

Mid-2013 Assessment and Outlook for the North American Market for HV and MV Instrument Transformers



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Introduction to the Report

Newton-Evans Research undertook research on the topic of high voltage (HV) instrument transformers (IT) in 2012, then again earlier this year for a private client study. Now, as follow-on to that program, Newton-Evans has extended its research into medium voltage (MV) instrument transformers during the second and early third quarters of 2013.

In summary, here are some key observations based on the research programs:

- The HV IT market in North America is forecast to reach \$[SAMPLE] by 2015.
- The MV IT market in North America is forecast to approach \$[SAMPLE] in 2013.
- By 2016, the combined HV/MV market will likely grow to more than \$[SAMPLE] with about \$[SAMPLE] in U.S. expenditures and \$[SAMPLE] spent by Canadian utilities and industry.
- **Cumulative shipments of HV/MV instrument transformers during 2013-2016 will approach \$[SAMPLE].**
- The manufacturing of HV IT equipment has a [SAMPLE] (CR₃) of suppliers.
- MV IT equipment manufacturing is less concentrated, and the market is supplied by several participants. (CR₈).
- Sub-transmission level IT equipment, if viewed as a separate segment, would reveal additional market segment suppliers such as the [SAMPLE] as key participants.
- Some suppliers look at firms such as [SAMPLE] as low voltage (LV) IT suppliers, when we rank them as MV/LV market segment co-leaders.
- The spate of acquisitions a few years ago, involving the acquisition of the three leading “independent” HV IT equipment manufacturers (Trench, Ritz and Kuhlman) by Siemens, Alstom Grid and ABB, respectively, foreshadowed anticipated growth in this segment of the IT market in North America.

Definitions of terms – HV Instrument Transformer

An HV instrument transformer's role is to provide accurate inputs to protection, control and metering systems including revenue metering. The main tasks of HV instrument transformers are:

- To transform currents or voltages from a usually high (*above 38.5kV*) kV value to a value easy to handle for relays and instruments.
- To insulate the metering circuit from the primary high voltage system.
- To provide possibilities of standardizing the instruments and relays to a few rated currents and voltages.

High voltage instrument transformers frequently combine current and voltage transformation. At medium voltage, there is usually a separation of functions into current transformers and voltage transformers.

During one phone interview with a senior manager at a leading instrument transformer manufacturer, the importance of higher medium voltage (sub-transmission) IT equipment was raised. According to that same source, the "encroachment" of ABB's market share is due to its Kuhlman acquisition, which is largely "sub-transmission" equipment with voltage ranges from 69kV to 115kV.

HV Instrument Transformer Market Participants

Market Participants	Products	2012 NAM Revenue \$MUSD	2012 Market Share %
ABB (with Kuhlman)	ABB builds HV KA(KXM) and OMU (Optical) CTs Kuhlman manufactures Lower HV levels/ranges and Sub-Transmission	\$(SAMPLE)	[SAMPLE] %
Alstom Grid (with Ritz HV)	CCV/CC/OTCF (Cap VTs); CTH/OSKF/SKF (CTs); COSI (Optical IT); OTEF (VT)	\$(SAMPLE)	[SAMPLE] %
ITEC	Growing in HV line of IT Equipment	\$(SAMPLE)	[SAMPLE] %
Siemens (Trench)	IOSK/IK5,IM,IH (CTs); TAG/SAS-SF6 (CT);CVEOT/VEOS (IVT); IVOKT/TMC/N5/N5H (Combined IT s); SA/SAD (SF6CTs); SU/SUD (SF6VTs)	\$(SAMPLE)	[SAMPLE] %
General Electric	[SAMPLE]	\$(SAMPLE)	[SAMPLE] %
U.S. Total		\$(SAMPLE)	100%

NAM Market Share Assessments for 2012 HV IT Shipment Values

HV Instrument Transformers

■ ABB ■ Alstom Grid ■ Siemens ■ GE ■ ITEC

[pie chart]

Medium Voltage Instrument Transformer Discussion

Because of the overlap in how utilities classify “sub-transmission”, we have included our market overview of MV IT equipment that follows.

In electrical engineering, **MV instrument transformers** include two types of devices: a current transformer (CT), used for measurement of electric current, and voltage transformers (VT) also known as potential transformers (PT).

A MV current transformer (CT) is a measurement device designed to provide a current in its secondary coil proportional to the current flowing in its primary. Current transformers are commonly used in metering and protective relays in the electrical power industry where they allow safe measurement of large currents, often in the presence of high voltages.

The MV **current transformer** safely isolates measurement and control circuitry from the medium voltages typically present on the circuit being measured. When current in a circuit is too high to directly apply to measuring instruments, a current transformer produces a reduced current accurately proportional to the current in the circuit, which can be conveniently connected to measuring and recording instruments. A current transformer also isolates the measuring instruments from what may be very high voltage in the monitored circuit.

Voltage transformers (VT) or **potential transformers (PT)** are another type of instrument transformer, used for metering and protection in HV/MV/LV circuits. These devices are designed to present negligible load to the supply being measured and to have a precise voltage ratio to accurately step down high and medium voltage so that metering and protective relay equipment can be operated at a lower potential.

MV Instrument Transformer Market Participants

Market Participants	Products	2012 NAM Revenue \$MUSD	2012 Market Share %
ABB (includes Kuhlman)	Family of IT products	[\$SAMPLE]	[SAMPLE] %
GEC Durham	CTs, VTs,	[\$SAMPLE]	[SAMPLE] %
General Electric	CTs, VTs	[\$SAMPLE]	[SAMPLE] %
ITEC	IT Custom	[\$SAMPLE]	[SAMPLE] %
Meremac	Family of LV/MV ITs	[\$SAMPLE]	[SAMPLE] %
Ritz-Alstom	MV IT Family	[\$SAMPLE]	[SAMPLE] %
SEL	CTs,	[\$SAMPLE]	[SAMPLE] %
Others (Several small firms)	CTs, PTs, ITs	[\$SAMPLE]	[SAMPLE] %
US Total		[\$SAMPLE]- [SAMPLE]	100%

**NAM Market Share Assessments for
2012 MV IT Shipment Values**

[pie chart]

Typical HV and MV Instrument Transformer - Unit Cost Ranges:

Recent 2012 U.S. utility bid tabulations for Instrument Transformers provided the following prices:

HV Class:

138kV PT \$[SAMPLE]-[SAMPLE] (three major participants bid ranges)

326kV VT \$[SAMPLE]-[SAMPLE] (seven participants bid ranges representing major manufacturers)

MV Class:

Ranging from \$[SAMPLE]-[SAMPLE] for MV IT units

Ranging from \$[SAMPLE]-[SAMPLE] for MV CT units

Note: Slip-Over and Bushing CTs are lower cost than free-standing units. Industry sources stated that a growing percentage of apparatus is shipped with IT equipment already integrated, and also that end-user buyers can still specify the CT and VT products to be used.

North American Instrument Transformer Market Size Assessment

The Instrument Transformer market in North America in 2012 was somewhat similar in terms of shipment values (not in unit shipments) into the HV and MV segments.

The Newton-Evans estimate of \$ [SAMPLE] in 2012 shipments for HV IT equipment has been concurred with by one of three market co-leaders as being “*a reasonable estimate.*” The company’s estimate of \$[SAMPLE] for shipments of MV IT equipment has been generally concurred with by participants in this mid-range segment of the IT market, though with different share estimates.

The combined HV/MV instrument transformer market in North America is likely to reach \$[SAMPLE] in 2013 and will exceed \$[SAMPLE] by 2016. Almost all industry interviewees were upbeat concerning the outlook for HV (and MV) Instrument Transformers in general, for both CTs and VTs.

Of the key North American IT equipment manufacturers, only [SAMPLE] participates to a significant extent in both the HV and MV segments. [SAMPLE] is the clear market segment leader in MV IT shipment values, and is growing to become a significant player in the HV IT segment in North America. One competitor did state that in their opinion, most of [SAMPLE]’s HV IT shipments to U.S. and Canadian customers are still in sub-transmission and lower HV ranges. ITEC believes its own business will grow nicely with planned new HV offerings in the 230kV range.

Overall, the IT sub-industry group of firms is positive regarding the outlook for IT equipment sales as the deployment of substation automation devices, including more relays and additional substation meters, continues to increase. Utility personnel and T&D engineering consultants we talked with also believe that the IT market is growing nicely, thanks to increases in transmission expenditures and the expansion of renewable energy facilities.

North American Market Segment Outlook for HV IT and MV IT Shipments

[line graph]

SAMPLE

Estimates of Percentage of HV IT shipments that are CT versus PT/VT
Consensus Estimates

Segmentation of the North American HV Instrument Transformer Market

% Share of HV IT Units

HV CT Shipments

[pie charts]

Internal Bushing Current Transformers

These are current transformers that use the current carrying parts of major equipment as their primary windings and are usually purchased as integral parts of such equipment. On a multi-ratio transformer, the secondary winding is tapped. Most manufacturers state that internal bushing current transformers furnished with a piece of equipment have thermal capabilities that equal the capability of the equipment.

External Bushing Current Transformers

These are current transformers that use the current carrying parts of major equipment as their primary windings, and are not usually purchased as integral parts of such equipment. Such current transformers are to be assigned ratings in accordance with the manufacturer's recommendations.

IT Market Observations from Industry Experts

[SAMPLE]

SAMPLE

[SAMPLE]

SAMPLE

Voltage Range Assessments for HV IT equipment shipments in 2012

[SAMPLE]

KV Range Breakouts for HV CT Shipments

Percentage of Unit Shipments

[pie chart]

SAMPLE

Applications of HV CTs in the United States

[SAMPLE]

**HV CT Applications among
Transmission Asset Owners**

HV CT Applications

SAMPLE