



SENSORS

LOW POWER INSTRUMENT TRANSFORMERS

Voltage and current sensors for
primary and secondary distribution networks

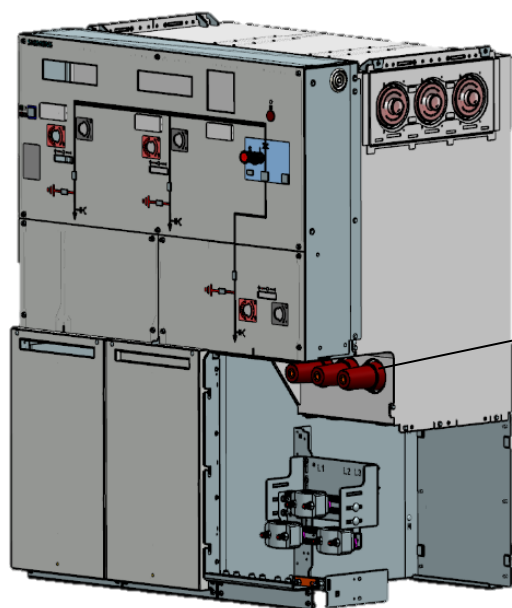


ZELISKO

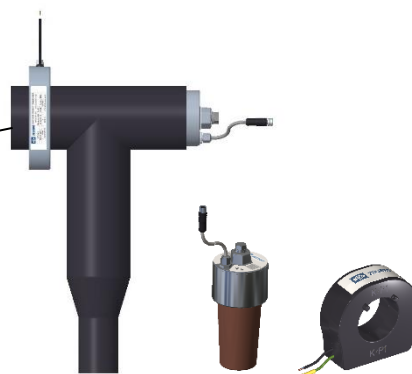
LOW POWER INSTRUMENT TRANSFORMER FOR MEDIUM AND HIGH VOLTAGE APPLICATIONS UP TO 72,5 KV AND 4000 A

The digital technology landscape's evolution requires reevaluating criteria for instrument transformers (ITs) in measurement and protection. Modern secondary equipment no longer requires the high-power output characteristic of traditional ITs, unlike their predecessors designed for electromechanical relays. Since 2012, Zelisko has responded to this by manufacturing low power ITs, referred to as current and voltage sensors. These devices fulfill various roles including power flow monitoring, grid control, and fault detection with directional determination. Moreover, they facilitate active generation and load management. Zelisko's U/I sensors adhere strictly to IEC61869-6/10/11 standards, ensuring regulatory adherence.

These sensors find application across diverse fields such as Indoor/Outdoor environments, Air Insulated Switchgear, and Gas Insulated Switchgear. Special emphasis is placed on ensuring the long-term stability of measured values, particularly in challenging environmental conditions characterized by wide temperature ranges and high humidity levels. In addition, the sensors' specialized variant extends their functionality to include measuring harmonics up to 9 kHz*:



Automated RMU configuration with Zelisko current and voltage sensor and T-plug



Against the backdrop of climate change, the energy transition necessitates a substantial increase in the adoption of renewable energies (RE) to mitigate greenhouse gas emissions, particularly in wind energy and photovoltaics. Challenges facing the electricity sector include expanding transmission and distribution grids, as well as addressing issues such as e-mobility and energy storage. Notably, enhancing the intelligence of the medium-voltage (MV) distribution grid holds significant importance in this context.

Ensuring essential security of electricity supply, voltage quality, and grid stability necessitates an intelligent medium-voltage (MV) distribution grid. Possible strategies include remote monitoring and control automation, as well as precise generation and load management through wide-range regulation.

ZELISKO LPIT

FUNCTIONAL PRINCIPLE AND ERROR LIMITS

LOW POWER VOLTAGE TRANSFORMER

LPVT Low-power voltage transformers from Zelisko are passive instruments employing a compensated resistive divider. Specifically engineered for medium and high voltage protection and measurement systems. Comprising two resistive elements, this transformer divides the input signal to yield a standardized output value that operates without saturation and correction factor. The voltage sensors are offered in various configurations for primary and secondary distribution switchgears, accommodating system voltages of up to 72.5 kV.

LOW POWER COMBINED TRANSFORMER

A combined low-power transformer integrates multiple functions typically found in separate voltage and current sensor into a single unit, thereby reducing space requirements, installation complexity, and costs. It is engineered for outdoor applications, functioning both as a bushing type for gas-insulated switchgear and as a block type configuration.

LOW POWER CURRENT TRANSFORMER

IC-LPCT Low-power current transformers for secondary distribution from Zelisko are passive instruments that operate on the principle of a ring core transformer equipped with an integrated precision shunt resistor to provide a voltage output directly correlated to the primary current.

EFD-IC-LPCT The earth fault detection sensor surveils the electrical system, detecting irregularities in current flow due to a displacement of the neutral point or insulation resistance.

Rogowski-LPCT Rogowski coil functions based on electromagnetic induction. The alternating current generates a changing magnetic field, which in turn induces a voltage in the coil's winding. This induced voltage is directly proportional to the rate of change of current flowing through the conductor.

ACCURACY LIMITS FOR MEASURING LPVT		
at rated burden and voltage between 80% and 120% of the rated voltage		
Accuracy class	Ratio error \pm (%)	Phase error \pm (min)
0,2	0,2	10
0,5	0,5	20
1	1,0	40

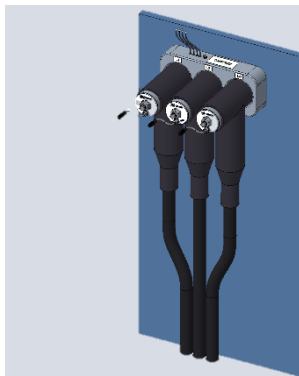
ACCURACY LIMITS FOR PROTECTIVE AND MULTIPURPOSE LPVT										
Accuracy class	Ratio error \pm (%)					Phase error \pm (min)				
	Percent of rated voltage					Percent of rated voltage				
	2	20	80	100	120/190	2	20	80	100	120/190
0,5P	2	1	0,5	0,5	0,5	80	40	20	20	20
3P	6	3	3	3	3	240	120	120	120	120
6P	12	6	6	6	6	240	240	240	240	240

ACCURACY LIMITS FOR MEASURING LPCT										
Accuracy class	Ratio error \pm (%)					Phase error \pm (min)				
	Percent of rated voltage					Percent of rated voltage				
	2	5	20	100	Kpcr	2	5	20	100	Kpcr
0,2S	0,75	0,35	0,2	0,2	0,2	30	15	10	10	10
0,2	-	0,75	0,35	0,2	0,2	-	30	15	10	10
0,5S	1,5	0,75	0,5	0,5	0,5	90	45	30	30	30
0,5	-	1,5	0,75	0,5	0,5	-	90	45	30	30
1,0	-	3,0	1,5	1,0	1,0	-	180	90	60	60

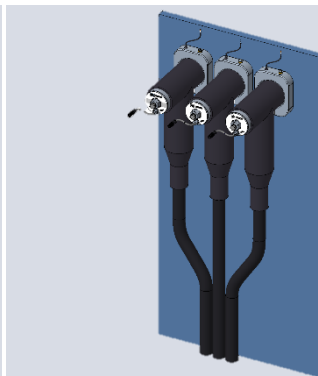
ACCURACY LIMITS FOR PROTECTIVE PASSIVE LPCT			
at rated frequency and rated primary current			
Accuracy class	Ratio error \pm (%)	Phase error \pm (min)	Composite error (%)
5P	1	60	5
10P	3	-	10

STANDARD CONFIGURATION OPTIONS FOR AUTOMATED RMU

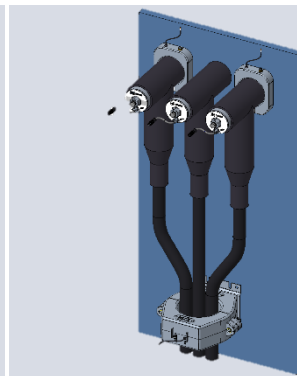
Original Equipment



1x SMCS3-JW1004 (multifunction current sensor)
3x SMVS-UW1001 (voltage sensor)

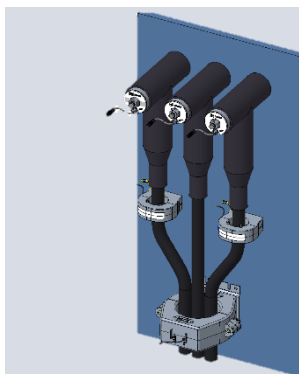


3x SMCS-JW1001 (current sensor)
3x SMVS-UW1001 (voltage sensor)

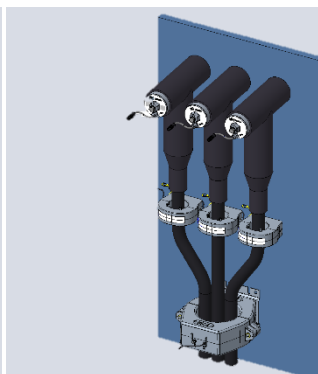


2x SMCS-JW1001 (current sensor)
3x SMVS-UW1001 (voltage sensor)
1x GAE120/SENS (sensors for earth fault detection)

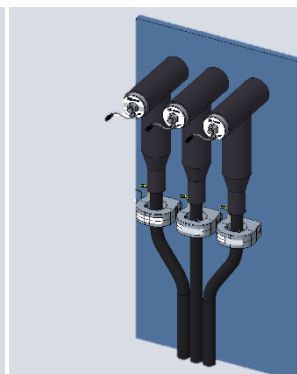
Retrofit



2x SMCS/T-JW1002 (current sensor)
3x SMVS-UW1001 (voltage sensor)
1x GAE120/SENS (sensors for earth fault detection)



3x SMCS/T-JW1002 (current sensor)
3x SMVS-UW1001 (voltage sensor)
1x GAE120/SENS (sensors for earth fault detection)








3x SMCS-JW1002 (current sensor)
3x SMVS-UW1001 (voltage sensor)

ZELISKO LPVT	MANUFACTURER	COMPATIBLE T-PLUG TYPE
UW1001	Nexans/Euromold:	400TB/G, 440TB/G, K400TB/G, K440TB/G, 400PB-XSA, KAA4
	Südkabel:	SEHDT 13, SEHDT 23, SEHDT 33, MUT 33
	TE Con/Raychem	RSTS-250A-C-RT-EL
UW1002-0	NKT	CB-12, CB-24, CB-36, CC-12, CC-24, CC-36
	TE Con/Raychem	RSTI-58XX, RSTI-CC-58XX, RSTI-68XX, RSTI-59xx
	Ensto	CONT630-24Lxx
UW1002-1	Nexans/Euromold	430TB, K430TB, 300PB/G, K300PB/G
UW1002-2	Südkabel	SET24, SEHDT 23.1, SAT24
UW1002-2	Cellpack	CTS 630 A
UW1002-3	Nexans/Euromold	(K)(M)480TB/G, (K)(M)484TB/G, (K)(M)489TB/G (K)(M)800PB/G; (K)(M)804PB/G, (K)(M)809PB/G, (K)(M)800SA
UW1002-5	Chardon	FDT630; RDT630
UW1004	Nexans/Euromold	R909TB/G
	NKT	CB 72




PRODUCT OVERVIEW – Low power voltage transformer

STANDARD VALUES		SECONDARY RATED VOLTAGE: 3,25/√3 V		BURDEN: 2 MΩ; 50pF	
PRODUCT	TYPE	MAX. INSULATION LEVEL	MAX. PRIMARY RATED VOLTAGE	APPLICATION	PRIMARY INTERFACE
PRIMARY DISTRIBUTION					
	UW1005-1	24/50/125 kV	22000/√3 V	GIS	cable plug size 1 for inner cone system acc. to EN50181
	UW1005-2	40,5/85/200 kV	36000/√3 V	GIS	cable plug size 2 for inner cone system acc. to EN50181
	UW1005-3	52/95/250 kV	45000/√3 V	GIS	cable plug size 3 for inner cone system acc. to EN50181
SECONDARY DISTRIBUTION					T-plug brand see page 4
	UW1001	40,5/85/200 kV	36000/√3 V	GIS	Interface type C acc. to EN50181
	UW1002-0	40,5/85/200 kV	36000/√3 V	GIS	asymmetrical interface
	UW1002-1	36/70/170 kV	33000/√3 V	GIS	asymmetrical interface
	UW1002-2	36/70/170 kV	33000/√3 V	GIS	asymmetrical interface
	UW1002-3	40,5/85/200 kV	36000/√3 V	GIS	asymmetrical interface
	UW1002-5	36/70/170 kV	33000/√3 V	GIS	asymmetrical interface
	UW1004	72,5/145/325 kV	66000/√3 V	GIS	Interface type F acc. to EN50181
	UW1013	36/70/170 kV	33000/√3 V	AIS indoor	-
	UW1020	36/70/170 kV	33000/√3 V	AIS outdoor	-



PRODUCT OVERVIEW – Low power current transformer

STANDARD VALUES		SECONDARY RATED VOLTAGE: 0,225 V		BURDEN: $\geq 20 \text{ k}\Omega$	
PRODUCT	TYPE	MAX. INSULATION LEVEL	MAX. PRIMARY RATED CURRENT	APPLICATION	PRODUCT FEATURES
PRIMARY DISTRIBUTION					
	JW100X	0,72/3 kV	Up to 4000 A	GIS / AIS Rogowski Technology ID up to $\varnothing 300 \text{ mm}$	Ratio on customer request e.g. 22,5mV @ 50 A
SECONDARY DISTRIBUTION					
	JW1001	0,72/3 kV	Up to 630 A	GIS / AIS Mounted on the bushing ID $\varnothing 82 \text{ mm}$	Ring core phase LPCT H=28mm for P10 H=50mm for P20
	JW1002	0,72/3 kV	Up to 630 A	GIS/ AIS Mounted on the cable ID $\varnothing 55 \text{ mm}$	split core phase LPCT
	JW1004	0,72/3 kV	Up to 630 A (EFD: 60 A)	GIS / AIS Mounted on the bushing ID 3 x $\varnothing 84 \text{ mm}$	3 x phase LPCT 2x phase LPCT & 1 x EFD 3 x phase LPCT & 1 x EFD
	JW1003	0,72/3 kV	Up to 630 A (EFD: 60 A)	GIS/ AIS Mounted on the cable ID $\varnothing 80/120/150 \text{ mm}$	Zero current sensor or phase current sensor

PRODUCT OVERVIEW – Low power combined transformer

STANDARD VALUES		SECONDARY RATED VOLTAGE: 3,25/ $\sqrt{3}$ V SECONDARY RATED VOLTAGE: 225 mV		BURDEN: 2 M Ω ; 50pF BURDEN: $\geq 20 \text{ k}\Omega$	
PRODUCT	TYPE	MAX. INSULATION LEVEL	RATED VALUES	APPLICATION	PRODUCT FEATURES
	K1112	36/70/170 kV	33000/ $\sqrt{3}$ // 3,25/ $\sqrt{3}$ V 300A // 225mV ext. 200%	Combined LPIT Outdoor Substation	H=345mm for 12kV H=398mm for 24kV H=448mm for 36kV
	UW7000-X	24/50/125 kV	22000/ $\sqrt{3}$ // 3,25/ $\sqrt{3}$ V 300A // 225mV ext. 200%	Combined LPIT Bushing type GIS	Mechanical design on customer request
	K1001	24/50/125 kV	22000/ $\sqrt{3}$ // 3,25/ $\sqrt{3}$ V 300A // 225mV ext. 200%	Combined LPIT Block type GIS	Combination of conventional and non- conventional outputs possible

PRODUCT OVERVIEW – Electronic devices

PRODUCT	TYPE	DESCRIPTION	FUNCTION
	GIM	Grid Intelligent Monitor	Detecting and indicating short circuits or ground faults Monitoring, measuring, and displaying operational values
	VMA	Voltage Metering Amplifier	Amplifying the output voltage of Zelisko voltage sensors from 3.25/ $\sqrt{3}$ V to 100/ $\sqrt{3}$ V or 110/ $\sqrt{3}$ V for metering applications

Product Overview – Secondary connection cable and interface

APPLICABLE FOR	CABLE TYPE	CONNECTION	LENGTH
LPVT LPCT	LiYCY-OB	M8 <--> open ends	1,7m / 3,7m / 5m / 6m / 8m / 10m
LPVT	CAT5e	M8 <--> RJ45	3,7m / 5m PIN (7) & PIN (8) 1m / 5m PIN (5) & PIN (4)
LPCT	LiYCY-OB	Mounted on the sensor with open ends	1,7m – 10m other lengths on request
LPCT	CAT5e	Mounted on the sensor with RJ45	1,7m / 3,7m / 5m PIN (1) & PIN (2)
LPVT & LPCT	Combi-Y-Adapter LI9YC(ST)11Y & LiYCY-OB	M8 <---> RJ45	5,7m (PIN (7) & PIN (8) for LPVT - PIN (1) & PIN (2) for LPCT) 5,7m (PIN (3) & PIN (6) for LPVT - PIN (1) & PIN (2) for LPCT)

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