

ASSET MANAGEMENT SYSTEM FOR PRIMARY AND SECONDARY EQUIPMENT

DIGSILENT StationWare 4.5



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The Innovative Data Warehouse Solution



SYSTEM PURPOSE

DlgSILENT StationWare is a centralised asset management system for primary and secondary equipment. The large number of individual settings for numerical relays nowadays requires careful management in order to function reliably. Networks consisting of devices from various manufacturers can be burdensome to an IT department; each manufacturer requires an installation of their own software. StationWare is a user-friendly, multi-user web application that requires no client-side installation. All settings are stored in a manufacturer-independent format, traceability of settings changes is provided, document management functionality is included, and settings data is exchanged with manufacturer-specific relay settings software and PowerFactory. In order to cater for business processes related to electrical equipment and protection settings, StationWare allows the definition of company-specific workflows.

The screenshot shows the StationWare 4.5 interface with a settings page for a relay. The top navigation bar includes 'Hierarchy', 'Reports', 'History', 'Library', and 'Administration'. The main content area displays 'Settings [Imported on 8/3/2015 11:08:15 AM]' with fields for ID (18878), Name (Imported on 8/3/2015 11:08:15 AM), Description, Foreign Key, Owner, Device Type (SEL351_generic), Device Usage, Firmware, Status (Planning), Created (8/3/2015 11:08:37 AM [Engineer]), and Last Change (8/3/2015 11:08:37 AM [Engineer]). A table below lists attributes with columns for Attribute, Description, Value, Range, Unit, and Assigned. The table includes entries for relay identification, transformer ratios, phase voltages, and impedance magnitudes.

Attribute	Description	Value	Range	Unit	Assigned
RelCategorised					
RID	Relay Identifier	100143			<input type="checkbox"/>
TID	Terminal Identifier	INDSILENT LEWIS C BU			<input type="checkbox"/>
CTR	Current Transformer Ratio	400	1-4000		<input type="checkbox"/>
CTRN	Neutral (0N) Current Transformer Ratio	400	1-10000		<input type="checkbox"/>
PTR	Phase (VA, VB, VC) Potential Transformer Ratio	1000	1.00-10000.00		<input type="checkbox"/>
PTRS	Sync Voltage (VS) Potential Transformer Ratio	1	1.00-10000.00		<input type="checkbox"/>
VDMO	Phase PF Inverse (set: 0..N) (OFF_25.00-3000.00)	44	25.00-300.00:OFF-9999999		<input type="checkbox"/>
Z1MAG	Positive-Seq. Line Impedance Magnitude	0.2	0.10-510.00	Ohms	<input type="checkbox"/>
Z2MAG	Negative-Seq. Line Impedance Magnitude	79.67	5.00-90.00	Degrees	<input type="checkbox"/>
Z0MAG	Zero-Sequence Line Impedance Magnitude	0.74	0.10-510.00	Ohms	<input type="checkbox"/>
Z0ANG	Zero-Sequence Line Impedance Angle	81.5	5.00-90.00	Degrees	<input type="checkbox"/>
LL	Line Length	0.68	0.10-999.0		<input type="checkbox"/>
ESOP	Phase Element Levels	3	1-611-999999		<input type="checkbox"/>
ESON	Number of Residual Instantaneous Overcurrent Levels	N	1-611-999999		<input type="checkbox"/>

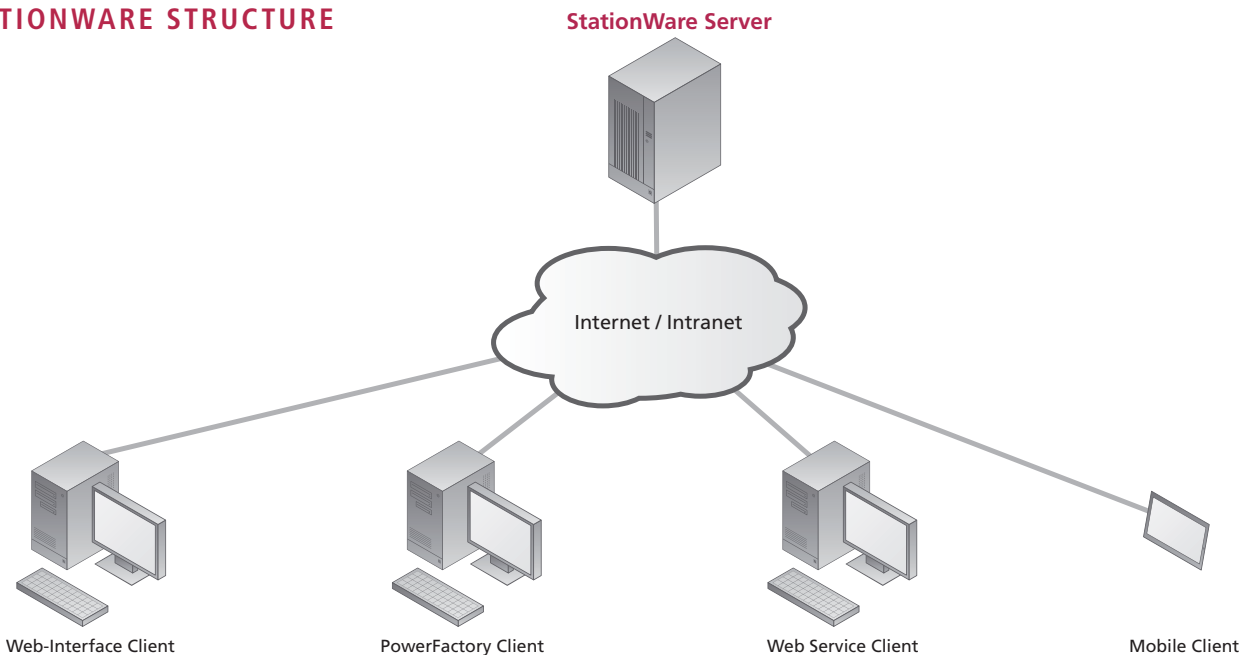


ASSET MANAGEMENT

In StationWare, assets can be managed in a completely user-definable hierarchy consisting of location and devices. Custom attributes can be defined for any asset depending on company requirements. Assets can be identified by a unique key to link StationWare to other asset management

systems. Access rights can be granted on the asset hierarchy according to a user's field of responsibility. The StationWare topology for primary and signal connections provides the possibility to connect electrical devices to form a network.

STATIONWARE STRUCTURE



DIgSILENT StationWare 4.5 Applications

PROTECTION SETTINGS MANAGEMENT

StationWare stores and records all settings associated with protection devices. A vast selection of device models is supported. User-defined device models can be created and imported with ease. Device models include multiple settings groups, range checks, descriptions, and units of measurement. The presentation of settings values faithfully reflects the original software.

Workflows handling protection settings are company-specific and the definition of this workflow is completely configurable. Email notifications can be triggered on workflow events. All changes regarding settings, devices, and locations are stored in an audit trail. Storing the data in a tamper-proof manner is essential for traceability and accountability.

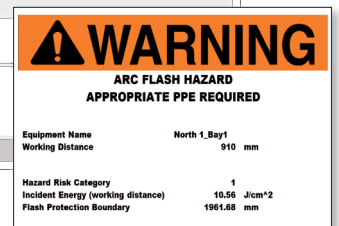


BUSINESS PROCESSES

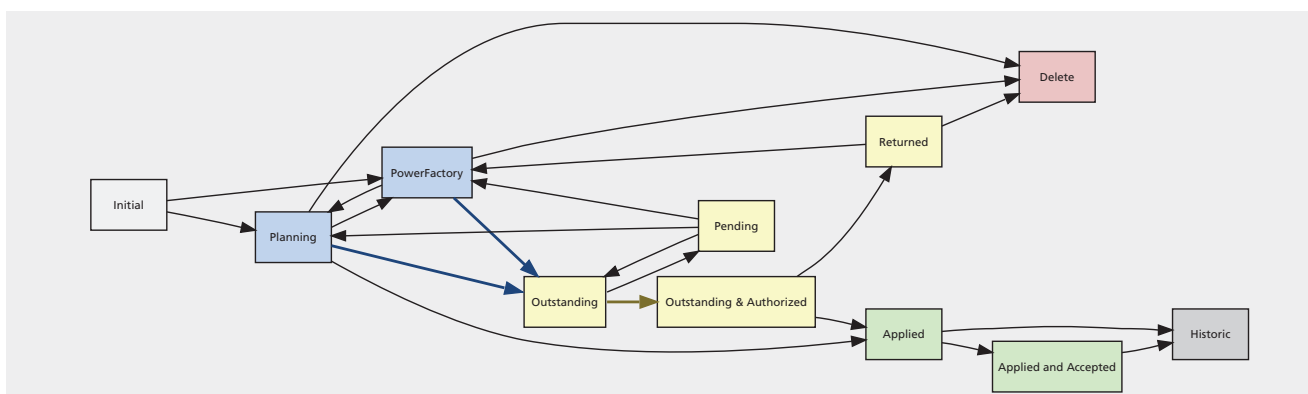
Business processes can be defined in StationWare. These processes can contain several individual tasks to create a detailed workflow representation. Every process type can be equipped with a fully-configurable workflow lifecycle.

Processes and tasks can be connected to devices and settings to indicate correlation. Examples of processes include maintenance, commissioning, cyclic protection tests, and arc-flash label creation. The latter process can be carried out in StationWare using specific arc-flash process lifecycles, reports, and scripts. Calculated arc-flash label parameters can be imported into StationWare from PowerFactory.

Business process management contains the same features as settings management including email notifications and audit trail support.



EXAMPLE RELAY SETTINGS LIFECYCLE

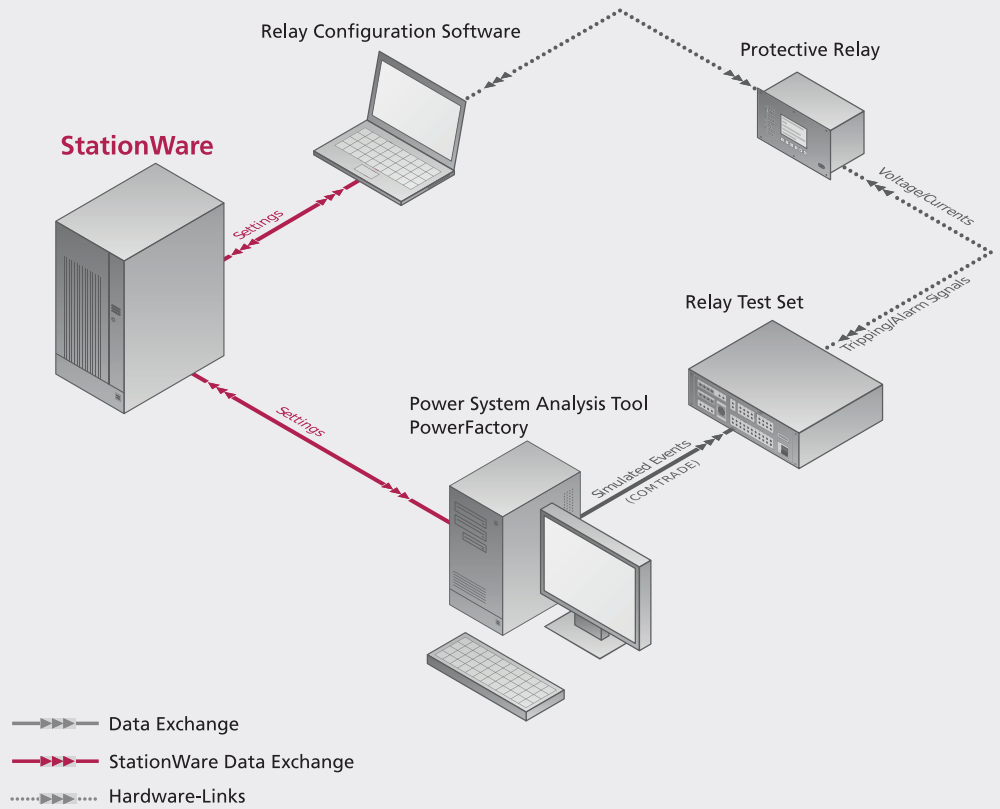


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StationWare 4.5 Data Interfaces

SETTINGS CONVERTERS

In StationWare, settings files can be viewed and managed independently of their manufacturer software. Converters provide the ability to import and export settings files directly to and from StationWare for further processing. In general, settings converters support manufacturer-specific file formats; this means that one converter can be used for various different device types and firmware configurations. The ever-growing selection of converters contains 30+ import and 15+ export converters. Digsilent accepts requests for the development of not yet supported file formats. Expert users also have the possibility to develop their own, custom converters.



REPORTS AND SCRIPTS

Reports are a tool to analyse, accumulate and present StationWare data in a clear manner. Scripts provide administrative users with the ability to automate common processes in StationWare. StationWare is shipped

with an extensive set of quickly accessible built-in reports. Users also have the option to develop custom scripts and reports using the Python programming language via well-documented interfaces.

WEB SERVICE/POWERFACTORY INTERFACE

Web services provide a remote interface to StationWare. Service methods can be invoked from a local computer or over the network to provide functionality for automated processes. This allows StationWare to integrate seamlessly into already-existing IT systems.

One example of the StationWare web service integration with another application is the PowerFactory link. This connection allows the exchange of calculation-relevant settings values between StationWare and PowerFactory.



DIgSILENT StationWare 4.5 Data Management

DOCUMENT MANAGEMENT SYSTEM

A built-in document management system supports easy access to device manuals, test reports, native settings files or additional documentation such as substation diagrams.

DOCUMENT LIBRARY

Documents and software packages can be stored in a central area: the document library.

Examples of files stored in the library include manuals, brochures, software packages, firmware packages, inspection templates. All file formats are supported. A full-text search is available for documents contained in the library. The folder structure is customisable, and access rights can be defined for each individual library folder.

AUDIT TRAIL

The audit trail provides StationWare with a safe and tamper-proof way of logging events. Detailed audit trail reports can provide users with data regarding modifications to settings, devices, and locations. This is essential for traceability and accountability.

AUTHORIZATION/AUTHENTICATION

StationWare authorization is based on roles. Authorizations can be granted on an object hierarchy level, individual lifecycle phases/transitions, and administrative functionality. This gives administrators the ability to precisely, yet easily, control the access rights of individual users.

StationWare can define user accounts with a specific username/password combination. Alternatively StationWare can be configured to use Windows domain users (LDAP) for authentication.

HISTORIC VIEW MODE

Historic data, which can be used to evaluate the network as it was at any particular point in time, may be recalled for analysis. Such analysis, together with knowledge of the system can lead to improved stability and availability. The StationWare historic view mode was created for this purpose. As an example the settings applied at a specific point in time can be viewed.

The screenshot displays the StationWare 4.5 user interface. The top-left pane shows a 'Library' tree with folders for various device types and models. The main window is divided into two sections. The upper section shows a 'Documents' table with columns for Name, Category, File name, Document description, Version description, Foreign Key, and Last Change. Below this, there are tabs for 'Model file (Excel)', 'Model file (PPSWS)', and 'Model file'. The lower section is titled 'Users and user groups' and shows a list of users and groups. A 'Group: SettingsEngineer' window is open, displaying a table of permissions for various system components.

Description	Access	No access	Effective
Administration control panel			
Access to the administration control panel	<input type="radio"/>	<input checked="" type="radio"/>	No access
Devices			
Lifecycle	<input type="radio"/>	<input checked="" type="radio"/>	No access
Device categories	<input type="radio"/>	<input checked="" type="radio"/>	No access
Manufacturers	<input type="radio"/>	<input checked="" type="radio"/>	No access
Usages	<input type="radio"/>	<input checked="" type="radio"/>	No access
Device types	<input type="radio"/>	<input checked="" type="radio"/>	No access
Locations			
Location categories	<input type="radio"/>	<input checked="" type="radio"/>	No access
Location types	<input type="radio"/>	<input checked="" type="radio"/>	No access
Location rights	<input type="radio"/>	<input checked="" type="radio"/>	No access
Library			
Document categories	<input type="radio"/>	<input checked="" type="radio"/>	No access
Library rights	<input type="radio"/>	<input checked="" type="radio"/>	No access

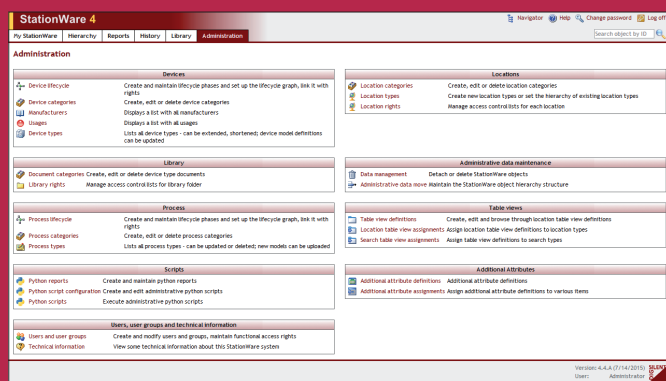
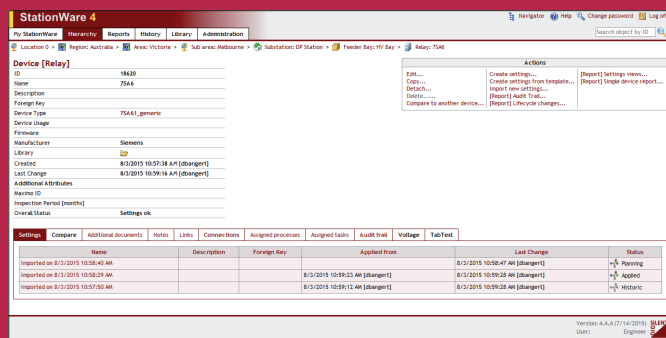
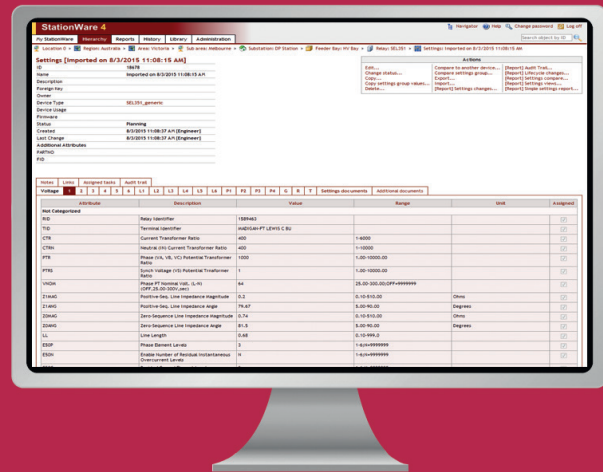
DIGSILENT StationWare 4.5 Key Features

StationWare uses state-of-the-art technology to provide users and administrators with a powerful multi-purpose tool.

StationWare manages protection for all fields of application: generation, transmission, distribution, and industrial systems.

Web services provide an easy way to extend StationWare and integrate it into the already existing IT ecosystem.

No client-side installation is required, meaning predictable maintenance costs.



KEY FEATURES:

Multi-user web application

No client-side installation is required

Converters for 30+ manufacturer-specific file formats

Central storage for power system equipment data

Web services for seamless IT ecosystem integration

User-defined workflows for settings and process management

User-definable Python scripts and reports

Document library for effective file storage and management

Data validation on settings values

Precise access rights management

Support of Oracle and MS SQL Server databases

Historic view mode to review data for a specific point in time

ASSET MANAGEMENT

- Asset Management for primary and secondary equipment
- User-definable location management
- User-definable asset types and asset attributes
- Topology model for primary and signal connections

PROTECTION SETTINGS MANAGEMENT

- Management of protection settings
- Management of protection devices and their attributes
- Comprehensive protection device model library
- Models including range checks and multiple settings groups
- Management of manufacturer-specific settings files
- Management and definition of settings templates

PROTECTION SETTINGS AND PROCESS LIFECYCLE

- Customer-specific phases and transitions
- Interactive lifecycle graph
- Access rights per phase and transition
- Audit trail
- Trace of historic settings records depending on lifecycle transitions
- Transition-triggered scripts and email notification
- User-definable checklists
- Multiple definable process lifecycles

REPORTING AND SCRIPTING

- Various built-in reports available
- Python scripting language for user-definable reports and scripts
- User-definable layout formats: xml, html, pdf
- Access rights management for reports and scripts

AUDIT TRAIL

- Safe logging of StationWare events
- Read-only (tamper-proof)
- Detailed reports

BUSINESS PROCESSES

- Management of business processes for primary and secondary equipment
- User-definable process types
- Assignment of devices and settings
- Definition and management of process life-cycles with customer-specific lifecycle phases and transitions
- Audit trail

DOCUMENT LIBRARY

- Central storage area for documents and software
- User-definable folder structure
- Access rights on library folders
- Full-text search

DOCUMENT MANAGEMENT

- Document attachments for assets
- Links to web pages or StationWare assets
- Custom notes on assets

HISTORIC VIEW MODE

- Snapshot of the StationWare system at a previous point in time
- Trace of historic settings records

USER MANAGEMENT

- StationWare specific user accounts
 - [Individual user page](#) **NEW**
 - Assigned settings
 - Assigned tasks
- Windows authentication using local or domain accounts (LDAP)
- Access rights management for user groups
 - Location-dependent rights
 - Lifecycle-dependent rights
 - Library-dependent rights
 - Functional rights

OFFLINE MODE

- Using StationWare in substations without computer network connection
- Working offline on a subset of the central database
- Synchronisation following next online login

DATA EXCHANGE FACILITIES

- Import/export of numerical protection settings files
- Import/export of task attributes
- Exchange of calculation-relevant parameters from/to PowerFactory
- Excel import/export capabilities
- Web service interface

MANUFACTURER-SPECIFIC INTERFACES

- Import Converters
 - ABB: CAP540, WinECP, PCM600
 - Areva: Micom S1: S&R103 IEC, S&R Modbus, S&R Courier
 - Basler: Bestcoms 851G/951
 - Eberle: WinREG, WinTM, Toolbox
 - GE: various Enervista software versions
 - MII, MM2, MM300/MM200, SR3
 - Nari Electric: PCS-Explorer
 - Nulec: WSOS
 - Reinhausen: TAPCON 240/260
 - Reyrolle: Reydisp Evolution
 - Schneider Electric: SEPAM converter
 - SEL: AcSELerator 4, AcSELerator 5
 - Siemens: DIGSI
 - VAMP: VAMPSET
 - ZIV: ZivercomPlus
- Export Converters
 - ABB: CAP540
 - Eberle: WinREG, WinTM, Toolbox
 - GE: various Enervista software versions
 - Nulec: WSOS
 - SEL: AcSELerator, SEL-5010
 - Siemens: DIGSI
 - VAMP: VAMPSET
 - ZIV: ZivercomPlus

DIGSILENT Company Profile



DIGSILENT is a consulting and software company providing engineering services in the field of electrical power systems for transmission, distribution, generation and industrial plants.

DIGSILENT was founded in 1985 and is a fully independent, privately owned company located in Gomaringen/Tübingen, Germany. DIGSILENT continued expansion by establishing offices in Australia, South Africa, Italy, Chile, Spain, France, and USA, thereby facilitating improved service following the world-wide increase in usage of its software products and services. DIGSILENT has established a strong partner network in many countries such as Mexico, Malaysia, UK, Switzerland, Colombia, Brazil, Peru, China and India. DIGSILENT services and software installations have been conducted in more than 130 countries.

DIGSILENT PowerFactory

DIGSILENT develops the leading integrated power system analysis software PowerFactory, which covers the full range of functionality from standard features to highly sophisticated and advanced applications including wind power, distributed generation, real-time simulation and performance monitoring for system testing and supervision. For wind power applications, PowerFactory has become the power industry's de-facto standard tool, due to PowerFactory models and algorithms providing unrivalled accuracy and performance.

DIGSILENT StationWare is a reliable central protection settings database and management system, based on the latest .NET technology. StationWare stores and records all settings in a central database, allows modelling of relevant workflow sequences, provides quick

access to relay manuals, interfaces with manufacturer-specific relay settings and integrates with PowerFactory software, allowing powerful and easy-to-use settings coordination studies.

PowerFactory Monitor is a flexible performance recording and monitoring system that copes easily and efficiently with the special requirements for system test implementation, system performance supervision and the determination and supervision of connection characteristics. Numerous monitoring systems installed at various grid locations can be integrated into a Wide-Area-Measurement-System (WAMS). PowerFactory Monitor can be fully integrated with PowerFactory software.

DIGSILENT Consulting

DIGSILENT GmbH is staffed with experts of various disciplines relevant for performing consulting services, research activities, user training, educational programs and software development. Highly specialised expertise is available in many fields of electrical engineering applicable to liberalised power markets and to the latest developments in power generation technologies such as wind power and distributed generation. DIGSILENT has provided expert consulting services to several prominent wind-grid integration studies.



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