



Standards

Certification

**Education & Training**

Publishing

Conferences & Exhibits



# 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](http://www.isa.org).

## 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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# Industrial Data Communications Systems (TS06M)

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 apply and maintain them effectively in your plant.

## YOU WILL BE ABLE TO:

- Apply traditional and current serial standards, such as EIA-232, 422, 423, and 485, in industrial plant floor settings
- Explain the inner working of proprietary PLC networks
- Identify Local Area Network (LAN) topologies and protocols
- Compare media access techniques such as CSMA/CD, token passing, and master/slave
- Describe design methods for Industrial LANs using Ethernet
- Define the different Ethernet varieties and which are best for industry
- 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

## YOU WILL COVER:

- **What is Data Communications?:** ISO/OSI Reference Model | Terminology Basics
- **Serial Communications:** Modem Principles | The EIA-232E Standard | Beyond 232: EIA-422/423/485/530 Standards
- **The Analog TelCo system including circuit types and Modems**
- **The Digital TelCo system T1/T3 circuits, ISDN, xDSL, Frame Relay, X.25 networks, ATM and SONET**
- **Data Link Layer Basics:** Data Encoding | Error Detection/Correction Schemes
- **Industrial Protocols:** Modbus and Modbus/IP, DNP3.0 and DF-1
- **LAN Technologies:** Overview of Ethernet Technology | Ethernet Cabling and Configuration Rules | Repeaters, Bridges, Routers, and Gateways
- **TCP/IP basics:** Is Ethernet Ready for the Plant Floor? | Industrial Ethernet Design Techniques
- **Fiber optics: standards, cables, applications, limitations**
- **Wireless Industrial Communications:** SP100, Wireless HART, Wireless Fieldbus, Wireless Profibus
- **Inside the Proprietary PLC Networks:** MB+ and DH+ LAN design
- **Data Exchange using OPC** for inter-system data exchanges
- **Troubleshooting Industrial Networks and Fieldbuses:** Five Rules for Troubleshooting | Troubleshooting with Statistics | Troubleshooting Tools

## COURSE DETAILS:

**Course No.:** TS06M

**Length:** 32 Modules

### 2019 SCHEDULE

This online, modular, interactive, computer-based training is available anytime on-demand.

## Not sure this particular course is for you?

A pre-instructional survey is available for you to evaluate your level of understanding of the course material and to show you the types of questions you'll be able to answer after completing the course.

**\*NOTE:** Once you access the course, you will have one year to access and complete the course and final exam.

**BEST  
VALUE!**

### TS06M FULL COURSE BUNDLE INCLUDES:

- All 32 modules
- 10% Discount
- Additional Prologue module
- One Year to access modules

### INDIVIDUAL MODULES:

- Module 1: Basic Electrical Communications: Data Communications Defined
- Module 2: Basic Electrical Communications: Data Communications History
- Module 3: Basic Electrical Communications: OSI Model
- Module 4: Basic Electrical Communications: Defining Industrial Communications
- Module 5: Basic Serial Data Signaling: Electrical Signaling
- Module 6: Basic Serial Data Signaling: EIA/TIA 232
- Module 7: Basic Serial Data Signaling: Clocking Asynchronous Data
- Module 8: Contemporary Data Communication Methods: Digital Representations of Data
- Module 9: Contemporary Data Communication Methods: Error Detection and Correction
- Module 10: Contemporary Data Communication Methods: Beyond EIA 232
- Module 11: Wireline and Fiber-Optic Communications: Wireline Communications
- Module 12: Wireline and Fiber-Optic Communications: Fiber-Optic Communication
- Module 13: Industrial Protocols: ModBus RT
- Module 14: Industrial Protocols: DeviceNET
- Module 15: Industrial Protocols: DNP 3.0
- Module 16: Local Area Networks
- Module 17: Media Access Control
- Module 18: Ethernet
- Module 19: Ethernet Variations
- Module 20: Wireless Principles
- Module 21: 802.15
- Module 22: Wireless WAN Technologies
- Module 23: WAN Technologies
- Module 24: Wide-Area Network Technologies
- Module 25: Network Connections
- Module 26: Ethernet LAN Components
- Module 27: TCP/IP
- Module 28: IPV6
- Module 29: IPV6 Implementation
- Module 30: Application Layer Protocols
- Module 31: Industrial Network Considerations Part 1
- Module 32: Network Considerations Part 2

**LEARN MORE  
ABOUT MODULES**

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- 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...

**REGISTER  
NOW**

## COURSE DETAILS:

**Course No.:** TS06

**Length:** 5 days

**CEUs:** 3.5

**Price:** 3,080 USD ISA Member  
3,465 USD Affiliate Member  
3,855 USD Community Subscriber/List  
3,080 USD Group

## RECOMMENDED RESOURCE:

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

### 2019 SCHEDULE

Newhall, CA (Los Angeles Metro) ..... 11–15 February  
RTP, NC ..... 13–17 May

# Industrial Networking and Security (TS12)

This course will cover the latest developments in networking, including practical tips on designing, implementing and testing TCP/IP-based networks and how to apply them securely and reliably in an Industrial environment. The elements used to create and protect an industrial network including switches, routers, firewalls and Intrusion detection/prevention systems are also discussed, as well as practical knowledge of LAN, WAN, and Web technologies. It illustrates what is safe and practical for today's plant floor, including Internet technologies such as web servers, TCP/IP, and fiber optics. Special focus will be placed on the questions of security in the industrial setting drawing on the work of the SP-99 committee and NIST. It covers the details of IP addressing and how functions and protocols such as DHCP, DNS, ARP/RARP and fast spanning tree are essential to make such networks function, including network troubleshooting and the use of network diagnostic tools.

## YOU WILL BE ABLE TO:

- Identify analog dial-up connections and modems standards
- Apply the TCP/IP protocols, addressing, and troubleshooting
- Estimate where web technologies can safely be used for process control
- Understand security technologies such as firewalls, proxy servers, virus scanning, and intrusion protection
- Perform basic security scanning on your networks and perform 'hardening' of your computers
- And more...

## YOU WILL COVER:

- TCP/IP Networking
- Secure Architectures
- Understanding Packets and Protocols
- Building a Plant Floor Web Server
- Network Security Issues
- And More

## CLASSROOM/LABORATORY EXERCISES:

- Configuring basic network parameters and settings
- Use TCP/IP diagnostic tools in Windows-2000/XP
- Using network analyzers to troubleshoot
- Use web technology to display plant data
- Configure a security firewall for the plant floor
- Perform a basic security scan on a target system

**REGISTER  
NOW**

## COURSE DETAILS:

**Course No.:** TS12

**Length:** 5 Days

**CEUs:** 3.5

**Price:** 3,080 USD ISA Member  
3,465 USD Affiliate Member  
3,855 USD Community Subscriber/List  
3,080 USD Group

**2019 SCHEDULE**  
Newhall, CA (Los Angeles Metro) ..... 18–22 February  
RTP, NC ..... 20–24 May