ZXDU68 S601 (V4.0)
Product Description

中兴通讯股份有限公司
ZTE CORPORATION

ZXDU68 S601 (V4.0) Product Description

About the Document

Version	Date	Author	Approved By	Remarks
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1 SYSTEM OVERVIEW

This chapter describes the product trend, applications, functions, features, technical parameters and system configuration.

1.1 Introduction

The ZXDU68 S601 (V4.0) 600A combined power supply system is the 50A series combined power supply for communications systems, a brand new release of ZTE Corporation. As an intelligent unattended power supply system, the ZXDU68 S601 is integrated with world-leading rectifier frequency conversion technology. It can be widely used in the switching equipment, microwave communication, mobile BTS, and optical transmission fields.

1.2 Comparison with the ZXDU68 T601

ZXDU68 S601 and ZXDU68 T601 belong to the same combined power supply series. ZXDU68 S601 uses the standard 2-m cabinet, while ZXDU68 T601 uses the standard 1.6-m cabinet. Besides the difference in structure of the whole equipment, the configurations and functions are totally the same. All the illustrations in this product description are based on the 2-m cabinet.

1.3 Models

The models of the ZXDU68 S601 are explained in Figure 1. **"68"** indicates that the system adopts the 50A rectifier, with the nominal output as -48V. **"S"** indicates that the system works in the standard 2-m cabinet. **"601"** indicates that the nominal capacity of the system output is 600 A.

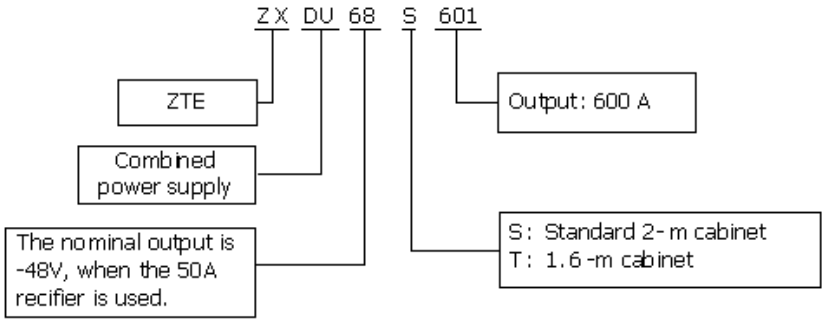


Figure 1 Explanations of ZXDU68 S601 Models

1.4 Functions and Features

The functions and features of the ZXDU68 S601 are as follows:

1. Tracing the latest trends of the world communication power supply technologies; using the advanced power supply control technology and components;
2. Ultra-small design for rectifier, with high power density up to 854 mW/cm^3;
3. Advanced modularized design and automatic current equalizing technology enabling N+1 backup mode of the system capacity and convenient expansion;
4. Perfect electromagnetic compatibility, minimum electromagnetic radiation, and minimum surge current at system startup;

5. Fully intelligent design; configured with centralized monitoring unit; designed with telemetering, telecommand and telecontrol functions; implementing computerized management, for the purpose of unattended management through communication with the remote central monitoring center, and thus meeting the demand of contemporary communication technology development;
6. Power supply control technology effectively combined with computer technology, for the sake of real-time monitoring over parameters of the rectifier and AC/DC power distribution;
7. Supporting three-phase electric grid input or single-phase voltage input; providing a wide range of input voltages (80 VAC ~ 300 VAC); applicable to regions with unstable power supply;
8. Providing emergency power supply through battery in case of mains power failure; supporting automatic mains-generator switching function;
9. Supporting the configuration of 12 rectifier modules at most as required;
10. Providing automatic battery management; powering communication equipment in the parallel float recharging mode; through monitoring unit, automatically measuring the battery recharging/discharging current and controlling the rectifier of floating/equalizing recharging to the battery;
11. Providing two-stage power shutdown function. When the system power supply switches to the batteries, loads are shifted off in two batches according to their different degrees of importance. When the battery voltage is lower than the primary shutdown voltage, audio and visual alarms will be given and the less-important loads will be shut down, to maximize the working time of the most important loads. When the battery voltage is lower than the secondary shutdown voltage, audio and visual alarms will be given and the important loads will be shut down, to avoid the battery from excessive discharging;
12. Multi-level lightning protection technology ensuring high reliability of the overall equipment;
13. When the system is faulty, the monitoring unit will give audio and visual alarms, and send alarm information to the remote central control room.
14. Using LCD to display the system information in text and graphic modes;
15. Flexible power distribution mode supporting upward or downward cabling as required;
16. Drawer structure facilitating transportation, installation, and maintenance;
17. Intelligent fan cooling mode ensuring minimum noise in operation;
18. High reliability, with MTBF ≥ 220,000 h;

1.5 Technical Features and Parameters

The technical parameters of the system are listed in Table 1 .

Table 1 Technical Parameter List

Technical Feature		Parameter
AC input	Input mode	3-phase 5 wire mode or 1-phase 3-wire mode
	Input voltage	Nominal voltage: 220 VAC; fluctuation range: 80VAC ~ 300 VAC.
	Input frequency	Nominal frequency: 50 Hz; fluctuation range: 45 Hz ~ 65 Hz
	Input current	≤ 100 A
	Efficiency	≥ 90%
	Power factor	≥ 0.99(full load)
DC output	Output current	Nominal output: 600 A
	Output voltage	Floating charging voltage is 53.5 VDC; equalized charging

Technical Feature		Parameter
		voltage is 56.4 VDC. Adjustable range: 42 VDC ~ 58 VDC continuous adjustable
	Noise	Peak-peak value: ≤ 200 mV (0 MHz ~ 20 MHz) Weighted noise: < 2 mV System audible noise: <55 dB (A)
	Security specifications	In compliance with GB4943-2001 and IEC950 standards
Environmental Conditions	Temperature	-5°C ~ +45°C
	Relative humidity	10% ~ 90%
Dimensions		H × W × D: 2000 mm × 600 mm × 600 mm

1.6 System Configuration

The system configuration is described in Table 2 .

Table 2 System Configuration

Type		Standard Configuration	Optional Configuration
AC power distributor	AC input	Single channel air switch input	Two air switches and two contactors; automatic switchover or manual switchover can be selected upon two-channel input; mechanical mutual-locking/electrical mutual-locking.
	Rectifier input switch.	12, each of which corresponding to one rectifier.	/
DC distribution	DC output	10-channel fuse output: 6-channel primary power-off and 4-channel secondary power-off.	Maximum channels can be 22 fuse channels. According to user's requirement, channels can be customized at the primary power-off side.
	Battery	2 channel input, 400 A of each	At most 3 channel battery input can be configured. The third channel occupies 1 channel DC output fuse space.
Emergency lighting		None	1 channel, customized as required
Rectifier		12	Expansion to 12 sets is supported.
Monitoring unit		1 set	/

2 STRUCTURE AND PRINCIPLE

This chapter introduces the structure and working principle.

2.1 Overall appearance and structure

2.1.1 Appearance

The appearance of the ZXDU68 S601 cabinet is shown in Figure 2.

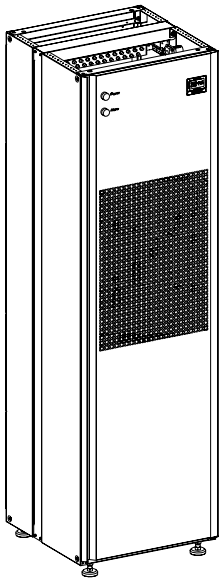


Figure 2 Appearance of the ZXDU68 S601 Cabinet

There are four legs (of adjustable height) at the cabinet bottom. They can be dismounted.

The front door of the cabinet can be opened at the left side. There are two striking indicator on the front door. The indicators are explained in Table 3 .

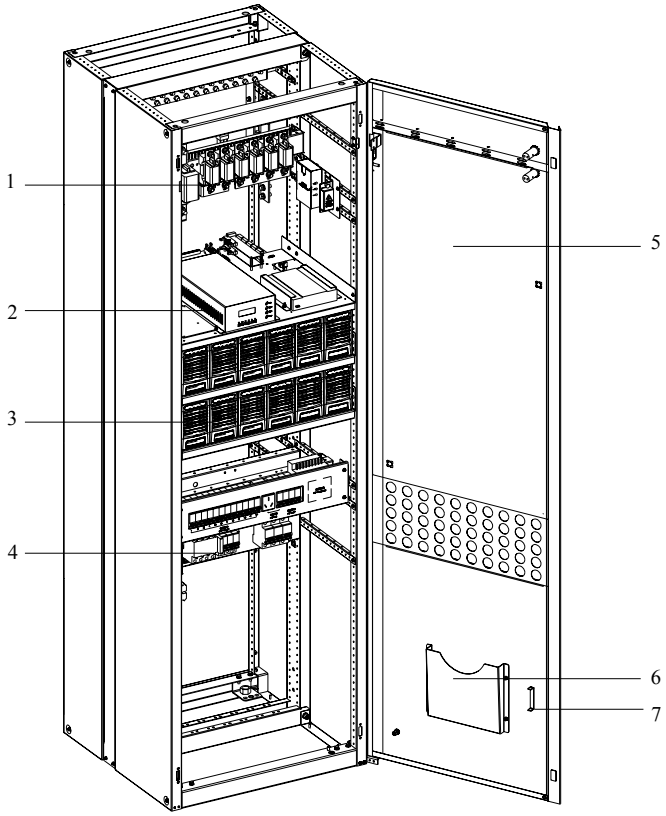
Table 3 Meanings of the Indicators on the Front Door

Name	Color	Status	Meaning
Working indicator	Green	Always on	Normal
		Always off	The system has no AC input.
Alarm indicator	Red	Always off	Normal
		Always on	System has alarms.
		Always on	A new alarm occurs or an alarm is removed.

The model plate is at the upper right corner of the cabinet, indicating the model of the equipment.

2.1.2 Structure

Open the front door to reveal the structure of the whole equipment, as shown in Figure 3.



1. DC power distribution 2. Monitoring unit 3. Rectifier
4. AC power distribution 5. Front door 6. File holder
7. Fuse extractor base

Figure 3 Structure of the Whole Equipment

2.2 System Principle

The system principle of the combined power supply is shown in Figure 4.

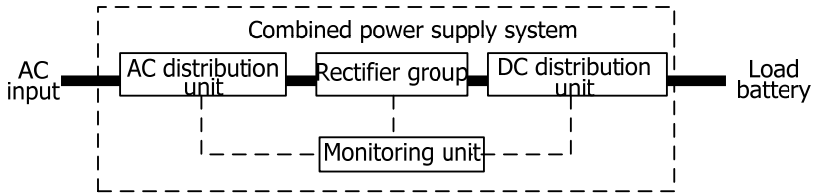


Figure 4 System Principle

The composition and functions of the combined power supply are described as follows:

1. AC distribution unit: Accessing, protecting and distributing AC power
2. Rectifier group: Implementing AC-DC conversion
3. DC distribution unit: Implementing output of DC power supply, battery connection and load protection.
4. Monitoring unit: Signal sampling, information collection, judgment, signal conversion and alarm function.

2.3 AC Distribution Unit

It accesses, protects and distributes AC power. Its principle is shown in Figure 5.

The system allows two mains input (or one mains input and one diesel generator input), with reliable mutual-locking relation. Lightning-protection measures also made. At the end of selection of the switching unit, two mains input are allocated to the rectifier group.

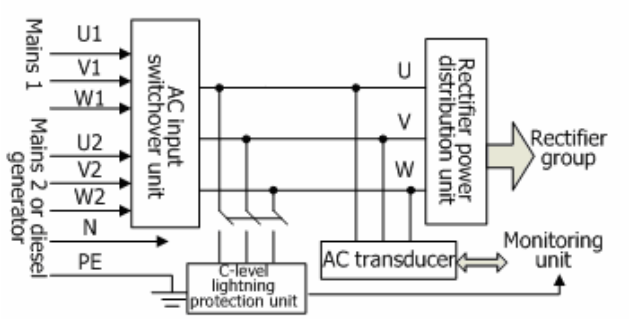


Figure 5 AC Distribution Unit

For the AC distribution unit, the integrated lightning-protection box can also be configured, especially in the area with frequent lightning, to improve protection for the equipment.

2.4 Rectifier Description

The structure, performance and interface definitions of the ZXD2400 (V4.0) 50A switch-mode rectifier used by this system will be introduced in this section.

The nominal output capacity of a single rectifier is 50 A. For the standard system configuration, at most 12 rectifiers can be configured.

2.4.1 Rectifier Appearance

The ZXD2400 (V4.0) features compact size and small weight. Its appearance is shown in Figure 6.

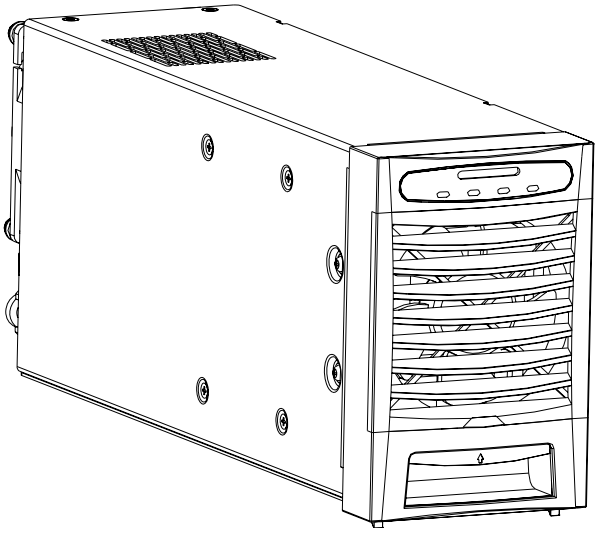


Figure 6 Appearance of ZXD2400(V4.0) Rectifier

2.4.2 Performance Indices

The performance parameters of the rectifier are listed in Table 4 .

Table 4 Performance Parameters of the ZXD2400 (V4.0)

Technical Feature		Parameter
AC input	Input mode	1-phase 3-wire mode (L/N/PE)
	Input voltage	Nominal voltage: 220 VAC; fluctuation range: 80 VAC ~ 300 VAC.
	Input frequency	Nominal frequency: 50 Hz; fluctuation range: 45 Hz ~ 65 Hz
	Input current	Not greater than 16 A.
	Efficiency	≥ 90%
	Power factor	≥ 0.99
DC output	Output power	Nominal output: 2400 W; maximum output: 3000 W
	Output voltage	Nominal output: 48 VDC Adjustable range: 42 VDC ~ 58 VDC continuous adjustable
	Current limiting threshold	(53 ± 1) A for input voltage 176 VAC ~ 300 VAC (30 ± 2) A for input voltage 110 VAC ~ 176 VAC (15± 2) A for input voltage 80 VAC ~ 110 VAC. After current limiting, flyback occurs when the output voltage decreases to 35 VDC ~ 39 VDC.
	Voltage stabilizing accuracy	≤ ±0.5%
	Current equalizing capability	A difference below 2.5 A between the maximum and the minimum values.
Mechanical parameters	Dimensions	H × W × D: 134 mm × 87 mm × 318 mm (excluding integrated socket)
	Weight	3.8 kg

2.4.3 Structure Description

The front panel of the ZXD2400 (V4.0) is equipped with such components as indicators, section display and handle; the back panel is equipped with input-output integrated socket. The structure is shown in Figure 7. The component names are explained in Table 5 .

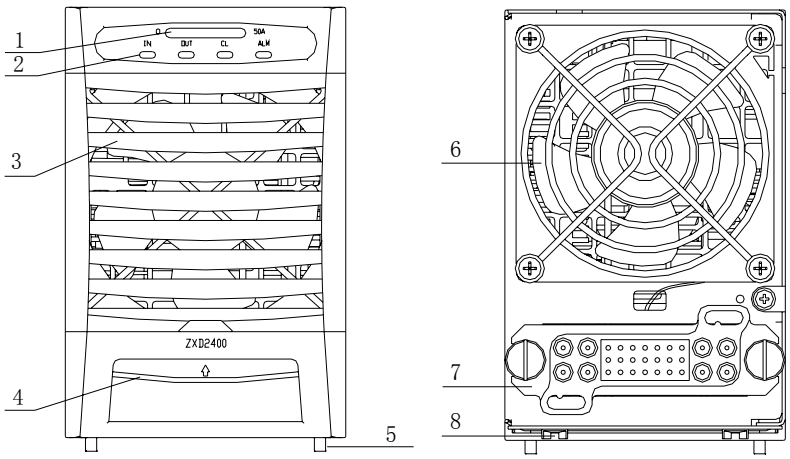


Figure 7 Front Panel and Back Panel

Table 5 Rectifier Component Names and Functions

No.	Component Name	Function Description
1	Segment LED	There are 10 segment LEDs, each of which represents 5 A output current.
2	Indicator	There are four indicators, showing the working statuses of the rectifier.
3	Shutter	Air inlet
4	Pinch handle	Used in loading/unloading and handling the rectifier.
5	Spacer pin	Locking the rectifier in position
6	Fan	Dissipating heat. The ventilation hole should not be blocked external foreign matter.
7	Integrated input/output socket	Input/output interface of the rectifier, used for connecting with the telecommunication power supply system.
8	Guide rail	Used in installation

2.4.4 Status Display

The working status of the ZXD2400 (V4.0) is represented through the section indicators and status indicators on the front panels, as shown in Figure 8.

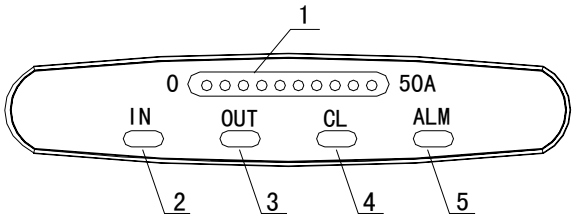


Figure 8 Rectifier Indicators

1. Section Display

Consisting of 10 green section indicators, the section display is used to indicate the output current. Each section represents 5A output current.

For example, when the output current of the rectifier is 10A, the left two section indicators are on. For example, when the output current of the rectifier is 15A, the left three section indicators are on. When the output current of the rectifier is 14A, the left two section indicators are on and the third indicator is off or dim.

2. Indicator Meanings

There are four status indicators on the front panel of the rectifier. They serve to indicate the running status of the rectifier. Their meanings are described in Table 6 .

In a normal condition, only the input and output indicators are on.

When current limiting occurs to the output, the current limiting indicator is on.

When an alarm occurs, the alarm indicator is on.

Table 6 Meanings of the Rectifier Indicators

Label	Name	Status	Indication Description
IN	Input	Green indicator	It is always on for normal AC input.
OUT	Output	Green indicator	It is always on for normal DC output.

CL	Current limiting	Yellow indicator	It is always on for current limiting of output.
ALM	Alarm	Red indicator	It is always on when alarm occurs.

2.4.5 Interfaces

The input/output integrated socket is used for connecting with the power system, with the interfaces arrangement shown in Figure 9.

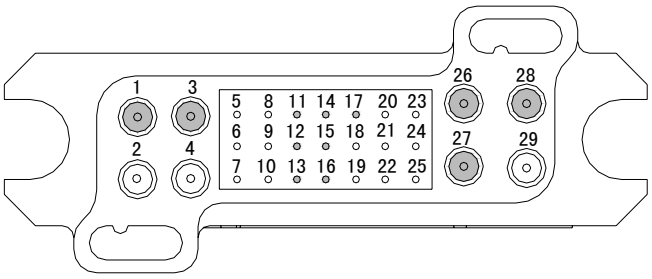


Figure 9 Input/Output Integrated Socket

Note: The numerals stand for the pin numbers.

The pin definitions are described in Table 7 . The electrical connection between rectifier and power system is implemented through this socket, requiring no other connections.

Table 7 Definitions of Pins of Input/Output Integrated Socket

Pin No.	Signal Definition	Description
1,2	Input 48V+	Corresponding to XJ4 of the MAIN board
3,4	Output 48V-	Corresponding to XJ5 of MAIN board
11	REMOTE	This signal is the OFF signal, used in the ON/OFF control over the rectifier by the system. When high level is input, the rectifier is turned off (level of 5V). When low level or high resistance is input, the rectifier is turned on.
12	ALARM	Low-resistance output: Corresponding to the startup process, internal faults or alarms/over-temperature statuses of the rectifier. High-resistance output: Corresponding to the normal working status
13	COM	Control ground of the monitoring system
14	ON-LINE	Rectifier in-position signal: Directly connected to the COM signal on the MAIN board
15	PWM	Input signal: Requiring a pulse signal with amplitude of 5 V
16	SHARE-BUS	Equalizing current bus: Bidirectional signal
17	FOUT	Output signal: 1.5 kHz
26	AC input PE	Directly connected to the case through conductor
27	AC input N	Corresponding to XJ2 of MAIN board
28	AC input L	corresponding to XJ1 of MAIN board
Note: The pins absent from this list are reserved. The MAIN board is a board inside the rectifier.		

2.5 DC Distribution Unit

Its principle is shown in Figure 10.

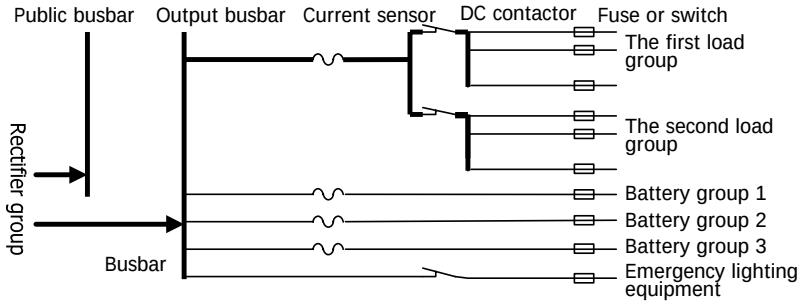


Figure 10 DC Distribution Unit

It provides short-circuit protection for the battery connection and load output, to provide action organization for the battery discharging protection upon mains failure.

For the DC distribution unit, the battery group is both input and output.

When the rectifier group charges the battery, the battery is the output unit, equivalent to the DC load.

When the battery powers the load due to AC power failure, the battery is the input unit, equivalent to the DC power.

2.6 Monitoring Unit

The monitoring unit of the ZXDU68 S601 is introduced in this section.

1. Structure: composition of the monitoring unit and board distribution.
2. Function: the monitoring mode, measurement quantity and measurement accuracy of the monitoring unit.
3. Menu: the menu structure and contents of the monitoring unit.

2.6.1 Appearance

The appearance of the monitoring unit, without the outer frame, is shown in Figure 11.

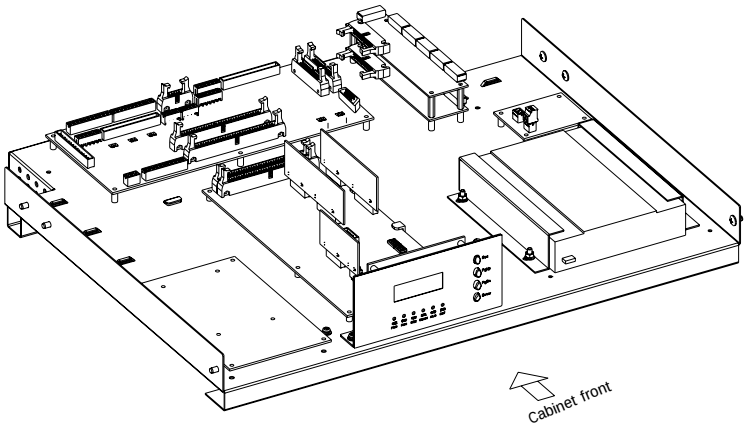


Figure 11 Structure of Monitoring Unit

2.6.2 Functions of Monitoring Unit

The principle of the monitoring unit is shown in Figure 12.

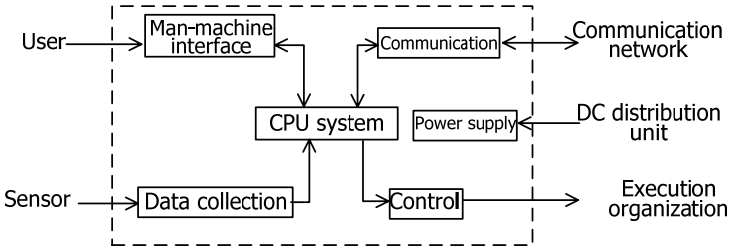


Figure 12 Principle of Monitoring Unit

2.6.2.1 Function Description of Monitoring Unit

The functions of the monitoring unit are described as follows:

1. Man-machine interaction

The system provides graphic MMI to facilitate operation. You can set the running parameters and query the running data. When anything abnormal happens, alarm will be reported automatically and the existing faults will be recorded for saving.

2. Communication

The monitoring unit provides RS232 interface and can implement remote monitoring through Modem or in other modes. It reports data to the remote control console, receives control instructions and executes them.

3. Data collecting and processing

The monitoring unit collects power distribution and environment data to judge power running status and identifies abnormal data.

4. Control

Based on your control commands, it can control ON/OFF of the rectifier and equalized recharging/float recharging status of the system, as well as to control the rectifier output voltage according to your demand.

2.6.2.2 Data Collection and Measurement Accuracy

The data collected by the monitoring unit and the measurement accuracy are listed in Table 8 .

Table 8 Data Collection and Measurement Accuracy

Data Source	Item	Accuracy
AC distribution unit	AC phase-U/V/W voltage	±1%
	AC phase-U current	±2%
	Status of AC input air switch	100%
	Working status of AC lightning arrester	100%
DC distribution unit	DC output voltage	±0.5%
	Battery voltage	±0.5%
	Batter current	±1%
	Total load current	±1%
	Status of battery air switch	100%
	Status of load fuse or switch	100%
	Battery temperature	±5℃
	Status of first-stage power shut-down	100%

Data Source	Item	Accuracy
	and second-stage power shutdown DC circuit breakers	
	Status of DC lightning arrester	100%
Rectifier	Output current	±1%
	In-position signal	100%
	Alarm information	100%
	AC input alarm signal	100%
Environment variant	Environment temperature	±5℃
	Environment humidity	±10%
	Flood/infrared/entrance control/smoke/glass broken signal	100%
Input main contact	Input main contact signal	100%

2.6.3 Structure Description

The monitoring unit of the ZXDU68 S601 uses the board direct installation mode. In other words, the board can be installed and dismounted in online mode, and thus facilitating maintenance.

2.6.3.1 Board Distribution

The board distribution is shown in Figure 13.

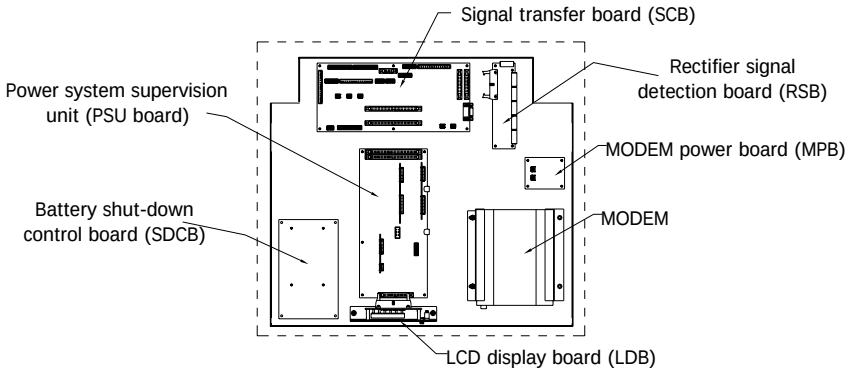


Figure 13 Distribution of Monitoring Unit

Note: MPB board and SDCB board are optional and can be configured as required.

2.6.3.2 Board Functions

In different configurations, the monitoring unit supports some optional boards for the sake of assistant monitoring functions. The board functions are listed in Table 9 .

Table 9 Board Descriptions of Monitoring Unit

Board Name	Abbr.	Board Functions	Config.
Power system supervision unit	PSU	Implementing signal sampling, system output control, communication and display functions of each unit except rectifier; powering the monitoring unit. The input and output signals of this board are connected through the signal transfer board.	Standard
Rectifier signal	RSB	Detecting the rectifier unit signals. It is divided into two boards, each of which	Standard

Board Name	Abbr.	Board Functions	Config.
detection board		are responsible for six rectifiers (which can be flexibly configured)	
Signal transfer board	SCB	Transferring the detection signals	Standard
LCD board	LDB	Providing LCD display interface and keyboard operation	Standard
Modem power board	MPB	Powering the Modem	Optional
Environment monitoring board	EMB	Inputting the detection signals of the environment variant	Optional
Relay output board	RLY	Providing 8 channels of extended main contact output signals	Optional
Power shut-down control board	SDCB	Providing manual power shut-down control function	Optional

The EMB detects the following environment variants:

- Environment temperature and humidity
- Flooding signal
- Infrared signal
- Entrance control signal
- Smoke signal
- Glass broken signal

2.6.4 Status Display

The front panel of the monitoring unit is composed of LCD, operation buttons and indicators, as shown in Figure 14.

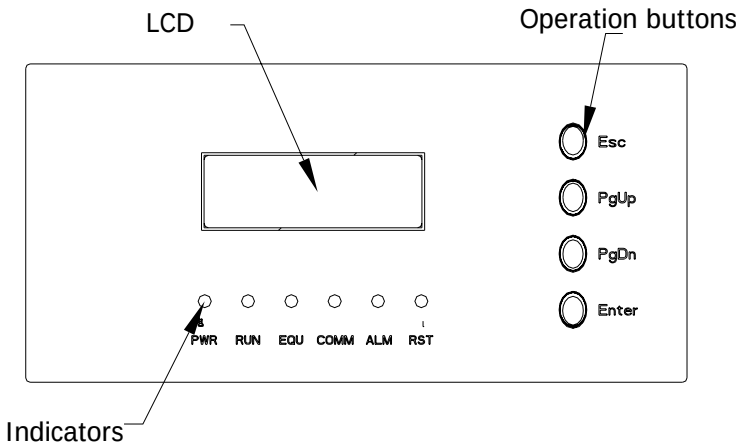


Figure 14 Front Panel of Monitoring Unit

The indicators can directly show the running status of the power system. The indicators on the front panel of the monitoring unit are explained in Table 10 .

Table 10 Indicators on Front Panel of the Monitoring Unit

Indicator	Abbreviation	Color	Description
Power supply	PWR	Green	When the indicator is on, it means that the power supply of the monitoring unit is

Indicator	Abbreviation	Color	Description
			normal.
Running	RUN	Green	When the indicator flashes, it means that the monitoring unit is in the working status.
Alarm	ALM	Red	When the indicator is on, it means that alarms occur.
Communication	COMM	Green	When the indicator flashes, it means that communication is under way.
Equalized recharging	EQU	Green	When the indicator is on, it means that system is in equalized recharging status.
Reset	RST	/	It is a hidden button hole, in which is the Reset key.

2.7 Description of Power Networking

This chapter describes the power networking modes and charts.

The combined power supply supports networking in multiple modes, for background monitoring. The common networking modes are introduced below.

2.7.1 Simple RS232 Serial Port Mode

The monitoring unit and the background are connected directly through the serial port. This is the most direct and convenient way of monitoring, but it is largely restricted by practical conditions. Usually, it is required that the distance between the background monitoring host and the power supply monitored should be within 15 m. The RS232 serial port mode is shown in Figure 15.

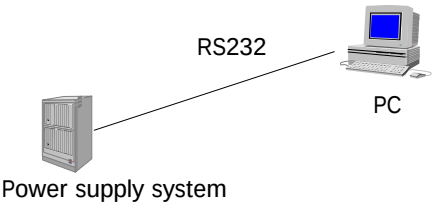


Figure 15 Connections of Serial Port Monitoring

2.7.2 Dial-up Mode (MODEM Mode)

The monitoring background exchanges data with the monitoring unit in the dial-up mode through a modem. In this mode, the monitoring background should be connected with two modems and the monitoring unit should be connected with one modem. Of the two modems connected to the monitoring background, one is responsible for data query, and the other for receiving the alarm data of the combined power supply system, as shown in Figure 16. This mode features the optimal versatility and is applicable to a majority of networking modes.

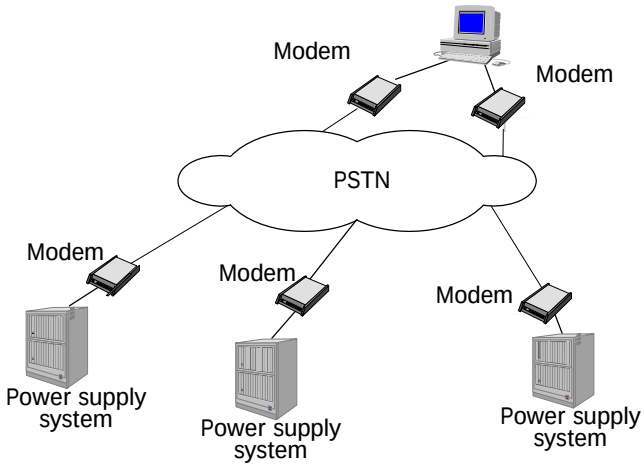


Figure 16 Monitoring in the Modem Mode

2.7.3 ZXJ10 Digital SPC Switch Mode

In this mode, networking is implemented on the monitoring platform of the ZTE's ZXJ10 Digital SPC Switch (ZXJ10 for short). The networking and connections are shown in Figure 17. For a single combined power supply system, this mode is similar to the simple RS232 serial port mode.

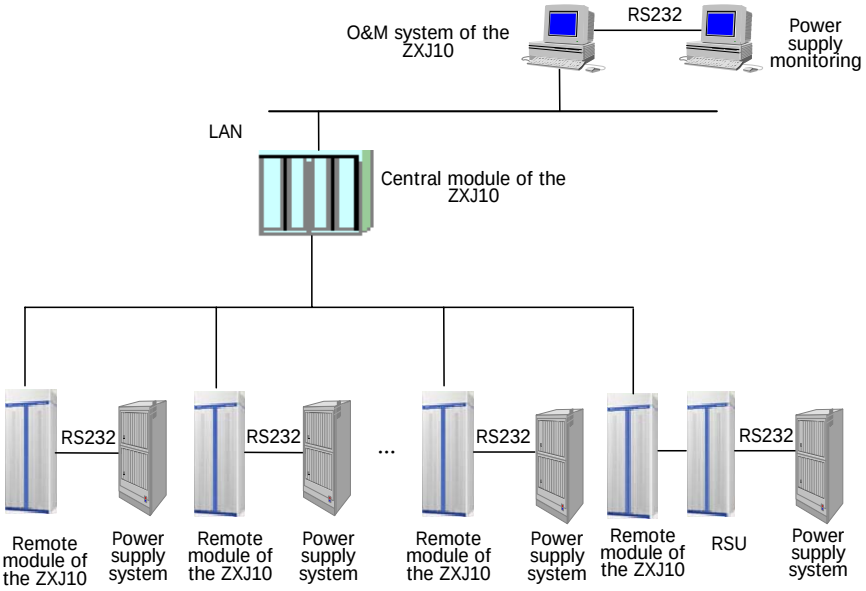


Figure 17 Monitoring in ZXJ10 Mode

The data under the power supply monitoring are transferred through the data channel of the ZXJ10. This mode is the most proper for the users with the ZXJ10, because it can save the networking cost (by sharing a set of monitoring hardware) and it is more reliable than the modem mode in terms of data transmission.

The serial port of the power supply is connected to serial port 2 of the ZXJ10 MP, and the background may either share a computer with the ZXJ10 maintenance platform or use a separate one, which must be connected by the network cable and run the NE2000 driver.

Features: real-time, simple and economical networking.

2.7.4 SCM Mode

The Signal Conversion Module (SCM) is the intelligent equipment developed by ZTE, used for GSM BTS centralized monitoring networking.

The SCM serves to connect the point-to-point digital channels provided by microwave or optical transmission equipment into a network, and thus implementing centralized monitoring for BTS power supplies, environment and other equipment. It is practical for the networking in the environment without phone lines but with point-to-point service digital channels.

The SCM features high reliability and wide range of applications. It has multiple standard interfaces applicable to RS232/RS422/RS485.

The SCM mode can combine the power supplies to be monitored into a tree network, and implement centralized monitoring on different power supply devices within this network through the monitoring center. The SCM networking model is shown in Figure 18.

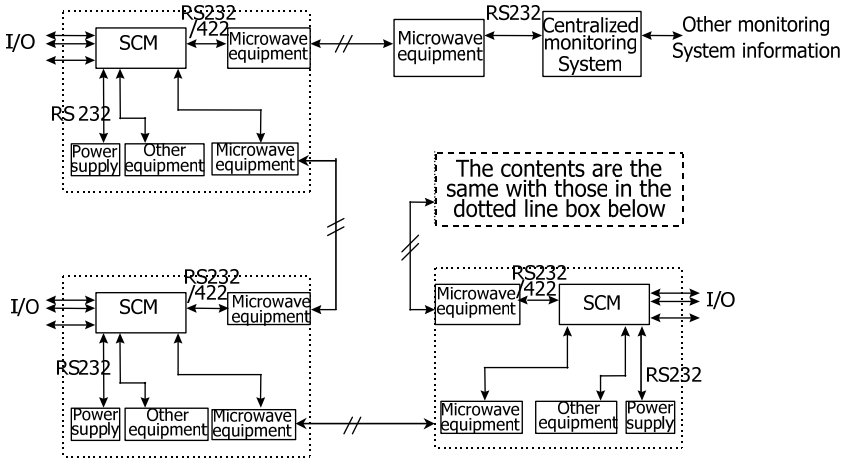


Figure 18 SCM Networking Model

For the system running on the network, SCM is a remote transmission mode. For a single combined power supply system, this mode is similar to the simple RS232 serial port mode.

2.7.5 Access Network Mode

The background monitoring networking can be in the access network mode. The serial port of the combined power system is connected to the serial port of ZTE access network equipment, which provides the dedicated power monitoring software to implement remote monitoring on the power system.

2.7.5.1 Using CSV Board

In the remote user unit system, there are an environment monitoring system and a combined power supply monitoring system. Both monitoring systems are connected to the CSV board of the access network system through the RS232 serial port, and transmit the bidirectional monitoring data to the remote monitoring and maintenance platform through the CSV board.

For the power supply monitoring system, there are two possibilities, as detailed below.

1. With Environment Monitor Board EMU

Both the power supply monitoring system and environment monitoring system exist in the system, where environment monitoring board (EMU) and the CSV board are directly connected, while the power supply monitoring system and the EMU are connected, as shown in Figure 19.

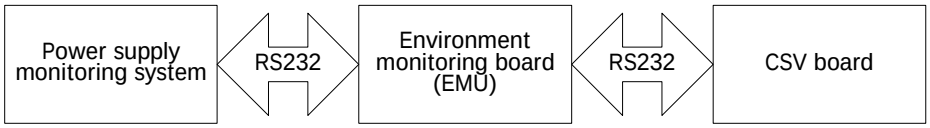


Figure 19 Connections among Power Supply Monitoring, Environment Monitoring and CSV Board

The power supply monitoring information is directly sent to the EMU and then forwarded to the CSV board.

2. Without Environment Monitor Board EMU

If there is only the power supply monitoring in the system, the power supply monitoring system will be directly connected to the CSV board, as shown in Figure 20.

Figure 20 Connections between Power Supply Monitoring and Access Network CSV Board

3. Precautions

When the CSV board is used for communication, two points should be emphasized:

1) Environment monitoring is completely transparent to the power supply monitoring system, which does not know or care about its existence.
2) No modification is necessary for the communication protocols of the power monitoring system in any one of the situations mentioned above.

2.7.5.2 Using PPS Board

The power supply can also be monitored through the PPS board that connects with the system, as shown in Figure 21 and Figure 22.

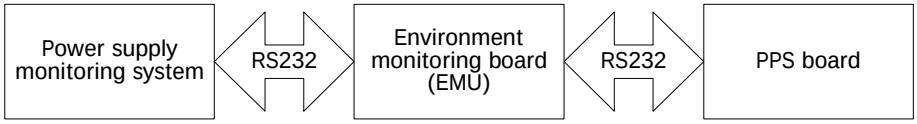


Figure 21 Connections among Power Supply Monitoring, Environment Monitoring and PPS Board

Figure 22 Connections between Power Supply Monitoring and PPS Board

2.7.6 CDMA Mode

For a single combined power supply system, the CDMA mode is similar to the simple RS232 mode.

Because there are many scattered CDMA BTSs, it is not practical and economical if the combined power supply systems themselves provide the data channel for maintenance and monitoring. Therefore, the CDMA internal communication channel can be used for communication, for the sake of daily maintenance and monitoring.

The power supply foreground can be connected through serial lines with the CDMA base transceiver, to implement data exchange. The power supply monitoring background should also communicate with CDMA background, which will establish data channels between the foreground and the background of the power supply, to reflect the monitoring information to the CDMA background operation and maintenance station.

Communication between the power supply background and CDMA background is implemented through the CDMA communication system and the corresponding TCP proxy program running on the power supply monitoring background.

The system connections are shown in Figure 23.

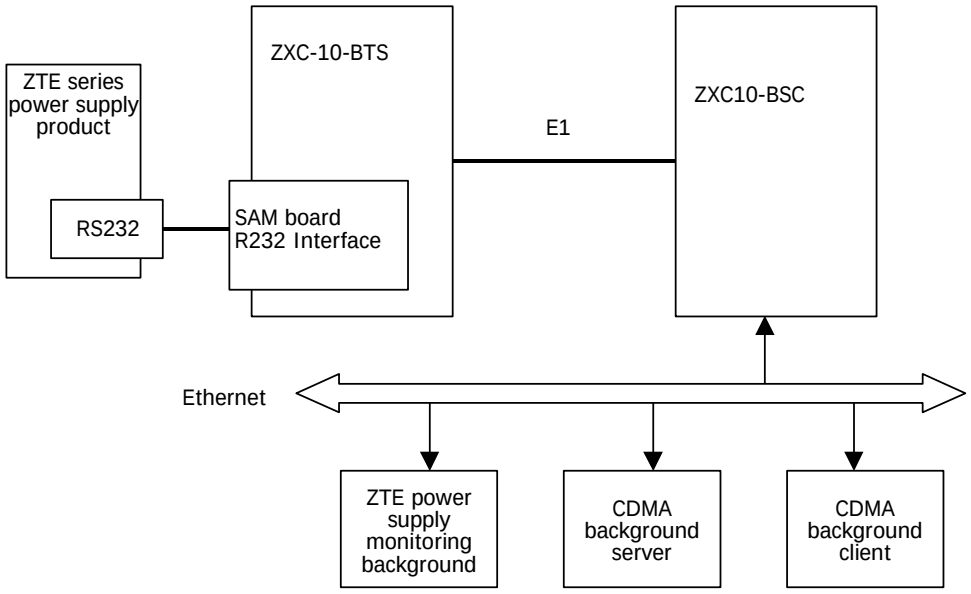


Figure 23 Monitoring Unit Connections in the CDMA Mode