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IEEE Std 1159
Chapter 7
Application Techniques

April 23, 2008

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Application Techniques

- Chapter Layout
  - Introduction
  - Monitoring Location
  - Equipment Connection
  - Measurement Thresholds
  - Installation Timeframe

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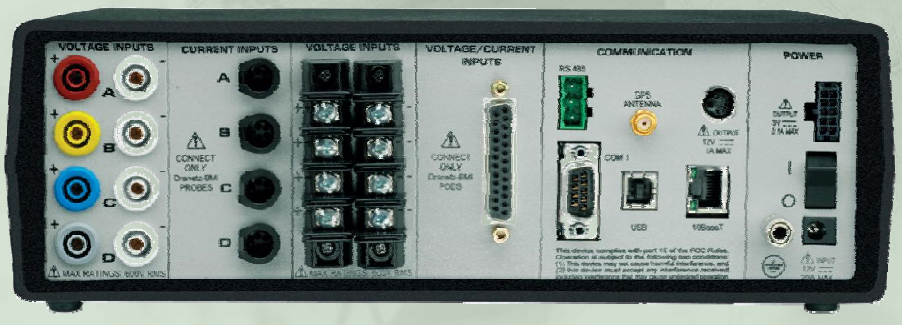
Why do we need this Standard?



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Why do we need this Standard?

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Why do we need this Standard?

- Connections are often 480 V
  - High Voltage?
- Mis-connection could lead to
  - Failed equipment
  - Work shut-down
  - Just plain bad day…

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Introduction

- Purpose of Clause 7
  - To provide some techniques for installation and use of power quality monitoring equipment
- General Safety Requirements
  - Recognition that meters are often installed on live electrical systems
  - Emphasis to follow published safety standards

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Monitoring Location

- Objective of the Investigation
  - The investigation may center on a specific component; the entire facility or a region
  - The investigation may involve power conditioning equipment
  - The investigation may surround end-use equipment or electrical distribution components

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Monitoring Location

- Location
  - The monitoring location is somewhat dictated by the type of problem being investigated:

If the problem resembles:	***Monitoring location is recommended to be:***
Specific piece of equipment exhibits power quality related problems	At the equipment connection to the facility electrical system (i.e. circuit breaker)
All equipment connected to a branch of the distribution system within a facility exhibits power quality related problems	At the branch connection to the facility electrical system (i.e. motor control center)
Entire facility exhibits power quality related problems	Secondary of the transformer serving the facility (note: may need monitoring on primary of same transformer by electric service provider)

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Monitoring Location

- Facility Power Quality Survey
  - Evaluation of the mechanical soundness of the electrical connections is important, but often neglected
  - The type of connection varies by the level of voltage of the system
  - Most monitoring equipment is able to direct-connect up to 600 Volts

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Equipment Connection

- Power Measurement
  - The polarity of the equipment connections is often critical to properly evaluate power factor and power

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Equipment Connection

- Single Phase Loads
  - Most straightforward approach
  - Follow equipment guidelines for proper setup and connection
- Three Phase Loads
  - Wye connection is similar to single phase connection (uses neutral)
  - Delta connection is often mis-connected for monitoring purposes

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Equipment Connection

- Connection Leads
  - Assume loose electrical connections
  - Be aware of the distance the connection leads run and equipment near that run
  - Evaluate sense leads physical support and strain relief after installation
  - Alligator clips – likely not able to provide proper strain relief

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Equipment Connection

- Current Monitoring
  - Multiple conductor measurements
  - Proper sizing of current transformers for measurements
  - Evaluation of proper current transformer for type of event to be captured (high frequency ability of the current transformer)

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Monitoring Thresholds

- There is ALWAYS something happening on the power system that the monitor can capture
- Thresholds determine the amount of data that the monitoring equipment saves
- It is important to note that just because the monitor did not record an event, that might just mean the monitor was not triggered

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Monitoring Thresholds

- Set-up Procedure
  - Determine the monitoring objectives
    - Determine the susceptibility of equipment under investigation (IEC and IEEE Standards)
  - Establish monitoring thresholds in accordance with equipment susceptibility
  - Allow monitor to operate for a short period of time
  - Adjust threshold settings based upon observations

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Installation Timeframe

- Duration of the monitoring depends upon the information needed
  - Typically, it is desirable to monitor for one complete cycle of business for the equipment under study
  - Often one or two weeks will fit this criteria

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Summary

- IEEE Standard 1159, Clause 7 provides the basic guidance to help you understand how to apply a monitoring device to evaluate power quality

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