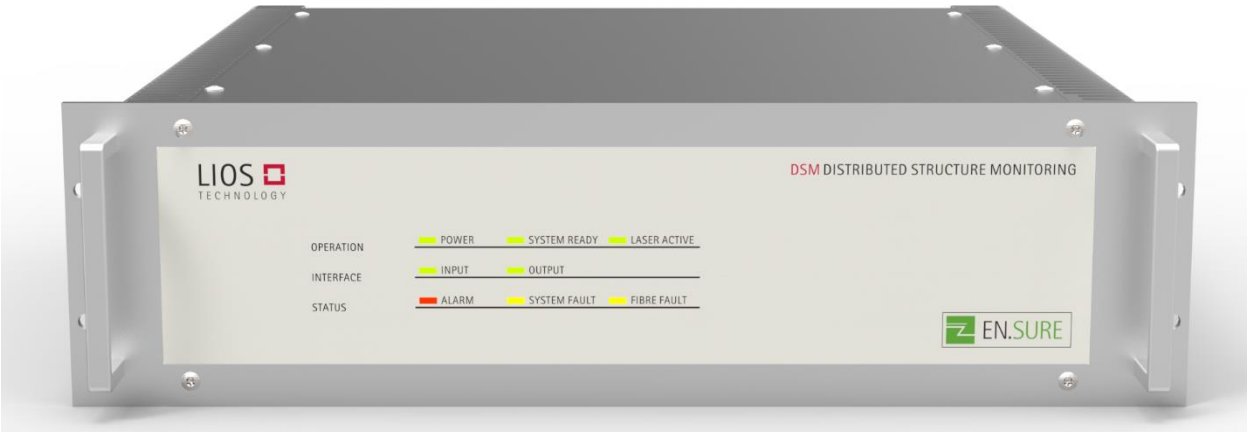
LIOS EN.SURE
DISTRIBUTED POWER CABLE MONITORING

Distributed Structure Monitoring System

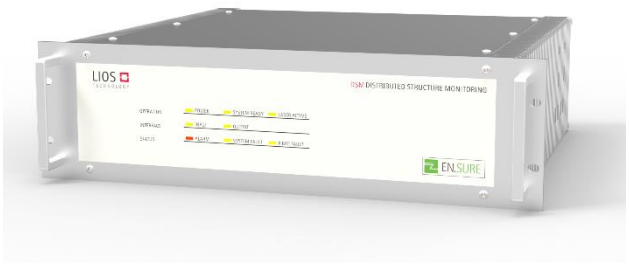


EN.SURE® DSM for Real Time Structure Monitoring of Long Power Cables

The EN.SURE DSM is a series of controllers for distributed structure monitoring (DSM) that is based on a proprietary Brillouin measurement technology. Its major advantages are the excellent distance range and measurement performance in combination with the passively cooled (fan-less) and maintenance-free industrial design of the EN.SURE DTS family. It exhibits a superior strain and temperature resolution and accuracy in comparison to other technologies. The excellent performance is achieved in both, single- and double-ended fibre configurations. The DSM series is designed for autonomous operation without PC and comprises an internal SSD (solid state drive) for storage of measurement and event data.

The DSM series is fully integrated with the Charon4 software suite for easy configuration, long-term data storage and enhanced visualization that also serves the EN.SURE DTS series. Data from DSM and DTS controllers and other sensors are easily combined in the database to enable an efficient monitoring of complex power cable installations using various sensing systems with different distance range and/or measurands.

The optional EN.SURE RTTR (real-time thermal rating) software package in addition enables the calculation of conductor temperature profiles along the entire length of a circuit as well as the prediction of temperature, time and ampacity. No cyclic load approximations have to be used, and constant or variable load may be considered in the predictions.



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Distance Ranges of DSM Models

EN.SURE DSM-050, -100, -200, -300, -400, -500	5 km, 10 km, 20 km, 30 km, 40 km, 50 km

Optical Data

Optical channels (internal)	1, 2, 3, 4, 6, 8, 9, 12 or 16
Fibre configuration	No loop or termination required
Optical connector(s)	E2000 / APC
Fibre types	Single-mode 9/125, e.g. ITU-T G.652, G.655 or G.657
Laser classification	Class 1M (IEC60825-1), eye-safe wavelength

Measurement Performance*

Sampling Interval	0.25, 0.5 or 1 m
Spatial resolution	1, 2, 3 or 5 m
Temperature resolution @ 10dB optical loss	< 1 °C
Strain resolution, minimum	< 2 με
Strain resolution @ 10dB optical loss	< 20 με
Temperature accuracy	2 °C**
Measurement time	1 to 20 min
* Measurement performance parameters are interdependent	** after calibration on a loose fibre without strain

Data Storage / Communication / Interfaces

Internal SSD storage	8, 16, 32 or 64 GB
Communication interfaces	2x Ethernet TCP/IP, USB, (optional: WLAN, GSM)
Communication protocols (options)	XML, MODBUS, DNP3, IEC60870, IEC61850
Programmable inputs / outputs	4 / 10
Fixed outputs	Collective fault and alarm
I/O board (optional***)	4 inputs / 12 outputs
Analogue sensors interface board (optional***)	4x Pt100, 2x 0(4)-20mA and 2x 0-10V
Analogue outputs (optional external module)	4 - 20mA
*** 2 optional boards can be installed in total	

Mechanical Data

Rack space	19-inch rack, 3 height units
Dimensions (H x W x D)	13.3 x 43.9 x 40.3 cm
Weight	15kg

Electrical Data

Power consumption, max. (DC / AC options)	40 W / 45 W
Operating voltage (DC-1 option)	12 ... 24 V DC (-15%/+10%)
Operating voltage (DC-2 option)	24 ... 48 V DC (-15%/+10%)
Mains voltage (AC option)	100 ... 240 V AC 50..60 Hz / 110... 220 V DC (-15%/+10%)

Environmental Conditions

Storage temperature	-40°C to +85°C
Operating temperature	-10°C to +60°C
Humidity (relative)	≤95 % (non-condensing)
Protection class (IEC 60529)	IP51

Conformity to Standards

Electrical safety	IEC/UL 61010-1, LV directive 2014/35/EC, CAN/CSA-C22.2
EMC****	EN61326-1, EN61000-6-2,3,-4-2,3,4,5,6,8,11,-3-2,3, FCC 47 CFR Ch.1 Part15
Hazardous substances, waste	RoHS directive 2011/65/EC, WEEE directive 2002/96/EC
Environmental testing****	IEC 60068-2-6,14,27,30
Functional safety (IEC61508)****	Hardware design compliant to Safety Integrity Level SIL2
Explosion safety (option)****	EX II (1) G [Ex op is T4 Ga] IIC / II (1) D [Ex op is Da] IIIC / I (M1) [Ex op is Ma]
**** Qualification in process	

CE

Ensure Save and Stable Grid Operation

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