

FREQUENTLY ASKED QUESTIONS

POWERLINK CM

Use Cases

- Can this solution be applied to cables (submarine, landline, ...) The system is applicable to overhead lines and cables. The major difference is the coupling to be used. Due to higher attenuation, a cable solution will not reach the distance of an overhead line.
- Can this solution be applied to distribution networks? This solution is independent of the voltage level. The criterion is the network topology. PowerLink CM can be used on any link-based network topology. If used in a meshed network, each tap or branch must be blocked by a line trap.
- Can a combination of overhead and underground transmission lines be monitored? Yes. The transition point will be clearly visible. Each transition point leads to an additional attenuation of the signal and thus reduces the maximum monitorable length.
- Can transformers be monitored? PowerLink CM is only applicable to HV lines or cables.
- Can insulator failures be detected? The insulator itself will not be monitored. Only a major impact on the HV line may be visible.
- Can PowerLink CM be used for line protection? PowerLink CM is a measuring device, not a line protection solution. Protection equipment can automatically initiate a trip caused by a tripping event.

Interfaces, Configuration, Requirements

- Does the device have to be tuned by the operator? The device needs to be configured based on line condition and available frequency bands. During commissioning the device will use the first measurement as reference profile. A renewal of the reference profile can be triggered manually at a later time if needed.
- Is the recording time configurable? Recording time can be configured in a broad range. We recommend a typical recording interval of 15 minutes for long-term measurements. For in-depth analysis, the recording interval can be lowered to 1 second.
- What kind of time synchronization is supported? NTP, IRIG-B, or Line clock sync are supported.
- Can we set limits to trigger some kind of alarm or event in the device? It is possible to manually set the threshold level for triggering an alarm relay or sending an alarm to the control center.
- Will the tool automatically interpret the measurements? The device records and displays a dynamic reflection profile. It does not provide an interpretation.
- What are the frequency ranges of the device? The device operates in a frequency range from 36 kHz to 500 kHz. For ideal operating conditions, we recommend using a bandwidth of 256 kHz.
- Is there a limitation on the monitorable line length? The maximum length mainly depends on the used frequency range and the attenuation of the transmission line. Transition points from overhead to cable, for example, significantly increase the attenuation. As a rule of thumb, the maximum monitorable line length in an ideal situation is ~400-500km.
- How does the device calculate the fault distance? Fault distance is calculated by time-of-flight measurement.

- Which communication protocols are supported? We support various protocols depending on the use case. Alarms can be raised via local alarm relays or by integration into an NMS via SNMPv3.
System configuration can be done via secure http connection to the device; various security features are implemented such as RADIUS authentication, role-based login, etc.
Download of large data files is best done by FTP.
- Do we need three devices to monitor all 3 phases, or is there a multiplexor to switch phases? When using phase-ground coupling, the device directly monitors a single line only. When using phase-phase coupling, the device monitors a combination of both phases.
Typically, monitoring of a single phase is sufficient. Depending on the geometry of the line, a major fault on one phase will be visible on the monitored phase by crosstalk.
- Measurements are done in experimental environment or in real time? Can the operator monitor it on a control panel? Measurements are done and displayed in real-time.
- Do we need additional equipment to operate PowerLink CM? The connection to the HV line requires three additional pieces of equipment:
1. Line Matching Unit, 2. Coupling Capacitor, 3. Line Trap.
- Many customers prefer travelling wave technology over impedance measurement technology PowerLink CM is no impedance measurement device. It detects a reflection profile and converts it via an algorithm into relative impedance change. The main application is condition monitoring. This use case is not supported by travelling wave technology.

Sensitivity

- Can the system perform Dynamic Line Rating? PowerLink CM works in a different way. A larger wire sag over longer period of time influences the electric field and thus is visible in the reflection diagram.
- What is the dependency on the conductor type? In general, this solution can be used on any conductor type. Different conductor types result in different line impedance to be compensated by the line matching unit. In addition, the conductor type has an influence on line attenuation and thus impacts the maximum monitorable length.
- Can the system eliminate the need for thermovision imaging of hotspots? A thermal hotspot is a highly localized event with limited impact on the overall relative impedance. By long-term observation you may be able to detect local changes of the profile that can serve as indication for such a hotspot.
- Will lightning surge be visible? Lightning is too short an event to be detectable by PowerLink CM. If it does not permanently damage the transmission line, it will not be visible.
- Will corona be visible? Corona is too short an event to be detectable by PowerLink CM. If it does not permanently damage the transmission line, it will not be visible.
- Will lightning damage the device? Lightning will have no adverse impact on PowerLink CM. Coupling capacitor and line matching unit protect the device against overvoltage.

Impact on existing PLC installations

- Is it possible to combine existing PLC with PowerLink CM? PLC is a communication device. PowerLink CM is a measuring/monitoring device. However, it is possible to reuse or to share the supporting infrastructure (line matching unit, coupling capacitor, line trap).
- Is it possible to use an existing PLC without interferences? We designed PowerLink CM so that it can be deployed in coexistence with existing PLC installations. Frequency planning - similar to PLC - is needed to ensure proper operation of both systems.