Training Course Guide 2019
All the information you need in one place to make an informed training selection.
Visit our web page: 
it is a useful place to find more information about our training offerings including other course guides etc. You can also download our Curriculum Guide from there.

http://www.gegridsolutions.com/multilin/support/training/

Visit our YouTube channels: 
did you know that we have a You Tube portal where you can find e-learning training videos at no cost. Here you can find how 2 videos, training webinars and training course modules for self learning

http://www.youtube.com/GEgridautomationLD

Contact us: 
need more information, have questions about our offerings, want to follow up with us on any training related issue, then contact us through our training mail box.

training.multilin@ge.com

also you can sign up for our monthly newsletter here.

Training Offerings:
● train at no cost use our YouTube Site or web resource pages
● attend one of our webinar training sessions.
● more formal needs.
● standard schedule courses
● on demand courses standard or custom at your place or ours.
● try our virtual classroom sessions (remote learning)
● try one of our certification programs

Did you know: 
that our Learning Centers have state of the art technology and learning material to allow the student to receive a rich learning experience, using smart boards, hands on workshop equipment, telepresence and digital device technologies.

Visit our on line store at: 
where you can view standard course schedule and purchase a seat/s on a specific course.

http://store.gedigitalenergy.com/TrainingCourses.asp

Visit our web site resources page: 
did you know here you can find a multitude of useful resources to assist your learning about our products services and solutions.

http://www.gegridsolutions.com/resources.htm

Certification Programs: 
● need more than a classical classroom session then try one of our programs.
● programs are based upon bended learning, combining;
  ● e-learning modules
  ● virtual classroom sessions
  ● assessment and testing
  ● intense workshop hands on sessions
● programs typically incorporate over 200 hours of training.

Grid IQ Learning Center's: Discover the Difference
Welcome to our integrated learning program, its aim is to provide a flexible learning methodology to learn all about our products, services and protection and control solutions offerings in creating protection and control schemes.

We cover all our protection and automation devices and protection elements including IEC 61850, HardFiber, Cyber Security and much more.

Our objective is not to simply look at specific products, but look more towards integrated systems and so while the program starts off with building product knowledge. This is only done so that we are building a knowledge foundation upon which to build out integrated systems capability.

Learning is done through a blend of e-learning modules, virtual classroom sessions and practical workshops with knowledge testing throughout.
Our training courses are constantly evolving. The future is built around learning events with material built to suit a wide range of students and delivery methods whether they be maintenance personnel, engineers or consultants. No matter what your background or depth of understanding or need we can deliver training that works for you.

You can take separate learning modules or combine them it’s your choice, or you can take one of our programs such as UR Platform and 8 Series Essentials, which combines learning modules, virtual classroom sessions and practical workshops.

Why are we evolving, training delivery

- Training is only a vehicle to assist learning
- Training is a transactional activity, it does not create expertise alone, attendance at a class simply stimulates the desire to learn and build your expertise.
- Expertise comes through the desire to learn and the quality of the learning experience created through learning resources and delivery methods, the key being practical application of taught principles and concepts.

What are we doing to improve

- Continuously improve the quality of our training content and training delivery methods.
- Seek to build skills through active learning, reinforced with assessment tests as we go.
- Evolve in how we execute training, using flexible blended learning offerings as integrated training programs.
- Use all available technology to improve the learning experience.
- Leverage social media wherever possible.

“I never teach my pupils, I only attempt to provide the conditions in which they can learn”.

“everything should be made as simple as possible, but not simpler.”
Albert Einstein

Improving the Learning Experience

<table>
<thead>
<tr>
<th>Self-Paced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodates a self-study approach to training for individuals who prefer to learn at their own pace and without the presence of an instructor.</td>
</tr>
<tr>
<td>eLearning</td>
</tr>
<tr>
<td>training content comprising of how2 videos, recorded webinars and training e-modules</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instructor Led</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designed for those who prefer attending courses in a classroom or similar environment facilitated by an experienced instructor while learning amongst a group of peers who share the same goal.</td>
</tr>
<tr>
<td>Webinars</td>
</tr>
<tr>
<td>Designed for those who are interested in gaining further knowledge regarding our products and theory based modules, our live webinars offers students the opportunity of attending our online sessions to discuss specific topics with a live instructor.</td>
</tr>
<tr>
<td>Virtual Classroom</td>
</tr>
<tr>
<td>Stay seated and connect with your peers through our virtual classroom sessions. These sessions are facilitated by a live instructor, allowing you the opportunity of reaching out throughout your learning.</td>
</tr>
<tr>
<td>Classroom</td>
</tr>
<tr>
<td>Whether you are interested in attending classes at our GE Learning Centers, or preferred location of your choice, our facilitators provide a learning experience like no other. Students are able to expand their knowledge in an environment conducive to learning.</td>
</tr>
</tbody>
</table>

Rethinking how education is delivered.
Redefining how learning is achieved
Each Virtual Course uses e-learning self pace course work, virtual class sessions and on-line testing/assessment of what you have learned. These courses are prerequisites for attending any of our workshop sessions that we offer.

**Course structure**

- **Virtual Classroom**
- **eLearning**
- **Test**
- **Virtual Classroom**
- **Test**

**Course tools**

To aid learning we provide access to various tools:

- **Virtual Classroom**
  - Classes can be run for a minimum of 8 persons and subject to content can be run for groups up to 25.
  - These are interactive sessions using GE video conferencing technology. All you need is a good internet connection, computer, web cam and microphone.

- **eLearning**
  - e-learning modules are video based learning they are compiled into playlists for courses with links provided.
  - Watch and learn as we take you on a step by step journey through the subject. All that is needed is an internet connection.

- **Test**
  - All our paid courses offer student assessment and testing.
  - Successful completion leads to issuance of a certificate that provides course abstract, level of attainment and number of learning hours.

- **Collaboration**
  - Enter our course collaboration tool, communicate with your instructor and your peers.
  - Have a question... ask!
  - See a question you know the answer... share!
  - The aim is to learn together.
who should attend
Managers, Consultants, Engineers and System Integrators responsible for power delivery in either utility or industrial sectors.

learning outcome
Students know the differences between a relay vs an IED, a digital relay vs a numerical relay, familiar with ANSI Device number and relevant settings of GE IEDs, the different types of calculations of the settings, and especially mysterious K factors in different applications.

prerequisites
Basic electrical knowledge, there are no GE course prerequisites. This course is a prerequisite for all other learning course/program offerings. A pass will be provided to participants who can demonstrate their knowledge by taking our on-line test.

what's covered
• FMPR-201 Current Elements
• FMPR-202 Voltage Elements
• FMPR-203/4 Directional Elements
• FMPR-205 Over/Loss Excitation
• FMPR-206 Phase Balance
• FMPR-207 Thermal Overload
• FMPR-210 Distance Elements
• FMPR-212 Synchronism and AR
• FMPR-214 Differential Elements

learning contact hours
• Virtual class 1: 1 hour (intro session)
• E-learn: 4 hours (playlist e-950)
• Virtual class 2: 6 hours
• Testing: 2 hours
• Total: 13 hours

Virtual class 2 is two 3 hours sessions. Learning contact hours quoted are our estimate of time to complete, actual is very much dependent on students prior knowledge.
Learning programs, blend together e-learning, virtual classroom sessions and face to face workshops. All elements have on-line assessment testing. To attend you must have completed all the prerequisites needed.

**Course Structure**

- **Virtual Class #1**
  - eLearning
  - Testing

- **Virtual Class #2**
  - Student complete self pace course work and knowledge testing
  - Discuss progress, Q&A session & plan for workshop

- **Workshop**
  - 3-5 days Hands on workshop
  - Coursework testing
  - Final program test
  - Wrap up final Q&A etc.

- **Virtual Class #3**
  - Collaboration

**Course Tools**

- Virtual Classroom
- eLearning
- Test
- Collaboration

**Key Attributes**

The UR and 8Series course programs build on the content learned in the virtual class offerings and move into system integration of GE products to create customer solution.

The students will practice the basic configurations of the relays in the first two days or four days, then in the last day will create one capstone project to use the knowledge learnt in previous exercises.

At the end of each course the student will have a greater understanding on the programming and operation of the UR and 8Series relays. Application Labs will allow the students to apply and hone their skills on these relays.

Both courses start with e-learning coursework and testing, and then a hands-on face to face workshop.

Throughout the course students are encouraged to collaborate with the instructor and their peers through the collaboration tool.

It's all about learning, it is much more than a training course!
Protection & Control

course code | TRNG-UR8S - Universal Relay and 8 Series Essentials

who should attend
Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using GE products in non-61850 and 61850 configurations.

learning outcome
Build a knowledge and understanding of UR and 8 Series hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

prerequisites
TRNG-FMPRV course is highly recommended or with certain UR & 8 Series working experiences.

workshop hardware needs
All equipment is provided as part of the workshop.

what’s covered
- Hardware
- Enervista software
- Diagnostic Tools
- I/O Configuration
- Protection Elements
- FlexLogic
- IEC61850
- Capstone project

learning contact hours
- E-learn: 6 hours (playlist e-954)
- Workshop: 40 hours
- Testing: 2 hours
- Total: 48 hours

Learning contact hours quoted are our estimate of time to complete, actual is very much dependent on students prior knowledge.

e-learning playlist | e-952 & e-953

Module | Name
--- | ---
UR-100 | UR Platform Overview
UR-101 | UR Platform Hardware
UR-102 | UR Platform Software
UR-103 | UR Platform FlexLogic
UR-104 | UR Platform Protection
UR-107 | UR Platform IEC61850 ed2
UR-110 | UR Platform AC input Configuration
UR-118 | Graphical Front Panel
UR-140 | UR7.0 Release Introduction
UR-141 | UR7.3 Release Introduction

Module | Name
--- | ---
BSP-100 | 8 Series Relay Overview
BSP-101 | 8 Series Hardware
BSP-102 | 8 Series Software Interface
BSP-103 | 8 Series Software Setpoints
BSP-104 | 8 Series Protocols
BSP-105 | 8 Series Control & Monitoring
BSP-106 | 8 Series FlexLogic
BSP-107 | 8 Series IEC61850 Configurator

timeline

Registration Deadline
8 weeks prior to workshop

Course notices sent out
7 weeks prior to workshop

Virtual Class 1
6 weeks prior to workshop

Complete: e-learning
2 week prior to workshop

Virtual Class 2
1 week prior to workshop

Workshop
Workshop week zero

Virtual Class 3
2 weeks after workshop

note 1: timeline is generic may vary dependent on scheduling logistics
# Prerequisites
Students MUST complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

# Learning Objective
On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate configure UR and 8 series relays where they can then hone their skills through further applications.

In addition to the exercise each module comes with an assessment test.

## Prerequisites
- **UR-401 | Initial Setup**
- **UR-402 | Diagnostic Setup**
- **UR-403 | Inputs & Outputs**
- **UR-404 | Metering**
- **UR-405 | Protection Summary**
- **UR-406 | FlexLogic**
- **UR-407 | IEC61850**
- **UR-408 | v7.2-IEC61850 or UR-414 | IEC61850 Ed 2**
- **61850-420 | UR-8S GOOSE**
- **8SP-401 | Hardware Setup**
- **8SP-402 | Software Interface**
- **8SP-403 | Generic Settings**
- **8SP-404 | Protection Functions**
- **8SP-405 | Controls and Monitoring**
- **8SP-406 | FlexLogic**
- **8SP-407 | IEC61850**
- **8SP-408 | SLD Editor**

## Capstone Project
- Interlock Scheme
- Breaker Simulator with 50BF Auto Reclose Scheme
- Breaker Fail Transfer Trip
- Main Tie Main Bus Scheme

## Classroom Taught
- **8SP-61850 l UR-8S GOOSE**

## Course Note
- Workshop activities are a mix of video based, written and demonstration instruction, followed by student hands on activities.
- The detailed content of each module is introduced on page 24-26.
- Learning content is provided on a digital device.
Protection & Control

**who should attend**
Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using GE products in non-61850 and 61850 configurations.

**learning outcome**
Build a knowledge and understanding of the UR hardware, software and configuration and its application within the smart grid.
Application Labs will give the students an opportunity to apply their knowledge.

**prerequisites**
TRNG-FMPRV virtual course is highly recommended or with certain UR working experiences.

**workshop hardware needs**
All equipment is provided as part of the workshop.

**what’s covered**
- Diagnostic Tools
- I/O Configuration
- Protection Elements
- FlexLogic
- IEC61850
- Application design
- Integration

**learning contact hours**
- E-learn: 6 hours (playlist e-952)
- Workshop: 24 hours
- Testing: 2 hours
- Total: 32 hours

Learning contact hours quoted are our estimate of time to complete, actual is very much dependent on students prior knowledge.

**e-learning playlist | e-952**

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR-100</td>
<td>UR Platform Overview</td>
</tr>
<tr>
<td>UR-101</td>
<td>UR Platform Hardware</td>
</tr>
<tr>
<td>UR-102</td>
<td>UR Platform Software</td>
</tr>
<tr>
<td>UR-103</td>
<td>UR Platform FlexLogic</td>
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<td>UR-104</td>
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<td>UR7.3 Release Introduction</td>
</tr>
</tbody>
</table>

**timeline note 1**
Registration Deadline
8 weeks prior to workshop

course notices sent out
7 weeks prior to workshop

virtual class 1
6 weeks prior to workshop

complete: e-learning
2 week prior to workshop

Virtual Class 2
1 week prior to workshop

Workshop
week zero

Virtual Class 3
2 weeks after workshop
# TRNG-UR Essentials | Practical Workshop

## Prerequisites
Students **MUST** complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

## Learning Objective
On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate configure UR relays where they can then hone their skills through further applications.

In addition to the exercise each module comes with an assessment test and final exam on the last day.

<table>
<thead>
<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR-401</td>
<td>Initial Setup</td>
<td>UR-405</td>
</tr>
<tr>
<td>UR-402</td>
<td>Diagnostic Setup</td>
<td>UR-406</td>
</tr>
<tr>
<td>UR-403</td>
<td>Inputs &amp; Outputs</td>
<td>UR-408</td>
</tr>
<tr>
<td>UR-404</td>
<td>Metering</td>
<td>Capstone Project</td>
</tr>
</tbody>
</table>

### Capstone Project
Examples:
- Interlock Scheme
- Breaker Simulator with 50BF
- Auto Reclose Scheme
- Breaker Fail Transfer Trip

## Learning content
- Workshop activities are a mix of video based, written and demonstration instruction, followed by student hands on activities.
- The detailed content of each module is introduced on page 24.
- Learning content is provided on a digital device.
### Protection & Control

#### who should attend

Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using GE products in non-61850 and 61850 configurations.

#### learning outcome

Build a knowledge and understanding of the product hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

#### workshop hardware needs

All equipment is provided as part of the workshop.

#### what’s covered

- Diagnostic Tools
- I/O Configuration
- Protection Elements
- FlexLogic
- IEC61850
- Application design
- Integration

#### prerequisites

TRNG-FMPRV virtual course is highly recommended or with certain 8 Series relay working experiences.

#### learning contact hours

- E-learn: 6 hours (playlist e-953)
- Workshop: 24 hours
- Testing: 2 hours
- Total: 32 hours

Learning contact hours quoted are our estimate of time to complete, actual is very much dependent on students prior knowledge.

#### e-learning playlist | e-953

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
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</thead>
<tbody>
<tr>
<td>8SP-100</td>
<td>8 Series Relay Overview</td>
</tr>
<tr>
<td>8SP-101</td>
<td>8 Series Hardware</td>
</tr>
<tr>
<td>8SP-102</td>
<td>8 Series Software Interface</td>
</tr>
<tr>
<td>8SP-103</td>
<td>8 Series Software Setpoints</td>
</tr>
<tr>
<td>8SP-104</td>
<td>8 Series Protections</td>
</tr>
<tr>
<td>8SP-105</td>
<td>8 Series Control &amp; Monitoring</td>
</tr>
<tr>
<td>8SP-106</td>
<td>8 Series FlexLogic</td>
</tr>
<tr>
<td>8SP-107</td>
<td>8 Series IEC61850 Configurator</td>
</tr>
</tbody>
</table>

#### timeline note 1

- Registration Deadline: 8 weeks prior to workshop
- Course notices sent out: 7 weeks prior to workshop
- Virtual Class 1: 6 weeks prior to workshop
- Complete: e-learning: 2 weeks prior to workshop
- Workshop: 1 week prior to workshop
- Virtual Class 2: 2 weeks after workshop
- Workshop: 2 weeks after workshop
Prerequisites

Students MUST complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

Learning Objective

On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate configure 8 series relays where they can then hone their skills through further applications.

In addition to the exercise each module comes with an assessment test and final exam on the last day.

MONDAY

- 8SP-401 | Hardware Setup
- 8SP-402 | Software Interface
- 8SP-403 | Generic Settings
- 8SP-404 | Protection Functions

TUESDAY

- 8SP-405 | Controls and Monitoring
- 8SP-406 | FlexLogic
- 8SP-407 | IEC61850

WEDNESDAY

- 8SP-408 | SLD Editor

Capstone Project

Examples:
- Interlock Scheme
- Breaker Simulator with 50BF
- Auto Reclose Scheme
- Breaker Fail Transfer Trip
- Main Tie Main Bus Scheme

Legend

- practical exercise
- classroom taught

Course Note

Workshop activities are a mix of video based, written and demonstration instruction, followed by student hands on activities.

The detailed content of each module is introduced on page 26.

Learning content is provided on a digital device.
# Protection & Control

## who should attend
Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using GE products in non-61850 and 61850 configurations.

## learning outcome
Build a knowledge and understanding of the product hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

## prerequisites
TRNG-FMPRV is highly recommended to attend.

## workshop hardware needs
All equipment is provided as part of the workshop.

## what’s covered
ANSI Device Elements for:
- Transformer Protection
- Generator Protection
- Motor Protection
- Feeder protection
- Busbar Protection

## learning contact hours
- Virtual class 1: 1 hour (intro session)
- E-Learn: 10 hours (playlist e-957)
- Virtual class 2: 2 hours
- Workshop: 40 hours
- Testing: 2 hours
- Virtual class 3: 2 hours
- Total: 57 hours

E-Learning hours depend on the selection of the videos; it may be longer or shorter than 10 hours.

## e-learning playlist | e-954 and/or 952/953/960 depends on the relay selected

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR-103</td>
<td>369 Motor Protection Hardware</td>
</tr>
<tr>
<td>SR-104</td>
<td>369 Motor Protection Software</td>
</tr>
<tr>
<td>SR-105</td>
<td>469 Motor Protection Hardware</td>
</tr>
<tr>
<td>SR-106</td>
<td>469 Motor Protection Software</td>
</tr>
<tr>
<td>SR-107</td>
<td>750 Feeder Protection Hardware</td>
</tr>
<tr>
<td>SR-108</td>
<td>750 Feeder Protection Software</td>
</tr>
<tr>
<td>SR-109</td>
<td>745 Transformer Protection Hardware</td>
</tr>
<tr>
<td>SR-110</td>
<td>745 Transformer Protection Software</td>
</tr>
<tr>
<td>SR-111</td>
<td>489 Hardware</td>
</tr>
<tr>
<td>SR-112</td>
<td>489 Software</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>3SP-100</td>
<td>3 Series Relay Overview</td>
</tr>
<tr>
<td>3SP-101</td>
<td>3 Series Hardware</td>
</tr>
<tr>
<td>3SP-102</td>
<td>3 Series Relay Software</td>
</tr>
<tr>
<td>3SP-103</td>
<td>3 Series Platform Elements</td>
</tr>
<tr>
<td>3SP-104</td>
<td>350 Feeder Protection</td>
</tr>
<tr>
<td>3SP-105</td>
<td>339 Motor Protection</td>
</tr>
<tr>
<td>3SP-106</td>
<td>345 Transformer Protection</td>
</tr>
<tr>
<td>3SP-107</td>
<td>3 Series IEC 61850</td>
</tr>
</tbody>
</table>

### timeline
- **Registration Deadline**: 8 weeks prior to workshop
- **Course notices sent out**: 7 weeks prior to workshop
- **Virtual Class 1**: 6 weeks prior to workshop
- **Complete: e-learning**: 2 weeks after workshop
- **Virtual Class 2**: 1 week prior to workshop
- **Workshop**: Week zero
- **Virtual Class 3**: 2 weeks after workshop

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**Note 1**: Timeline is generic may vary dependent on scheduling logistics.

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TRNG-MTDT Essentials | Practical Workshop

**Prerequisites**

Students **MUST** complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

**Learning Objective**

On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate small scale substation solutions from where they can then hone their skills through further application.

In addition to the exercise each module comes with an assessment test and final exam on the last day.

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**MONDAY**

- **Distribution**
  - 489/889/G60 Generator Protection
  - UR-420 | B30 Bus Protection
  - 345/745/845/T60 Transformer Protection

- **Motors**
  - D60/L90 Line Protection
  - 350/750/850/F60/P14D Feeder Protection
  - F650 Bay Controller

- **Integration**
  - 3SR-404 | 339 Motor Protection
  - SR-403 | SR369 Motor Protection

**TUESDAY**

- **Distribution**
  - D60/L90 Line Protection
  - 350/750/850/F60/P14D Feeder Protection
  - F650 Bay Controller

- **Motors**
  - 3SR-404 | 339 Motor Protection
  - SR-403 | SR369 Motor Protection

- **Integration**
  - Non 61850 Application Scheme Integration

**WEDNESDAY**

- **Motors**
  - 3SR-404 | 339 Motor Protection
  - SR-403 | SR369 Motor Protection

- **Integration**
  - 61850 Application Scheme Integration

**THURSDAY**

- **Motors**
  - SR-405 | SR469 Motor Protection
  - UR-425 | M60 Motor Protection

- **Integration**
  - 3 phase motor protection and control

**FRIDAY**

- **Motors**
  - 8SP-421 | 869 Motor Protection
  - MM-401 | MM series Motor Protection

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**Legend**

- **practical exercise**
- **classroom taught**

**Course Note**

Workshop activities are a mix of video based, written and instructor demonstrated, followed by student hands on activities. Learning content is provided on a digital device.

* Students need to decide their workshop relay types when register this course.
Protection & Control

Course Delivery Offerings | Workshop

course code | TRNG-DIST - Distribution Essentials

who should attend

Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using GE products in non- 61850 and 61850 configurations.

learning outcome

Build a knowledge and understanding of the product hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

prerequisites

TRNG-FMPPV is highly recommended to attend.

workshop hardware needs

All equipment is provided as part of the workshop.

what’s covered

ANSI Device Elements for:
• Transformer Protection
• Generator Protection
• Line Protection
• Busbar Protection
Integration Applications:
• IEC61850

learning contact hours

• E-learn: 6 hours (playlist e-958)
• Workshop: 24 hours
• Testing: 2 hours
• Total: 32 hours

E-learning hours depends on the selection of the videos, it maybe longer or shorter than 6 hours.

e-learning playlist | e-954 and/or 952/953/960 depends on the relay selected

Module | Name
--- | ---
SR-103 | 369 Motor Protection Hardware
SR-104 | 369 Motor Protection Software
SR-105 | 469 Motor Protection Hardware
SR-106 | 469 Motor Protection Software
SR-107 | 750 Feeder Protection Hardware
SR-108 | 750 Feeder Protection Software
SR-109 | 745 Transformer Protection Hardware
SR-110 | 745 Transformer Protection Software
SR-111 | 489 Hardware
SR-112 | 489 Software

Module | Name
--- | ---
3SP-100 | 3 Series Relay Overview
3SP-101 | 3 Series Hardware
3SP-102 | 3 Series Relay Software
3SP-103 | 3 Series Platform Elements
3SP-104 | 350 Feeder Protection
3SP-105 | 339 Motor Protection
3SP-106 | 345 Transformer Protection
3SP-107 | 3 Series IEC 61850

Course Delivery Offerings | Workshop

timeline note 1

Registration Deadline
8 weeks prior to workshop

course notices sent out
7 weeks prior to workshop

Virtual Class 1
6 weeks prior to workshop

complete: e-learning
2 week prior to workshop

Virtual Class 2
1 week prior to workshop

Workshop
week zero

Virtual Class 3
2 weeks after workshop

Virtual Class 4
1 week after workshop
Prerequisites
Students MUST complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

Learning Objective
On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate small scale substation solutions from where they can then hone their skills though further application.

In addition to the exercise each module comes with an assessment test and final exam on the last day.

This course is a free form style: after complying with the prerequisites and completing the course work students come to the workshop and complete 2-4 out of 16 relay modules and at least 1 integration exercise for successful course completion.

Distribution
- 489/889/G60 Generator Protection
- UR-420 | B30 Bus Protection
- 345/745/845/T60 Transformer Protection
- D60/L90 Line Protection
- 350/750/850/F60/P14D Feeder Protection
- F650 Bay Controller

Integration
- Non 61850 Application Scheme Integration
- 61850 Application Scheme Integration

Legend
- Practical exercise
- Classroom taught

Course Note
Workshop activities are a mix of video based, written and instructor demonstrated, followed by student hands on activities.

Learning content is provided on a digital device.

* Students need to decide their workshop relay types when register this course.
Protection & Control

Course code | TRNG-MTR - Motors Essentials

who should attend
Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using GE products in non-61850 and 61850 configurations.

learning outcome
Build a knowledge and understanding of the product hardware, software and configuration and its application within the smart grid. Application Labs will give the students an opportunity to apply their knowledge.

prerequisites
TRNG-FMPRV is highly recommended to attend.

workshop hardware needs
All equipment is provided as part of the workshop.

what’s covered
Configuration and Motor Protection Elements from a selection of GE Multilin Motor Protection Relays. Integration Applications:
• IEC61850

learning contact hours
- E-learn: 6 hours (playlist e-959)
- Workshop: 24 hours
- Testing: 2 hours
- Total: 32 hours
E-learning hours depends on the selection of the videos, it maybe longer or shorter than 6 hours.

E-learning playlist | e-959

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR-103</td>
<td>369 Motor Protection Hardware</td>
</tr>
<tr>
<td>SR-104</td>
<td>369 Motor Protection Software</td>
</tr>
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<td>SR-105</td>
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<td>469 Motor Protection Software</td>
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<td>8SP-121</td>
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<td>3SP-105</td>
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<td>FMPR-109-1</td>
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<td>FMPR-109-3</td>
<td>Motors Protection part 3</td>
</tr>
<tr>
<td>FMPR-2002</td>
<td>Technical Webinar Motor Protection</td>
</tr>
</tbody>
</table>

timeline note 1:
Registration Deadline 8 weeks prior to workshop
course notices sent out 7 weeks prior to workshop
Virtual Class 1 6 weeks prior to workshop
complete: e-learning 2 week prior to workshop
Virtual Class 2 1 week prior to workshop
Workshop week zero
Virtual Class 3 2 weeks after workshop

note 1: timeline is generic may vary dependent on scheduling logistics

Virtual Class 3
TRNG-MTR Essentials | Practical Workshop

**Prerequisites**

Students **MUST** complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

**Learning Objective**

On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate small scale substation solutions from where they can then hone their skills through further application.

In addition to the exercise each module comes with an assessment test and final exam on the last day.

**MONDAY**

**TUESDAY**

**WEDNESDAY**

This course is a free form style: after complying with the prerequisites and completing the course work students come to the workshop and complete 2-4 out of 6 relay modules, on the last day, the student need to use pickup one of the motor relay and configured to control and protect one GE 1 horsepower 3 phase motor.

### Motors

- 3SR-404 | 339
  Motor Protection
- SR-405 | SR469
  Motor Protection
- 3SR-403 | SR369
  Motor Protection
- UR-425 | M60
  Motor Protection
- 3SR-404 | 339
  Motor Protection
- MM-401 | MM series
  Motor Protection

### Integration

- **3 phase motor protection and control**

**Course Note**

Workshop activities are a mix of video based, written and instructor demonstrated, followed by student hands on activities.

Learning content is provided on a digital device.

* Students need to decide their workshop relay types when register this course.
| course code | TRNG-DSA - IEC61850 Advanced |

**who should attend**

Engineering Staff within electrical utility, industrials & system integrators who need to design protection and automation systems using GE products in 61850 configurations.

**learning outcome**

Build a knowledge and understanding of the product hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

**prerequisites**

IEC 61850 essential training or equivalent working experience.

**workshop hardware needs**

All equipment is provided as part of the workshop.

**what’s covered**

- SV, GOOSE, MMS Messages
- SCL, CID, ICD, IID Configuration
- Cross Platform Interoperability
- PRP
- Breaker Failure Transfer Trip
- Main Tie Main Bus Transfer Scheme
- Fast Load Shedding

**learning contact hours**

- Virtual class 1: 1 hour (intro session)
- E-learn: 10 hours
- Virtual class 2: 2 hours
- Workshop: 40 hours
- Testing: 2 hours
- Virtual class 3: 2 hours
- **Total**: 57 hours

E-Learning hours depends on the selection of the videos, it maybe longer or shorter than 10 hours.

**timeline**

- Registration Deadline: 8 weeks prior to workshop
- Course notices sent out: 7 weeks prior to workshop
- Virtual class 1 completion: 2 weeks prior to workshop
- Virtual Class 2: 1 week prior to workshop
- Workshop: week zero
- Virtual Class 3: 2 weeks after workshop

*note 1: timeline is generic may vary dependent on scheduling logistics*
**Prerequisites**

Students **MUST** complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

**Learning Objective**

On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate small scale substation solutions from where they can then hone their skills through further application.

In addition to the exercise each module comes with an assessment test and final exam on the last day.

---

**MONDAY**

Networking, Protocols, standards, 61850 fundamentals

Gateway, Relay, Merging unit configuration

**TUESDAY**

MMS, GOOSE, SV, SCL, ICD, CID Configuration

Digital Substation Simulation

**WEDNESDAY**

PRP Simulation

Breaker Failure Transfer Trip Simulation

**THURSDAY**

Main Tie Main Bus Transfer Scheme

Main Tie Main Bus Transfer Scheme Simulation

**FRIDAY**

Fast Load Shedding

Fast Load Shedding Simulation

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**Course Note**

Workshop activities are a mix of video based, written and instructor demonstrated, followed by student hands on activities.

Learning content is provided on a digital device.

* Students need to decide their workshop relay types when register this course.
## Protection & Control

**course code |** TRNG-URPL - UR Platform

### who should attend
Technician and electrician within electrical utility, industrials & system integrators who need to learn the UR hardware, software interface, the setting files download & upload, how to retrieve the events and waveform records, the basic protection elements.

### learning outcome
Build a knowledge and understanding of the UR hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

### prerequisites
- Fundamentals of Modern Protective Relaying is highly recommended
- No E-learnings are required for this course.

### workshop hardware needs
All equipment is provided as part of the workshop.

### what’s covered
- Hardware & Software
- Actual Values & Settings
- I/O Configuration
- Protection & Control
- FlexLogic
- IEC61850 or specific UR application

### learning contact hours
- 32 hours over 4 days

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## COURSE CONTENT & TIMING

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<th>WEDNESDAY</th>
<th>THURSDAY</th>
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</thead>
<tbody>
<tr>
<td>UR Hardware Overview and Exercises</td>
<td>Protections and Exercises</td>
<td>FlexLogic and Exercises</td>
<td>IEC 61850 Overview UR application</td>
</tr>
<tr>
<td>EnerVista Software and Exercises</td>
<td>Control and Exercises</td>
<td>Breaker Simulator Exercise and AR test</td>
<td>IEC 61850 Exercises ANSI Device Test</td>
</tr>
</tbody>
</table>
**Protection & Control**

**Course Delivery Offerings | Classical**

### Course Code: TRNG-8SPL - 8 Series Platform

#### Who Should Attend

Technician and electrician within electrical utility, industrials & system integrators who need to learn the 8 Series hardware, software interface, the setting files download & upload, how to retrieve the events and waveform records, the basic protection elements.

#### Learning Outcome

Build a knowledge and understanding of the 8 Series hardware, software and configuration and its application within the smart grid. Application Labs will give the students an opportunity to apply their knowledge.

#### Prerequisites

- Fundamentals of Modern Protective Relaying is highly recommended
- No E-learnings are required for this course.

#### Workshop Hardware Needs

All equipment is provided as part of the workshop.

#### What’s Covered

- Hardware & Software
- Actual Values & Settings
- I/O Configuration
- Protection & Control
- FlexLogic
- IEC61850 or 8 Series Application

#### Learning Contact Hours

- 32 hours over 4 days

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**Course Content & Timing**

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<thead>
<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
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</thead>
<tbody>
<tr>
<td>8 Series Hardware Overview and Exercises</td>
<td>Protections and Exercises</td>
<td>FlexLogic and Exercises</td>
<td>IEC 61850 Overview</td>
</tr>
<tr>
<td>EnerVista Software and Exercises</td>
<td>Control and Exercises</td>
<td>Breaker Simulator Exercise and AR test</td>
<td>IEC 61850 Exercises</td>
</tr>
</tbody>
</table>
Protection & Control

Course Delivery Offerings | Classical

course code | TRNG-FMPR - Fundamentals of Modern Protective Relaying

who should attend
Managers, Consultants, Engineers and System Integrators responsible for power delivery in either utility or industrial sectors.

learning outcome
Students acquire basic knowledge on the fundamentals of today’s technology in various applications. The objective is to ensure that Students have the basic knowledge to make future GE courses attendance effective.

prerequisites
Basic electrical knowledge, there are no GE course prerequisites.

workshop hardware needs
None

what’s covered
- Power System Overview
- Generator Protection
- Transmission Line Protection
- Busbar Protection
- Distribution Protection
- Transformer Protection
- Motor Protection

learning contact hours
- 32 hours over 4 days

COURSE CONTENT & TIMING

MONDAY
- Power Systems Overview
- Power System Protection

TUESDAY
- Generator Protection
- Busbar Protection

WEDNESDAY
- Transformer Protection
- Transmission Line Protection

THURSDAY
- Feeder Protection
- Motor Protection
Protection & Automation

who should attend
Managers, Consultants, Engineers and System Integrators responsible for power delivery in either utility or industrial sectors.

learning outcome
Students acquire basic knowledge on the fundamentals of today’s technology in various applications. The objective is to ensure that Students have the basic knowledge to make future GE courses attendance effective.

prerequisites
Basic electrical knowledge, there are no GE course prerequisites.

workshop hardware needs
None

what’s covered
• Network Protocols
• SV Messages
• GOOSE Messages
• MMS Messages
• SCL, CID, ICD, IID Configuration
• Applications

learning contact hours
• 40 hours over 5 days

COURSE CONTENT & TIMING

MONDAY
Network Protocols
Gateway Configuration

TUESDAY
SV Messages
Merging Units Configuration

WEDNESDAY
GOOSE Message
Protection Relay Configuration

THURSDAY
MMS Messages
Relay to Gateway Configuration

FRIDAY
Applications
Digital Substation Simulation

Course Delivery Offerings | Classical
**Course Delivery Offerings | Classical Automation**

**course code | TRNG-D20 - D20 Fundamentals**

**Prerequisites**
No pre-requisites for this course. Course is conducted between 8:30 to 3:30 unless agreed otherwise by instructor and students. Students are expected to complete all lab work to receive certificates.

**Learning Objective**
On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate D20MX with DNP to a DNP master station. Students will gain knowledge of DNP message and DNP message analysis.

**Legend**
- practical exercise
- classroom taught

**Course Note**
D20 elements of course uses DNP Protocol serial connection to devices so protocol messages can easily be seen and allow student to fault find and quickly assimilate the information easily in a classroom environment within the time constraint. Students are then able to apply this to Ethernet systems and other protocols and applications, using the relevant documentation.
**Prerequisites**

No pre-requisites for this course. Course is conducted between 8:30 to 3:30 unless agreed otherwise by instructor and students. Students are expected to complete all lab work to receive certificates.

### Learning Objective

On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate D25 with DNP to a DNP master station. Students will gain knowledge of DNP message and DNP message analysis.

### Course Delivery Offerings | Classical

<table>
<thead>
<tr>
<th>MONDAY</th>
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<th>WEDNESDAY</th>
<th>THURSDAY</th>
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</thead>
</table>
| **D25-101**  
D25 Hardware | **D25-401**  
D25 Firmware | **D25-404**  
DNP Overview | **D25-408**  
DNP DPA (Data processing configuration) setup | **D25-412**  
DNP Simulation 2 Master with 2 slaves |
| **D25-102**  
D25 Firmware | **D25-402**  
D25 Default Config | **D25-405**  
DNP DCA (Data collection application) setup | **D25-409**  
DNP DPA communication link setup | **D25-413**  
DNP Simulation same box setup |
| **D25-103**  
SGConfig Overview | **D25-403**  
D25 Plant I/O configuration | **D25-406**  
DNP DCA configuration | **D25-410**  
DNP Simulation 1 master with 1 slave | **D25-414**  
DNP message analyzer |
| **D25-104**  
SGConfig D25 Default Configuration | **D25-404**  
D25 IO and Wesmaint configuration | **D25-407**  
DNP DCA communication link setup | **D25-411**  
DNP Simulation 1 master with 2 slaves | **D25-415**  
Summary and closeout |

### Course Note

D25 elements of course uses DNP Protocol serial connection to devices so protocol messages can easily been seen and allow student to fault find and quickly assimilate the information easily in a classroom environment within the time constraint. Students are then able to apply this to Ethernet systems and other protocols and applications, using the relevant documentation.
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