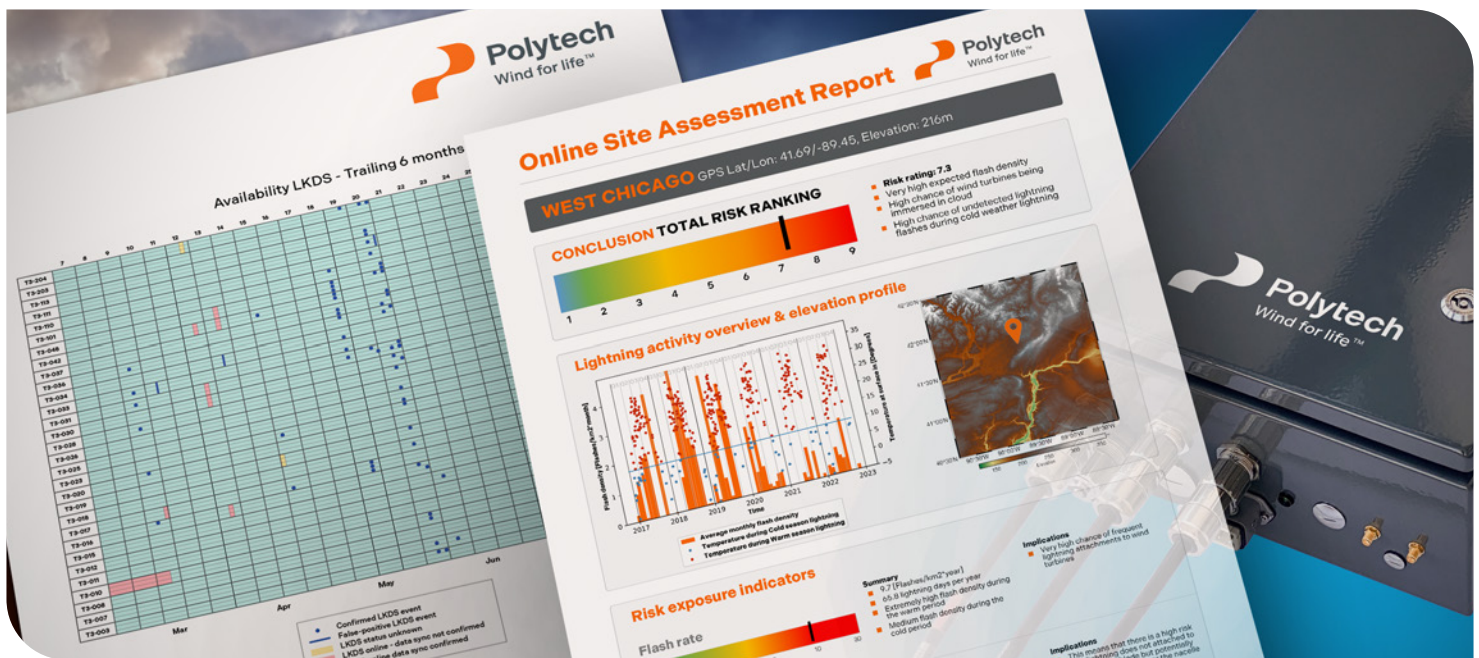




Upgrade Your Turbines with Lightning Key Data System (LKDS®)

AVOID UNNECESSARY DOWNTIME AND EXPENSIVE REPAIRS



The right and accurate data on lightning strikes is the key to proper operation and maintenance of wind turbines.

As wind turbines grow in size and operate in more remote, high-risk areas, lightning strikes pose an increasing threat, impacting turbine uptime and escalating repair costs. Polytech's Lightning Key Data System (LKDS®) offers a robust, real-time solution tailored for retrofitting turbines, helping asset owners protect and extend turbine lifespan by capturing essential lightning data and reducing unnecessary inspections and damages that could lead to component failure.

Knowing the exact time, peak current, charge, specific energy, and rise time, you will get a unique and accurate insight to make immediate and right decisions on whether the turbine can continue to operate safely or must be stopped immediately for inspection. You can therefore plan your service more efficiently and avoid stopping the turbine for no reason.

With LKDS®, you also have an overview of accumulated lightning strikes hitting your blades, so you avoid overlooking emerging damages which may have fatal consequences for the turbines if not taken care of in time.

The complete picture right away

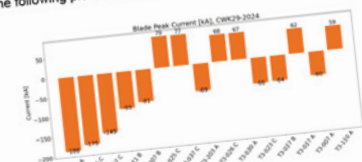
LKDS® records the lightning strike in a time frame of 1.5s on each of the three channels. This ensures a measurement of the entire lightning incidence and an accurate calculation of key parameters enabling recordings even in severe thunderstorms with fast and multiple strikes.

SUMMARY OF LKDS® ADVANTAGES

- Improves uptime and reduces inspections.
- Online access to all data (peak current (kA), energy (MJ/Ω), charge (C) and current rise time (dl/dt).
- Low trigger level to capture small upward strikes
- Long recording time to capture the entire event
- High dynamic range & resolution
- Capture small as well as big strikes with high accuracy.
- Onboard UPS System
- Capturing lightning events even with no power to the turbine.
- High sampling rate to capture all events and stroke components
- DNV verified & compliant to class 1 in the IEC 61400- 24 Ed2 Annex L standard.

Ranking of lightning events until CWK29-2024

During CWK29-2024, 1 lightning event was recorded for WEH T3. The following plots rank the accumulated exposure of the 15 most exposed blades until CWK29-2024.



Largest current magnitudes since commissioning of the LKDS measuring system.
The peak current is responsible for magnetic fields and electrodynamic forces.



Accumulated absolute charge transfer since commissioning of the LKDS measuring system.
Charge is responsible for erosion and wear on air terminations, and the exposure to enable preventive maintenance.



Largest specific energy since commissioning of the LKDS measuring system.
The specific energy defines the heating of the current path, and potentially the extension of the damages in the event of an interception failure.

A lightning strike is powerful and complex, but Polytech makes it simple. You get monthly reports on lightning events for each blade and accumulated strikes, so you can make better and faster decisions protecting your assets.

Efficient, real-Time monitoring and Reporting

LKDS® records lightning events in real-time, storing up to 1,000 events. Data is accessible through SCADA-compatible communication channels, enabling asset owners to integrate LKDS® into existing monitoring systems. Monthly reporting and targeted inspection recommendations are available to streamline maintenance planning and minimize unnecessary turbine stops.

Rugged design built for the harshest conditions

LKDS® is crafted to withstand extreme environments, including offshore conditions. The system is rigorously tested for vibration, temperature, and electromagnetic interference. LKDS® data is DNV-accredited, meeting industry standards like Class 1 of the IEC 61400-24 Ed2 Annex L, and providing reliable records for insurance and warranty claims.

LKDS® has been tested extensively in EMC, climate chambers, and mechanical test rigs, and has also been exposed to numerous lightning strike impacts at an accredited testing facility. With thousands of systems installed and validated in the field, LKDS® has a proven field performance above 99.9%. It is a robust and reliable product suitable for the harsh onshore and offshore operating conditions.

1 Peak and accumulated data

Peak and accumulated data

Windfarm T3 until CWK29-2024

	Blade A					Blade B					Blade C				
	Number of strike	Current max [kA]	Charge total [C]	AI max [kJ/kg]	ditd max [kA/us]	Number of strike	Current max [kA]	Charge total [C]	AI max [kJ/kg]	ditd max [kA/us]	Number of strike	Current max [kA]	Charge total [C]	AI max [kJ/kg]	ditd max [kA/us]
T3-003	5	-55.0	14.4	62.5	3.4	2	0.7	0.5	0.1	0.1	4	-26.6	112.1	102.8	8.0
T3-007	11	-60.3	280.4	556.9	10.2	10	-48.1	110.8	945.1	8.7	7	-42.7	96.2	616.4	6.6
T3-008	5	-51.5	52.1	226.8	7.8	5	-48.1	129.0	154.1	9.5	2	-46.6	76.9	296.8	13.6
T3-010	2	-24.6	12.5	39.3	5.4	3	-27.6	32.6	31.8	7.5	2	-25.7	51.8	67.7	1.1
T3-011	1	-19.4	3.1	11.0	5.1	4	-44.4	256.3	174.3	5.1	3	-36.9	15.0	113.2	6.6
T3-012	3	-22.6	22.9	21.9	5.5	9	-32.8	60.5	56.0	13.8	3	-31.7	15.1	76.8	5.3
T3-015	5	-38.0	36.4	53.7	9.3	6	-38.8	11.2	110.8	6.5	2	-149.9	96.3	2149.9	9.7
T3-016	4	-36.3	24.3	117.2	5.4	5	-64.5	73.0	260.0	7.3	5	-22.2	5.7	16.4	7.8
T3-017	7	62.6	189.9	421.1	15.7	3	0.6	5	-30.5	47.3	81.5	9.4	0	-38.6	118.0
T3-018	1	-6.4	1.4	0.1	0.6	1	0.9	0.0	0.6	0.1	2	-38.6	118.0	65.5	7.0
T3-019	3	-38.4	17.2	43.0	9.5	1	0.9	0.0	0.6	0.1	4	-60.4	131.0	287.4	16.8
T3-020	5	-9.2	41.5	16.8	4.1	3	-14.9	73.5	71.4	6.2	6	79.5	96.7	1260.3	22.8
T3-023	2	-2.6	1.5	0.4	0.2	5	-35.2	85.2	71.4	6.2	3	68.2	69.0	311.4	44.2
T3-025	2	24.4	4.6	14.2	5.2	1	-0.7	4.7	0.7	0.0	5	-38.0	11.8	125.2	4.8
T3-026	4	27.5	12.2	33.3	5.6	3	-40.1	28.6	149.2	8.0	1	-28.9	93.5	35.5	8.2
T3-028	1	-43.0	13.8	107.3	88.9	3	-34.2	93.8	73.4	7.5	7	-43.7	24.4	183.1	6.4
T3-029	9	67.5	231.1	775.1	7.5	8	62.5	176.6	237.4	8.4	3	-54.8	9.8	213.8	1.5
T3-030	3	186.6	64.3	5497.9	42.4	10	-45.6	31.7	411.6	13.5	1	-24.1	4.4	39.0	3.1
T3-031	3	-42.1	10.7	92.8	7.4	2	-36.8	148.9	291.3	8.7	1	-53.1	27.2	133.4	7.6
T3-033	3	-38.9	107.2	102.9	22.2	3	-44.0	100.2	321.2	52.8	7	78.0	44.1	324.1	17.1
T3-034	4	3.3	0.0	0.0	2.3	4	-33.2	47.6	79.2	7.4	3	-33.0	66.0	144.4	6.8
T3-036	1	-44.9	223.8	234.6	16.1	2	-5.4	34.9	13.2	0.7	6	2.5	100.9	56.4	0.4
T3-037	7	-44.9	223.8	234.6	16.1	2	-5.4	34.9	13.2	0.7	6	2.5	100.9	56.4	0.4
T3-042	4	2.7	19.5	9.8	3.1	5	33.7	122.4	254.7	9.8	3	-40.7	71.5	349.7	10.3
T3-048	6	45.6	54.6	148.9	5.2	3	-45.4	85.5	100.0	3.6	4	-29.9	144.8	70.2	11.9
T3-101	1	-45.8	111.0	210.0	3.1	6	0.5	3.0	0.1	2.9	5	-2.4	4.9	2.5	0.1
T3-131	1	-45.8	111.0	210.0	3.1	6	0.5	3.0	0.1	2.9	5	-2.4	4.9	2.5	0.1
T3-110	3	59.4	156.5	2329.3	79.0	4	0.5	3.0	0.1	2.9	5	-33.3	66.9	56.6	31.8
T3-110	3	59.4	156.5	2329.3	79.0	4	0.5	3.0	0.1	2.9	5	-33.3	66.9	56.6	31.8

Achieve greater availability and control with LKDS®

With Polytech's LKDS®, asset owners gain confidence in the safety, performance, and cost-efficiency of their wind assets.

Retrofit your turbines with the most advanced lightning data system and take control of maintenance strategies with precision data, robust design, and actionable insights. Check out how affected your site is at polytech.com/online-lightning-site-assessment



The Lightning Key Data System is integrated in the wind turbine hub and blade area and is designed to withstand harsh environments. A sensor in each blade gives instant measurements of the lightning behavior during a strike.