

# 基于通讯光缆的分布式电缆沟环境温度及电缆防盗监测系统开发及应用研究

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**摘要:** 针对深圳电缆沟分布广、距离长、环境复杂等特点, 并时常受外力破坏、人为偷盗以及火灾影响, 从而引发电缆断裂、短路、设备跳闸、停电等故障。基于单模通讯光纤的分布式测温 and 振动传感技术, 研发了基于通讯光缆的分布式电缆沟环境温度及电缆防盗监测系统, 其监测距离 10 km, 温度定位精度达到  $\pm 1$  m, 振动定位精度达到  $\pm 5$  m; 通过现场模拟测试, 报警率达到 100%。

**关键词:** 通讯光缆; 光纤传感; 环境温度监测; 电缆防盗; 集成系统

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## Development and application of distributed cable trench environment temperature and cable anti - theft monitoring system based on communication fiber optic cable

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**Abstract:** In the cable channel of China Southern Power Grid, according to wide distribution, long distance, complex environment, and often destroyed by the external force, for theft and fire, causing the cable fault, short circuit, tripping device, power failure of this phenomenon, we researched and developed distributed cable channel temperature and cable anti - theft monitoring system of communication cable based on single mode communication optical fiber distributed temperature measurement and vibration sensing technology, its monitoring distance is 10KM, abnormal temperature of the positioning accuracy is less than 1 meters and precision positioning vibration is 5 meters. The alarm rate is up to 100% through field simulation and test.

**Keywords:** communication fiber cable; Optical fiber sensing; environmental temperature monitoring; cable anti - theft; integrated system

近年, 城市 10 kV 配网电缆化率大幅提高。由于电缆铜皮铜芯具有较高价值, 导致电缆被频繁偷盗; 非电网管线在电缆沟中施工可能导致电力电缆的损坏; 长期运行过程存在电缆老化、短路等引发火灾。现有的“人防”、“物防”手段都无法做实

时监测。

分布式光纤传感技术只需利用通讯光缆的一芯即可实现温度监测或者防盗监测, 具有本质防爆、抗强电磁干扰、电绝缘性好、防雷击、高精度、重量轻、体积小等特点, 是一种具有高度智能化、自动化的监测技术。因此, 开发基于通讯光缆的分布式电缆沟环境温度及电缆防盗监测系统尤为重要。