Guide for the Technical Specification of IoT (Internet of Things) Intelligent Terminal within Switchgear









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speed/collector

IED controller

IoT intelligent

terminal

Intelligent Construction Demand



Temperature monitoring

Monitoring the environmental temperature of switchgear or Ring main Unit (RMU)

Cable temperature

monitoring

Monitoring three phases cable temperature to pre-judge the cable health condition

Bus temperature monitoring

Monitoring the bus temperature to analyze the bus health

Video monitoring

Monitoring videos of the earthing switch position to realize "double confirmation" accordance with the remote communication state

Mechanical characteristics monitoring

Monitoring the breaker's mechanical characteristics to analyze the operating conditions and lifetime, which will guide intelligent operation and maintenance of switchgear or RMU



characteristics

video collector

collecto

Learning from functional mobilephone to smart mobilephone, the intelligent terminal could achieve universal hardware and flexible software configuration, as well as support functional expansion as needed, which combined with many kinds of traditional electrical terminal functions and APP software that contains different requirements



Traditional detection

- High labor costs
- Patrol inspection is not timely, no early warning
- •Much more blind spots in patrol inspection

 Terminal has limitations: inadequate software scalability, proprietary communication,
non-standardized design, etc.

More electric shock hazard exists in live inspection







Current monitoring

Iower labor and labor costs

real-time monitoring, gives early warning to the faults

- Historical data query, trend analysis, fault diagnosis
- Potential failure points could be monitored with pre-judgement and analysis method



Market requirements



GSMA reports that the number of industrial IoT terminals will reach 6 billion in 2020 and 14 billion in 2025, with an average annual growth rate of 21%.



Schneider Electric launches intelligent loop switchgear, based on EcoStruxure architecture of IoT to meet users' increasing demands for digital power distribution operation and management



ABB adopts IoT technology to monitor equipment operation data and contact temperature in real time to help users to realize big data analysis and preventive maintenance



GE Power

GE America provides data bus r service for the Iot intelligent terminal through the "PredixMachine" device on the Predix platform



Siemens of Germany releases two kinds of gateway devices: "MindConnec Nano" and "MindConnect IoT 2040"



Technical requirements

Smart switchgear demands



Standard requirements

There is no relevant standard to regulate intelligent terminal within switchgear

Flexibility

Simple to realize, offering up to 66% less cables and up to 10% less connectivity components

Scalability

Users could download any functional APP software with universal hardware in the IoT intelligent terminal to realize evolving requirement.



Service continuity

Reliable and simple to service, offering up to 36% less maintenance cost



Future proof

Offering upgrade and update solutions with zero downtime





Artificial intelligence and machine learning function of IoT intelligent terminal:

- Breaker statement monitoring
- Earthing switch monitoring







Title	Correlation
Arulvizhi, D.Venkatesan, M.VAdivazhgan, Advancement in the Switchgear to Intelligent Switchgear for Smart Grid [J]. IJSRD- International Journal for Scientific Research & Development Vol.7, Issuel1, 2020	This paper elaborates the technology of switchgear intelligent construction and proposes the use of intelligent terminals, which will accelerate the pace of the switchgear intelligent construction
BS EN 62271-2004: AC Metal-Enclosed Switchgear and Controlgear for rated voltages above 1 kV and up to and including 52kV.	It is not applicable to the intelligent construction of switchgear and ring main unit (RMU).
IEEE C37.100-2001-IEEE Standard Definitions for Power Switchgear.	The standard just defines the terms for switchgear products, but excludes the functional and technical specification for IoT intelligent terminal
Guide for the Technical Specification of Smart Distribution Transformer Terminal.	The standard is limited to the substation area and is not related to the intelligent terminal of terminals of switchgear and RMU.



- Provides general functional and technical specification for IoT intelligent terminal (as a device) used in intelligent switchgear and RMU, and the system voltage is up to 35kV.
- Addresses various functions and requirements of its environmental aspect, communication and information exchange interface, power supply, hardware and software platform, and advanced application.
- Offers design, manufacturing, operation and testing for intelligent switchgear and RMU.



Entities involved are expected to include:

- State Grid Xuji Group Co., Ltd.
- China Electric Power Research Institute.
- China Southern Power Grid Academy of Science.
- State Grid Xiongan New Area Electric Power Supply Company.
- Newcastle University Upon Tyne.
- Tianjin University.
- Xi'an Jiao Tong University.
- North China University of Technology.
- Datang Telecom Technology Co., LTD.
- Schneider Electric SA.
- HUAWEI Technologies Co., LTD.



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