



UNITROL[®] 6800 Excitation Systems Proven Performance Solutions

Power and productivity
for a better world™



UNITROL® 6800

Product Benefits



ABB is the world leading supplier of high quality Automatic Voltage Regulators (AVR) and Static Excitation Systems (SES) that offer solutions for any type and size of power plant with high return on investment. UNITROL 6800 SES, from UNITROL 6000 product family, cover medium to high power range applications and set a new benchmark for the global industry with respect to functionality, reliability and connectivity.

Tailor-made system

The flexible mechanical concept of UNITROL 6800 is based on proven prefabricated functional modules. With single / double channel control configuration (additional back-up controller on request) and a wide selection of thyristor bridge modules, the system can be configured to meet all field data and availability requirements.

Main features

- + IEC 61131 application software programming with ABB Control Builder M
 - + Fully compatible with ABB's 800xA IT platform
- + Fiber optic serial communication between the cubicles
 - + Electrical insulation and high EMC immunity
 - + Easy detached installation of the control cubicle
 - + Online maintenance capability
- + 64 bit floating point CPU
 - + No restrictions regarding data scaling and range

Selected applications

- + Hydro power plant
- + Nuclear power plant
- + Gas turbine power plant
- + Coal-fired power plant
- + Synchronous condensers

Key benefits

- + Easy operation, monitoring and maintenance of the system

User-friendly Excitation Control Terminal

- + High quality

Usage of proven prefabricated functional modules

- + Optimized contribution to network stability

Built-in Power System Stabilizer (PSS) options

- + High control integration ability

Prepared for IEC 61850

- + Efficient product life cycle management

Extended life time of your assets with minimum costs

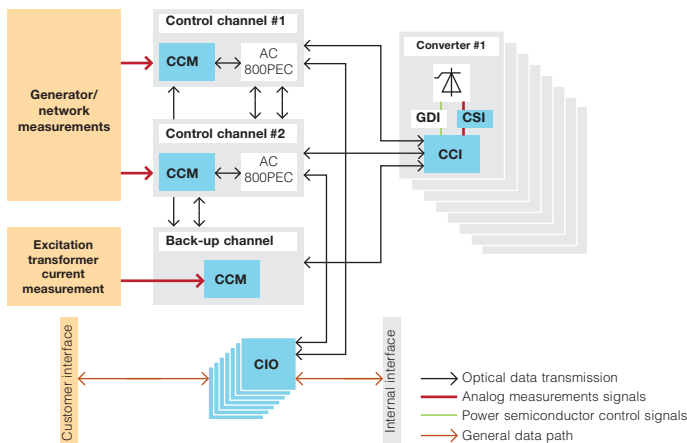
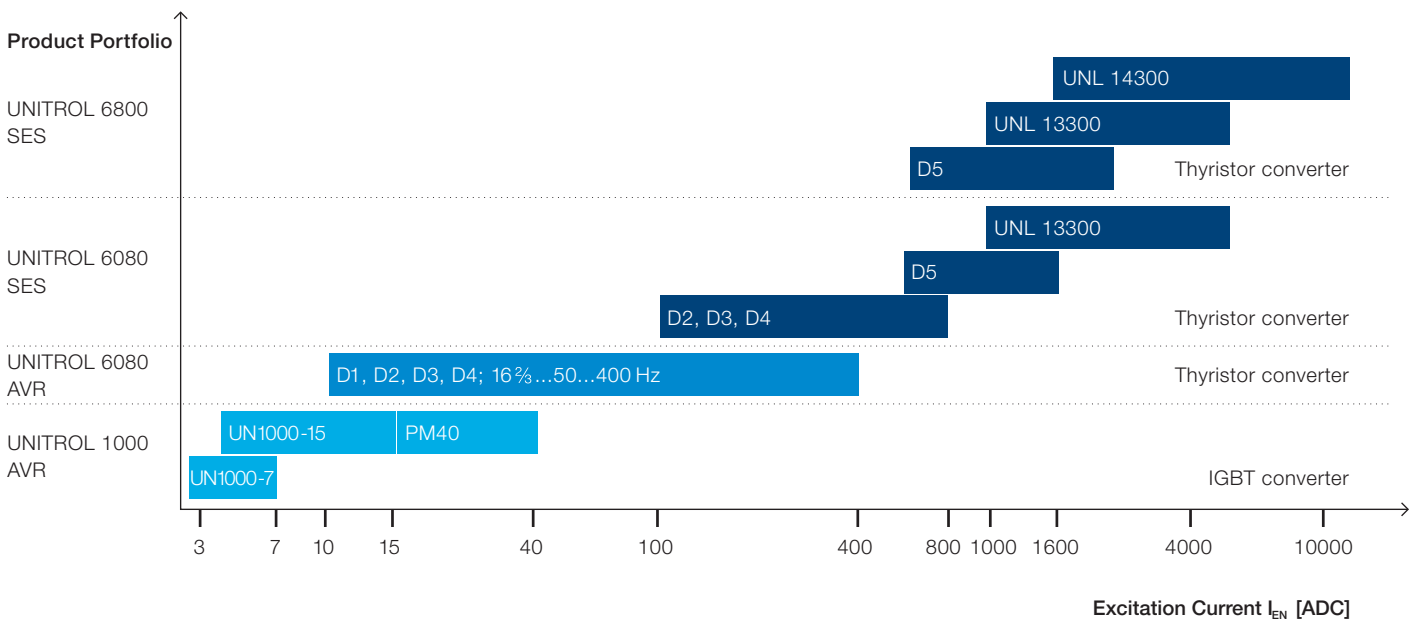
- + Professional technical help always within your reach

ABB's global excitation service network

Engineering Concept

UNITROL 6800 systems can be built with up to three control channels: two fully featured channels and one back-up channel for emergency control of the generator. The back-up channel is a single Communication, Control and Measurement (CCM) unit. Its separate hardware and different software guarantee utmost system availability. Each channel is able to control all modules of the redundant power converter. Each module is connected via its own Converter

Control Interface (CCI), which also provides diagnostic and maintenance functions including transient recorder. Converter Signal Interface (CSI) and Gate Driver Interface (GDI) provide potential barriers inside the power converter. On the system level Combined Input Output (CIO) units are used to interface with internal and external analog and digital I/O signals, 100% redundant if required.



Hardware concept of UNITROL 6800

		UNITROL 6800 SES	UNITROL 6080 SES/AVR
Closed-loop Control	Single channel	Yes	Yes
	Double channel	Yes	Yes
	Back-up channel	Yes	Yes ¹⁾
Converter Module Type		D5 (DCS800) UNL 13300 UNL 14300	D1...D5 (DCS800) UNL 13300
	Converter Redundancy	1+1 n-1/max.modules	Yes No
Input Data	Max. AC voltage	1500 V	690 V
	Rated frequency	50/60 Hz	50/60 – 480Hz ²⁾
Max. Output	Cont. DC current	10'000 A	1600 A
Data	Ceiling voltage	1900 V	850 V

1) With third converter module for max. continuous DC current ≤ 800 A
2) >50/60Hz for AVR's only; single phase supply for AVR's also available

UNITROL® 6800 System

UNITROL 6800 SES are engineered and built to meet the individual operational and environmental conditions as well as international and local standards. All systems undergo a 100% functional test before leaving the factory.

Excitation Control Terminal

User-friendly human machine interface for easy operation, monitoring and maintenance of the system

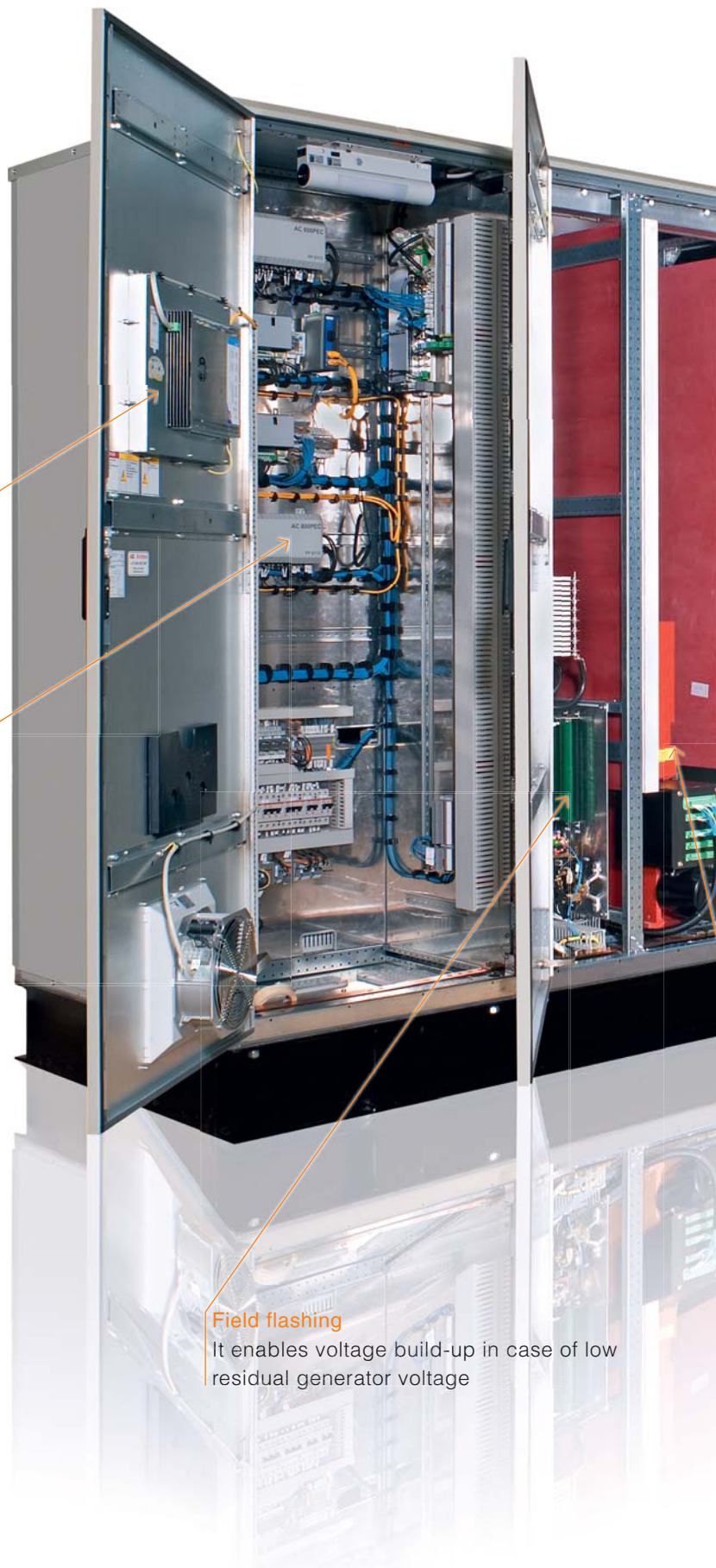
Control electronics

Two or three redundant control channels. All devices easily accessible for testing and replacement during online operation

The communication between control channel(s), power converter, and analog and digital I/O devices is done via fiber optic cables. It reduces electro-magnetic interference and allows an easy detached installation of the control cubicle.

Field flashing

It enables voltage build-up in case of low residual generator voltage





DC output

DC cables/bus ducts enter from the bottom or top

Converter Control Panel

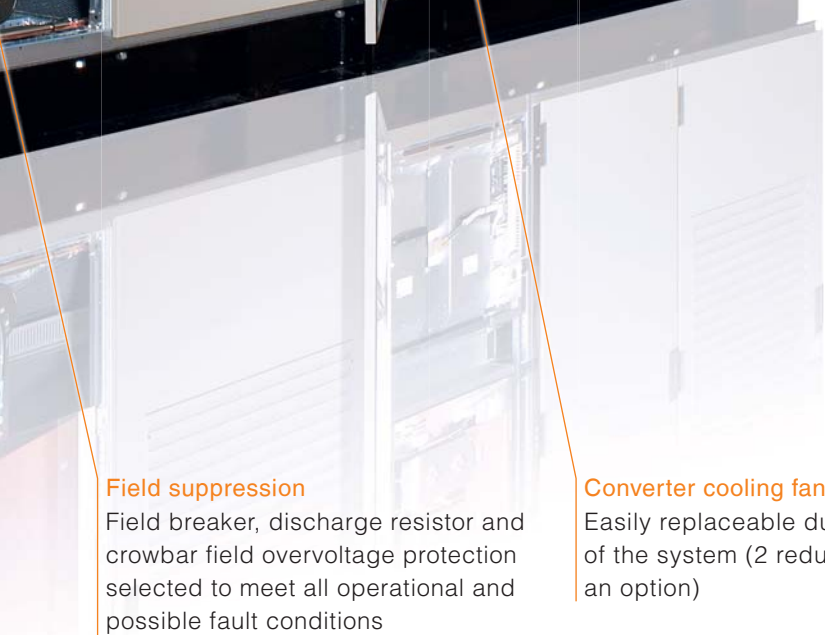
Provides actual values, converter current and temperature data, as well as LED status indication

AC input

Spacious cubicle to connect the AC cables/bus ducts entering from the bottom or top

Power converter

Fully controlled thyristor bridges



Field suppression

Field breaker, discharge resistor and crowbar field overvoltage protection selected to meet all operational and possible fault conditions

Converter cooling fans

Easily replaceable during operation of the system (2 redundant fans as an option)



Cooling air flow

System is forced cooled with air-inlet on the front and air-outlet on top

UNITROL® 6800 Control Functions

The well-structured standard firmware includes all regulation, protection and monitoring functions required for the secure operation of the SES. Nevertheless it can be adapted to specific customer requirements by extending the number of I/O signals or adding optional software functions.

Closed-loop control

- Voltage regulator with PID filter (AUTO operating mode)
- Field current regulator with PI filter (MAN operating mode)
- Reactive and/or active current droop compensation
- Limiter circuits for
 - Maximum and minimum field current
 - Maximum stator current, dependent on machine cooling media temperature
 - P/Q underexcitation
 - Volts/Hertz
- Manual restrict
- Power factor/Reactive load control
- Power System Stabilizer

Protection and monitoring functions

Monitoring and protection functions can be configured on three different action levels:

- Alarm signal only
- Usage of redundant circuits
- Instantaneous excitation trip for protection purposes

Major available functions:

- Overcurrent protection (instantaneous/inverse time)
- Volts/Hertz protection
- Loss of field protection
- Rotor temperature
- Thyristor conduction monitoring
- Actual value monitoring
- Field flashing time limit

Data and event recording

The internal event recorder function can handle and store up to 2000 events, each provided with real-time stamp. The data recorder contains a preconfigured part that can record 64 signals/2000 data points each, and a freely configurable part for 8 signals/2000 data points each.

The display and analysis of the recorded data is done by means of the Excitation Control Terminal Software.

If the AVR/SES is equipped with an Excitation Control Terminal, the recorded data are downloaded into its memory to be available independently of the main controller.

System time synchronization

The system clock of all the controllers can be synchronized with a time source by SNTP (Simple Network Time Protocol) with an accuracy better than 1ms.

The time signal can be sourced internally (from the Excitation Control Terminal) or externally from the plant LAN (Ethernet).

With an optional receiver GPS (Global Positioning System), IRIG-B (the USA, Asia) or DCF77 (Europe) signals can be used as well.



Sample of fast trending record for closed-loop AVR test

UNITROL® 6800

Hardware Components

The system is based on the AC 800PEC high performance processor family, which belongs to the ControlIT product line. It is an extension of ABB's 800xA control platform, developed to meet the fast control requirements of power electronics.

Control

The AC 800PEC control system excels in very high processing speed, providing:

- Fast analog and digital process I/Os with a typical cycle time of 400 μ s
- Fast closed-loop control and regular process logic implemented in a single controller
- Low-speed I/Os with a typical cycle time of 10 ms
- Very fast programmable logic for converter pulse control and optical communication with cycle time down to 25 ns

The AC 800PEC is fully integrated into ABB's ControlIT software environment.

Power converter

The power converter contains one or more converter modules selected and connected in order to meet the system requirements with respect to duty cycle and availability. ABB has developed a range of power converters dedicated to SES, for example D5, UNL 13300 and UNL 14300. The latter can be equipped with 3" or 4" thyristors.

Main features:

- AC supply voltage up to 1500 V
- High insulation level – HiPot test voltage up to 7.5 kV
- Redundant fans, replaceable during operation (option)
- Low noise level of cooling fans ≤ 70 dB(A)
- Active current balance control

Optional features of UNL 14300 power converter:

- "Draw out" design
- Safe test position for online repair and function tests
- Removal or replacement of the power part with a module trolley



Measuring unit and main control channel of UNITROL 6800



UNL 14300 power converter in draw out position

UNITROL® 6800 Communication Features

The communication features of UNITROL 6800 systems ensure simple and user-friendly human machine interaction, whether it comes to system commissioning or integration into the plant control system.

Excitation Control Terminal (ECT)

The ECT is a user-friendly human machine interface, which enables operation, monitoring and maintenance of the system. It is a powerful industrial PC that runs independently of the system's controller. Events and system data can be recorded over a long period of time. The LCD touch screen provides the operator with a range of selectable screens showing information on the actual status of the system in graphical and numerical form.

Integration into the plant control system

Ethernet and fieldbus protocols Modbus-RTU, Modbus-TCP and Profibus are the main choices for communication with the plant control system. UNITROL 6800 systems are also prepared for the IEC 61850 communication standard.

Remote diagnostics

Remote diagnostics and troubleshooting help to reduce the mean time to repair and service costs. UNITROL 6800 is prepared to support remote access. Thus the local maintenance staff can get all necessary support from ABB service specialists.



ECT Software, "operation" screen



Front view of the ECT, "power chart" screen

UNITROL® 6800 Software Tools

The specially developed software tools simplify the everyday use of your system and allow additional programming if required.

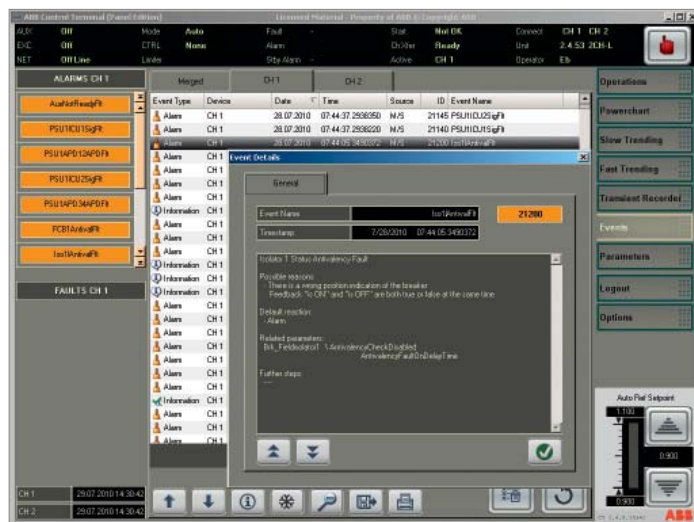
Excitation Control Terminal Software (ECT SW)

The ECT SW is a valuable tool that enables commissioning, operation, monitoring and maintenance of the system. It can be either loaded on the Excitation Control Terminal or installed on any PC operating under WINDOWS.

The software has built-in user documentation in various languages that simplifies the troubleshooting procedure. Using the “events” screen the system operator can directly access the events description and get troubleshooting instructions. The feature supports many languages, for example: English, French, Spanish, German, Portuguese, Russian and Chinese.

Control Builder M

This is an extensive programming and engineering tool. WINDOWS integrated and IEC 61131 compliant, it manages the applications of the AC 800PEC software. The AC 800PEC add-on provides full integration of the AC 800PEC into the ABB ControlIT™ software environment.



ECT Software, events screen showing troubleshooting instructions



ECT Software, “slow trending” screen

UNITROL® 6800

Service and Support

Whether it comes to life cycle management or technical support, the worldwide network of UNITROL specialists is at your service along the life span of the system.

Installation and commissioning

ABB engineers are ready to assist you wherever you are. You will benefit from their professionalism, extensive experience and multilingual skills.

Training

ABB University offers standard and customized training courses for UNITROL 6000 excitation systems. For your convenience, on-site training options are also available. For detailed training programs, please visit: www.abb.com/abbuniversity.

Product life cycle management

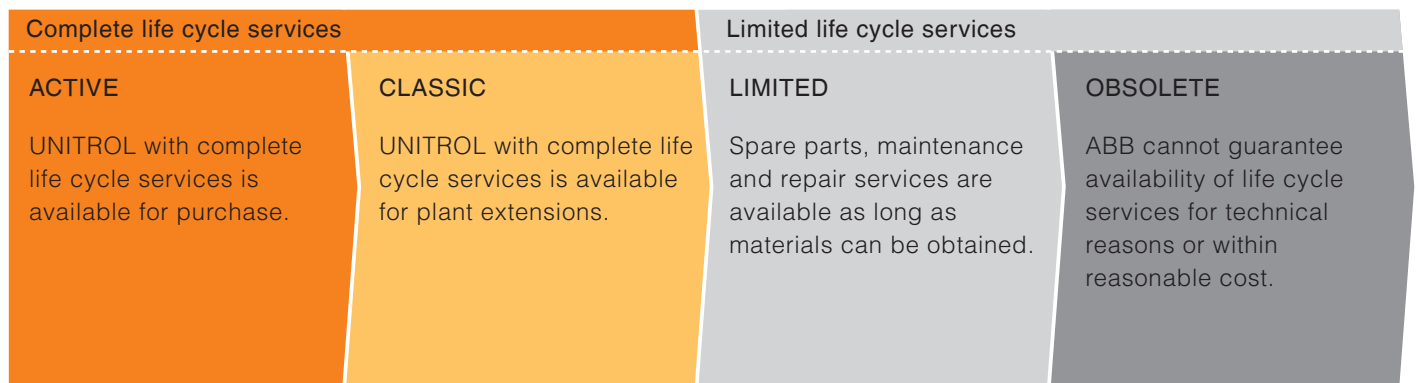
ABB follows a four-phase model for managing excitation life cycle. Depending on the product's life cycle phase, the service specialists recommend necessary actions and approach the clients proactively to inform them on all maintenance, service and upgrade necessities. It helps the customers to optimize the life time of their assets at minimum costs.

Examples of life cycle services:

- Prompt technical support
- Remote services
- Preventive and corrective maintenance
- Upgrade and modernization

For urgent technical assistance, please call our 24/7 Hotline: 1-800-665-8222

ABB life cycle management model



Complete life cycle services are guaranteed for the Active and Classic phases. As soon as the system enters the Limited phase, we recommend upgrading, retrofitting or replacing the equipment with the latest technology available in the Active phase.

Contact us

ABB Inc.

Excitation Systems & Static Starters
10300 Henri Bourassa West
St-Laurent, Québec H4S 1N6
Telephone: 514 332-5350
24 hour support: 1-800-665-8222
Fax: 514 332-0609
E-mail: pes@ca.abb.com
www.abb.com/unitrol

© Copyright ABB. All rights reserved.
Specifications subject to change
without notice.