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Data Sheet 5.91-1/2

Transformer Loss Measuring System, Type LiMOS

Application

- Measurement of no-load loss and current
- Measurement of load loss and impedance voltage
- Temperature rise tests
- Zero-sequence measurements
- Induced voltage tests

Description

The Transformer Loss Measuring System LiMOS consists of up to three combined voltage and current sensor units LiMO and one receiver unit LiMO-MCSU.

Each LiMO sensor contains a high accuracy current transducer and a compressed gas standard capacitor. The digitizing of the sensor signals is performed by the LiMO-MTU located at the bottom of the LiMO sensor unit. The digitized and preprocessed signals are transmitted to the common receiver unit LiMO-MCSU via fiber-optic cable.

The evaluation of transformer losses and other readings are executed in the receiver unit LiMO-MCSU. Optionally, the transmitted signals are converted back to analog values for further evaluation with third-party power analyzers. The system software iMOS enables the integration of the loss measuring system into the HIGHVOLT control for automated evaluation and recording of measured values.

The loss measuring system LiMOS is designed for indoor application only.

System Software iMOS

The LiMOS comes with the system software iMOS that serves to operate the whole measuring system and to read out, process and visualize the measured data. This software enables channel-wise access to operating elements and status.

The iMOS software allows the remote-controlled change of the measuring range of all voltage and current ranges and optionally offers sequence-controlled measurements.

If used with multi-phase systems the software is capable of multi-channel data processing making also relations between the measured values of the several phases available.

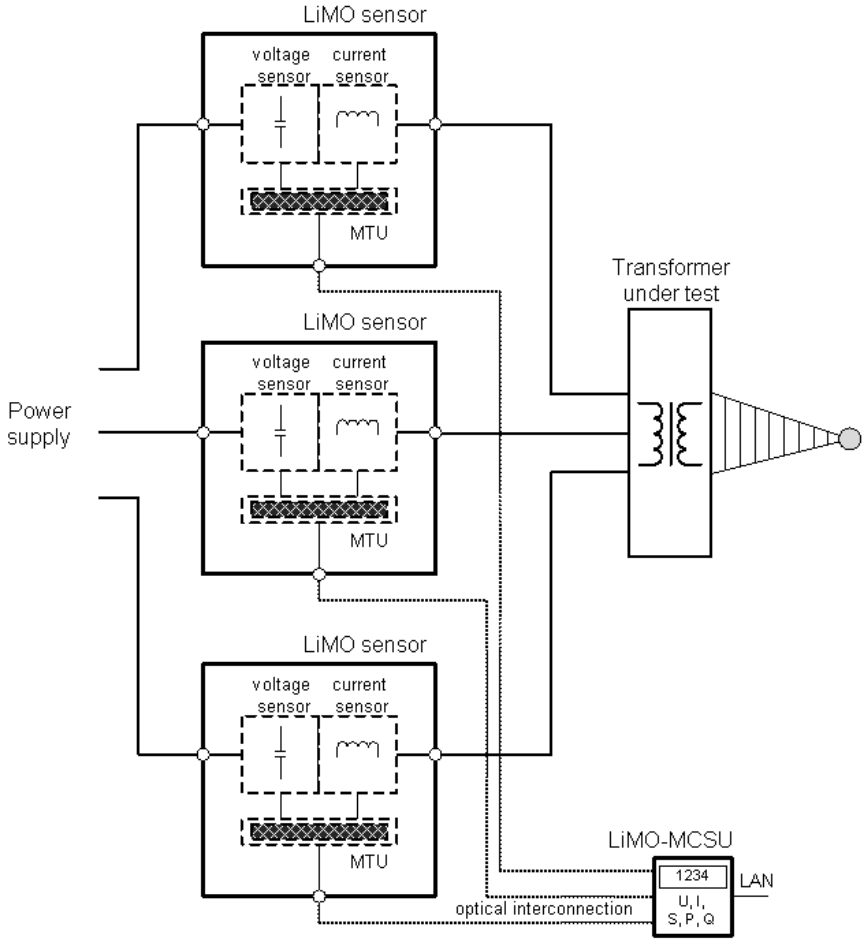

Fig. 1 Transformer Loss Measuring System LiMOS

Fig. 2 Transformer Loss Measuring System LiMOS 2000/100-3 (with LiMOS MCSU; left: stand alone, right: integrated into operator desk)

Advantages

The Transformer Loss Measuring System LiMOS is the universal tool for the technical and commercial assessment of power transformers. LiMOS enables the precise adjustment of test voltage and current for every transformer test as well as the measurement of losses and other essential values with highest accuracy.

It comprises the latest technologies for the fully digital signal processing, conditioning and optical transmission. These technologies facilitate the highest electromagnetic compatibility, stability and long-term accuracy.

The combined voltage/current sensors and the digital technology enable a very compact design with only three HV devices for three phases. This means smallest volume and footprint.

Table 1: Main Parameters

Main Parameters	**unit**	Type **LiMOS 2000/100**	Type **LiMOS 4000/100**	Type **LiMOS 2000/200**	Type **LiMOS 4000/200**
LiMO System					
Performance					
Rated voltage (phase-to-earth)	kV	100		200	
Rated current	A	2000	4000	2000	4000
Measuring frequency	Hz	50, 60			
Operating frequency	Hz	40 to 200			
Voltage measurement					
Ranges	kV	0.1 – 0.2 – 0.5 – 1 – 2 – 5 – 10 – 20 – 50 – 100		0.1 – 0.2 – 0.5 –1 – 2 – 5 – 10 – 20 – 50 – 100 - 200	
Measuring accuracy	%	0.08 [1)]			
Current measurement					
Ranges	A	1 – 2 – 5 – 10 – 20 – 50 – 100 – 200 – 500 – 1000 - 2000	2 – 5 – 10 – 20 – 50 – 100 – 200 – 500 – 1000 – 2000 – 4000	1 – 2 – 5 – 10 – 20 – 50 – 100 – 200 – 500 – 1000 - 2000	2 – 5 – 10 – 20 – 50 – 100 – 200 – 500 – 1000 – 2000 - 4000
Measuring accuracy	%	0.08 [1)]			
Loss measurement – Accuracy [2)]					
cos φ = 1.000	%	0.11		0.13	
cos φ = 0.100	%	0.13		0.15	
cos φ = 0.050	%	0.19		0.22	
cos φ = 0.020	%	0.52		0.55	
cos φ = 0.010	%	0.87		0.90	
cos φ = 0.008	%	1.10		1.13	
LiMO sensor unit					
Environmental conditions					
Operating temperature	°C	+ 5 to +40			
Storage temperature	°C	-20 to +50			
Humidity	%r.H.	30 – 80 (non condensing)			
Normal operating conditions					
Rated power supply voltage	V(AC)	100 to 240			
Power supply frequency	Hz	50 / 60			
Maximum required input power	W	80			
Safety clearances					
to earthed components	m	0.5		1	
phase-to-phase	m	1		2	
Insulating gas		SF_6, quality according to IEC 60 376			
Operating pressure (at 20 °C)	bar	4			
Quantity of SF6 gas	kg	8.5			
Dimension and weights (approx.)					
Length	m	1.8	1.6	1.6	1.6
Width	m	0.9	0.9	0.9	0.9
Height	m	2.2	2.0	2.5	2.5
Weight	kg	670	670	750	750
LiMO-MCSU receiver unit					
Performance					
Monitor output (MCSU L version only)					
Voltage monitor voltage (at 100% range utilization)	V	1			
Current Monitor voltage (at 100% range utilization)	V	1			

Main Parameters	**unit**	Type **LiMOS 2000/100**	Type **LiMOS 4000/100**	Type **LiMOS 2000/200**	Type **LiMOS 4000/200**
Power output (MCSU A and MCSU AL versions only)					
Output voltage (at 100% range utilization)	V	100			
Output current (at 100% range utilization)	A	1			
Features					
Interface		Ethernet LAN (TCP/IP)			
Range Display		2x LCD			
Safety loop contacts					
Operating voltage	V	≤ 240			
Quantity		2			
Environmental conditions					
Operating temperature	°C	+10 to +30			
Storage temperature	°C	-20 to +50			
Humidity	%r.H.	30 – 80 (non condensing)			
Normal operating conditions					
Rated power supply voltage	V(AC)	100 to 240			
Power supply frequency	Hz	50 / 60			
Maximum required input power	W	150			
Dimension and weights					
Length	mm	483 (19”)			
Width	mm	392			
Height	mm	267 (6HU)			
Weight	kg	14			
Accessories					
Fiber optic cable	m	50			
Laptop					

[1] - at 40 % to 110 % range utilization

[2] - at ≥ 100 V and ≥ 1 A

Type designation

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LiMOS 2000/100-3              loss measuring system with LiMO sensors and receiver unit
       |    |  |
       |    |  +------------  number of phases
       |    +---------------  rated voltage in kV
       +--------------------  rated current in A

LiMO 2000/100                 combined current/voltage sensor with transmission unit (MTU)
      |    |
      |    +----------------  rated voltage in kV
      +---------------------  rated current in A

LiMO-MCSU LG 2000/100-3       receiver unit (MCSU)
          ||  |    |  |
          ||  |    |  +-----  number of phases
          ||  |    +--------  rated voltage in kV
          ||  +-------------  rated current in A
          |+----------------  device chassis
          |                   E:  integrated into operator desk
          |                   G:  stand-alone
          +-----------------  postprocessing features
                              A:  analog output
                              L:  power analyzer functions
                              AL: analog output and power analyzer functions
```