

Presentation 2004

Medium voltage
Instrument transformers
and Sensors



2003

ABB s.r.o – org. unit EJF
was appointed by BA PTMV
GFFF for MV CTs, VTs and
Sensors



ABB

Instrument transformers history

- 1887 Foundation of factory (Bartelmus & Donát)
- **1919 Production of instrument transformers with oil insulation**
- 1927 Take over by Škoda Plzeň
- **1952 Production of instrument transformers with epoxy insulation**
- 1959 Incorporated into ZSE Praha Group
- 1983 Technology of automatic pressured gelation (APG) implemented
- **1993 100% of shares was purchased by Asea Brown Boveri Ltd.**
- 1993 Foundation of Instrument transformers division in CZ, BU 3440
- **1997 New production plant erected, new production technology and testing equipment**

- **2002 CZELS was appointed as Global focused feeder factory (GFFF) for both indoor and outdoor MV Instrument transformers up to 40,5 kV – responsibility worldwide**
- **2003 CZELS was appointed as Global focused feeder factory (GFFF) for both MV Instrument transformers and sensors – responsibility worldwide**

Inductive Instrument transformers – IEC standard

IndoorCTs



Bus CTs



Bushing CTs



Bar primary bushing CTs

Support (post) CTs



Outdoor current transformers

Outdoor ITs

Special CTs



Single pole VTs



Single pole VTs with fuse



Double pole VTs



Outdoor voltage transformers



IndoorVTs

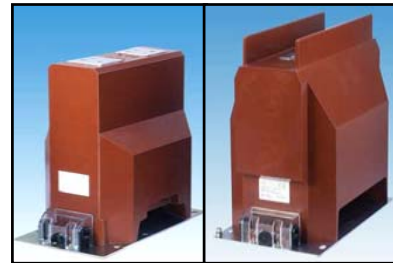
Indoor Current Instrument Transformers

Support (post) CTs

TPU 4x.xx.....up to 12 kV
TPU 5x.xx.....up to 17,5 kV
TPU 6x.xx.....up to 24 kV



TPU 7x.xx.....up to 36 kV - 40,5 kV



Bar primary bushing CTs

TTR.... up to 12 kV, up to 24kV

Bushing CTs

BB....up to 24 kV

Bus CTs

KOKS....up to 12 kV, up to 17,5 kV,



KOKSup to 24 kV



**Casting equipment
(vacuum or APG)**

Indoor Voltage Instrument Transformers

Single pole insulated VTs

TJC 4 up to 12 kV

TJC 5 up to 17,5 kV

TJC 6 up to 24 kV



TJC 7 or 7.1..up to 36 kV - 40,5 kV

KGUGI...up to 36 kV (up to 2000 VA)



Single pole insulated VTs with fuses

TJP 4.x up to 12 kV

TJP 5.x up to 17,5 kV

TJP 6.x up to 24 kV



TJP 7.1 or 7.2..up to 36 kV - 40,5 kV



Double pole insulated VTs

TDC 4 up to 12 kV

TDC 5 up to 17,5 kV

TDC 6 up to 24 kV



KGUG...up to 36 kV(up to 2000 VA)



Testing equipment

Outdoor Voltage and Current Instrument Transformers

Current transformers

**TPO 6x.xx.....up to 24 kV,
TPO 7x.xx... up to 40,5 kV**



Voltage transformers

single pole VTs

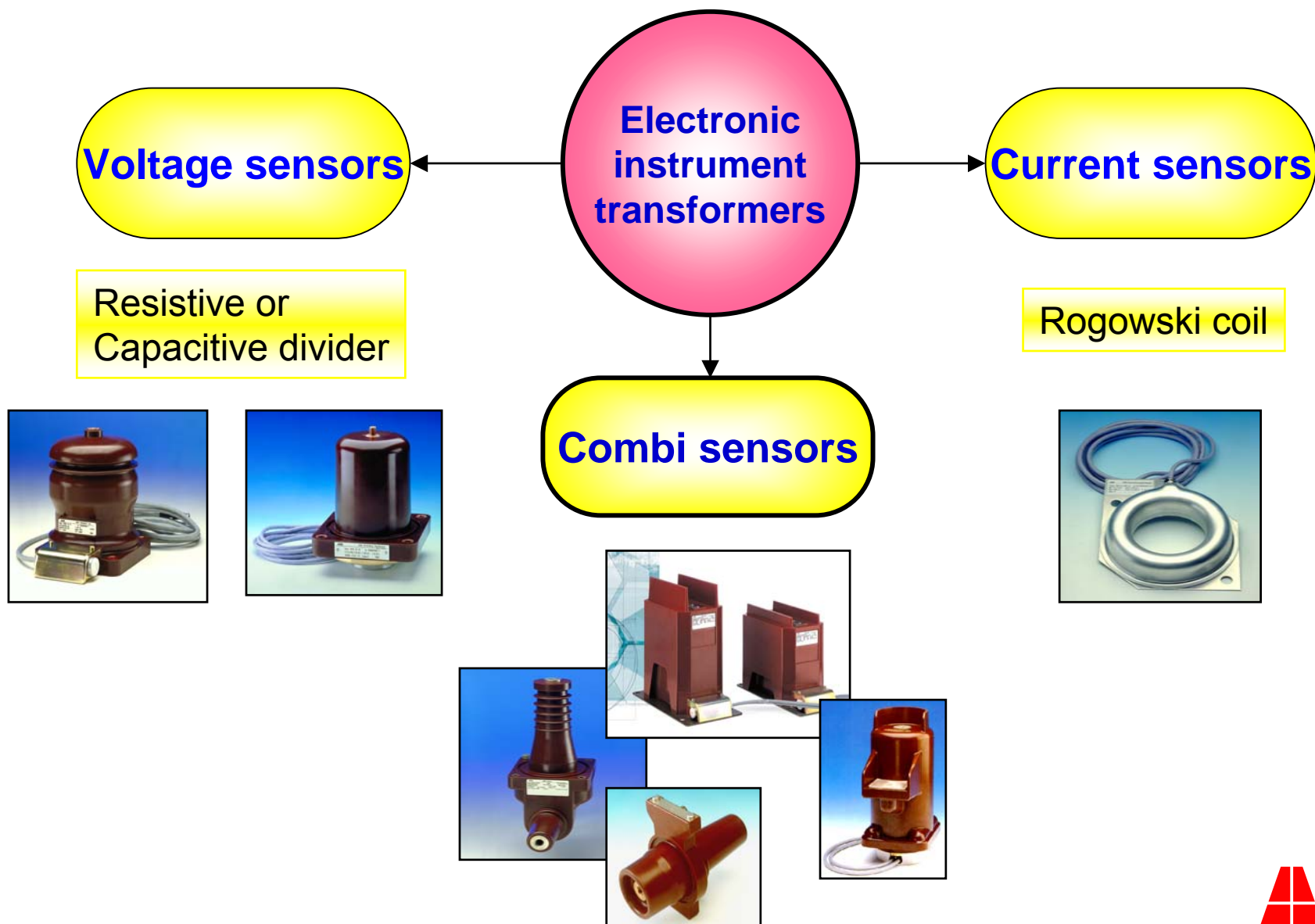
**TJO 6.....up to 24 kV
TJO 7...up to 40,5 kV**

double pole VTs

TDO 6...up to 24 kV



Electronic Instrument transformers (sensors)-IEC standard



Current Sensor - Rogowski coil, KECA __ A1 (AIS)

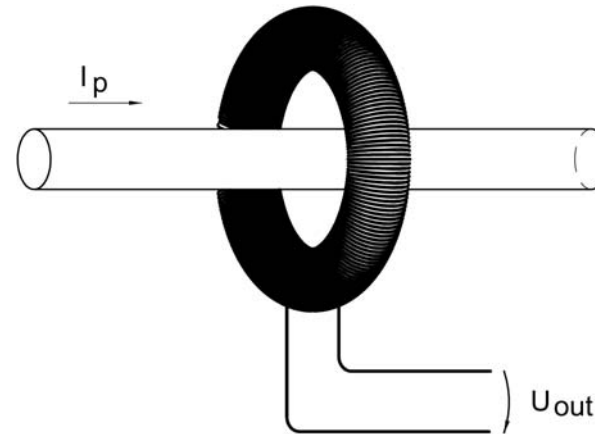
$$B = \frac{\mu_0}{2\pi} \frac{I}{r}$$



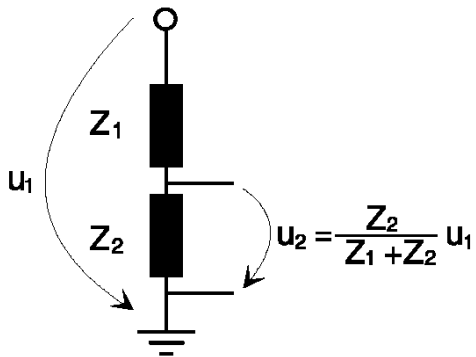
André Marie Ampère
(1775-1836)

- First published in 1912 by Rogowski and Steinhaus
- Uniformly wound coil with non-magnetic core
- Output signal is proportional to the derivative of primary current
- IEC 60044-8
- Nominal primary current
80, 300 or 800 A
- Current sensor cl. 1.0

$$u_{out} = M \frac{di_p}{dt}$$



Voltage Sensor - Voltage Divider



Resistive divider

- Matched resistor pair
 - 1:10 000 divider ratio
- Accuracy up to class 0.5

KEVI 24A1 , 24 kV (GIS)



KEVA 24A __ , 24 kV (AIS)



Capacitive divider

- $Z_c = 1/\omega C$
 - 1:10 000 divider ratio
- Accuracy up to class 3
- Small size ideal for bushings



Combi Sensor, type KEVCD_



- Current and voltage sensors in the same block
- Measurement and protection by one sensor
- Dimensions and primary connections same as DIN-type CTs (DIN 42600)
- 12, 17.5, 24 kV, two types:
 - A. ≤ 1250 A
 - B. > 1250 A (max. 3200 A)
- Including coupling electrode for voltage indication

Selection Guide for KEVCD Sensors

Nominal voltage	Rated current range (first row)			
	Functions included (second row)			
	< 1250 A		1600...3200 A	
	$I + U + U_{ind}$	$I + U_{ind}$	$I + U + U_{ind}$	$I + U_{ind}$
Upto 12 kV	KEVCD 12 AE3	KEVCD 12 AG3	KEVCD 12 BE2	KEVCD 12 BG2
Upto 12 kV *)	KEVCD 12 AE3C	KEVCD 12 AG3C	KEVCD 12 BE2C	KEVCD 12 BG2C
Upto 17.5 kV	KEVCD 17.5 AE3	KEVCD 17.5 AG3	KEVCD 17.5 BE2	KEVCD 17.5 BG2
Upto 24 kV	KEVCD 24 AE3	KEVCD 24 AG3	KEVCD 24 BE2	KEVCD 24 BG2

*) Insulation level according to Chinese standard



CVT+ program for Instrument transformers



Successful industrial application of on-line engineering tool for engineer-to-order products.

GFFF in Europe:

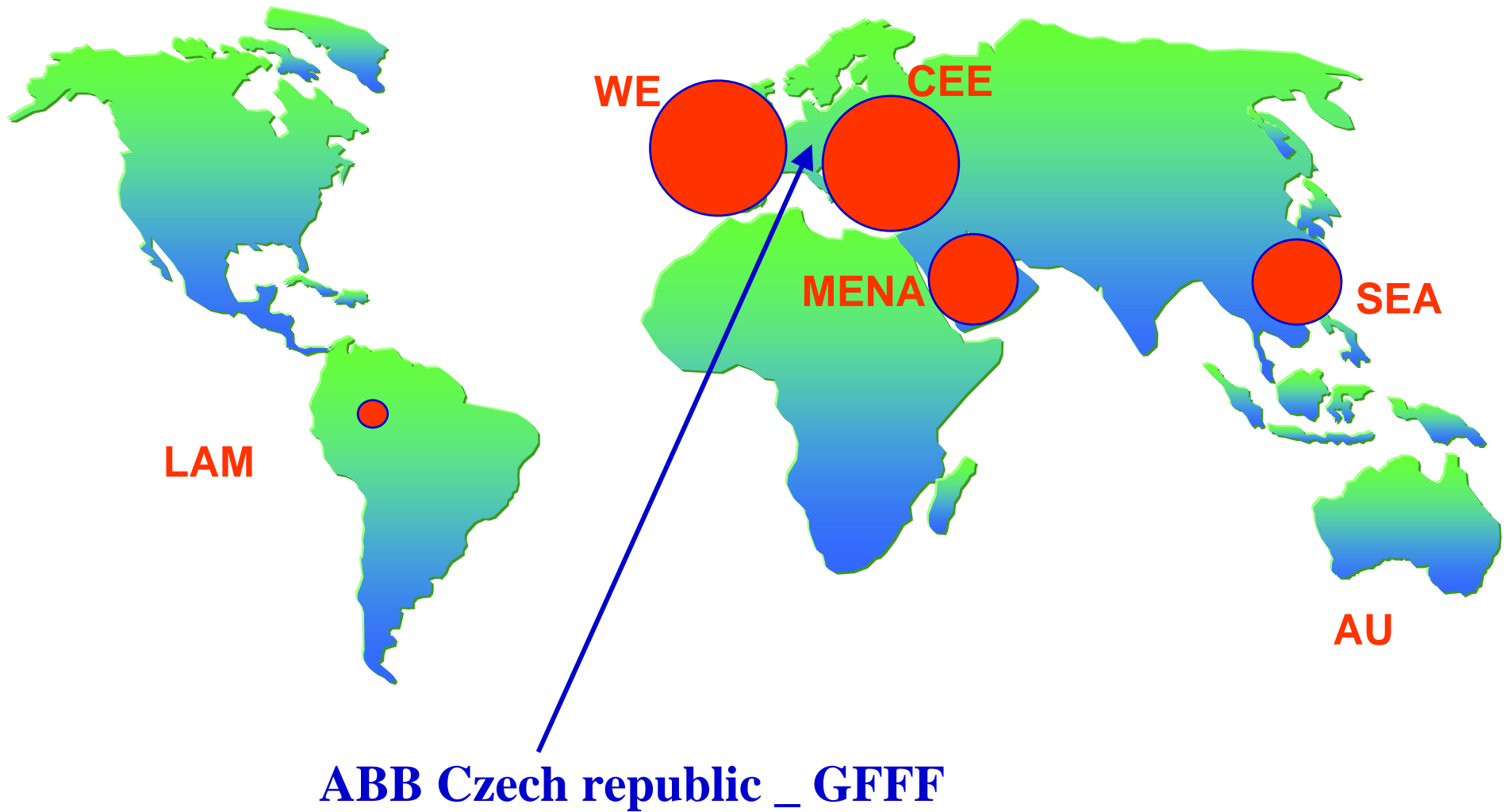
ABB CZELS – Brno – Czech Republic



CVT+ allows ABB to become **the fastest supplier**

- **Vision for conventional instrument transformers:**
 - customer places order within 15min
 - production starts within 2 hours
 - manufacturing time < 6 working days
- **Guarantee cost efficiency by a common range of main ITs and common processes**
- **Advanced system for engineering wide range of Instrument Transformers to speed up product design and manufacturing**
- **Internet Sales System brings the set of products with fully customisable solutions**

Instrument transformers – export 2003



Instrument transformers – external R 2003

