly ease you into on-the-job skill and confidence.

If you’re an experienced HVAC professional, you’ll find it indispensable for its wealth of immediately accessible tables, tips and techniques. This is the place to look for crystal-clear descriptions of common symptoms and problems – and the quickest and best solutions possible.

Handy portable size (5” x 8”) – for on-the-job answers where and when you need them.

Fastfacts in every chapter tell you what to do… what to avoid… best bets… bad moves.

Much, much more!

You get handy lists of tools, specification charts — and just about everything else you need to get any HVAC job done quickly and correctly

✧ Understand the mechanics of ductwork
✧ Use the psychrometric charts to design and troubleshoot HVAC systems that heat, cool, or humidify the air
✧ Become familiar with all functioning parts of HVAC systems with break-away views, like this one of a typical valve p. 129
✧ Know how to properly mount and support plastic piping to account for its expansion due to temperature change
✧ Find a simple way to determine how much energy is transferred across air-to-air coils or air-to-water coils
✧ Avoid creating a fire hazard in a residential HVAC system with the cable tip on p. 70
✧ Identify a problem with HVAC equipment by tracking its electrical efficiency
✧ Design and debug control systems p. 111
✧ Follow safety guidelines to eliminate costly consequences, from expensive equipment repair or replacement to catastrophic injuries to facilities personnel
✧ Test if a valve is piped backwards (often the cause of water hammer). Directions on p. 195
✧ Recognize features common to the operation of all chillers — knowledge that can eliminate troubleshooting headaches. See discussion beginning on p. 223
✧ Save a tremendous amount of energy and reduce the wear and tear on the chiller compressor by diverting cooling water to the secondary water distribution system p. 244
✧ Find an extensive troubleshooting flowchart for hot water boilers (it’s on pp. 288-295)
✧ Install steam pressure gauges at several point along the steam lines — a cheap way to prevent you from making a big, expensive mistake
✧ Ensure your personal safety with lock out/tag out procedures when working with steam
✧ Get unresponsive damper motors, which fail more often than fan motors, working again
✧ Explore practical installation considerations that ensure long life and proper operation of an air-handling unit
✧ Pick from among several workable strategies to suppress noise from supply air ducts
✧ Troubleshoot swamp coolers
✧ Follow a few simple rules to ensure safe, proper operation and good readings from a multimeter

This “how-to” powerhouse is loaded with schematics. Here’s a Wheatstone bridge circuit, often used in HVAC sensors.

Much, much more!