Industrial Communications Training
Optimizing the flow and value of real-time data

Setting the Standard for Automation™
Expert-led training with real-world application from a global leader of automation and control resources

Communication networks are the mission-critical backbone of automation and control solutions. And, given the rapid changes occurring in the area of communications, comprehensive industrial communications training is essential to address ever-evolving technical challenges.

After all, improperly designed, programmed, or maintained communications networks and components can lead to unreliable performance, loss of critical data, security breaches, and system downtime and failure.

As a widely recognized, world leader in automation and control training, the International Society of Automation (ISA) provides the proven expertise needed to protect your industrial communications systems, and the practical methodologies to help you immediately apply your knowledge in the workplace.

ISA's industrial communications training starts with the fundamentals, providing the underlying principles and tools needed to design effective communications systems, and outlining the equipment, software, and protocols required to transmit, report, and process real-time data. More advanced instruction covers programming, installation, maintenance, and integration of programmable logic controllers (PLC) and programmable automation controllers (PAC), and furnishes critical survival strategies for instrumentation and control personnel.

All ISA training courses provide real-life examples and case histories, further reinforcing the practical and relevant nature of ISA training. To ensure flexibility and to meet varying customer needs, ISA offers communications training at a variety of locations: at ISA headquarters in North Carolina, at ISA's many regional training centers, and onsite directly at customer facilities.

Who is ISA?
Founded in 1945, ISA is a global organization that serves automation and control professionals through standards development, certification, education, training, publishing, and technical conferences and events. To learn more about ISA Training, visit www.isa.org/web14/COMTRN.

ISA Training: World-class subject-matter expertise
ISA's courses are known and respected worldwide for their unbiased, practical approach to technology application. For more than 65 years, ISA has built on its proven track record of identifying and providing real-world technical resources for automation and control professionals. ISA works with leading content experts to deliver rapid, customized solutions.

Taking an ISA training course will:
- Enhance on-the-job training
- Fill in missing knowledge gaps
- Teach you the How's and Why's
- Provide continuing education credits
- Expand your professional network
- Give you access to industry experts

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PLC/PAC Automation: Basic Structure, Programming, Installation, and Maintenance

This course defines Programmable Logic Controller (PLC) and Programmable Automation Controller (PAC) architecture, configuration, installation, maintenance, and programming. The course content covers today’s various PLC vendors.

YOU WILL BE ABLE TO:
• Identify the basic components of PLC/PAC systems and where they are utilized
• Identify the basic IEC 61131-3 programming languages: Relay Ladder Diagram (RLD), Structured Text (ST), Function Block Diagrams (SBD), and Instruction List (IL)
• Wire a complete PLC system utilizing digital and analog I/O simulators
• Install and tune a PID
• Troubleshoot and maintain PLC/PAC systems
• And more…

YOU WILL COVER:
• Basic Components of a PLC/PAC System
• Input/Output (I/O) Systems: Discrete, Analog, DC, and AC Input/Output Modules
• CPU Operation and PLC Memory Organization
• PLC/PAC Relay Ladder Diagram Programming
• Motor Control Connection to PLC
• And more…

CLASSROOM/LABORATORY EXERCISES:
• Wire discrete and analog devices to PLC
• Enter, download, and test a ladder program
• Program permissive logic, timer and counter, data manipulation, and basic arithmetic operations
• Develop and program from a selection of real-world applications

RECOMMENDED COURSE PREREQUISITE:
• Basic AC and DC Electric Theory (e.g. Ohm’s Law, etc.)

COURSE DETAILS:
Course No.: TC30P
Length: 5 days
CEUs: 3.5
Price: $2,590 ISA Member
       $2,915 Affiliate Member
       $3,240 Community Member/List
       $2,590 Multi-Registration Rate

Recommended Resource:
ISA Text: Programmable Controllers, Fourth Edition by Thomas A. Hughes

2014 SCHEDULE
Houston, TX..........................17–21 February; 11–15 August

Register or learn more at www.isa.org/web14/COMTRN
Advanced System Programming Languages (IEC 611313) Utilized By PLC/PAC Systems

Today's PLC/PAC systems are powerful computers that can be programmed in five different languages, which can co-exist on the same operating platform. All five languages conform to the IEC 611313 specification. This course was developed for the individuals responsible for selecting the proper language(s) for an application. The course will explain the constructs and operation of the various instructions in the repertoires. For the course project selected, students will program an application in all five languages, testing through simulation.

YOU WILL BE ABLE TO:
• Identify the basic components of PLC/PAC systems and where they are utilized
• Identify the IEC 611313 programming languages
• Develop, write, and test “real-world applications” utilizing the various types of the IEC 611313 languages

YOU WILL COVER:
• Basic Components of a PLC/PAC System
• Language Definitions and Programs Using:
  – Relay Ladder Diagram (RLD)
  – Structured Text (ST)
  – Function Block Diagrams (SBD)
  – Instruction List (IL)
  – Sequential Function Chart (SFC)

CLASSESR/LABORATORY EXERCISES:
• Write programs in RLD, ST, SBD, IL, and SFC languages

RECOMMENDED COURSE PREREQUISITES:
• A basic understanding of PLC systems
• ISA Course: PLC/PAC Automation: Basic Structure, Programming, Installation, Maintenance (TC30P)

COURSE DETAILS:
Course No.: TC36P
Length: 5 days
CEUs: 3.5
Price: $2,590 ISA Member
       $2,915 Affiliate Member
       $3,240 Community Member/List
       $2,590 Multi-Registration Rate

Recommended Resource:
ISA Text: Programmable Logic Controllers: An Emphasis on Design and Application, Second Edition by Kelvin T. Erickson

2014 SCHEDULE
Houston, TX...............28 April – 2 May;
27–31 October

Register or learn more at www.isa.org/web14/COMTRN
What type of PLC/PAC system do I choose? The PLC/PACs system provides three major subsections: (1) PLC/PAC hardware and software, (2) graphics, and (3) communications. This course will explore all three of these areas and a variety of options. During the course, you will learn how to develop possible system requirement questions for various PLC/PAC vendors prior to the implementation project. You will also learn how to choose the proper programming language(s) to fit your system (RLD, ST, SBD, IL, and/or SFC). How personal computers (PC) are being used as PAC front ends and how I/O is being connected will also be covered.

YOU WILL BE ABLE TO:
- Explain the differences between a PLC (programmable logic controller) and a PAC (programmable automatic controller)
- Decide when to use a DCS, PLC, or PAC system and their economic justifications
- Define various industrial communication protocols, including Ethernet
- Utilize basic graphics and their applications
- Discuss system configuration of digital and analog I/O
- Choose which of the IEC 611313 languages works best for your project

YOU WILL COVER:
- Basic components of a PLC/PAC system
- Basics of Various Communication Protocols and Where to Use Them
- The IEC 611313 Specification for Programming Different Languages Used in PLC/PAC Systems
  - Structured Text (ST)
  - Relay Ladder Diagram (RLD)
  - Function Block Design (SBD)
  - Instruction List (IL)
  - Sequential Function Chart (SFC)
- System Installation Guidelines
- System Wiring Checkout
- And more…

CLASSROOM/LABORATORY EXERCISES:
- Wire a complete digital and analog I/O PLC system to a simulator and do a complete system checkout
- Configure a digital/analog I/O hardware and CPU from a system specification
- Program, download to PLC, and simulate an RLD
- Draw and tag basic graphic symbols
- Set up communications between eight application programs

COURSE DETAILS:
Course No.: TC39P
Length: 5 days
CEUs: 3.5
Price: $2,590 ISA Member
       $2,915 Affiliate Member
       $3,240 Community Member/List
       $2,590 Multi-Registration Rate

Register or learn more at www.isa.org/web14/COMTRN
Industrial Data Communications Systems

Starting from the basics, this course gives you the tools to design and maintain industrial communications systems on your plant floor. You’ll learn the underlying principles behind today’s industrial communications systems, including Modbus, Data Highway Plus, Ethernet, and TCP/IP. Real-life examples and case histories provide insight into the facts behind control networks and how to effectively apply and maintain them in your plant.

YOU WILL BE ABLE TO:
• Apply serial standards, such as EIA-232, 422, 423, and 485, in plant floor settings
• Compare media access techniques such as CSMA/CD, token passing, and master/slave
• List options for Ethernet hardware to avoid instant obsolescence and being locked in the past
• Select and apply fiber optic technology
• Differentiate between different wireless and Industrial Ethernet alternatives
• And more...

YOU WILL COVER:
• What is Data Communications?
• Serial Communications
• Industrial Protocols
• LAN Technologies
• Fiber Optics
• And more...

CLASSROOM/LABORATORY EXERCISES:
• Solve EIA-232 cabling problems
• Use protocol analyzers to capture serial and network traffic
• Use oscilloscopes to analyze network signals
• Use cable analyzers to diagnose cable/fiber optic problems
• And more...

COURSE DETAILS:
Course No.: TS06
Length: 5 days
CEUs: 3.5
Price:
  $2,590 ISA Member
  $2,915 Affiliate Member
  $3,240 Community Member/List
  $2,590 Multi-Registration Rate

RECOMMENDED RESOURCE:
ISA Text: Industrial Data Communications, Fourth Edition by Lawrence M. Thompson

“TS06 and TS12 are courses anyone aspiring to successfully navigate the electrical/instrument/automation career ladder should attend. The course objectives should be a career-long training goal.”
—Larry Thompson, Instructor

Save on training when you join ISA!
ISA members save 20% on the Community Member/List price for all ISA training courses and products.

2014 SCHEDULE
Research Triangle Park, NC...17–21 February; 25–29 August
Burbank, CA.........................19–23 May
Houston, TX.........................3–7 November

Register or learn more at www.isa.org/web14/COMTRN
IT Survival Basics for I&C Personnel

This course will provide an explanation of IT concepts and technology including Ethernet networking, switches, routers, servers, PCs, and firewalls. In addition, you will learn about wireless Ethernet networks and TCP/IP communications and how cybersecurity is applied to protect them. Students will gain a familiarity with basic IT concepts and technology, enabling them to effectively collaborate and communicate with IT personnel and to perform basic IT functions essential in a modern plant and with modern control system technology.

YOU WILL BE ABLE TO:
• Configure a switch for VLANs and Quality of Service
• Configure a basic firewall rule set
• Select the appropriate settings for “hardening” a PC
• Configure the security settings for Wireless Ethernet
• Configure IP and Ethernet addresses and subnet masks
• And more…

YOU WILL COVER:
• Ethernet Communications
• Setting up VLAN and QoS Configurations
• ARP and DHCP Protocols
• IPv4 Addressing and Subnet Configuration
• Applying Routing within a Plant Environment
• And more…

CLASSROOM/LABORATORY EXERCISES:
• Use Wireshark to “sniff” and analyze Ethernet traffic
• Configure a DHCP server
• Configure a VLAN
• Set up a wireless router with security
• Configure SNORT as an NIDS monitoring
• And more…

RECOMMENDED COURSE PREREQUISITES:
• General knowledge of Data Communications
• ISA Course TS06: Industrial Data Communication Systems (see page 5)
• ISA Course TS12: Industrial Networking and Security (see page 6)

COURSE DETAILS:
Course No.: TS14
Length: 5 days
CEUs: 3.5
Price: $2,590 ISA Member
       $2,915 Affiliate Member
       $3,240 Community Member/List
       $2,590 Multi-Registration Rate

Register or learn more at www.isa.org/web14/COMTRN
Bring ISA industrial communications training right to you!
All of ISA’s industrial communications training courses can be taught at your company location through ISA’s Onsite Training. Contact ISA at +1 919-549-8411 or at info@isa.org for more information.

Don’t miss these limited 2014 course offerings!
Register or learn more at www.isa.org/web14/COMTRN

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Founded in 1945, the International Society of Automation (www.isa.org) is a leading, global, nonprofit organization that is setting the standard for automation by helping over 30,000 worldwide Members and other professionals solve difficult technical problems, while enhancing their leadership and personal career capabilities. Based in Research Triangle Park, North Carolina, ISA develops standards, certifies industry professionals, provides education and training, publishes books and technical articles, and hosts conferences and exhibitions for automation professionals. ISA is the founding sponsor of the Automation Federation (www.automationfederation.org).