E-31	Keywords	Y4	system or software	Z4	Power	F33	Electric Utility

TEPCO Power Grid, Inc.

Engineering Service: Distribution Automation System (DAS)

Features

Improvements to the power supply reliability and efficient operation of the distribution system, are achieved in order to maximize the capacity for accepting generated power and interconnectable capacities.

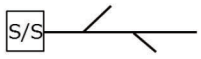
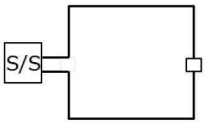
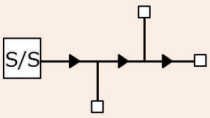
- Multi-divided multi-connected system, supporting effective power outage recovery and efficient system operations
- Online monitoring of system operation status with distribution automation system
- Shortened power outage recovery time through rapid identification of power outage locations, using automatic and remote controls

Overview or Principles

[Multi-divided and multi-connected power systems]

Reducing the duration of power outages, wherever they occur in the world, is a major problem for society overall, therefore power utilities constantly strive to improve power supply reliability. The planning of power distribution systems is extremely important, since distribution systems are the closest to users in any power transmission and distribution network and since a lot of the power outages are caused by power distribution facilities.

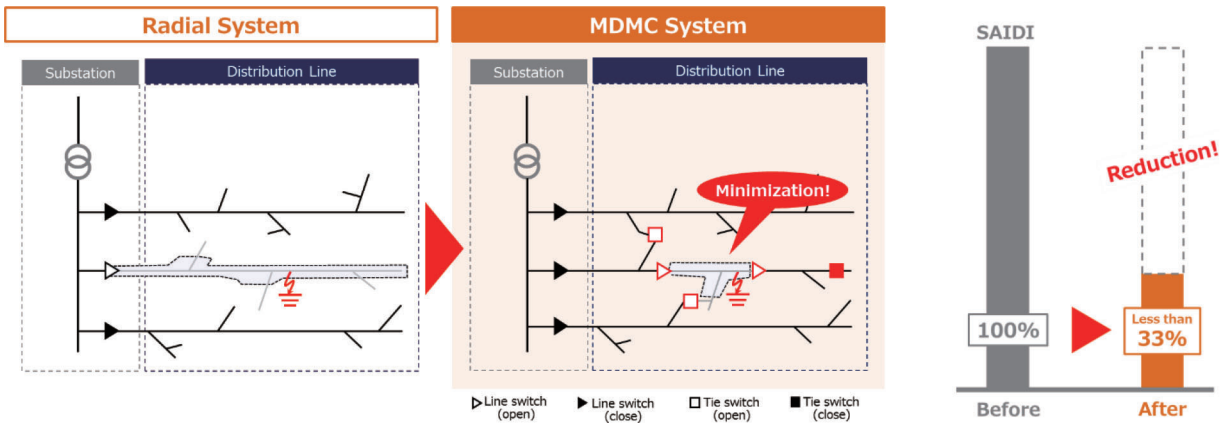
A variety of systems are among power distribution systems, however the multi-divided and multi-connected (MDMC) system has been utilized by TEPCO Power Grid, Inc. The multi-divided and multi-connected system, interconnects distribution lines, whereas distribution lines are distributed across multiple sectors, providing a higher reliability than radial systems and are capable of a higher operating rate to power distribution lines than loop systems. The multi-divided and multi-connected system is a superior power distribution system configuration, but since the configuration is complicated, a high degree of load management technology is required.

	Radial	Loop (Ring)	MDMC*
MV system			
Number of tie points	0	1	3
Maximum operation rate	100%	50%	75%
Reliability	Low	High	High

* In the case of three-division three-connection system

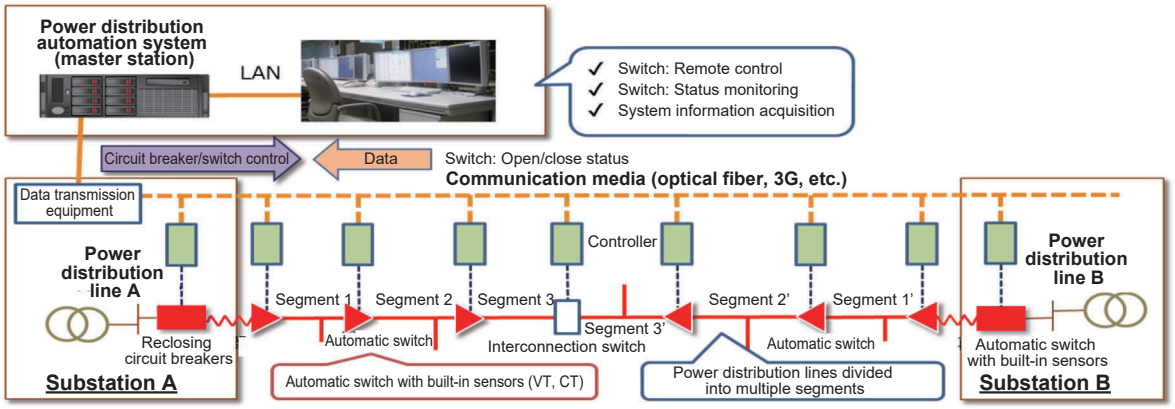
[Distribution Automation System]

The distribution automation system is capable of performing a series of operations, including “automatic identification of fault segment”, “automatic cutoff of fault segment”, “automatic recovery of healthy segment”, entirely on its own when any fault occurs in the power distribution system. The system configuration of a multi-divided and multi-connected system is essential to rapidly restore power to healthy segments (segments outside fault segments where problems have not occurred). Utilizing sophisticated facility forming know-how, accumulated over many years, to build multi-divided and multi-connected systems, while supporting efficient and rapid fault recovery and improving reliability with power distribution automation systems, TEPCO Power Grid, Inc. is contributing to maximizing the capacity for receiving the power generated by reusable energy.

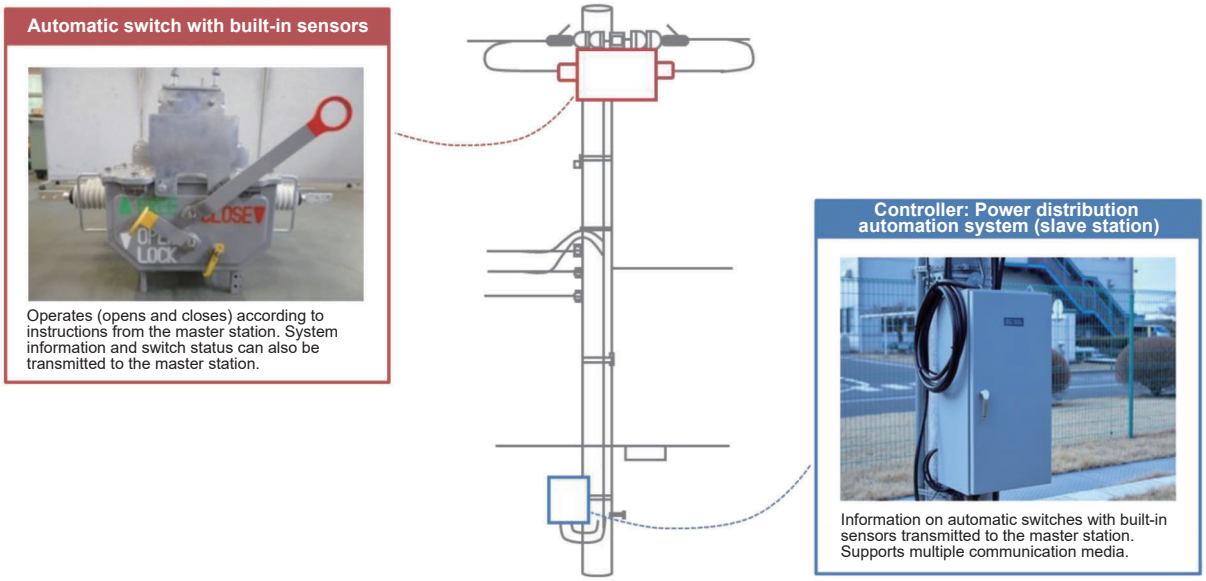


Implementation effect of three-division, three-connection power distribution automation system (image)

[Automatic switch with built-in sensors]
A power distribution automation system will become capable of remotely acquiring power system information, such as voltage, current, power factors and the like, by combining the system with an automatic switch with built-in sensors. The acquired information will be used to gain an understanding of the voltage distribution and network congestion status in the power distribution system, thereby maximizing the capacity to connect with sources of reusable energy.



Configuration of power distribution automation system (example)



Energy saving effects & special notes

The following effects can be expected by achieving a reduction in power outage duration and operating power distribution lines at high rates.

- ◆ Maximize capacity to receive reusable energy generated power (kWh)
- ◆ Maximize capacity to interconnect with systems of reusable energy (kWh)

Past or planned implementations

Domestic

- ◆ Power distribution automation at TEPCO Power Grid, Inc. (from 1990 to the present time)

Overseas

- ◆ Power distribution facility planning system popularization promotion project in Vietnam (2016 to 2017)
- ◆ Power distribution system, operating system and management technology popularization promotion project in the Philippines (from 2017 to the present time)

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