Grid Solutions
a GE and Alstom joint venture

DIGITAL INSTRUMENT TRANSFORMERS PRODUCT SOLUTIONS

COSI

Compact Sensor Intelligence

Grid Solutions is ahead of the competition thanks to its innovative, patented optical instrument transformer technology.
It enables full IEC 61850 implementation and sets the benchmark in transmission network architectures for today's and tomorrow's electricity networks and Smart Grids.





Smart digital instrument transformers solutions for Smart Grids

Our comprehensive COSI range includes a full offer of optical instrument transformers for AC or DC applications:

- **COSI-CT** Optical current transformer (AC or DC)
- **COSI-MU** Merging unit
- **COSI-CM** Combined metering unit
- **COSI-CT F3** Flexible optical current transformer

Our technology is based on the effects of light influenced by current (Faraday effect) to measure current. Our technology is suitable for use in AC or DC transmission systems.

The transformer can also be used in high-current DC applications, such as large scale aluminium electrolysis companies.

COSI-CT can be applied in HVAC systems with a rated voltage of up to 1200 kV or HVDC systems with a rated voltage of up to 800 kV. The equipment takes precise measurements within a range between 1 A and 4800 A. The protective current is up to 216 kA (peak value) and the bandwidth is DC 20 kHz.

A WEALTH OF BENEFITS

Digital instrument transformers offer many benefits compared to conventional instrument transformers (oil, SF_6) including:

Wide dynamic range
1 A to 4800 A. One current transformer can cover a wide dynamic range via the same output. The protective current is up to 216 kA (peak value) and the bandwidth is DC to 20 kHz.

Smart Grid ready
COSI products deliver direct digital output according to IEC 61850-9.2 or 1 A for metering applications.

System cost savings
Drastic reduction of cabling and cubicle costs in substations compared to conventional systems.

Standard optical fibre
All signals are transmitted through a standard fibre optic cable (same cable as used in Telecoms). By using a globally-available fibre optic cable to connect all electronic equipment, we offer our customers substantial savings on global maintenance.

Lightweight
Typically, an optical sensor represents
only 10% of the weight of an oil-filled transformer. As transportation costs and ease of installation depend on the weight and volume, the benefits are immediately apparent. There is no need for special transportation to protect the equipment against vibrations. Moreover, the support structure also depends on weight and dimensions, so global installation costs are also reduced.



Installation flexibility
Bus mounting is possible, as well as horizontal mounting or assembly directly on the circuit breakers. All these configurations are possible with digital instrument transformers, but not with oil-filled equipment. The total substation footprint can be reduced by as much as 15 to 25%



Increased safety for people, substation equipment and the environment
The COSI range is explosion proof. No oil and no SF_6 mean no environmental costs on end-of-life disposal and no leakage problems. Moreover, horizontal transport and (long-term) storage is possible without risk and there are no ferro-resonance or dangerous open secondary concerns.

Near-zero maintenance
Time is money and the optical sensors dramatically reduce the number of outages for maintenance. No oil sampling or DGA are needed. Optical sensors offer remote monitoring for preventive maintenance without tripping.

A seismic solution
Digital instrument transformers offer retrofitting flexibility regardless of seismic withstand. Also, they are constructed with a composite line post insulator for maximum seismic endurance.

Secondary circuit saving and "forgiving secondaries"
In oil-filled and SF_6 technology, a magnetic current transformer requires two (or more) wires for each core. Losses in the secondary loop can either dramatically increase the core sizes or require greater wire selections. The wide dynamic range of sensors and the Ethernet connection limits the number of "secondaries" and makes most of the secondary wiring obsolete.

In oil-filled current transformers, eventual modifications are either very costly or impossible. Moreover, it is often impossible to add more secondaries or modify key characteristics once the production of a CT is in progress. With digital current transformers, additional secondaries or last-minutes changes in specifications can be handled by the electronics; the turns ratio is user-selectable on site.

Flexibility and inventory reductions
Ratio can be modified any time (via computer connection). This results in very short delivery times (from stock). Moreover, the CT ratio can be adapted according to CT location and there is a significant reduction in customer stocks as there are no specific CT needs for each ratio.

Software evolution
It is possible to update or enhance software throughout the life of the equipment.

Interchangeability
In the case of an (exceptional) failure in the electronics, all that is needed is a very simple box change. No recalibration is required.

Our technology, expertise and experience are our best assets. Grid Solutions' current transformer COSI-CT is a high-end solution. developed by former NxtPhase (now part of Grid Solutions), the USA's recognised pioneer in optical current transformers.

Our optical products are installed around the world in more than 300 substations in 19 countries.

COSI-CT has already been accredited by New York ISO, California ISO, Lapem Mexico, Measurement Canada and Gost in Russia

In March 2010, to meet the specific requirements of the Chinese Smart Grid, COSI-CT underwent a dynamic simulation test on a 500 kV transformer substation protection relay in the China Electric Power Research Institute (CEPRI). This is an example of how Grid Solutions is using COSI-CT to support the development of Smart Grids, since today's power grids need to deliver more energy with greater flexibility and in a more complex environment – using the same infrastructure.

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