Sensores de voltaje y corriente no convencionales Nuevas tecnologías

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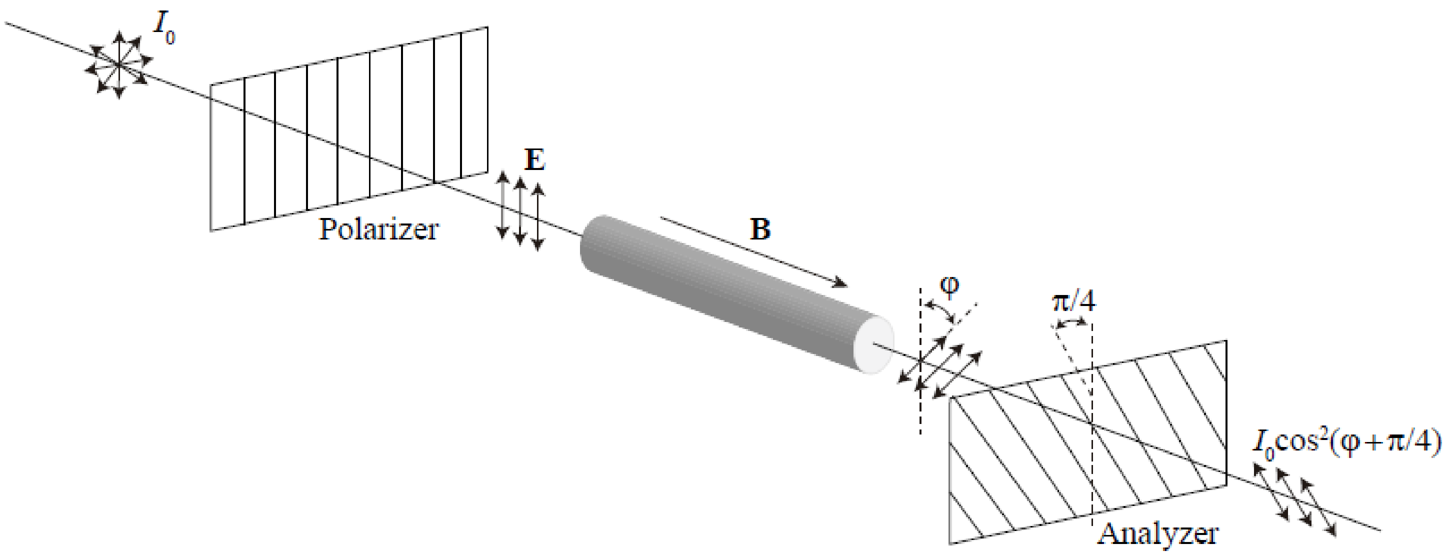
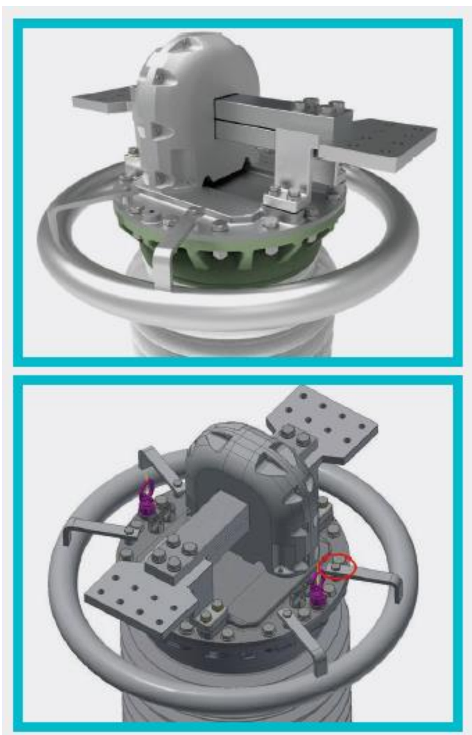
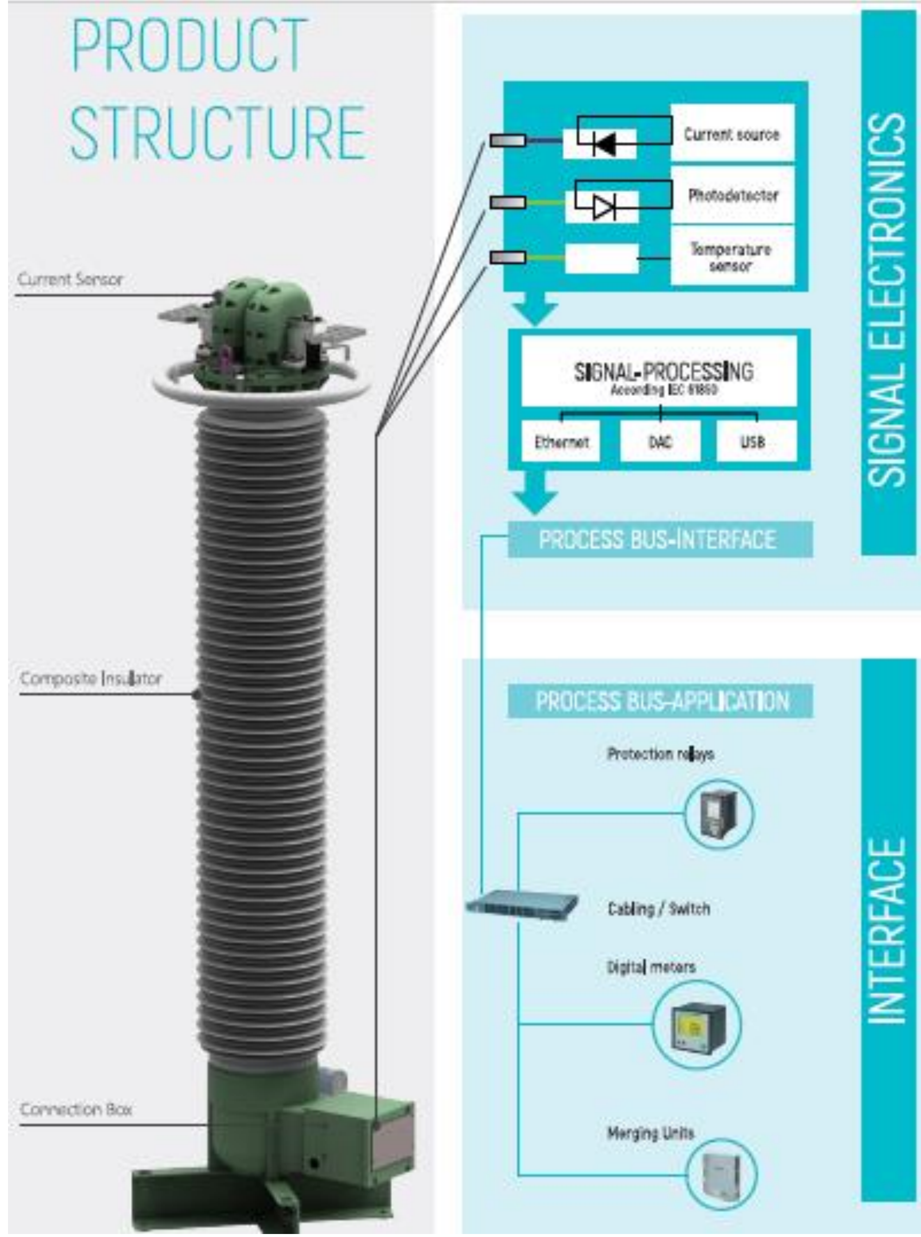
Transformadores ópticos de corriente

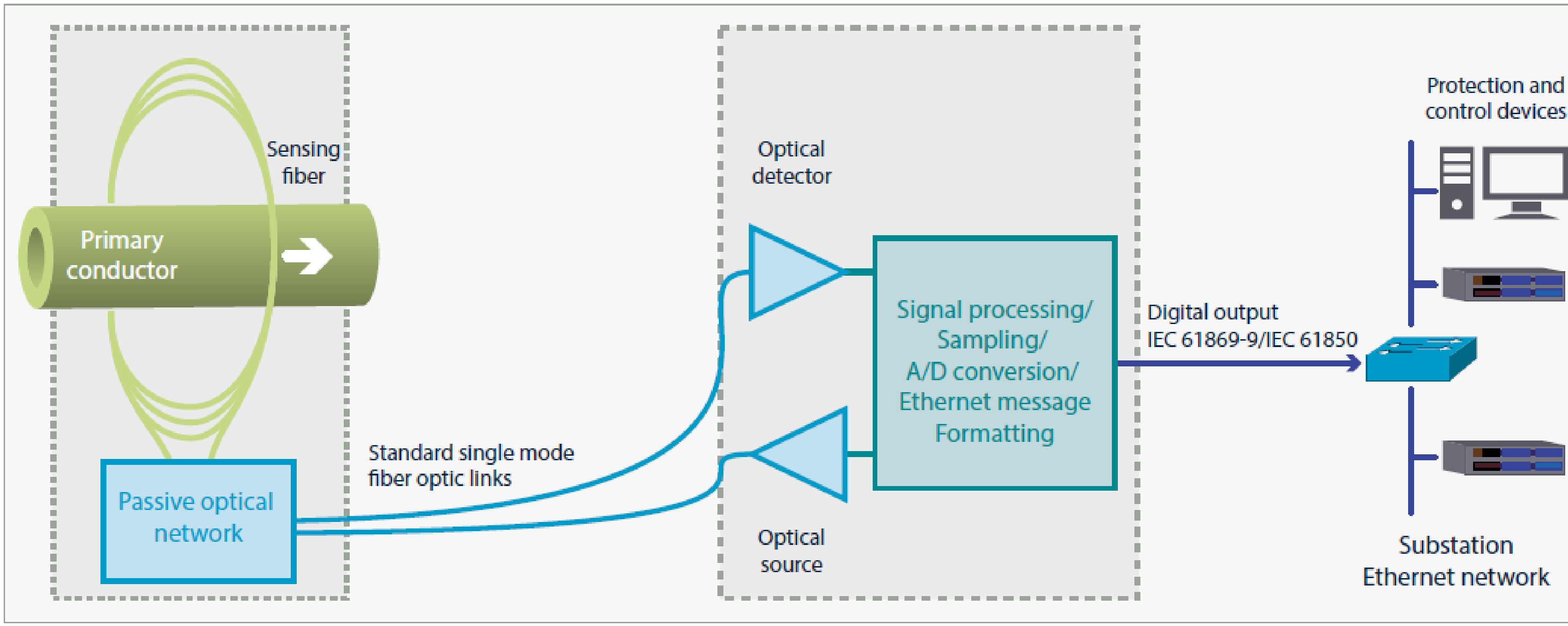
- Efecto Faraday
  - Verdet constant: V
  - $\Phi = V.B.L$






PRODUCT
STRUCTURE
Current Sensor
Composite Insulator
Connection Box
Current source
Photodetector
Temperature sensor
SIGNAL-PROCESSING
According IEC 61850
Ethernet
DAC
USB
PROCESS BUS-INTERFACE
SIGNAL ELECTRONICS
PROCESS BUS-APPLICATION
Protection relays
Cabling / Switch
Digital meters
Merging Units
INTERFACE

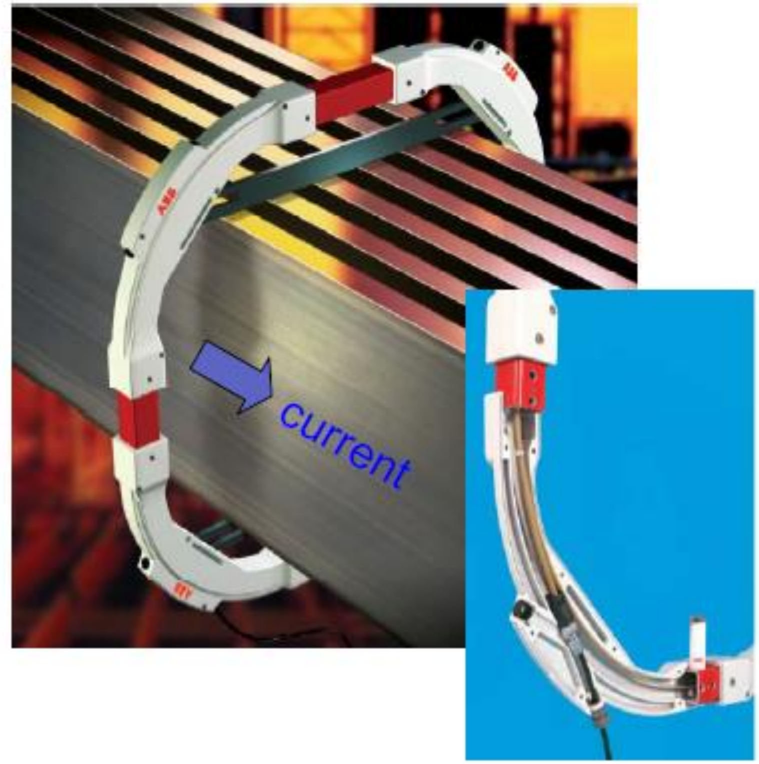
SDO OCT IEC 61850 OPTICAL CURRENT TRANSFORMER



ARTECHE

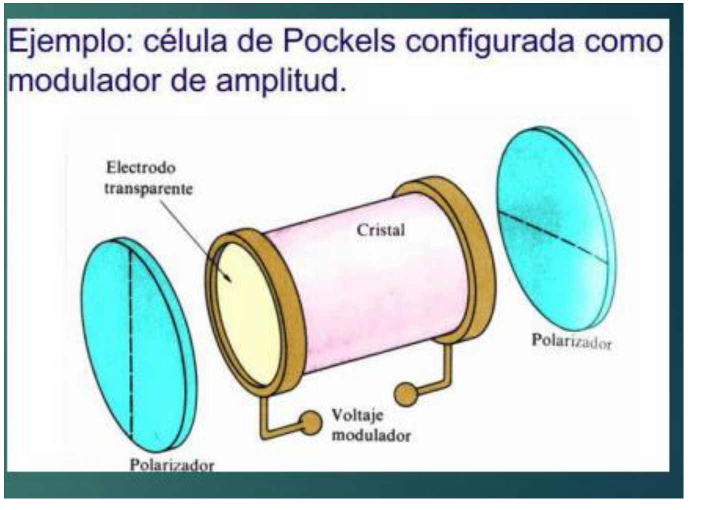
Nominal current	User specified for up to 2,500 A (Higher current ratings available under request)
Rated short-time thermal and dynamic current	25 kA rms for 3 s, 62.5 kA peak 50 kA rms for 1 s, 125 kA peak 75 kA rms for 1 s, 187.5 kA peak
Rated continuous thermal current	2,500 A rms
Accuracy	0.2 s / P20
Bandwidth	2.4 kHz at 80 samples/cycle 7.6 kHz at 256 samples/cycle
Weight	15 kg
IP protection	IP66
Primary terminal	Aluminum
Temperature	-40°C to +85°C
Humidity	100% Storage 90% Operating
Vibration	1G
Optical connectors	2 x SC/APC
Fiber type for connection with the SDO MU merging unit	Standard duplex single mode

Fiber-Optic Current Sensor



Transformadores ópticos de voltaje

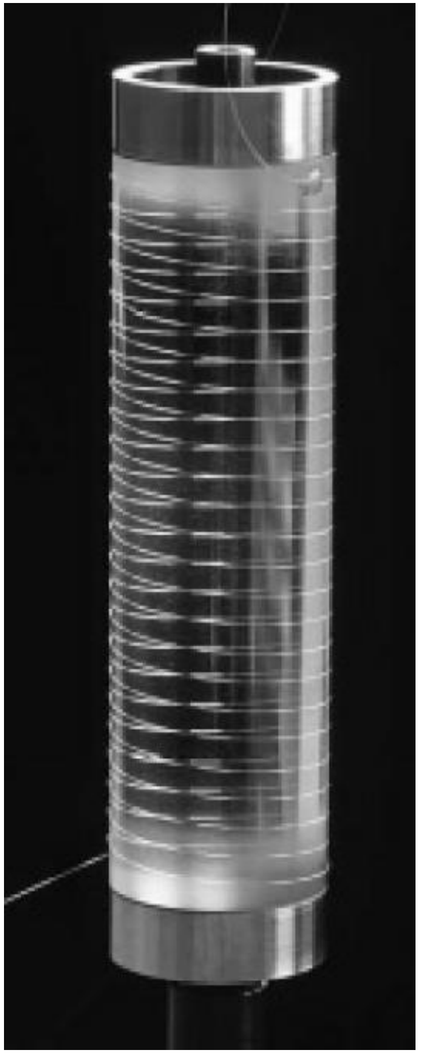
- Transductor de voltaje electro óptico (EOVT). Usa el efecto Pockels por el cual un cristal gira el ángulo de luz polarizada proporcionalmente al campo eléctrico longitudinal aplicado.



Transductor de voltaje piezoeléctrico

Usa el efecto piezoeléctrico inverso en un transductor de cuarzo en forma de cilindro.

La deformación piezoeléctrica del transductor es producida por el campo eléctrico y detectada por una fibra óptica arrollada a la superficie del cristal.



Transformadores ópticos de voltaje y combinados

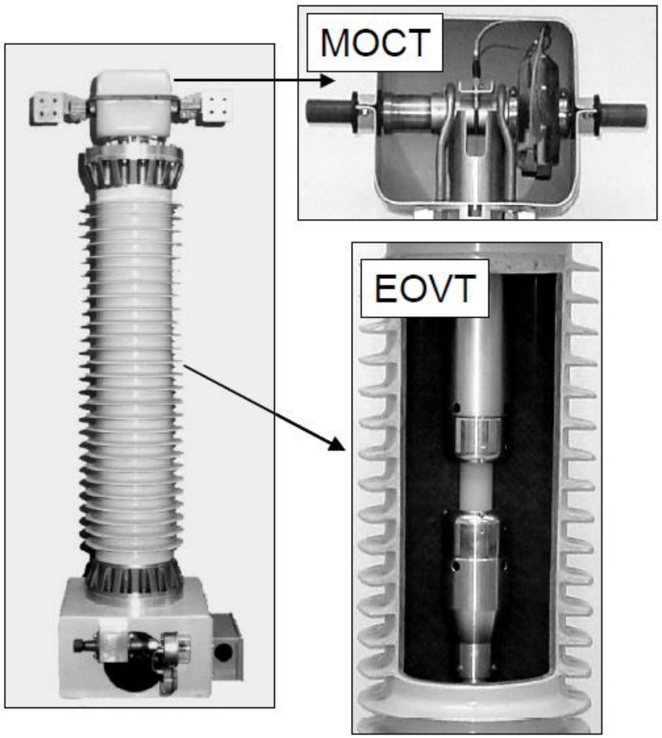


Fig. 2. Optical metering unit (OMU) with current transducer (MOCT) and voltage transducer (EOVT).

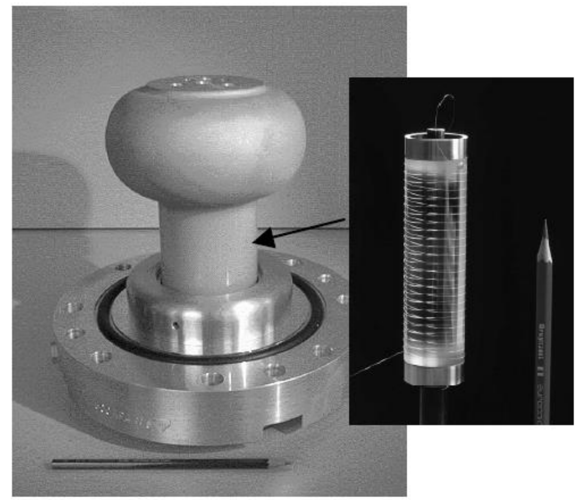


Fig. 4. Piezo-optic voltage transducer for 170 kV gas-insulated switchgear. The 100 mm long quartz crystal (right) is mounted inside a insulator tube (arrow) separating the high-voltage electrode (top) and the base flange

Fiber-Optic Current and Voltage Sensors for High-Voltage Substations, K. Bohnert, P. Gabus, and H. Brändle, ***Conference on Optical Fiber Sensors, October 13-17, 2003, Nara Japan***

Sensores de tensión por campo eléctrico

Fig. 1. Practical constructions of sensors, left: “improvised” metal plates near switch gear; right: specially developed sensor (within circle) near cable termination

On-site Voltage Measurement with Capacitive Sensors on High Voltage Systems
Wu,,. Wouters, E.J.M. van Heesch, and E.F. Steenni 2011 IEEE Trondheim PowerTech

Sensores de tensión por campo eléctrico

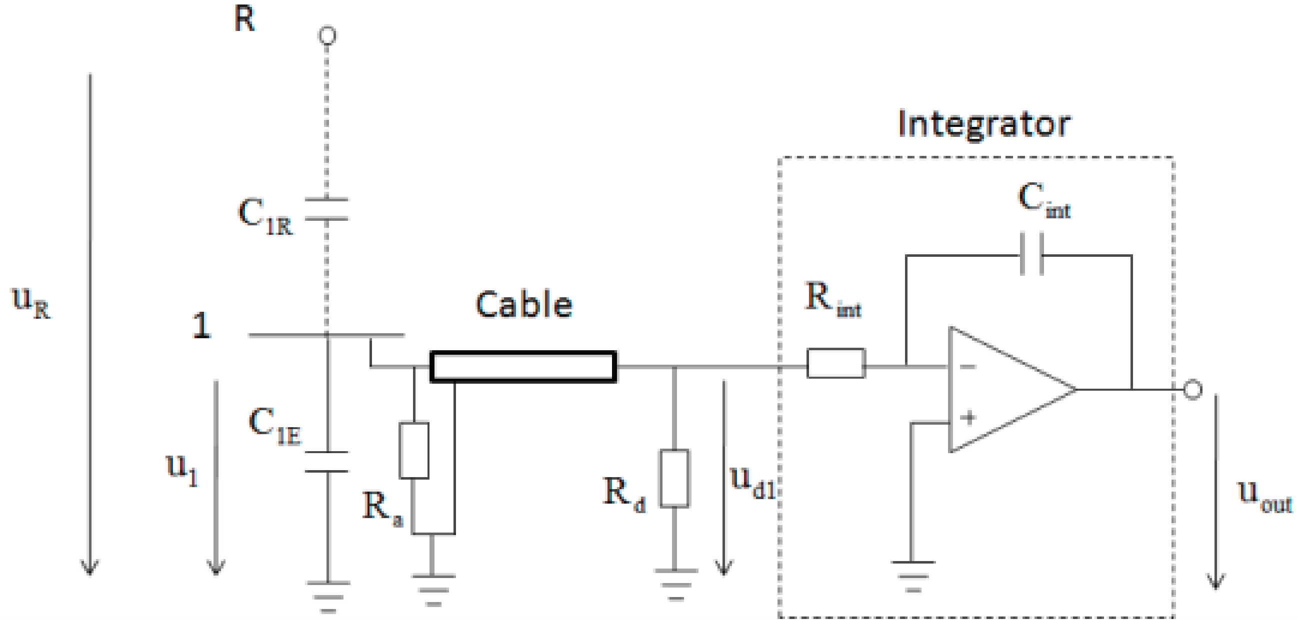


Fig. 2. Configuration for a single phase (R) with sensor (1) and measuring system (terminated cable with integrator)

Sensores de tensión por campo eléctrico

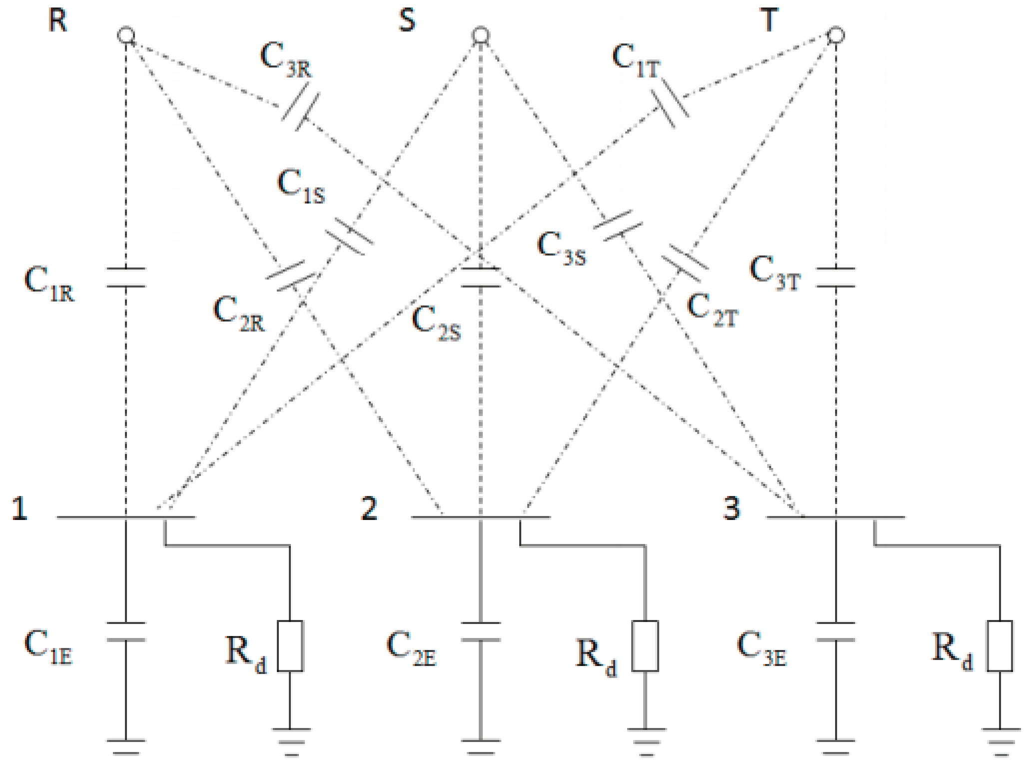
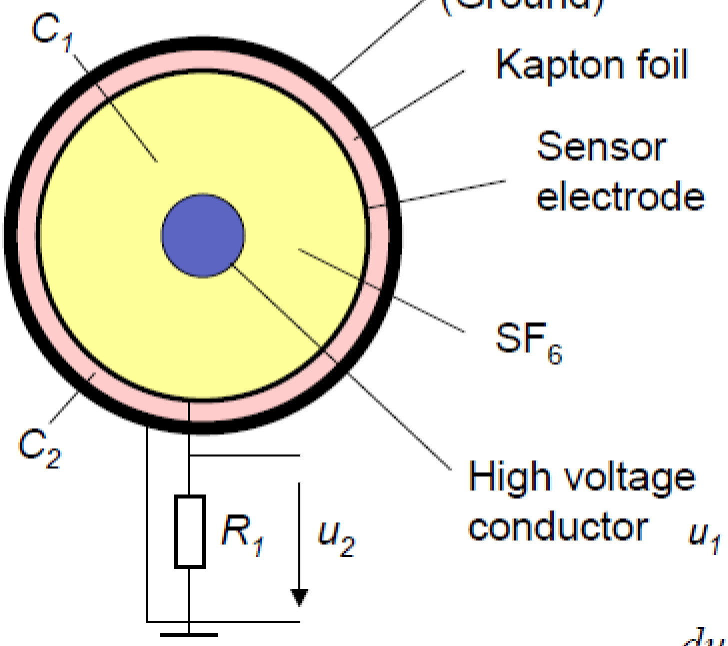


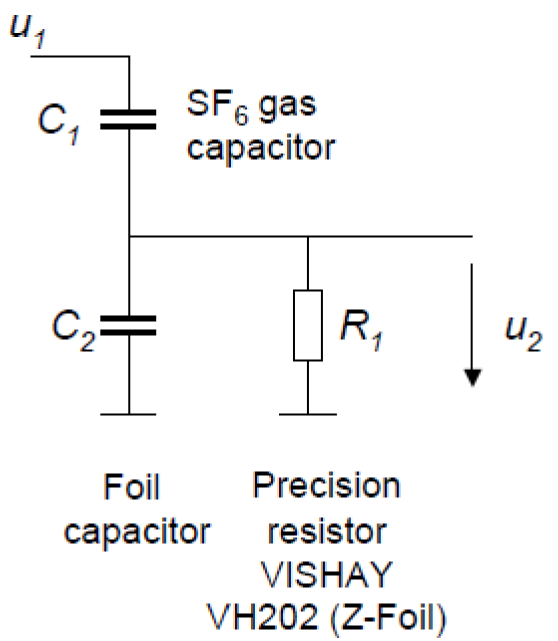
Fig. 4. Capacitive coupling scheme of the three-phase overhead lines to the sensors

Voltage Sensor

Principle



Equivalent circuit



$$u_2 = RC_1 \frac{du_1}{dt} \quad \text{for} \quad f << \frac{1}{2\pi RC_2}$$

ABB

Sensores de corriente por efecto Hall

SS4825

Linear Hall Effect Sensor

Features

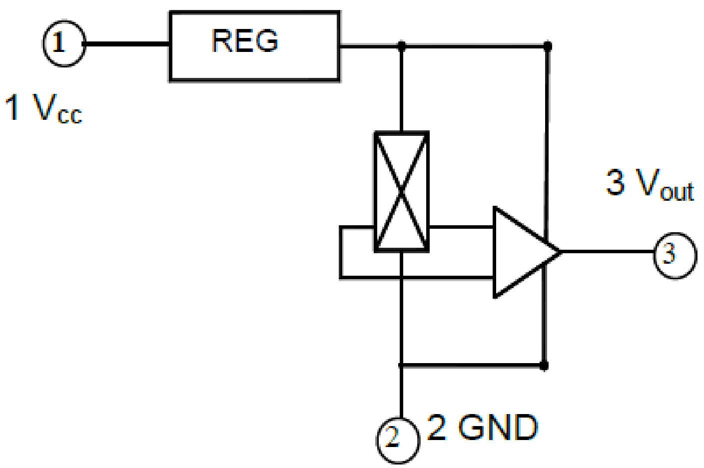
- Miniature construction
- Low-Noise Output
- 4.5 V to 6 V Operation
- Magnetically Optimized Package
- Linear output for circuit design flexibility
- Temperature range of -40 °C to 150 °C

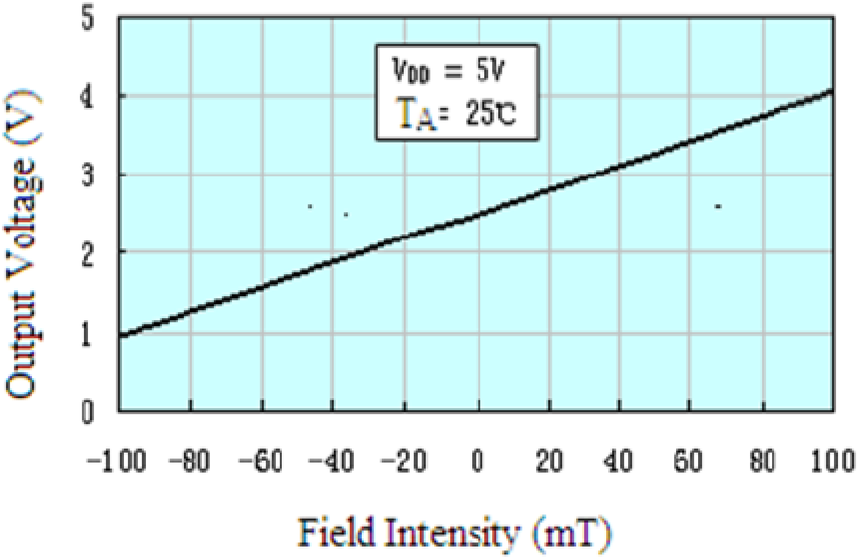
3 pin SOT23 (suffix SO)

3 pin SIP (suffix UA)

Sensor Hall

Functional Block Diagram



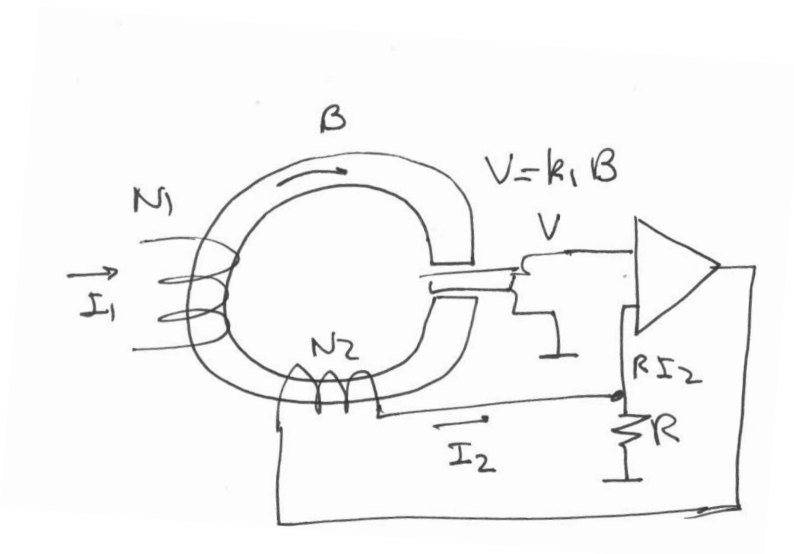


Sensor Hall

Operating Parameters T_A =25°C， V_{CC} =5.0 V

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operating voltage	V_{CC}	Operating	3.0		6.5	V
Supply current	I_{CC}	Average		4.2	8.0	mA
Output Current	I_{OUT}		1.0	1.5		mA
Response Time	Tack			3		uS
Quiescent Output Voltage	Vo	B = 0G	2.25	2.5	2.75	V
Sensitivity	$\triangle V_{OUT}$	T_A= 25°C	2.0	2.5	3.0	mV/G
Min Output Voltage		B = -1500G		0.86		V
Max Output Voltage		B = 1500G		4.21		V
Linearity（% of Span)				-0.007		
Temperature Error （Null Drift）			-0.10		0.10	%/°C
Sensitivity Drift		$T_A \geq$ 25°C	-0.15		0.05	%/°C
		T_A < 25°C	-0.04		0.185	%/°C

Sensor de corriente por efecto Hall



$$V = R I_2 \qquad N_1 I_1 - N_2 I_2 = \frac{B}{\mu} \ell$$

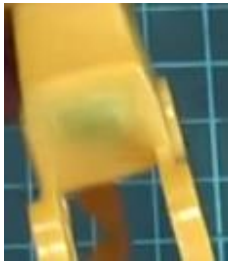
$$N_1 I_1 - N_2 \frac{k_1 B}{R} = \frac{B}{\mu} \ell$$

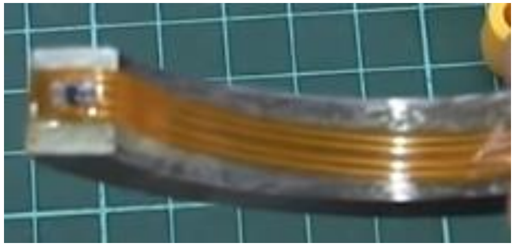
$$N_1 I_1 = B\left(\frac{\ell}{\mu} + \frac{N_2 k_1}{R}\right)$$

$$B = \frac{N_1 I}{\ell/\mu + \frac{N_2 k_1}{R}} \Rightarrow 0 \text{ si } \frac{N_2 \cdot k_1}{R} \to \infty$$

$$\therefore \boxed{I_2 = \frac{N_1}{N_2} I_1}$$

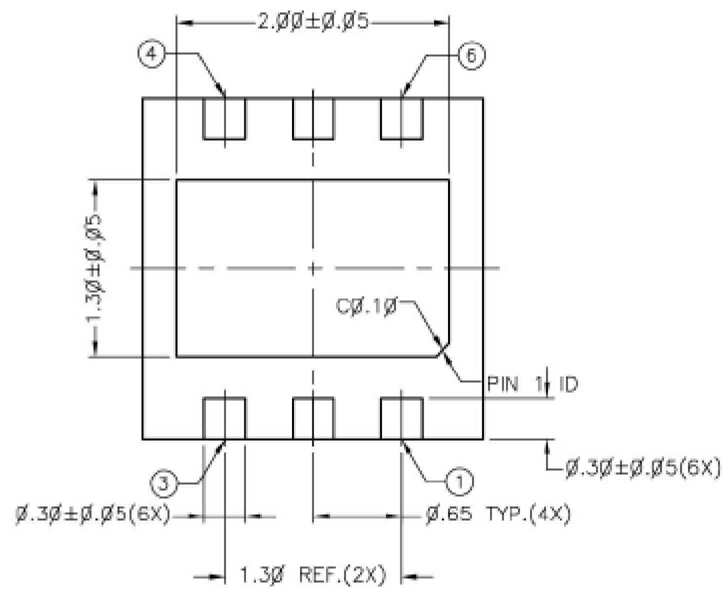
Pinza de corriente por efecto Hall





Sensores de corriente por magneto resistencia (GMR)

Package Drawing – TDFN6 2.5 mm x 2.5 mm



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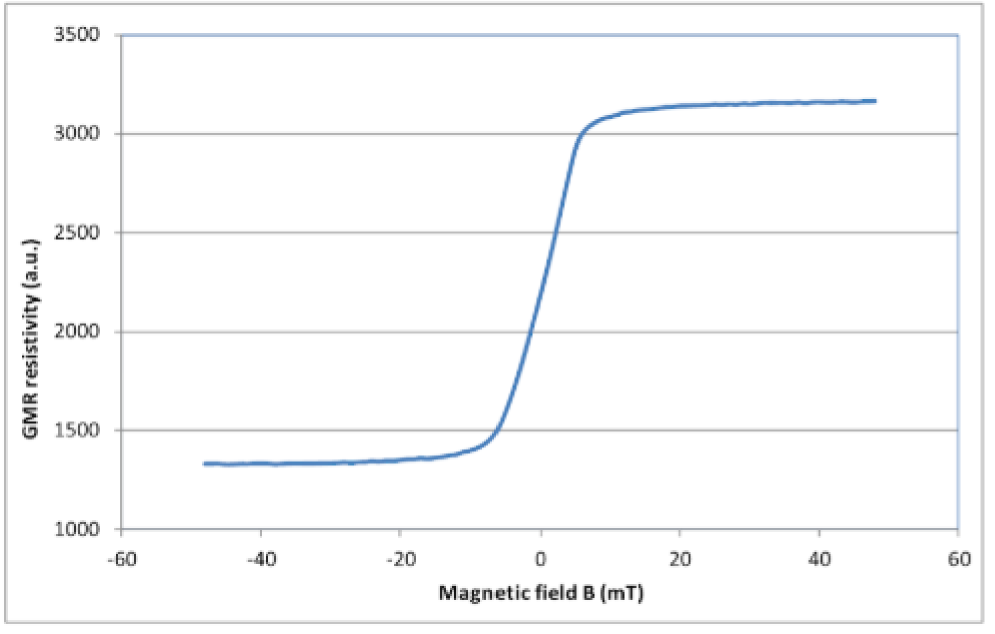
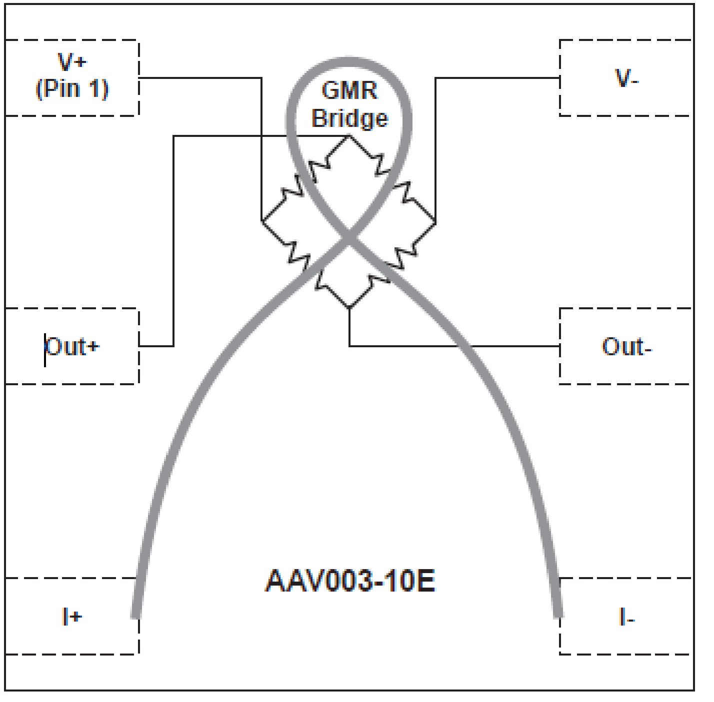
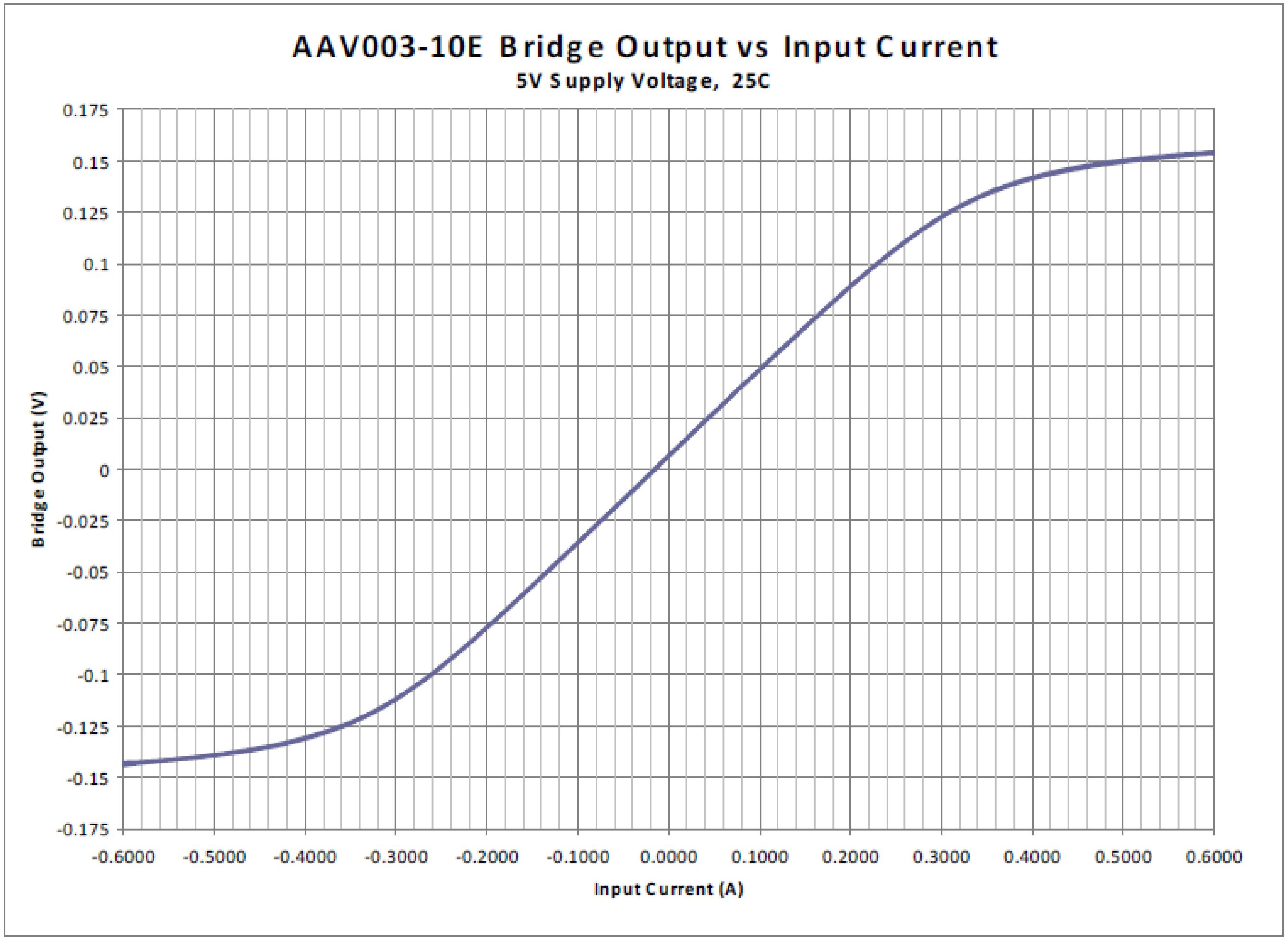




AAV003-10E Functional Diagram

Sensores de corriente por magneto resistencia (GMR)



Sensores de corriente por magneto resistencia (GMR)

Operating Specifications:

Parameter	Test Conditions	Min.	Typ.	Max.	Units
Nominal Bridge Resistance	25°C	5500	7000	8500	Ohms
Sensitivity	Operating; 5 V Supply, 25°C	0.06	0.08	0.10	mV/V-mA
Frequency Response		100			KHz
Linear Range of Current Measurement	Operating; Full Voltage and Temperature Range	−80		80	mA
Output Linearity	Over Linear Current Range; Full Oper. Temperature Range	99%			
Bridge Electrical Offset	25°C	−4		+4	mV/V
Offset Drift over Full Temperature Range	Zero Current	−1.0		1.0	mV/V
Bridge Supply Voltage				24	|Volts|
Isolation Voltage	See Note 1	240			VRMS
On-Chip Current Strap Resistance	25°C	0.25		0.35	Ohms
On-Chip Current Strap Resistance Temperature Coefficient			+0.6		%/°C
Temperature Range of Operation	Operating	−40		85	°C
Bridge Resistance Temperature Coeff.	Operating		+0.1		%/°C
Bridge TCOV[2]	Operating		−0.21		%/°C

Fin