Landis+Gyr
manage energy better

Landis+Gyr S650
Smart Grid Terminal

A smart grid innovation

Emerging challenges in the distribution system.

Utilities, both distribution network operators (DNOs) and distribution system operators (DSOs), are facing growing challenges due to quick changes happening to electrical distribution grids. The energy distribution system is moving from a simple top/down power flow topology to a complex, dispersed and more volatile distributed generation network.

A number of changes are occurring that affect current distribution grid structures:

- Massive renewables and microgeneration rollouts
- Fast closure of a significant number of nuclear power plants
- Increasing power quality problems
- Potential deployment of electrical vehicles

Such changes demand for a better understanding of electrical measurements (power flow, voltage, currents, harmonics, etc.) at medium voltage (MV) and low voltage (LV) nodes. The aging infrastructure isn't able to cope with this extraordinary network transformation without additional measures.

To keep the situation under control, protect investments and avoid costly damage to installed equipment requires new concept tools and solutions. Moreover, the quality and continuity of energy delivery must be kept on a healthy level, and the prevention of blackouts and equipment replacements has become a major requirement for utilities.

How to overcome these challenges?

One of today's most limiting factor in addressing such challenges is the lack of useful, available information about the lower level of the distribution system. An important step in finding a resolution to this challenge is to give visibility into the behavior of electrical parameters in the network.

Such visibility includes providing answers to the following questions:

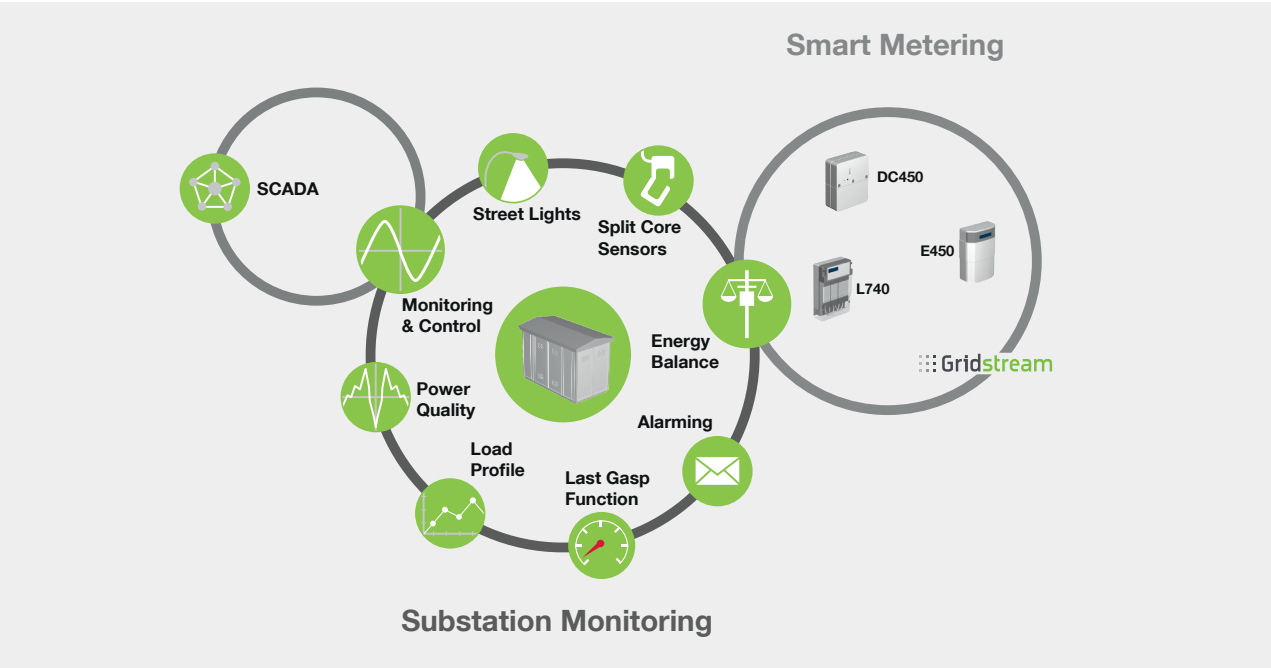
- What happens to a secondary transformer when a peak of photovoltaic generation exceeds the local consumption?
- How does the voltage react on intermittent power flow pattern?
- Is the LV network balanced enough to minimize losses?
- Are there non-technical losses/fraud?
- Is there something happening in the transformer station that requires a quick action?

To overcome an unsatisfactory situation with affordable efforts, it is necessary to invest in cost efficient equipment that provides the most relevant features.

Introducing the Landis+Gyr S650 Smart Grid Terminal

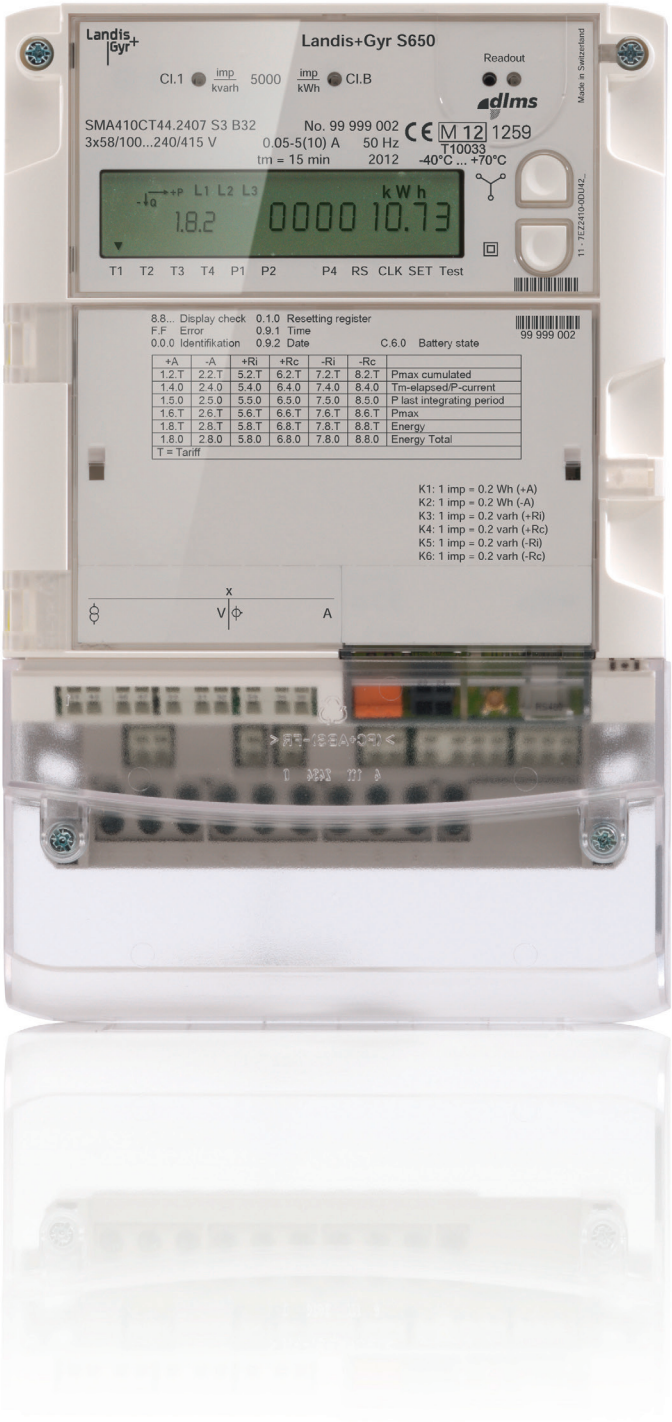
With the S650 Smart Grid Terminal, Landis+Gyr is contributing again to more comprehensive smart energy management. The S650 will become a crucial component for advanced LV distribution network infrastructures.

The S650 has a familiar look and feel to the current Landis+Gyr E650 industrial meter series, since the design was inspired by this proven and successful Landis+Gyr product. Enhanced hardware and extended firmware features, as well as the same MAP tools used by the E650 family, guarantee ease of use and installation.



Typical application areas

- Energy balancing
- Transformer monitoring
- Street light monitoring and control
- Renewable and microgeneration integration



Main benefits

- Easy to install entry-level smart grid product
- All in one product concept allows for ease of use
- Includes phase shift correction for split core current transformer
- Based on the proven E650 (ZMD) robust platform
- Utilizes a MID certified industrial function set
- Simple to combine with a data concentrator in an AMI installation or provide data to a SCADA system

Main features

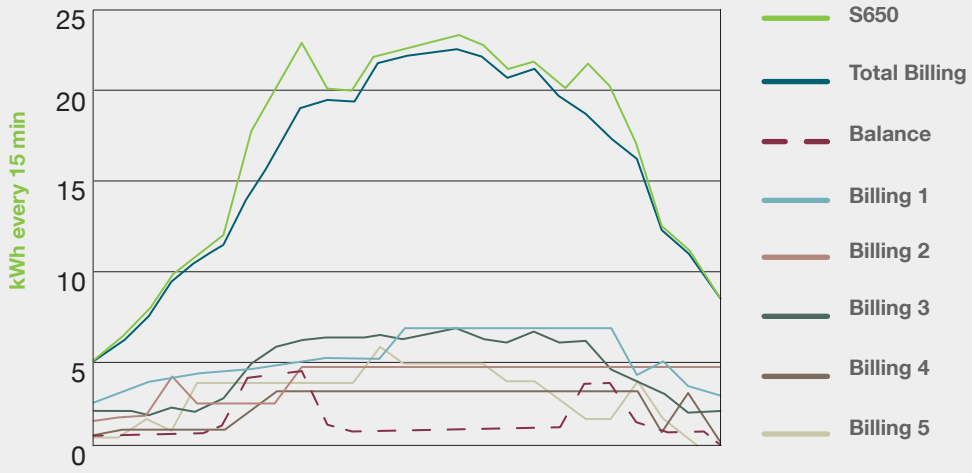
- Network and transformer monitoring
- Last gasp function
- Technical and non-technical loss tracking (energy balancing)
- Voltage and power flow control
- Basic power quality data monitoring
- Advanced alarming
- Decentralized street light control

Energy balancing

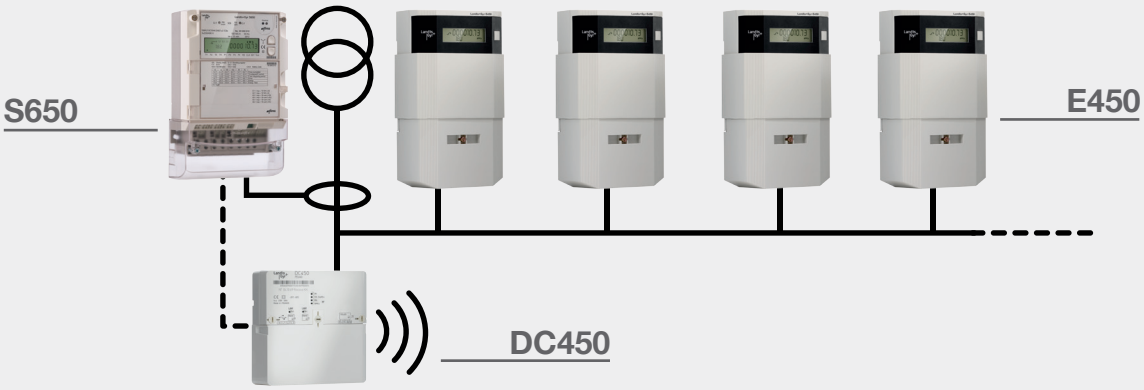
The S650 provides an accurate comparison between the energy delivered (measured at the transformer) and the energy consumed (measured with meters at all the LV network consumption points) in order to detect any kind of losses.

- Revenue and network optimization
- Optimized communication infrastructure
- Real loss calculations on low voltage

Energy balance between meters and the S650



The S650 is connected to the data concentrator DC450 through the RS485. It can use the same communication channel as a smart meter.



Transformer monitoring

With a complete measuring package, the Landis+Gyr S650 Smart Grid Terminal solution makes visible what really occurs on an LV distribution network and includes all the power quality metrics needed to control the environment of microgeneration.

- Increase LV visibility
- Basic power quality
- Easy to install
- Asset protection and management
- Network optimization
- Abnormal events alerts

Unbalance measurement features (current and voltage) can be used to detect and record unbalance network conditions in order to optimize load distribution and cut network losses (neutral current reduction). This feature provides information for optimal asset and operation planning – such as with network reconfiguration, deferments or avoidance of new investments. Moreover, Total Harmonics Distortion (THD) measurement can provide information of an overloaded transformer due to harmonics.

Our transformer monitoring solution is easy to install using a split core transformer with the possibility to correct additional errors, such as phase shifts, for better accuracy. Its comprehensive and powerful load profile capabilities allows for the tracking of basic power quality parameters such as slow voltage variations, frequency, THD and voltage unbalances, and also provides data for the EN50160 report.

The S650 allows for the permanent monitoring of occurrences in the transformer station using digital inputs, grid events and internal device status events. About 40 different messages can be generated to provide information about the network or transformer environment.

It also provides detailed alarming information such as device identification, date, time, and alarm contents. These alarm events can be sent through a GSM cellular network to any phone number via SMS or via data concentrator to the smart meter head-end-system. Such information supports maintenance processes and can help dispatch service crews in an efficient and optimized way. Safety, maintenance and missing voltage information can then be prioritized according to its importance.

Metering metrics

SMA400	
Instantaneous values	
Voltage phase-neutral or phase-ground	V1, V2, V3
Voltage phase-phase	V12, V23, V31
Current	I1, I2, I3, IN
Frequency	■
Phase angles	■
Unbalance current/voltage	■
Active power (+/-)	P1, P2, P3, P-Total
Reactive power (+/-)	Q1, Q2, Q3, Q-Total
Power factor	PF1, 2, 3, PF-Total
Displacement power factor or cos φ	DPF1, 2, 3, DPF-Total
THD of phases current/voltage (absolute)	Phase 1, 2, 3
THD of phases current/voltage (percent)	Sum
THD of active energy (import/export)	Sum

Street light monitoring and control

The S650 Smart Grid Terminal can cover street light billing applications (MID approved) and address various street light scenarios with ease and flexibility due to its added benefits.

- Combined billing and street light control
- On-board astronomical clock
- Broken lamp detection and relay monitoring

The S650 direct connected type is appropriately fit to monitor and control street lights and doesn't require additional sensors (120A). It can be simply installed on a wall.

With the integrated astronomical clock with geographical position settings (latitude and longitude), it is possible to have accurate sunset and sunrise trigger signals. With additional offsets, the switching point can be customized to local specific geographic requirements such as lakes, mountains and valleys.

Combined with powerful control table functionalities that account for different signals (i.e., light sensors, astronomical triggers, time-of-use and remote control and remote control) it is possible to build any light scenarios with this decentralized solution.

With the S650, it is possible to differentiate industrial from residential areas according to specific needs thereby optimizing street light energy consumption. Additionally, maintenance features helps users with lamp changes, remote failure detection and simple overriding programs.

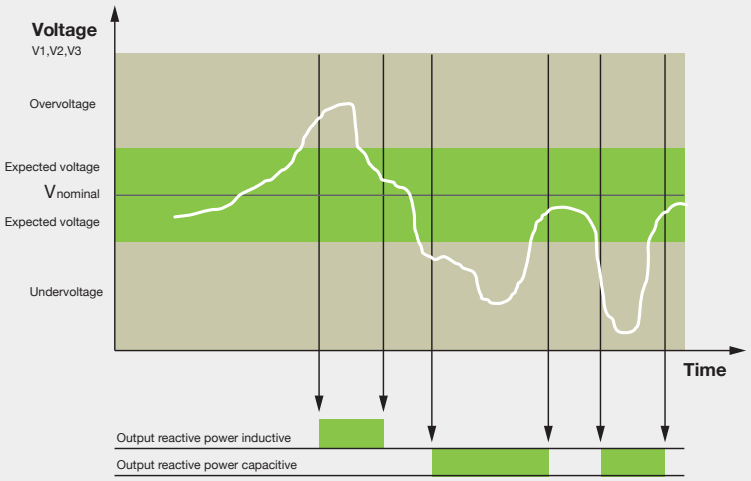
Renewable and microgeneration integration

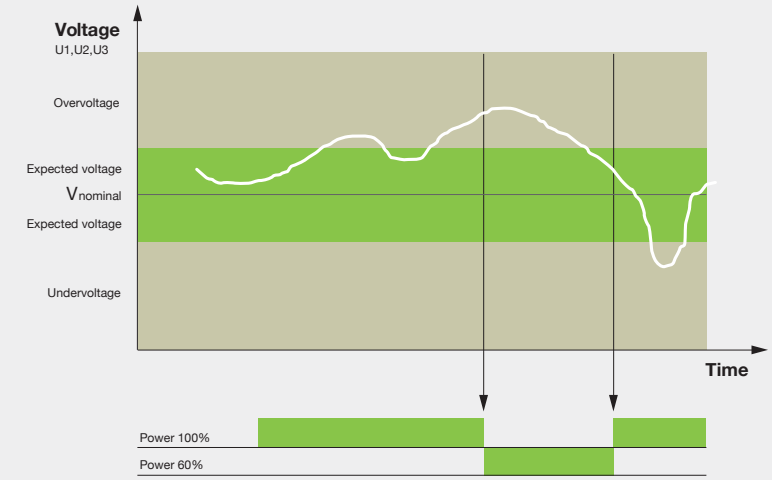
The deployment of renewables involves the potential for disturbances such as over voltages, fast power changes, harmonics, and unbalance over the distribution system depending on production conditions or balancing between microgeneration and consumption.

The S650 Smart Grid Terminal covers all billing industrial applications (MID approved) while addressing important network operating use cases. The S650 provides all the power quality metrics needed to control the environment of microgeneration. It also provides advanced alarming in case of a violation of critical parameters (i.e., over-voltage, over-current and demand control) and a measurement package to track significant disturbances (i.e., voltages, current, harmonics, frequency and unbalance).

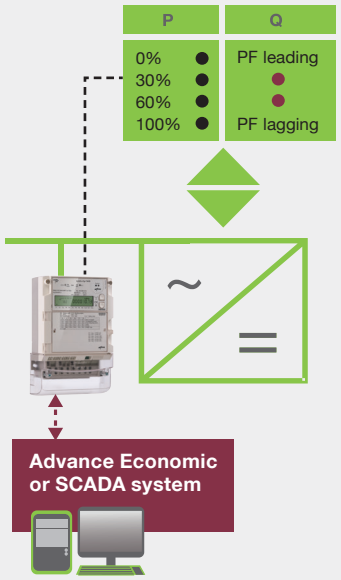
- Combined billing and operation control
- Power flow control
- Standardized interface inverter control
- Voltage control
- Abnormal event alerts
- Basic network power quality monitoring

Local voltage control (U-Q control / U-P control)





Remote power flow control according to German EEG law



The offer

The S650 is based on the successful E650 meter platform, which has been deployed in more than 70 countries with over 1.5 million units. It combines modern technology and robustness and is completed with features dedicated to cover MV/LV transformer monitoring and street light use cases.

The S650 has the same look, feel and operating principles as the E650 and comes with a software suite such as the Landis+Gyr MAP parameterization and service tools.

Quality and safety:

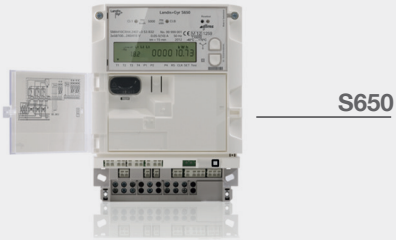
The S650 already meets all metering standards applicable to the respective requirements. Additionally, it already meets requirements with regards to the immunity of high frequency – from 9 to 150kHz – generated from or renewable inverters and EV charger equipment.

Basic configuration

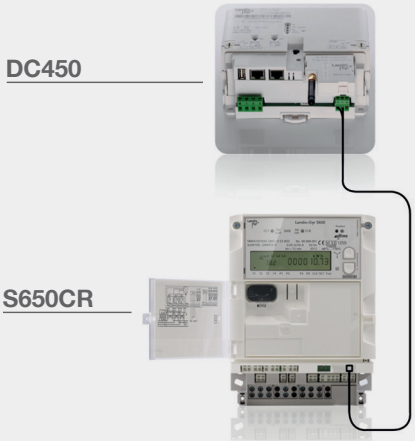
The Landis+Gyr S650 (SMA300/400 and SFA400) has a flexible architecture and is the answer to your specific needs for:

- MV/LV transformer and network monitoring
- Street light billing and switching applications
- Renewable, microgeneration billing, control and integration

The modular S650 can use the comprehensive CU offer portfolio from the successful E650.



The S650 can be easily connected with a DC450 data concentrator, thereby optimizing the communication investment.



		S650 (SMA402C)	S650 (SFA405C)	S650 (SMA410C)	S650 (SMA402C)	S650 (SMA405C)	S650 (SMA410C)	S650 (SMA310C)	S650 (SFA410A)	S650 (SMA410A)	S650 (SMA310A)
Application	High voltage	■	■	■	■	■	■	□	■	□	□
	Medium voltage	□	□	□	■	■	■	□	□	■	□
	Low voltage	□	□	□	□	■	■	■	■	■	■
Connection Type	Transformer conn.	■	■	■	■	■	■	□	■	■	□
	Direct connection	□	□	□	□	□	□	■	□	□	■
Metering accuracy	Class 0.2/0.5	■	□	□	■	□	□	□	□	□	□
(Active/Reactive Energy)	Class 0.5/1.0	□	■	□	□	■	□	□	□	□	□
	MID C										
	Class 1.0/1.0	□	□	■	□	□	■	■	■	■	■
	MID B										
		Combi								Active	
Energy Type	Active energy	■	■	■	■	■	■	■	■	■	■
	Reactive energy	■	■	■	■	■	■	■	□	□	□
	Apparent energy	■	■	■	■	■	■	■	□	□	□

Basic functionality

Electronics	Wide-voltage power supply
	Large LCD display
	Up and down buttons for the display
	Optical button for the display
	Utility sealed reset button
	Optical interface (IEC 62056)
	Optical test output
	Three control inputs
	Two output contacts
Recording	8 measurement channels with total register
	32 energy registers
	Stored values register
	9 operating time registers
	Event log
Functions	Installation support on display
	Set mode via buttons
	Realtime clock with power reserve
	Instantaneous values
	Voltage monitoring including unbalance and cos Φ
	Boolean I/O control functions
	Gregorian and Persian calendar
	Real time simple SMS alarm
	Remote control of output contacts
Housing	Glass fiber reinforced, antistatic
	Crystal clear, unbreakable windows
	Wiring diagram on faceplate
	Utility sealed battery box

Additional functionality

Measured values
- Instantaneous values for current, phase angle, frequency, power factor, cos, active and reactive powers, unbalance

Tariff functions
- Average demand
- Time-of-use (TOU) tables
- Programmable matrix-based mixed control

Astronomical clock
- 6 different signals (energy signals, local and remote overriding control possibilities)

Recording
- 24 demand registers
- 2 power factor register
- 2 independent load profiles (billing and power quality monitoring) with integration period from 1 to 60 minutes
- 26-channel profile memory

Extended alarms
- Detailed alarms capabilities with time stamping and alarm contents

Special functions
- Backlit and LED alert programmable display
- Extended CT/VT error correction
- THD measurements and calculation of losses (Transformer and Line)
- Detection of strong magnetic fields
- Opening detection of terminal cover

Extension boards (only one possible)
- 4 control inputs + 2 output contacts
- 2 control inputs + 4 output contacts
- 3 control inputs + 2 relay outputs + Additional power supply
- 6 output contacts
- Additional power supply + 4 output contacts

Software tools

MAP 120
- Parameterization

MAP 110
- Installation support
- Meter data readout
- Load profile analysis
- Security system visualization
- Communications settings

Key requirements for such systems include efficient monitoring, alarming and control. Equally as important is an easy installation and integration into the communication infrastructure.

Combined with a smart metering rollout, energy distributors can find additional benefits for smart grid deployments like protecting and optimizing revenues or addressing new needs such as street light monitoring and control.

These systems can provide network operators with essential information needed to understand power flows while optimizing network operations.

For inquiries about the S650 Smart Grid Terminal, contact us at info@landisgyr.com

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