

ICS 27.100
CCS P 62

DL

**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

DL/T 5149-2001

**Technical code for designing computerized monitoring and
control system of 220~500kV substations**

200~500kV 变电所计算机监控系统设计技术规程

(English Translation)

Issued on: December 26, 2001

Implemented on: May 1, 2002

**Issued by: National Economic and Trade Commission of the People's
Republic of China Foreword**

Table of Contents

Foreword	5
1 Scope of application	7
2 Normative references	8
3 General	9
4 Main terms	10
5 System composition	12
5.1 System structure	12
5.2 Network structure	12
5.3 Hardware equipment	13
5.4 Software system	14
5.5 Technical indicator	15
6 System functions	18
6.1 Data acquisition and processing	18
6.2 Database establishment and maintenance	18
6.3 Control operation	19
6.4 Anti-mislocking	20
6.5 Synchronizing	20
6.6 Alarm processing	21
6.7 Event sequence recording and accident recall	21
6.8 Screen generation and display	22
6.9 Online calculation and tabulation	22
6.10 Electric energy processing	23
6.11 Telecontrol function	23
6.12 Clock synchronization	23
6.13 Man-machine interaction	24
6.14 System self-diagnosis and self-recovery	25
6.15 Interface with other devices	25
6.16 Operation management	26
7 Signal input/output	27
7.1 Analog input signal	27
7.2 On-off input signal	27
7.3 Electrical energy data input signal	27

7.4 On-off output signal	28
8 Equipment layout	29
8.1 Layout of station level equipment	29
8.2 Layout of bay level equipment	29
8.3 Screen cabinet structure and screen layout	29
9 Venue and environment	30
10 Power supply	31
11 Lightning protection and grounding	32
12 Cable selection and laying	34
Appendix A (Indicative) Description of the words in this Code	35
Appendix B (Indicative) Analog signal	36
Appendix C (Indicative) Main on-off input signals	43
Appendix D (Indicative) Electrical energy signal acquisition parameters	45
Appendix E (Indicative) On-off output signals	47

1 Scope of application

This Code is applicable to the design of computerized monitoring and control system for the newly built 220kV hub substations and 500kV (330kV) substations. Expansion and reconstruction projects of the same voltage grade may be carried out with reference.

2 Normative references

The following standards include provisions that constitute provisions of this

Code by reference in this Code. At the time of publication of this Standard, the editions indicated are valid. All standards are subject to revision. Parties to this Standard shall explore the possibility of using the latest editions of the following standards.

GB/T 50217-1994 Code for design of cables electric work

GB/T 17626-1998 Electromagnetic compatibility - Testing and measurement techniques

DL/T 630-1997 Technical requirement for RTU with a.c. electrical quantities input, discrete sampling

DL/T 634-1997 Telecontrol equipment and systems - Part 5. Transmission protocols - Section 101 Companion standard for basic telecontrol tasks

DL/T 667-1999 Telecontrol equipment and systems - Part 5. Transmission protocol - Section 103 Companion standard for the information interface of protection equipment

DL/T 719-2000 Telecontrol equipment and systems - Part 5. Transmission protocol - Section 102 Companion standard for the transmission of integrated totals in electric power systems

DL 5002-1991 Specifications for the design of dispatching automation in district electric power systems

DL 5003-1991 Specifications for the design of dispatching automation in electric power systems

DL/T 5136-2001 Technical code for designing of electrical secondary wiring in fossil fuel power plants and substations

DL/T 5137-2001 Technical code for designing electrical measuring and energy metering device

SDJ 2-1988 Technical code for designing 220~500kV substations

3.0.1

This Code is specific design regulations for 500kV (330kV) substations and 220kV hub substations using the computerized monitoring and control system, and is supplementary regulations for implementing the relevant provisions of Technical code for designing 220~500kV substations and Technical code for designing of electrical secondary wiring in fossil fuel power plants and substations.

3.0.2

The design of the computerized monitoring and control system of substations shall follow the following principles.

- 1) Improve the safety production level, technical management level and power supply quality of substations.
- 2) Make the substations easy to operate and simple to maintain, improve labor productivity and operating efficiency, and realize the reduction of labor and enhancement of efficiency.
- 3) Reduce connection between secondary devices, and save control cables.
- 4) Reduce the configuration of substation equipment, avoid repeated equipment settings, and achieve resource sharing.
- 5) Reduce the area of substations and the project cost.

3.0.3

The selection of the computerized monitoring and control system of substations shall be safe, reliable, economical, advanced in technology, and in line with nationality. Mature and reliable products that are open, extensible, and highly resistant to interference shall be

adopted.

3.0.4

The computerized monitoring and control system of substations shall be able to realize reliable, reasonable and perfect monitoring of substations, shall have all telecontrol functions such as telemetering, tele-signalisation, tele-regulation, telecontrol, etc., and shall be capable of exchanging information with the computer system of the dispatching communication center.

3.0.5

In addition to the implementation of this Code, the design of the computerized monitoring and control system of substations shall also carry out relevant standards, specifications and codes, and regulations.

4.0.1 Hierarchical

A way to organize elements at different levels. Among which, the elements of the higher level have a control relationship with the elements of the lower level.

4.0.2 Distributed

Refer to the distribution of the composition of the computerized monitoring and control system of substations in resource logic or topology, mainly focusing on the distribution problem on processing and distribution problem on functions from the perspective of system structure.

4.0.3 Decentralized

Refer to the composition of the computerized monitoring and control system of substations in terms of physical significance relative to centralization, emphasizing the object-oriented and geographic decentralization.

4.0.4 Data acquisition

Convert all kinds of electrical quantity and status signals in the field into digital signals that can be recognized by the computer and store in the computer system.

4.0.5 Data processing

Systematize all kinds of data of related equipment to support the system to complete the functions of monitoring and control, protection, control and recording.