



# DF1800 Catalogue

Local Data Monitoring System



For Reliable, Secure and Economical Energy System Operation

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## Summary

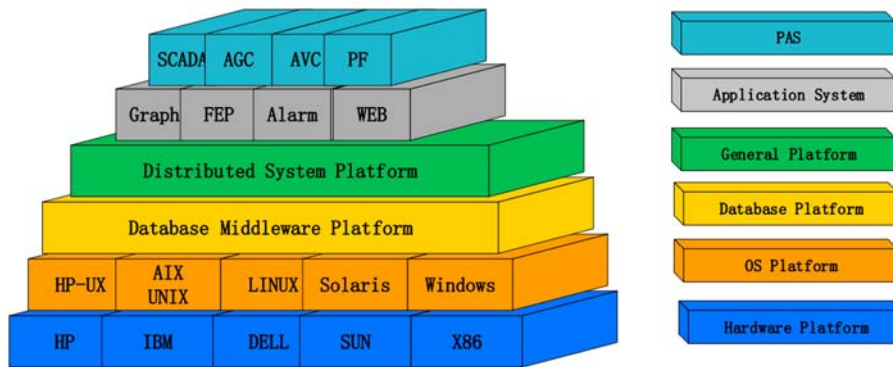
DF1800 Local Data Monitoring System is integrated solution for analysis and operation of transmission and distribution substation, photovoltaic power station and wind power station. DF1800 provides the functions of supervisory & control, network analysis, safe and economical operation instruction, dispatch information management, active power/reactive power control, voltage control, etc.

DF1800 is developed under an established quality assurance program and has been used as high reliability Electrical Power Automation Systems software worldwide.

DF1800 was developed under a modular designing concept and with Server/Client architecture. It is a Reliable, Scalable and Flexible system.

## System Hierarchy

**DF1800 LDMS software system has four layers in design:**



### The First: Distributed System Operation and Development Middleware Platform

It is called general OS platform layer. It is a middleware between DF1800 LDMS system and different operating systems. This middleware isolates DF1800 applications with OS, at the same time, it provides uniformed OS function interface for DF1800 applications, and it provides operation environment for the applications. And it makes DF1800 system high portable. It assures that different operation systems like Windows, different UNIX, Linux can be used at the same time in system. For example HP-UNIX, IBM AIX, SUN Solaris,

Linux, Windows Server & Windows Workstation, etc. So it can provide most cost-effective solutions for power enterprises and protect the customer's investment.

### The Second: Object Oriented Real Time Database Middleware Layer following IEC61970/IEC61968

It is called uniform power application platform. It adopts the object oriented power device model definition and EMSAPI established by IEC, it is a power system application oriented real time database management system. The



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special platform, makes SCADA, AVC, AGC have application level openness based on IEC 61970/61968 CIM/CIS, and makes the application software modules “Plug and Play” possible.

acquisition service, web service and interconnection adapter with other systems. The establishment of application platform layer makes it easy for the system development and upgrade.

### **The Third: Application Platform Layer**

It provides general application interfaces and service for SCADA, AGC, AVC and other applications. It is composed of integrated GUI, integrated drawing-model-database editing tool, printing service, data

### **The Fourth: Power Application Software Layer**

This layer includes many power system applications, such as SCADA, AGC, AVC, Photovoltaic Power Forecasting, Wind Power Forecasting, etc.

## **Application Modules**

### **DF1800 SCADA Software Modules**

- DF1800 SCADA HMI
- DF1800 SCADA Database Editor
- DF1800 SCADA Data Viewer
- DF1800 SCADA Database Backup Manager
- DF1800 SCADA Database Connection Monitor
- DF1800 SCADA Drawing Editor
- DF1800 SCADA Front End Viewer
- DF1800 SCADA Front End Server
- DF1800 SCADA Real Time Alarm Viewer
- DF1800 SCADA Historical Event Viewer
- DF1800 SCADA Report Manager
- DF1800 SCADA System Manager
- DF1800 SCADA Real Time Database Sever
- DF1800 SCADA Real Time Database Viewer

### **DF1800 Advanced Software Modules**

- DF1800 Web Server
- DF1800 Application Programming Interface
- DF1800 Photovoltaic/Wind Power Forecasting
- DF1800 Automatic Generation Control
- DF1800 Automatic Voltage Control

## System Features

### Integrated Hardware/Software Platform

- Provide uniform application developing interfaces to improve the efficiency of system upgrade and customer development
- Provide Uniform, extensible, distributed, transparent operating system platform
- Flexible configuration and expansion ability
- Support Unix OS, Windows series OS and Linux OS
- Support commercial relation database such as Oracle, Sybase, SQL-server and MySQL
- Standard external communication interface to integrate with other systems

### Features of SCADA Package

- Secured operation via Area of Responsibility and password verification
- Secured data viewing on displays and alarm processing based on AOR
- Perfect data processing and calculations functions, such as engineering unit conversion, multi-level limits checking, and rate of change checking etc
- Advanced alarm and event processing functions
- Support alarm information forwarding via mobile short message system
- Control Permissive interlocks logical definition interface
- Support continuous SCADA snapshots for archiving or PDR
- Support dual net, dual-computer redundancy
- Support Server/Client Topology Model, and support remote operation workstation accessing SCADA function
- Provide programming language for

customized function developing

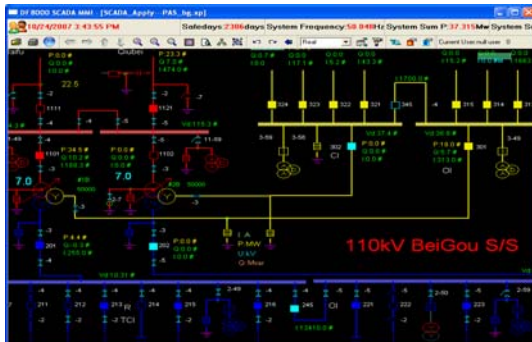
### Friendly Human Machine Interface

- Built-in intelligent graphics
- Display Real-time data on one-line diagrams
- Configurable font types, styles & colors
- Configurable display ratings & modes
- Graphical display of equipment impedance & grounding
- Automatic distinguish of energized & de-energized elements
- Text box editor with dynamic link to properties
- Intelligent text box & hyperlink marks
- User-friendly plotting
- CIM based diagram-model-database integration
- CIM based graphic primitive and modeling
- Diagram drawing, model building, and data editing integrated
- Plot-browse-test integration
- Transmission/distribution network modeling integration
- Customizable HMI
- Use advanced QT developing platform, provide identical HMI style under different OS
- Support user customized device primitive and menu
- Provide Unitizing Summaries Displays
- Support X-Window and OSF/Motif and three-dimensional graphics Based on OpenGL
- Support various drawing format such as Bitmap, DXF and gif images etc
- Support automatic diagram generation, including diagram of total network power flow, diagram of power supply tracing, diagram of bay, etc

### Basic SCADA Modules

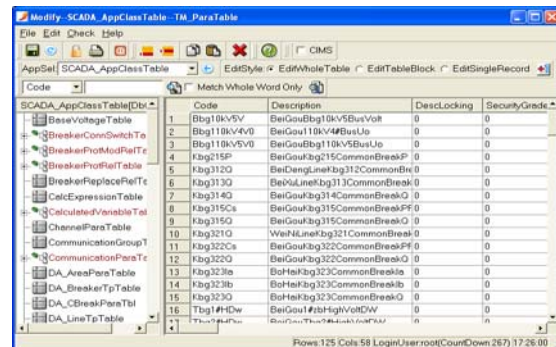
#### DF1800 SCADA HMI

DF1800 SCADA HMI Module is distributed and fully-graphical human-machine interface developed based on network window system X-Window, industrial standard OSF/Motif or Windows and three-dimensional graphics standard OpenGL. The system fully takes into account the different requirements proposed by different applications, such as NAS, DMS, AGC, DMIS, AMR and TMS when designing, and mixes the miscellaneous requirements. All the operations can be performed on the human-machine interface, via clicking mouse to make the operation more convenient. The shortcut operations are defined too, which make the operation more simple and convenient. The single key can be defined to navigate display also to speed up the operation.



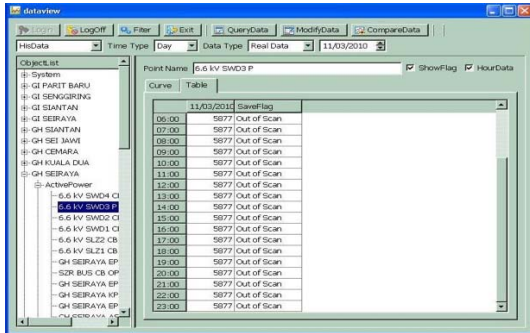
#### DF1800 SCADA Database Editor

- Set an object-oriented data model referenced to CIM, to establish the foundation for the “plug-and-play” of the application software.
- Implementing the “seamless connection” between commercial relational database and real-time database.
- Fulfill real-time database management of distributed application environment to realize the independence and transparency of physical storage.
- Implement the fast copy and backup of database.



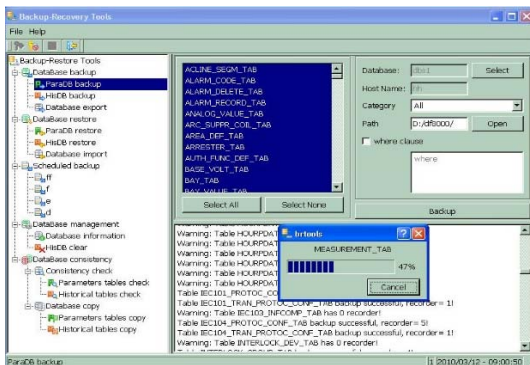
#### DF1800 SCADA Database Viewer

DF1800 SCADA Database Viewer Module is responsible for the query or modification of historical data. The system provides a database interface to display data at any time interval in tables or curves. The historical data can be modified with proper authority, and the system will re-calculate the modified data and make statistics again.



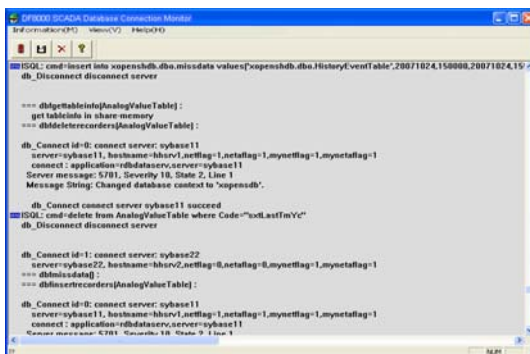
### DF1800 SCADA Database Backup Manager

DF1800 SCADA Database Backup Manager module is for dumping, replication and transcription the Database, its menu is convenient and friendly. To display the parameter table structure is also provided.



### DF1800 SCADA Database Connection Monitor

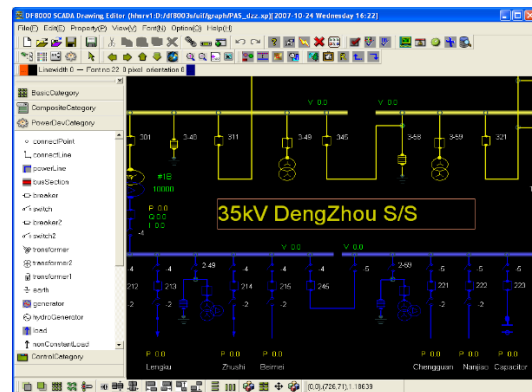
DF1800 SCADA Database Connection Monitor Module is the interface for outputting database accessing command and the operation result. This interface helps the system administrator to diagnose the system running status.



### DF1800 SCADA Drawing Editor

DF1800 SCADA Drawing Editor Module adopts the object-oriented technique. All devices and electric power symbol are treated as objects. The system can display three dimension images and flashes, many kinds of fonts. The system also supports Unix system X terminal and simulated X terminal on a PC.

DF1800 SCADA Drawing Editor Module is able to display drawing on static or dynamic mode with multilayer structure. The system has unlimited display of layer and view and may set database information for Power Device. The system also integrates the power device symbol pre-defined function. The DF1800 SCADA Drawing Editor can synchronize the modified drawing via network after the archiving command is issued.

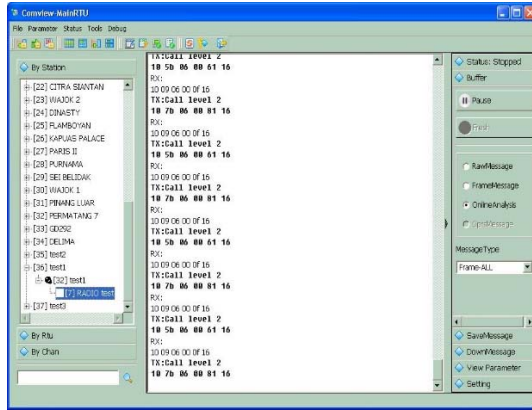


### DF1800 SCADA Front End Viewer

DF1800 SCADA Front End Viewer Module displays the parameters of the FEP system, checks the channel buffer, monitors the RTU status, watches the raw real-time data, and tests the data transmission. It also acts as the protocol analyzer.



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### DF1800 SCADA Front End Sever

- Support synchronous/asynchronous channel
- Auto-Switch main/standby channel according to channel status
- Auto-Switch main/standby FEP according to host status
- Monitor and control the running status of channel
  - Support all standard international communication protocol (such as IEC60870-5-101, IEC60870-5-103, IEC60870-5-104, IEC61850, MODBUS serial or Over IP, DNP 3.0 serial or Over IP, etc.)
- Adopt Terminal Server to allow the serial equipment to be connected to LAN and WAN directly.
- Support 4G/3G/GPRS communication

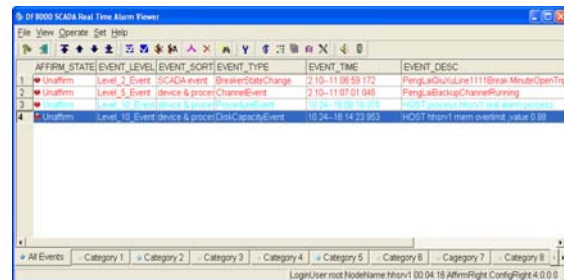
### DF1800 SCADA Real Time Alarm Viewer

All the alarm and event have attributes like: priority, point or device name, substation name, type, time, status or value, area of responsibility, etc. And alarm style, description, sound or not are user definable.

Alarms include: fault trip, no command change of switch, protection signal, fault trip times of breaker violating limit, analog value violating limits, change rate of analog

point violating limit, and so on.

DF1800 SCADA Real Time Alarm Viewer provides SMS and Email Messenger. The module uses the short-message service supplied by the mobile communication service to send the classified and filtered SCADA system's information to the dedicated mobile phone. The subsystem can make the user gathering the real-time information of the power grid easily at any time and in any place via using the public SMS. It can speed up the efficiency for restoring the power grid's abnormal accident. Customer can set the information style according to their requirement. The system can improve the operation efficiency and reduce the labor intension for the operator.



### DF1800 SCADA Historical Event Viewer

DF1800 SCADA Historical Event Viewer Module is the interface to retrieve the history event. It is useful to analyze accident of the power grid. The interface provides the access to set the event searching condition.

The module provides the function of event editing, such as add an event record, delete an event record or modify an event record.

DF1800 SADA Historical Event Viewer

As RTU

From: 1/24/2007 12:00:00 AM To: 1/24/2007 04:26:59 PM

RTU

Subnet All

Device

RTU

Subnet All

Device

EventID	EventCat	EventType	EventTime	DeviceName	Manufacturer	Description
53	0000	operation event	2007-01-24 14:45:13.393	rtu001	Mano1	Load table anal
52	0001	operation event	2007-01-24 14:45:13.915	rtu001	Mano1	Load table anal
51	0002	operation event	2007-01-24 14:45:15.929	rtu001	Mano1	Load table anal
54	0003	operation event	2007-01-24 14:45:15.946	rtu001	Mano1	Load table anal
55	0004	operation event	2007-01-24 14:45:15.962	rtu001	Mano1	Load table anal
56	0005	operation event	2007-01-24 14:45:15.978	rtu001	Mano1	Load table anal
57	0006	operation event	2007-01-24 14:47:20.774	rtu001	Mano1	Load table anal
58	0007	operation event	2007-01-24 14:47:20.826	rtu001	Mano1	Load table anal
59	0008	operation event	2007-01-24 14:47:40.195	rtu001	Mano1	Load table anal
60	0009	operation event	2007-01-24 14:47:40.392	rtu001	Mano1	Load table anal
61	0000	operation event	2007-01-24 14:47:40.343	rtu001	Mano1	Load table anal
62	0001	operation event	2007-01-24 14:47:40.427	rtu001	Mano1	Load table anal
63	0002	operation event	2007-01-24 14:47:40.500	rtu001	Mano1	Load table anal
64	0003	operation event	2007-01-24 14:47:40.546	rtu001	Mano1	Load table anal
65	0004	operation event	2007-01-24 14:48:00.705	rtu001	Mano1	Load table anal
66	0005	operation event	2007-01-24 14:48:00.875	rtu001	Mano1	Load table anal
67	0006	operation event	2007-01-24 14:48:00.219	rtu001	Mano1	Load table anal
68	0007	operation event	2007-01-24 14:48:00.312	rtu001	Mano1	Load table anal
69	0008	operation event	2007-01-24 14:48:00.528	rtu001	Mano1	Load table anal
70	0009	operation event	2007-01-24 14:48:00.621	rtu001	Mano1	Load table anal
71	0070	operation event	2007-01-24 14:48:00.668	rtu001	Mano1	Load table anal
72	0071	operation event	2007-01-24 14:48:00.519	rtu001	Mano1	Load table anal
73	0072	operation event	2007-01-24 14:49:00.000	Mano1	Mano1	Modify DB para
74	0072	operation event	2007-01-24 14:52:00.000	Mano1	Mano1	Modify DB para
75	0074	operation event	2007-01-24 14:15:00.000	Mano1	Mano1	Modify DB para
76	0075	operation event	2007-01-24 14:25:00.000	Mano1	Mano1	Modify DB para
77	0076	operation event	2007-01-24 14:32:00.000	Mano1	Mano1	Modify DB para
78	0077	operation event	2007-01-24 14:33:00.000	Mano1	Mano1	Modify DB para
79	0078	operation event	2007-01-24 14:33:00.000	Mano1	Mano1	Modify DB para
80	0079	operation event	2007-01-24 14:34:00.000	Mano1	Mano1	Modify DB para
81	0080	operation event	2007-01-24 14:35:00.000	Mano1	Mano1	Modify DB para

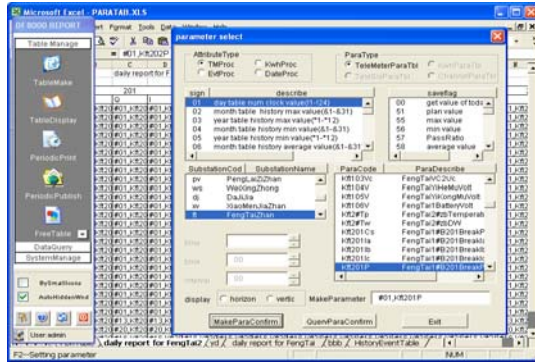




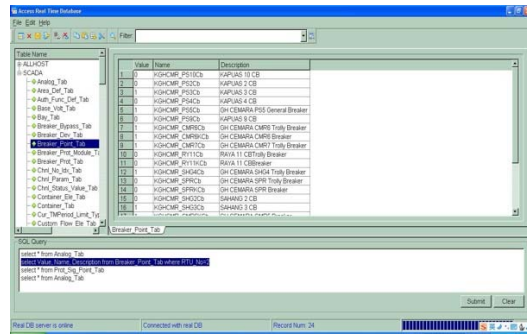
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### DF1800 SCADA Report Manager

- Based on MS Excel; Access all the function provided by the MS Excel
- Customized reports generation & plots
- Access the History database by ODBC driver
- Public the Report sheet to Web

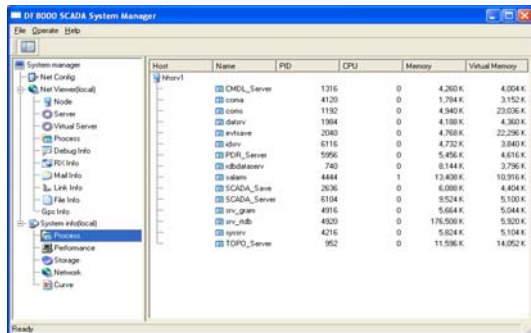


Viewer Module is the interface to display real time database parameter. The interface provides access to view and modify the parameter and help the system administrator to diagnose the consistency between real-time database and relational database.



### DF1800 SCADA System Manager

- Provides system performance output Interfaces according to the OS system management functions
- Provide network communication management
- Provide distributed objects management
- Provide node and process management
- Provide system on-line diagnose interface



### DF1800 SCADA Real Time Database Sever

DF1800 SCADA Real Time Database Sever adopts Server/Client mode. There is only one node whose database is taken as the referenced one in the whole system, the other nodes copy the referenced one as their local real-time database. The copies of real-time database is updated automatically and kept the same with the referenced one, to meet the data consistency requirement of the distributed system.

Distributed real-time database management solves the problem of maintaining the consistency of real-time database in the platform level, and carries perfect full-scale management. It makes that the upper applications can process interior data centrally, efficiently balances the system load, and improves the usability and stability of the system.

### DF1800 SCADA Real Time Database Viewer

DF1800 SCADA Real Time Database

## Advanced Software Modules

### DF1800 Web Server

- Based on Browser/Server (B/S) architecture
- Provide graphical data browsing via IE browser
- Provide scalable vector graphics and OpenGL displaying style at IE browser
- The real-time data can be updated on the IE browser
- Browsing various reports via IE browser
- Querying the power device parameters via IE browser
- Accesses history data and events via IE browser

### DF1800 Application Programming Interface

- Support constant and variable define
- Support following kinds of calculations
- Arithmetical calculation such as +, -, \*, /.
- Relation calculation such as >, <, ==, etc.
- Logic calculation such as AND, OR, NOT, XOR etc.
- Bit operation such as &, | etc.
- Support following kinds of functions
- Mathematic function such as square, square root, mod etc.
- Statistics function such as maximum, minimum and average.
- Bit operation function such as shift left, shift right, rotate shift left, rotate shift right, bit set.
- Trigonometric function such like cos, sin.
- Time function
- Logic function
- Permit function
- User defined function.
- Support sentences of evaluate, return etc.
- Support commands such as remote control, manual data setting

### DF1800 Automatic Generation Control

- Collect telemetry for all the required quantities
- Filter telemetry
- Select best alternative telemetry where redundant values are available
- Accept scheduled interchange
- Compute the Area Control Error (ACE)
- Filter ACE
- Calculate control allocation
- Issue controls to generators or invertors
- Model and monitor generator or invertors response
- Adjust the active power based on the plan curve
- Monitor NERC performance
- Provide the data interface to electricity market
- Adopting the Object-Oriented Structure Design

### DF1800 Automatic Voltage Control

- Monitor and analyze reactive power and bus voltage to minimize loss by adjusting capacitor and tap ratio of transformers and other reactive power devices
- Constraint reactive power and voltage limits to access to optimal area for power balancing
- Adjust the reactive power based on the plan curve

### DF1800 Photovoltaic/Wind Power Forecasting

- Support super short-term forecasting, short-term forecasting, medium- and long-term forecasting
- Support different forecasting algorithm
- Support similar day model

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