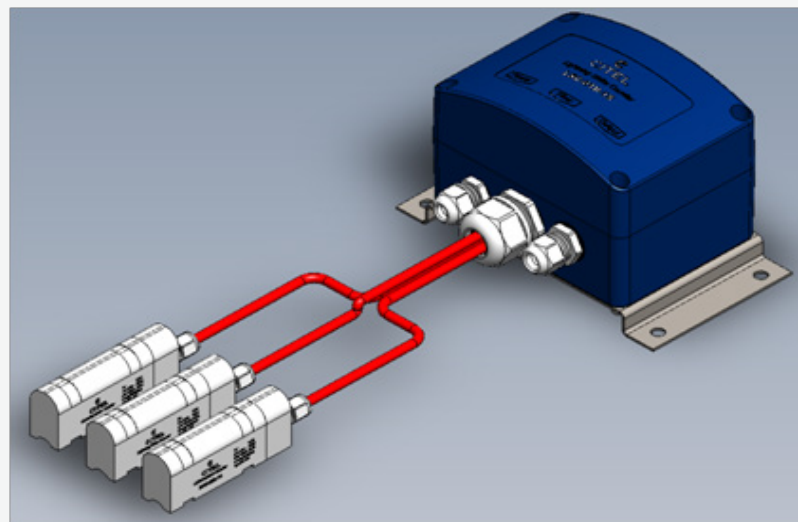


LSC-B

Surge current counter
for wind turbine

Technical specification



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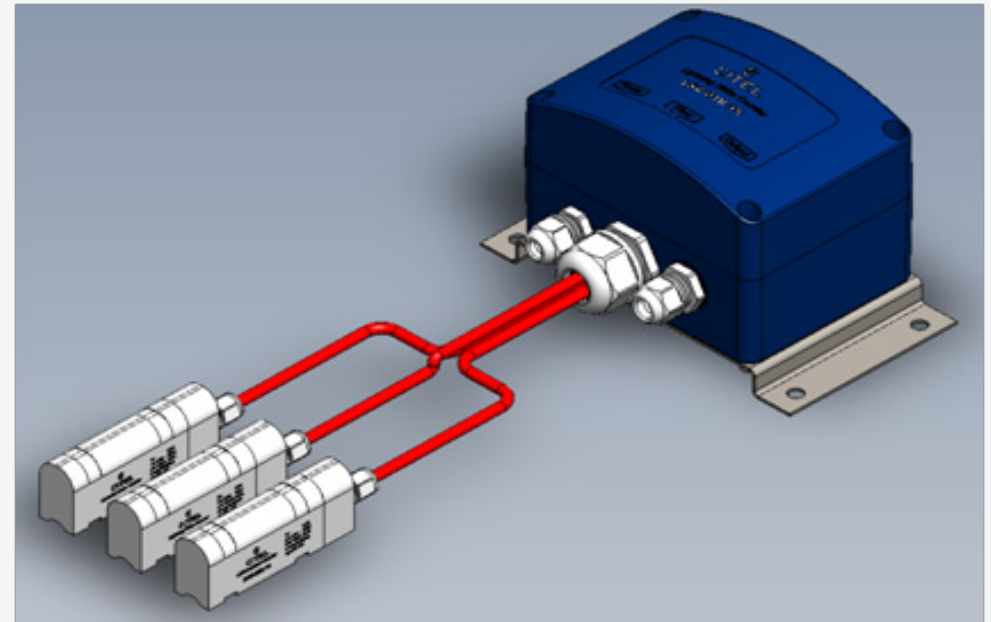
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1 - Description

LSC-B is a unique lightning current measurement system developed by CITELE and dedicated to wind turbines equipment, as requested by the IEC61400-24 standard (Lightning protection of Wind turbines).

LSC-B is a Lightning Strike Counter designed to measure the huge currents flowing inside the wind turbine when it is stroked by lightning and provides valuable data for operation monitoring and maintenance.



2 - Standard

IEC61400-24: Wind turbines – Part 24: Lightning protection

IEC 62561-6 [2018]: Lightning protection system components (LPSC)

Part 6: Requirements for lightning strike counters (LSC)

3 - Product Structure

LSC-B is composed of three sensors and one detector, which transmits information through the optical fiber. LSC-B is installed in the blades and hub, and each blade is typically installed with one sensor (Fig 1) to collect lightning information from down conductor of air-termination and use MOSFET switch output. The requirement of each turbine is shown in Table 1 as following.

Installation site	Product	Quantity
Each blade	LSC-02B	1
	Fiber	1
Hub	LSC-01B	1
	2- core shielded power cables	1
	2- core shielded cables for output signal	1
Total	LSC-02B	3
	Fiber	3
	LSC-01B	1
	2- core shielded power cables	1
	2- core shielded cables for output signal	3

Table 1 - The requirement of each turbine

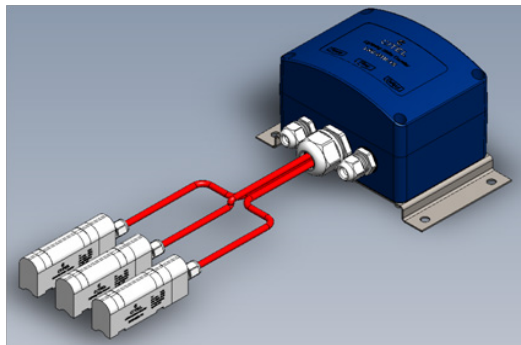


Fig 1 - The structure of LSC-B

3-1 Sensor

The sensor LSC-02B collects LEMP by means of electromagnetic induction, which is isolated from lightning channel with high security. It is composed of lightning sensor, rectifier, current limiter and optical signal transmitter, as following Fig 2 and Fig 3.

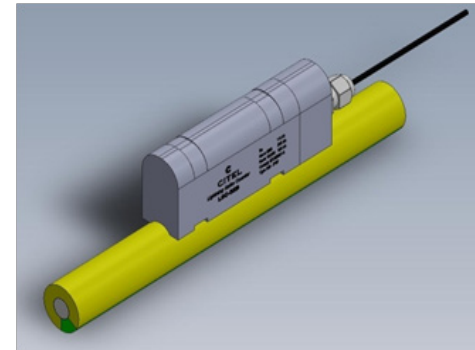


Fig 2 - Shape of LSC-02B sensor

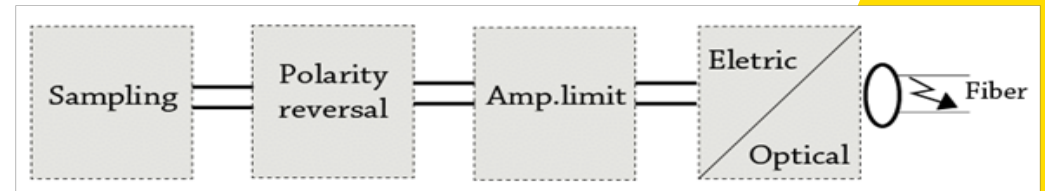


Fig 3 - Construction of LSC-02B sensor

4 - Specification and Function

3-2 Detector

The detector LSC-01B transmits the number of lightning in the form of MOSFET switch signal to the PLC in the turbine, by the circuit of delay and signal processing. It is composed of optical-to-electrical transducer, delayer, signal processor and MOS FET relay, as following Fig 4 and Fig 5.

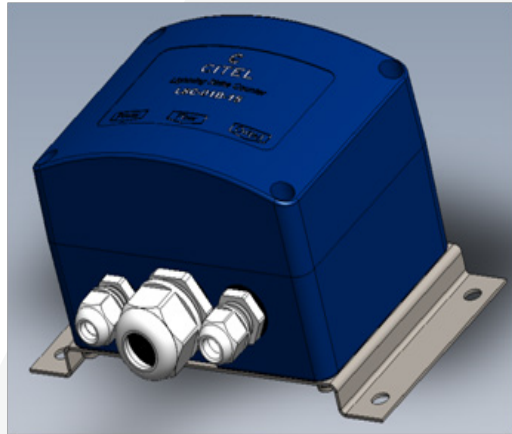


Fig 4 - Shape of LSC-01B detector

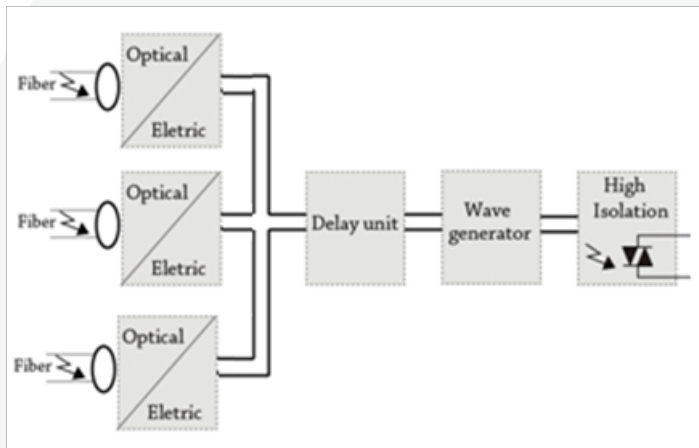


Fig 5 - Construction of LSC-01B detector

4-1 Speficiation

Min/Max. Surge Current	1kA /200kA
Power supply	DC 15V/0.5A
Temperatures	-40°C + 70°C
Vibration and Shock	F : 10-55 Hz, < 1.5 mm, 3 g
Output	MOSFET switch
Output switch off when lighting	>1s
Sensor size	94×35×22mm
Detector size	150×110×98mm
Sensor weight	80 g
Detector weight	1200 g

Table 2 - Specification of LSC-B

4-2 Function

Operating state	Output state
Normal	Output switch on
Power on	Green LED on, Red LED flash, output switch off >1s, then return to the normal state
Lightning	Red LED flash, output switch off >1s, then return to the normal state
Test Laser pen simulation	Red LED flash, output switch off >1s, then return to the normal state

Table 3 - Function of LSC-B

5 - Interface information

The user interface of LSC-01B is composed of three parts: the power input, fiber input and switch output. PG water joint should be installed in the user-side. The two-core shielded cable is used for the power input, and the shield conductor of the two-core shielded cable should be connected to the nearby ground; The fiber input is composed of three fiber interfaces, corresponding to three sensors; The switch output is composed of three MOS FET relays (The detail output switch interface can refer to table 4).

The three fiber terminal blocks have independent connection (the connection diagram can refer to the figure 7). Two-core cable can be used to communicate the signal. The detail connection can refer to the figure 6.

Load voltage (AC peak/DC)	V _{OFF} = 350V
Continuous load current	I _O = 120mA
Normal	Output switch on, green LED on
Lightning	Red LED flash, output switch off >1s, then return to normal state

Table 4 - Detector output switch interface

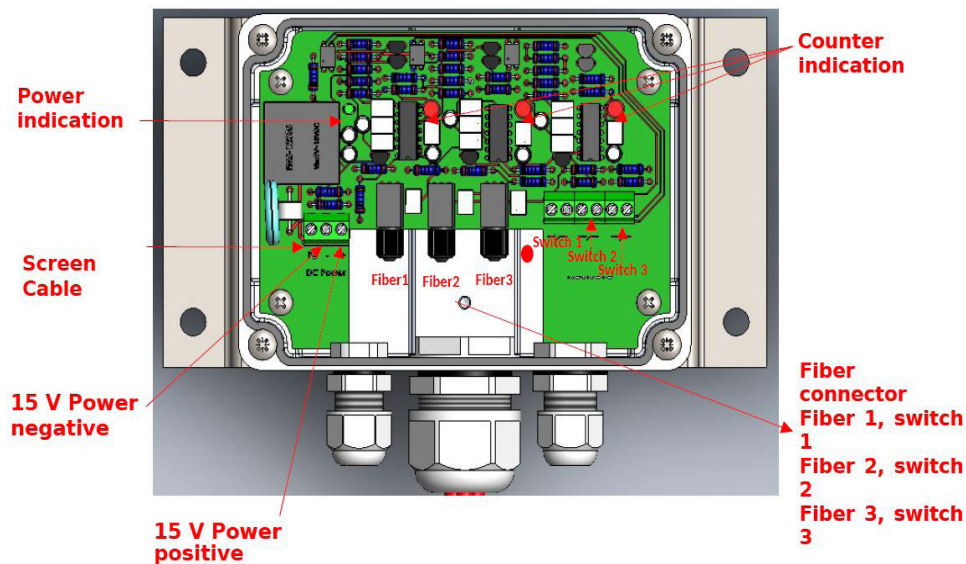


Fig 6 - Wiring diagram

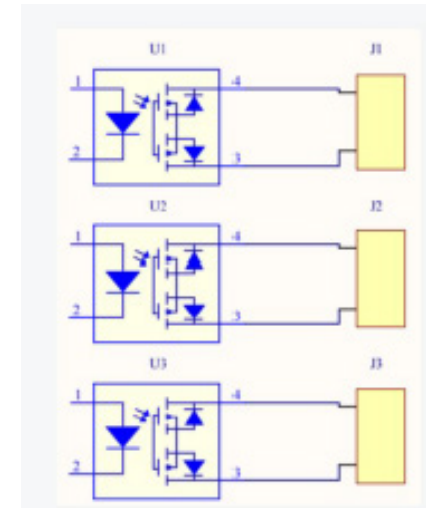


Fig 7 - Signals output diagram

6 - Installation

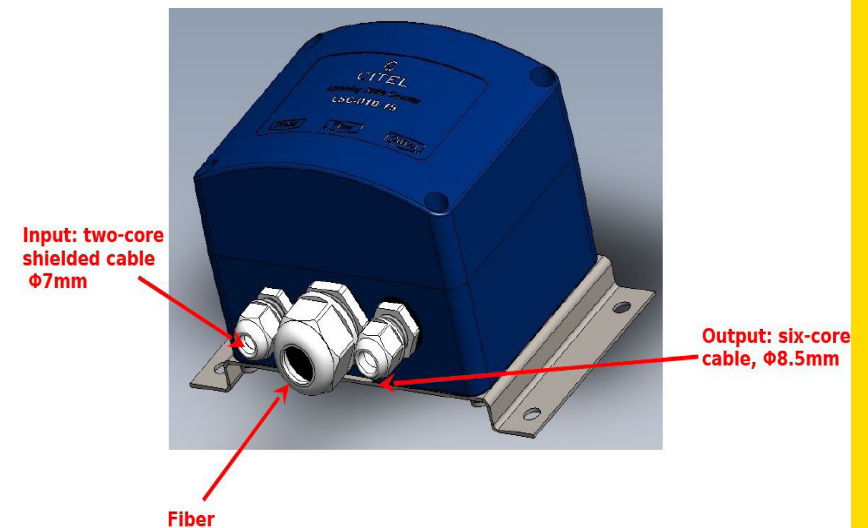
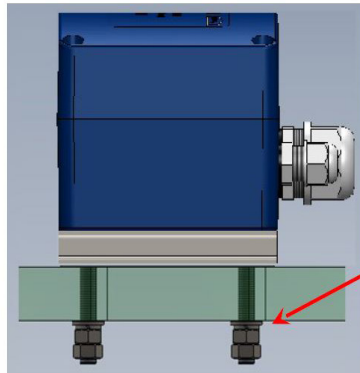


Fig 8 - Installation Diagram 1



Screwed to the plate
by M8 stainless
steelscrews (50mm)

Fig 9 - Installation diagram 2



Fig 10 - Insatallation Diagram 3

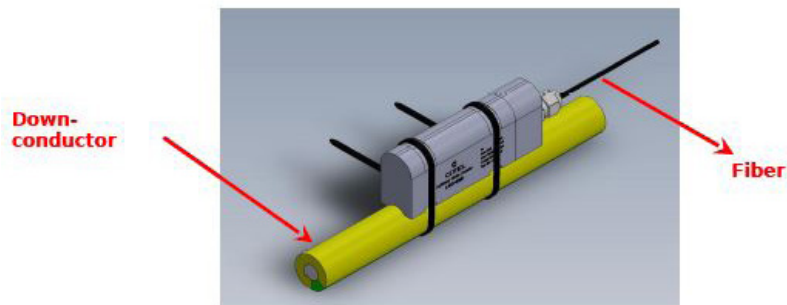


Fig 11 - Installation Diagram 4

LSC-02B has to be covered with FRB (Fiber Reinforced Plastics) in Blade factory.