CONTROLS ACADEMY
Technical Training
controlsolutionstraining.com
NEXUS CONTROLS TRAINING CENTERS

For further information, kindly contact below Email Address:

NexusTraining.admin@bakerhughes.com

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A WORLDWIDE PARTNER
FOR OPERATIONAL EXCELLENCE

Nexus Controls Academy provides technical training on turbine controls solutions delivered by our experienced instructors and Field Engineers. You and your team will benefit from comprehensive hands-on courses, starting at fundamentals and progressing to in-depth troubleshooting on turbine controls.

Nexus Controls technical training programs provide you and your team the knowledge and skills to maintain and control your machinery and to optimize the performance of your equipment. Nexus Controls builds with you a training plan that is best adapted to your needs.

Overall we aim to maximize your return-on-investment with a focus on skills development for operators and maintenance personnel responsible in delivering machinery availability and reliability.
POWER UP YOUR KNOWLEDGE

Nexus Controls provides a full range of training related to turbine control solutions. These courses which encompass all aspects from fundamentals to in-depth solution and diagnostics are based on value-added pillars.

**EXPERIENCE** from our Controls Upgrade field engineers and technical experts. With more than 20 years of engineering and field experience, Baker Hughes has built the structure of long-term skill development.

**TECHNICAL EXPERTISE** with 7 experienced trainers globally. Our team combines product installation, operation, maintenance or engineering experience with technical expertise, proven teaching skills and a commitment to knowledge transfer.

**HANDS-ON WORKSHOP** to guarantee operational excellence and to ensure trainings combine theory and practice. Workshops include practice with simulators and/or control pannels. Class sizes are kept small ensuring students get the most out of training.

**CUSTOMIZED TRAINING** to fit with your needs and enhance your teams performance. Based on 12 standard offerings, courses can be customized to your teams experience (operators, managers, engineers...). Curriculums can be developed, including gap analysis, target objectives and skills development needs.

**UP-TO-DATE MATERIAL** to optimize learning. Course content and workshops are continually revised to reflect latest technologies, experience and local regulatory standards.

**COMPREHENSIVE OFFERS** to match your specific needs and what works best for your team: modular training at one of BH training centers or at your site, coaching program or skills development program.

Excellence is an ART won by training and habituation.

We ARE what we repeatedly DO.

Excellence then is not an act, but a HABIT.

Aristotle
TECHNICAL EXPERTISE
HANDS-ON WORKSHOPS
FIELD EXPERIENCE
REAL CASES
MODULAR TRAINING

Provide your team with the right skills and knowledge, according to their profile, to increase their motivation, performance and productivity.

Our core curriculum includes 12 main training modules with an emphasis on practice. The benefits of training on real equipment is instantaneous. In small groups, trainees learn both theory and practice, the “why” and the “how-to”. Courses are adapted to your profile. Additional courses are available for controls solution migration.
**COACHED PROGRAM**

Empower employees by combining standard training and personalized on-site coaching to improve their confidence, efficiency and operational excellence.

To get the most out of training, Nexus Controls set up the coached program. Based on their knowledge, trainees will be oriented to the appropriate training program and once completed, will benefit from onsite coaching to leverage what they have learned in classroom on their day-to-day job at site. This program brings incremental value and confidence to your engineers.

**SKILLS DEVELOPMENT PROGRAM**

Bring your team to a higher confidence and competence level with our customer-specific program, based on proven technical competency matrix.

Nexus Controls work with you to develop a comprehensive Skills Development Program specifically designed to address your needs. It will help you to build sustainable competencies and maximize your return on investment in condition monitoring technologies.

The first step in our Skills Development Program is establishing a role-based competency matrix. This will be achieved by combining your organization’s job descriptions with condition monitoring best practices from Nexus Controls. The team will be assessed against a competency matrix specific to their role to identify skills and competency gaps. Based on the skills gaps identified, condition technologies deployed at site and operational constraints, a roadmap to build sustainable competencies will be developed.

By using customized training content, our certified instructors will conduct training sessions at a BH training center or at your site. These power users equipped with plant-specific knowledge and advanced awareness of the systems will be able to extract maximum benefit from the systems deployed and improve the ROI.
Controls
Mark VIe Upgrade Introduction

Duration
2 days (14 hours)

Audience
- Operators
- New Plant Personnel

Objectives
- Familiarize operations team with Mark VIe and HMI main components.
- Build skills to confidently operate the unit and diagnose alarms.

Program

Day 1 System Overview and Architecture
- MKVIe System Overview
- ToolBoxST structure
- Equipment Walk Down

Day 2 WorkStationST alarm viewer basics
- Cimplicity Screens Review
- Cimplicity Startup and Navigation
- Cimplicity Trends
- Historian PI

Simulators, Customer Software, & Laptop equipment can be added at additional costs.

Learning path

Prerequisites
- Control system knowledge
- Computer literacy
- Ability to read English

Next steps
- Mark VIe Intermediate

BENEFITS
- 2 day familiarization designed for minimal time impact to customer operations
Mark VIe Upgrade Intermediate

Duration
5 days (35 hours)

Audience
- Operators willing to develop their knowledge on Mark VIe
- Maintenance Personnel
- Intermediate Controls technicians and engineers

Objectives
- Discover basics for Cimplicity screens and upgrade orientation.
- Understand hardware upgrades on the turbine in association with the upgraded control package.
- Work with the Mark VIe control system on the turbine, process alarm troubleshooting and analyze the control code.
- Discuss on LVDT calibration, Cimplicity software programming, sequence editing or diagnostic alarm troubleshooting.

Program

Day 1 Equipment Review
- MKVIe System Overview
- ToolBoxST structure
- Cimplicity Startup and Navigation
- Cimplicity Trends
- Historian PI

Day 2 Toolbox
- Finder
- Watch windows
- Constants and variables
- Monitoring Software & Trenders
- MKVIe I/O Pack Controls & PDM
- View & troubleshoot IO diagnostic alarms

Day 3 Maintenance
- I/O Pack and Terminal board replacement
- Controller card replacement
- Permanent software changes
- Editing application software
- Configuring IO points
- LVDT calibration

Day 4 HMI Cimplicity (Basic)
- UDH-Networking
- Introduction to EGD
- Cimplicity Single Screen Troubleshooting
- Cimplicity Communications
- Cimplicity Single Screens
- Compiling and Downloading

Day 5 Troubleshooting
- Alarm tracing
- Add & modify alarms
- Viewing triplog
- Capture blocks & DDRs
- Trip History

Learning path

Prerequisites
- Mark VIe Introduction
- Control system experience
- Computer literacy
- Ability to read English

Next steps
- Mark VIe Advanced

BENEFITS
Mark VIe simulation kit and customer software interaction.
Objectives

- Enhance troubleshooting skills for the purpose of trip reduction and recovery.
- Develop skills for maintaining optimum performance and availability.
- Understand communications principles.

Program

Day 1 Introduction
- Documentation Overview
- Documentation Conventions
- Unit specific P&IDs
- A010 Unit control specifications
- Device summary

Day 2 Alarm Troubleshooting Skills
- Process alarm troubleshooting skills
- Alarms tracing skills to field devices
- Discrete & Analog Blockware Analysis

Day 3 Diagnostic Alarm Troubleshooting
- Trip Troubleshooting
- TripLogs and triggered trends
- Historical Alarms analysis
- IO Modules replacement

Day 4 Software Skills
- WorkStationST and Cimplicity communications
- Logic Forcing and signal tracing

Day 5 Equipment and Labs
- Equipment Walk Down
- Advanced Case Study
- Capture blocks & DDRs

Prerequisites

- Mark VIe Intermediate
- Control system experience
- Computer literacy
- Ability to read English

Next steps

MARK VI Upgrade Advanced

BENEFITS

Mark VI simulation kit and customer software interaction.
Excitation & Starter
EX2100e Upgrade Introduction

Duration
2 days (14 hours)

Audience
- Operators.

Objectives
- Learn about function and calibration of the standard excitation modules and auxiliary equipment,
- Understand software tools and options for each excitation system.

Program

Day 1 Introduction
- Exciter Overview
- Role of Excitation System
- Exciter Major Components
- Off Line Generator Fundamentals & Synchronizing
- Major Components of an Excitation System
- Generator Operation Off Line
- Excitation Off Line Protective settings
- Synchronizing

Day 2 On Line Generator Operation & Shutdown
- Loading the generator
- Watts and VARs
- Generator On line curves
- On line exciter protection
- Description of PSS Operation (If applicable)

Learning path

Prerequisites
- Prior generator operation experience recommended
- Reasonable computer skills & Ability to read English

Next steps
- EX2100e Upgrade
  - Intermediate

BENEFITS
- 2 day familiarization designed for minimal time impact to customer operations
Objectives

- Understand LCI software.
- Learn about the functions of the static start system.

Program

Day 1 Introduction
- Static Starter Overview
- Role of Static Starter System
- Static Starter Major Components

Day 2 LCI Static Start
- Hardware overview
- LCI Software and familiarization
- Running the diagnostic tests
- Troubleshooting faults and alarms
- Interactive session and Q&A on LS2100e Upgrade

Learning path

Prerequisites
- Recommended excitation systems knowledge
- Reasonable computer skills & Ability to read English

Next steps
- EX2100e/LS2100e Upgrade Intermediate

Benefits

- Use of site drawings and system settings during the course
EX2100e Upgrade Intermediate

Objectives

- Discover the function, calibration of the standard excitation modules, auxiliary equipment, software tools and some options for each excitation system.
- Learn how to perform basic startup checks and basic trouble shooting techniques on Generators, Excitation System and Solid State Power Conversion Modules.
- Start calibrate and trouble shoot the components of the EX2100e Generator Excitation Systems.

Program

Day 1 Introduction
- Exciter Overview
- Role of Excitation System
- Exciter Major Components
- Off Line Generator Fundamentals & Synchronizing
- Major Components of an Excitation System
- Generator Operation Off Line
- Excitation Off Line Protective settings
- Synchronizing

Day 2 On Line Generator Operation & Shutdown
- Loading the generator
- Watts and VARs
- Generator On line curves
- On line exciter protection
- Description of PSS Operation (if applicable)
- Classroom demonstrations

Day 3 Exciter Software
- Exciter Hardware and Excitation Drawings
- Description of Exciter Hardware Components
- Recommended Maintenance of Exciter
- Local Keypad

Day 4 Troubleshooting and Maintenance
- Lockout and tag out
- General Troubleshooting Guidelines
- Fault Indications

Day 5 Course overview and Labs completion
- Equipment Walk Down
- Advanced Case Study

Learning path

Prerequisites
- EX2100e Introduction
- Reasonable computer skills & Ability to read English
- ISO Category II

Next steps

EX02

BENEFITS

EX2100e simulation kit and customer software interaction.
EX2100e/LS2100e Upgrade Intermediate

Duration
5 days (35 hours)

Audience
- Operators.
- Maintenance team.

Objectives
- Learn about Generator Operation, Excitation, LCI and the functions of the Generator Protection Panel.
- Stress the safe operation of the generator.
- Enhance skills in maintenance and troubleshooting on the EX2100e.

Program

Day 1 Introduction
- Exciter Overview
- Role of Excitation System
- Exciter Major Components
- Off Line Generator Fundamentals & Synchronizing
- Major Components of an Excitation System
- Generator Operation Off Line
- Excitation Off Line Protective settings
- Synchronizing
- Classroom demonstrations of settings using trainer

Day 2 On Line Operation & Shutdown
- Loading the generator
- Watts and VARs
- Generator On line curves
- On line exciter protection
- Description of PSS Operation
- Classroom demonstrations of settings using trainer
- Exciter Hardware and Excitation Drawings
- Description of Exciter Hardware Components
- Recommended Exciter Maintenance
- Local Keypad
- Print Reading Exercises
- Excitation Elementary drawings
- Excitation instruction manuals
- HMI excitation screens
- Troubleshooting and Maintenance
- Lockout and tag out
- General Troubleshooting Guidelines
- Fault Indications
- Component Maintenance

Day 4 LCI Static Start
- Hardware overview
- LCI Software main components
- Running the diagnostic tests
- Troubleshooting faults and alarms

Day 5 Generator Protection Panel
- Generator One Line drawing
- Generator Protection Panel elementary drawings
- Device function numbers
- Lockout relays
- Tripping schemes with lockout relays

Learning path

Prerequisites
- EX2100e Introduction
- LS2100e Introduction
- Reasonable computer skills & Ability to read English

Next steps

EXLS02

Benefits
Use of site drawings and system settings during the course
HMI, Network and Cybersecurity
# HMI Upgrade Introduction

## Duration
3 days (21 hours)

## Audience
- Operators and Maintenance team
- Customer with HMI Upgrade projects.

## Objectives
- Provide maintenance team with required knowledge to new HMI software and features.

## Program

### Day 1 Cimplicity Training
- Cimplicity Startup and Navigation
- GT start-up and synchronization
- WorkStationST Alarm viewer basics
- ToolBoxST Basics
- Workstation ST Basics

### Day 2 Trender Files Training
- Trender
- Alarm Tracing
- Troubleshooting Cimplicity Screens

### Day 3 UDH Networking Training
- Viewing Trip Log Data
- Mark Vie
- Cimplicity Communications
- Cimplicity Screen Editing
- Adding Cimplicity Screen Navigation
- HMI Backup

## Learning path

### Prerequisites
HMI01

### Next steps
- MkVie
- Cyber SecurityST

## BENEFITS
Training Laptops with customer simulated software and graphics
Objectives

- Discover the theory and main basic functions of Networking systems.
- Learn how to manage and troubleshoot network.

Program

Day 1 Introduction to Networking
- Intro to OSI Model
- Network Types and Config
- Data Transmission
- Media: Copper, Fiber, Noise
- Wireless Networking Devices

Day 2 Networks and Hardware
- Topologies
- Logical & Ethernet Networks
- VLANs
- TCP/IP Protocol
- IPv4 & IPv6 & IPV6 Addressing
- Delivery

Day 3 Routers
- Static Routing
- Dynamic Routing

Day 4 Network Management
- TCP/IP Services
- Assigning IP Addresses
- DNS (Domain Name Services)
- Command & Utilities
- TCP/IP Protocols
- WANS Introduction and Connectivity

Day 5 Network Troubleshooting
- Network Monitoring
- Configuration Documentation
- Network Performance
- Network Security: vulnerabilities, threats, authentication, encryption

Learning path

Prerequisites
- Network Upgrade Maintenance Intermediate
- HMI Upgrade Introduction
- Cyber Security ST

Next steps
- Network Upgrade Maintenance Intermediate
- HMI Upgrade Introduction
- Cyber Security ST

BENEFITS
- Training Laptops and switches using simulated SW and communications
Network Upgrade Intermediate

Duration
3 days (21 hours)

Audience
- Maintenance team
- Plant IT team

Objectives
- Learn how to conduct Switch Configurations, Routing, and TCPIP Addressing.
- Be able to perform maintenance and troubleshooting of networks

Program

Day 1 Introduction to Networking
- Networking Architecture
- Network 3.1 and Network 4.0
- TCPIP Addressing
- TCPIP Protocol
- IPV4 Addressing & subnetting

Day 2 Switches and Routing
- Routing Static
- Routing Dynamic
- Cisco Switches Introduction
- Switch Configuration

Day 3 Network Troubleshooting & Event Recovery
- Troubleshooting tools
- Communication Failures
- Mac address filtering
- Acronis Backup & Recovery

Learning path

Prerequisites
- Network Upgrade Introduction

Next steps
- Cyber Security ST Intermediate

BENEFITS
Training Laptops and switches using simulated SW and communications
Cyber Security CAP Introduction

Objectives

- Enhance knowledge on Basic and Advanced functions of Cyber Security.
- Enable site personnel to perform Cyber Asset Protection (CAP) updates and troubleshooting.

Program

Day 1 Introduction to Cyber Security Protection
- Cyber Protection: Industry Best Practices
- Patch Management Overview: OS, SW, AV’s
- Anti-Malware, Virus Protection Management
- Testing & Validation Process, High-Level

Day 2 CAP Patching & Event Recovery
- CAP Patching Instruction, Process
- CAP Patching, Hands-On Lab #1
- Event Recovery, Acronis, Backup & Recovery
- Event Recovery, Hands-On Lab #2
- Adv. CAP Troubleshooting Topics

Day 3 Advanced Cyber Security Protection
- SecurityST Introduction
- SIEM, Splunk, Hands-On Lab #3
- Authentication, Access Control
- SecureSuite Compact
- Firewalls Intro and OpShield

Learning path

Prerequisites

Next steps

- Cyber Security ST Intermediate

BENEFITS

3 day familiarization on Core Cyber Security Protection topics
Cyber SecurityST Intermediate

Duration
5 days (35 hours)

Audience
- Security ST operators
- Maintenance team
- Plant IT team.

Objectives
- Enhance knowledge on Basic and Advanced functions of SecurityST system.
- Enable site personnel to perform maintenance on SecurityST.
- Learn how to integrate HMI and network switch devices.

Program

Day 1 Introduction to SecurityST
- SecurityST Hardware
- SecurityST Virtual Machines

Day 2 Virtual Machine (VM) Navigation
- Using the Virtual Client
- Logging into Virtual Machines
- Virtual machine navigation
- Logging on to API & other VMs

Day 3 Domain Controllers
- Basics of GE domain controllers and groups
- Performing administrative tasks in DC1
- Identify and modify domain policies
- Setting up & Login a new user
- Suspending or deleting a user

Day 4 API
- Account passwords, & assigned roles
- Domain policies & settings

Day 4 AP1
- Setting up centralized virus management
- Setting up centralized backups
- Managing the CatTools application
- Managing application patches
- Adding a new HMI, Installing Agents
- Configure Acronis Application
- Creating Acronis Backup Plans
- Sophos Application
- vCenter Protect & RADIUS Client
- Switch Configuration Backup
- Restoring from Backup
- System Recovery Disc

Day 5 Cisco Switch Configuration
- Basics & switch configuration
- Switch Backups
- Switch name change
- Turning ports on/off
- IP addresses, time source match
- MAC Address Filtering
- AP2, Splunk SIEM
- Splunk Applications

Learning path

Prerequisites
- Cyber Security CAP Introduction

Next steps

SECST02

BENEFITS
Practice on VM, DC1/DC2, Domain Policies, API, Switch configuration.
Nexus OnCore Introduction

Objectives

- Focus on Operators Basics for Optimum C Screens and upgrade orientation

Duration

2 days (14 hours)

Audience

- Operators

Program

Day 1 Equipment Overview

- Nexus Hardware Introduction
- Nexus Software Introduction
- HMI Screens Review

Day 2 General Configuration

- System Configuration
- HMI Configuration
- Finder & Searching
- Trender

Methodology: Classroom learning by presentation slides.
Reference of manuals and plant specific documentations.
Equipment walk-down, and Question & Answer sessions

Learning path

Prerequisites

Next steps

- Nexus OnCore Intermediate

BENEFITS

Hands-on, simulated experience, with customer’s software
NEX02

Objectives

- Discover Operators Basics for Optimum C Screens.
- Enable team to manage Nexus control hardware, conduct process alarm troubleshooting and review the control code.
- Review calibration, OptimumC software, sequence editing & diagnostic alarm troubleshooting.

Program

**Day 1 Introduction**
- Nexus Hardware Introduction
- Nexus Software Introduction
- HMI Screens Review

**Day 2 General Configuration**
- System Configuration
- HMI Configuration
- Finder & Searching
- Trender

**Day 3 Software**
- Real Time and Historical Data Bases
- Function Blocks
- Order of Operation
- Creating and editing screens
- Software Lab

**Day 4 HMI Optimum C**
- Third Party Communications
- System Diagnostics
- I/O Configuration
- Adding I/O Point

**Day 5 Troubleshooting**
- NTP Setup
- Reports
- Alarm Tracing
- Adding Alarms

Methodology: Customer Software and Laptop equipment labs and simulation. Panel for training at Nexus Controls Training Center

Learning path

Prerequisites

- Nexus OnCore Introduction

Next steps

BENEFITS

Hands-on, simulated experience, with customer’s software

Duration

5 days (35 hours)

Audience

- Operators
- Maintenance team
WOODWARD
Woodward Introduction

Duration
2 days (14 hours)

Audience
- Operators
- Maintenance team

Objectives
- Familiarize operator teams with Woodward controls, main components and associated systems and devices.
- Learn with On-Site equipment

Program

Day 1 System Overview and Architecture
- Woodward System Overview
- Software Overview, GAP & Control Assistant
- Wiring and Elementary prints and I/O logic
- Equipment Walk Down

Day 2 WorkStationST alarm viewer basics
- System calibration review
- Troubleshooting, standard steps and process

Optional additional topics:
- Fanuc or PLC or Quick Panel software
- Alarm Tracing review
- Alarm designations & trip screens

Methodology: Classroom learning by presentation slides. Reference of manuals and plant specific documentations. Equipment walk-down, and Question & Answer sessions

Learning path

Prerequisites

Next steps

BENEFITS
Onsite equipment walk-down for operational overview.
Objectives

- Familiarize teams with Woodward controls, main components and associated systems and devices.
- Be able to use Woodward service, software and programming (GAP) tools to understand sequence, HW I/O signal tracing, trend parameters, calibrate and/or stroke actuators/valves and troubleshoot process alarms.
- Understand how to start, stop, load/unload or shutdown the unit.
- Understand ho to use the HMI alarms and events history functions.

Program

**Day 1 System Overview and Architecture**
- Micronet/Micronet+ System Overview: HW, architecture & components
- RTCnet & Linknet HT distributed IO

**Day 2 Woodward Solutions**
- LM2500 Fundamentals
- Auxiliaries hardware & devices:
  - MLO/SLO supporting systems,
  - Hydraulic/Pneumatic starting systems,
  - Fuel supply systems,
  - Control devices,
  - Protection devices
- GAP:
  - Introduction & structure
  - Programming & troubleshooting
  - Hands-on practice

**Day 3 Woodward Solutions focus**
- Micronet +
  - Software tools tuneables, appmanager, SOS OPC
  - System calibration review
  - Troubleshooting, standard steps and process
  - Micronet+ hands-on practice
- Woodward valves/acuators for aeroderivative gasturbines

**Day 4 Woodward Solutions focus**
- Citect HMI: overview & troubleshooting
- DVP: configuration tool & hands-on practice

**Day 5 Woodward Solutions focus**
- DVP + Service: configuration tool & hands-on practice
- Protect SX configuration tool & hands-on practice

Methodology: Classroom learning by presentation slides. Reference of manuals and plant specific documentations. Equipment walk-down, hands-on practices and Q&A sessions

Learning path

Prerequisites

Next steps

**Duration**

5 days (35 hours)

**Audience**

- Technicians
- Engineers
- Supervisors involved on daily GT control systems maintenance tasks

**WW02**

**BENEFITS**

Woodward solutions hands-on practice and operational application.
Be confident in your employees’ competences

Nexus Controls can work on defining the competency matrix and setting up the competence development plan to make sure your team is equipped with all the knowledge and confidence to efficiently manage your assets.

For more information, visit:
https://www.controlsolutionstraining.com