

The past



The future

## Siemens Sm@rtGear™ Low Voltage Switchgear

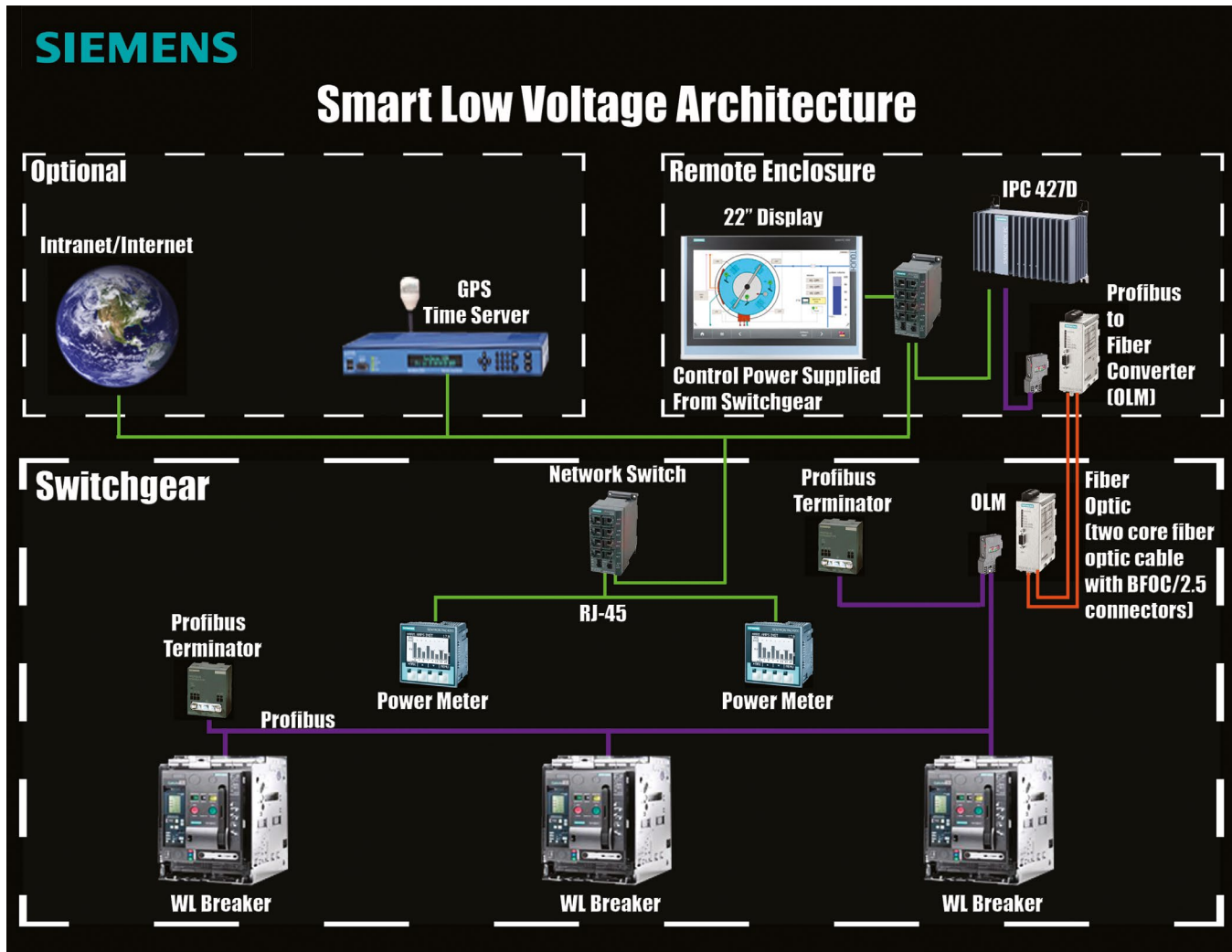
[usa.siemens.com/switchgear](http://usa.siemens.com/switchgear)

Why settle for partial control when you can have total control and pay less? Traditional hard wired remote control panels provide additional safety for your personnel but Siemens Sm@rtGear™ LVS can provide the same breaker remote control plus remote monitoring and configuration of all embedded intelligent devices.

Siemens Sm@rtGear™ LVS is pre-configured and pre-programmed low voltage metal-enclosed switchgear that provides out-of-the-box remote monitoring, configuration and control of embedded intelligent devices.

All of the Sm@rtGear™ LVS communication backbone is installed and tested at the Siemens factory and the user only has to physically connect the three communication cables that connect the low voltage switchgear to the remotely mounted touch screen interface panel (HMI).

The remote HMI allows the user to access the intelligent devices embedded in the low voltage switchgear. Using the HMI, the user can monitor, configure and control the intelligent devices. The Sm@rtGear™ LVS CPU acts as the local master and can also be a remote slave tied into an upstream supervisory system.



Sm@rtGear™ LVS standard features

- PC with pre-programmed software to remotely monitor, configure and control embedded intelligent devices and structural monitoring devices.
- 22" touch screen HMI pre-configured and programmed with application specific graphical user interface (application specific elevation and one-line drawings) that act as user home page.
- Communication backbone linking embedded intelligent devices, CPU and HMI.
- ETU776 trip units in all breakers with Dynamic Arc Flash Sentry (DAS) that supports arc flash incident energy reduction.
- Electrically operated breakers with spring charge motor, shunt trip and remote closing coil.
- Metering and protective relaying functionality in all breakers.

Sm@rtGear™ LVS standard functionality includes:

**LVS one-line view**

- Breaker status – open/closed/tripped
- Breaker position – connect/test/disconnect
- Dynamic Arc Flash Sentry (DAS) status – activated/deactivated
- Bus status – dead/healthy/unhealthy
- System alarm warning (when applicable)

**LVS elevation view**

- Breaker status – open/closed
- Breaker position – connect/test/disconnect
- Dynamic Arc Flash Sentry (DAS) status – activated/deactivated
- Bus status – dead/healthy/unhealthy
- System alarm warning (when applicable)

## User Administrator

- Add or delete users
- Assign user access rights
- Ping the IP addresses on the network
- Edit Nameplates
- View PC Web Server
- Set Breaker Restriction
- Edit Users

## Cell Blocking

- Add or remove breakers from the system screens (one-line and elevation). As an example, if a breaker needs to be removed from its cell for an extended period of time, that cell can be blocked so that associated alarms aren't displayed and the system isn't slowed down by the CPU constantly looking for a breaker that has been removed. Breaker provision cells (cradle only – no breaker) can be blocked and when a breaker is installed, the cell blocking can be removed so that the system displays the new breaker.

## WL breaker control (Password or hardware enabled/disabled)

- Open selected breaker
- Close selected breaker
- Activate DAS (arc flash maintenance mode)
- De-activate DAS (arc flash maintenance mode)

## WL breaker monitoring

- Breaker ID
- Trip Unit ID
- Breaker time clock - includes time of day, day, month and year
- Breaker status – open/closed
- Breaker ready to close indication – OK/No
- Spring charge status – charged/discharged
- Breaker temperature (current temperature, time stamped minimum temperature and time stamped maximum temperature)
- Cradle temperature (current temperature, time stamped minimum temperature and time stamped maximum temperature)
- Number of switching operations under load
- Number of switching operations caused by trips
- Number of short circuit trips
- Number of overload trips
- Number of ground fault trips
- Time until presumed overload trip
- Runtime meter
- Contact wear status
- Operation counter reading
- Rating plug (amperage)
- Voltage
  - L-N A phase
  - L-N B phase
  - L-N C phase
  - L-N Average
  - L-L A-B phases
  - L-L B-C phases
  - L-L C-A phases
  - L-L Average
  - Phase unbalance

- Form factor
- Peak factor
- THD
- Minimum Volts A-B with Time Stamp
- Minimum Volts B-C with Time Stamp
- Minimum Volts C-A with Time Stamp
- Minimum Volts A-N with Time Stamp
- Minimum Volts B-N with Time Stamp
- Minimum Volts C-N with Time Stamp
- Minimum THD Voltage with Time Stamp
- Maximum Volts A-B with Time Stamp
- Maximum Volts B-C with Time Stamp
- Maximum Volts C-A with Time Stamp
- Maximum Volts A-N with Time Stamp
- Maximum Volts B-N with Time Stamp
- Maximum Volts C-N with Time Stamp
- Maximum THD Voltage with Time Stamp
- Amperage
  - A phase
  - B phase
  - C phase
  - Average
  - Neutral (if applicable)
  - Ground
  - Phase unbalance
  - THD
  - Minimum Current A Phase with Time Stamp
  - Minimum Current B Phase with Time Stamp
  - Minimum Current C Phase with Time Stamp
  - Minimum Current Neutral with Time Stamp
  - Minimum Current Ground with Time Stamp
  - Minimum Current Mean with Time Stamp
  - Minimum Current Long Mean with Time Stamp
  - Minimum Peak Factor with Time Stamp
  - Minimum Form Factor with Time Stamp
  - Minimum THD Current with Time Stamp
  - Maximum Current A Phase with Time Stamp
  - Maximum Current B Phase with Time Stamp
  - Maximum Current C Phase with Time Stamp
  - Maximum Current Neutral with Time Stamp
  - Maximum Current Ground with Time Stamp
  - Maximum Current Mean with Time Stamp
  - Maximum Current Long Mean with Time Stamp
  - Maximum Peak Factor with Time Stamp
  - Maximum Form Factor with Time Stamp
  - Maximum THD Current with Time Stamp
- Power
  - KW A
  - KVAR A
  - KVA A
  - KW B
  - KVAR B
  - KVA B
  - KW C
  - KVAR C
  - KVA C
  - KW total
  - KVAR total
  - KVA total
  - PF A phase
  - PF B phase

- PF C phase
- PF total
- Frequency
- Minimum Mean Power Factor with Time Stamp
- Minimum Mean kVA with Time Stamp
- Minimum Mean kW with Time Stamp
- Minimum Mean kVAR with Time Stamp
- Minimum Frequency with Time Stamp
- Maximum Mean Power Factor with Time Stamp
- Maximum Mean kVA with Time Stamp
- Maximum Mean kW with Time Stamp
- Maximum Mean kVAR with Time Stamp
- Maximum Frequency with Time Stamp
- Energy
  - Active normal KWH
  - Active reverse KWH
  - Reactive normal KWH
  - Reactive reverse KWH
- Harmonic analysis (bar graph)
  - Voltage (1st – 29th harmonic)
  - Current (1st – 29th harmonic)
- Logs
  - Event logs (1st – 10th events)
    - Event time
    - Event source
    - Event reason
  - Trip logs (1st – 5th events)
    - Event time
    - Event source
    - Event reason
- Diagnostics
  - Diagnostic Message
  - Current at Shutdown
  - Most Loaded Phase at Shutdown
  - Modules on the Cubical Bus
  - Active Extended Protective Functions
  - Active Threshold Alarms
  - Active Trip Unit Alarms

#### WL breaker configuration

(Password and/or hardware enabled/disabled)

- Trip unit active parameter set – A (normal mode) / B (maintenance mode)
- Long-time pickup
- Long-time delay
- I4T Curve for LT
- Phase loss sensitivity
- Thermal memory
- Short-time pickup
- Short-time delay
- Short-time – Off/Trip
- I2T curve for ST
- Instantaneous pickup
- Instantaneous – Off/Trip
- Ground fault pickup
- Ground fault delay
- Grand fault alarm pickup
- Grand fault alarm delay
- Ground fault alarm – Off/Trip
- I2T curve for GF
- Neutral protection (amperage)

- Neutral protection – Off/Trip
- Arc flash hazard calculation
  - 3 phase bolted fault current (user input)
    - System voltage (user input)
  - System grounding – Grounded System/Ungrounded System/High Resistance (user input)
  - Arc flash arcing current (displays calculated value)
  - Arc flash incident energy (displays calculated value)
  - Arc flash hazard category (displays calculated value)
  - Arc flash hazard boundary (displays calculated value)
  - Box configuration value (displays default/assumed value)
  - Conductor gap (displays default/assumed value)
  - Working distance (displays default/assumed value)
  - Distance x factor (displays default/assumed value)

#### Documentation

- LVS as-built lineup drawings
  - Bill of material
  - General arrangement
  - General information
  - One-line
  - Physical arrangement
  - Schematics
- LVS installation manual
- Breaker operator manual
- Spare parts list

Sm@rtGear™ LVS optional functionality includes:

#### WL breaker monitoring

- Breaker door position – open/closed
- Trip & close coil monitoring

#### Digital meter monitoring (provided at no additional cost if digital meter is supplied)

- Voltage Va-n
- Voltage Vb-n
- Voltage Vc-n
- Voltage Va-b
- Voltage Vb-c
- Voltage Vc-a
- Current a phase
- Current b phase
- Current c phase
- Apparent Power a phase (KVA)
- Apparent Power b phase (KVA)
- Apparent Power c phase (KVA)
- Active Power a phase (KW)
- Active Power b phase (KW)
- Active Power c phase (KW)
- Reactive Power a phase (KVAR)
- Reactive Power b phase (KVAR)
- Reactive Power c phase (KVAR)
- Power Factor a phase
- Power Factor b phase
- Power Factor c phase
- Frequency
- Average Voltage Vph-n
- Average Voltage Vph-ph
- Average Current
- Total Apparent Power (KVA)

- Total Active Power (KW)
- Total Reactive Power (KVAR)
- Total Power Factor
- Total Harmonic Distortion (THD) – Current a phase
- Total Harmonic Distortion (THD) – Current b phase
- Total Harmonic Distortion (THD) – Current c phase
- Total Harmonic Distortion (THD) – Voltage a phase
- Total Harmonic Distortion (THD) – Voltage b phase
- Total Harmonic Distortion (THD) – Voltage c phase
- Current Unbalance (%)
- Voltage Unbalance (%)
- Trending
  - Power Factor
  - kVA
  - kW
  - kVAr
  - Volts A-B
  - Volts B-C
  - Volts C-A
  - Amps A
  - Amps B
  - Amps C

#### **TPS 6 SPD monitoring**

**(provided at no additional cost if SPD is supplied)**

- Phase A status (OK/Event)
- Phase B status (OK/Event)
- Phase C status (OK/Event)
- Service (Not needed/Needed)

#### **High Resistance Grounding (HRG)**

**(provided at no additional cost if HRG is supplied)**

- System Status
  - Normal
  - Phase A Fault
  - Phase B Fault
  - Phase C Fault
  - NGR Failure
  - NGR Voltage Above Limit
  - NGR Voltage Below Limit
  - NGR Current Above Limit
  - NGR Current Below Limit
- System IG Current
- System Charging Current
- System Data
  - Sensing Resistor Voltage Alarm Level – Short Circuit
  - Sensing Resistor Voltage Alarm Level – Nominal
  - System Rated Voltage
  - System Rated Current
  - NGR Maximum Voltage

- NGR Minimum Voltage
- NGR Maximum Current
- NGR Minimum Current
- Loss of Voltage Monitoring (LVM) Mode
- System Timers
  - Ground Fault Time Delay
  - Pulse Rate
  - Alarm Resend Timer
- Alarm Log (Last 200 Alarms)
  - Alarm Type
  - Alarm Value
  - Alarm Date
  - Alarm Time
  - Alarm Acknowledge
- Event Log (Last 200 Events)
  - Event Type
  - Event Date
  - Event Time
  - Event Acknowledge
- Pulse Status (On/Off)
- Activate Pulse (On/Off)
- Customer Password

#### **LVS structural monitoring**

- Bus temperature
- Cable temperature
- Humidity
- Smoke
- Water (flooding)
- Control power availability

#### **Custom Maintenance Reports**

##### **Customer Responsibility:**

- Communication cable installation from switchgear to remote HMI panel
- Installation of HMI enclosure (wall mounted or freestanding)
- Ethernet connection, if available, and required to connect HMI to LAN
- Reliable 120VAC power supply for HMI panel
- Protective parameter settings of trip units based on short circuit, coordination and arc flash calculations
- Password /Security Level Settings

#### **YouTube Sm@rtGear™ LVS Quick Overview Video Link:**

<http://www.youtube.com/watch?v=gPbt-kq3G8o>

#### **YouTube Sm@rtGear™ LVS Detailed Overview Video Link:**

<http://www.youtube.com/watch?v=azznYLfBnPE>





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Order No.: LVFL-PAFUT-0318

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