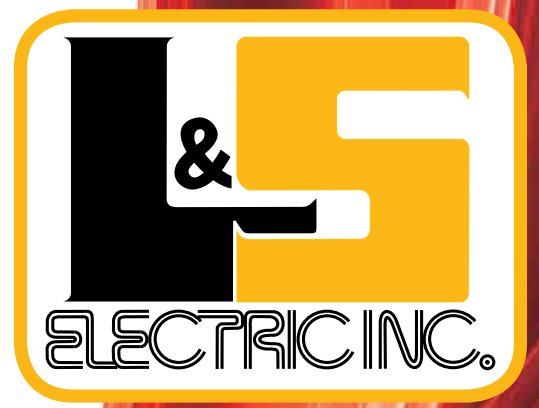


Commissioning Services



Dedicated People, Quality
Products, and above all, Service

L&S Electric Commissioning Services

L&S Electric offers a comprehensive line of electrical commissioning services to meet your needs, regardless of voltage.

Our team of qualified field services engineers are knowledgeable about all types of power systems and their components.

Our Power Service Specialists are available 24 hours a day, seven days a week.

Substation Commissioning

Apparatus testing

- Breakers
 - SF6
 - Vacuum
 - OCB
 - Air breakers
- Transformers
 - GSU
 - Large power
 - Station Service
- Relays
 - Microprocessor
 - Solid state
 - EM
 - Manually and electrically operated switches
- Cables
 - CT's, PT's, CVT's, CCVT's, and SA's
- All apparatus tested
- Thermography, ultrasound, and radio interference
- Controls
- Functional testing
- Communication testing

Breaker Commissioning

Electrical testing, troubleshooting, and commissioning of electric power systems is essential to the safe start up of any electrical system for the first time, regardless of size or industry. Our experienced Power Service team provides expertise that will avoid prolonged delays in the start up which can lead to costly productivity losses.

Our technicians perform a variety of other maintenance services that include insulation and contact resistance, timing, dielectric withstand tests, and more.

- Insulation resistance
- Contact resistance
- Timing
- Dielectric withstand tests
- Power factor
- Minimum pick up tests for coils
- SF6 gas work
- Proper operation of auxiliary devices
- Comprehensive battery of electrical tests performed on-site

Transformer Commissioning

Transformer maintenance and proper installation of power transformers is critical for extending the life of your transformer. Our skilled, experienced technicians install, assemble, and vacuum-fill new and rebuilt transformers.

Our technicians perform a variety of other maintenance services that include oil sampling and testing, oil retrofilling, regasketing, bushing replacement, radiator replacement, welding repairs, load tap changers, and transformer painting.

- Complete dress out
- Turns ratio
- Insulation resistance
- Winding resistance
- Excitation
- Power factor
- SFRA
- Tap changer controls and set-up
- All gauges and peripheral devices tested
- Oil analysis
- Comprehensive battery of electrical tests performed on-site

Relay Commissioning

- Setting installation
- Fault interpretation
- Protective element calibration
- Automated test plan set up
- Logic strings tested
- Input / Output operation
- Satellite relay testing on multiple lines
- Primary injection for bus differential
- All protection schemes: differential, breaker failure, POTT, block fast trip, etc.

Switch Commissioning

- MOD's
- EOD's
- Insulation resistance
- Contact resistance
- Power factor
- Dielectric withstand
- Alignment
- Cam adjustment
- Timing
- Comprehensive battery of electrical tests performed on-site

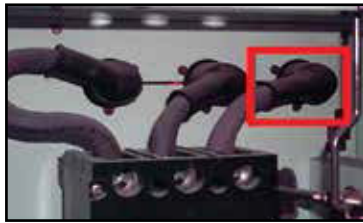
Thermographic Surveys

Sophisticated Equipment

- Long wave system, which is less susceptible to reflections, allows accurate temperature measurement in adverse environments
- Measurements from 14 °F to 2732 °F [-10 °C to +1500 °C] with ±0.1 °C accuracy
- Scanning distances up to 60 feet

On-Site Report

- Immediate preliminary analysis
- Details potentially hazardous problems



Formal Thermographic Report

- Indicates each piece of equipment that has been scanned
- Summarizes all problems found and recommends solutions
- Identifies each problem by equipment name and location, provides a detailed description, and states a recommended action for repair

CT'S, PT'S, CVT'S, CCVT'S

- Insulation resistance
- Ratio
- Polarity
- Saturation
- Burden
- Power factor
- Dielectric withstand
- Excitation
- Single point ground

Controls and Functional Tests

- Injection of AC circuits
- Verification/operation of DC circuits
- Testing/operation of all protection schemes
- End-to-end line relay testing via satellite
- Multiple terminal lines
- Verification/operation of control
- Verification of RTU, SCADA, and DCS points

VLF / Tan Delta

- Definitive baseline test to establish trend
- IEEE® 400.2 Standard
- Maximum voltage of 44k Vrms
- True sine wave low frequency output
- Capable of testing 1 microfarad at .01 Hz and 60 kV peak
- Recognized power generation market leader

Partial Discharge Testing

- IEEE® 400.3 Standard
- Industry standard for validating new installations
 - Workmanship defects
- Signal attenuation is the limitation for all PD Testing. Attenuation occurs >5k feet, splices, joints, etc. increase attenuation
 - Millivolt signal
 - No power limitation
- 0 PD is the limit
 - 6pC or 6000 the test specimen fails
 - Test technician needs to differentiate between noise and signal

Cable Commissioning

- Insulation resistance
- Shield continuity
- DC hipot
- AC hipot
- Tan-Delta
- VLF
- Partial discharge

OUR LOCATIONS



Wausau - North/Corporate

5101 Mesker Street • Schofield, WI 54476
715-359-3155 • t/f: 800-283-8332 • fx: 715-355-5931



Wausau - South

1730 County Road XX • Rothschild, WI 54474
715-359-4860 • t/f: 888-246-1249 • fx: 715-359-9450



Sturtevant

10200 Durand Ave • Sturtevant, WI 53177
262-886-1875 • t/f: 800-367-7676 • fx: 262-886-9202



Appleton

2820 N Roemer Rd • Appleton, WI 54911
920-730-0203 • t/f: 800-283-5564 • fx: 920-730-0937



Minneapolis

9300 Evergreen Blvd NW • Minneapolis, MN 55433
763-780-3234 • t/f: 800-290-9320 • fx: 763-780-3957



Duluth

4413 Venture Ave • Duluth, MN 55811
218-729-3375 • t/f: 800-943-9549 • fx: 218-729-3382



Menominee

1100 56th Ave • Menominee, MI 49858
906-864-2500 • t/f: 800-864-2507 • fx: 906-864-3672



Hydro Solutions

1810 County Road XX • Rothschild, WI 54474
715-359-0551 • t/f: 877-258-5128 • fx: 715-355-5948

Visit our website



www.lselectric.com