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Aftermarket Solutions, Ref. No. [431]

Excitation Control Equipment

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ECS2100 Digital Excitation System

Voltage Regulators and Static Excitation Systems

Originally a Westinghouse Product



PRX-400B Solid-State Regulator for Multi-Field Excitation System



WTA-300B Potential Source Static Excitation System



MGR Solid-State Regulator for Single-Field Excitation System

Product Description

Excitation control equipment is the equipment which provides excitation power, regulation, control and protection for a synchronous machine.

The primary function of the equipment is to provide field current. In controlling the field current, the output voltage of the synchronous generator may be regulated. Equally important is the regulation, control and protection aspects of a modern excitation system. These functions are accomplished automatically by appropriate changes in the level of machine excitation.

Excitation control equipment is applied primarily as a voltage regulator for synchronous generators. There are also some limited applications of products applied for supplying excitation for synchronous motors.

Product History

The Excitation Control Equipment Product Line began manufacturing excitation equipment in the 1920s under the name of Westinghouse Electric Corporation. Excitation equipment was manufactured in Pittsburgh, PA until 1985 at which time it was moved to Asheville, NC. As power systems grew in size, the need to regulate the output voltage of the generator became apparent. The first voltage regulators were electromechanical designs. Eventually, magnetic designs replaced the electromechanical designs. The magnetic type designs were replaced by solid-state designs which were introduced in the 1960s. Since the introduction of solid-state designs in the 1960s, steady improvements have been made to these designs. The first digital designs were introduced in the mid 1990s and a second generation digital design was introduced in the year 2000.

Product History Time Line

Page	Product	1925	1935	1945	1955	1965	1975	1985	1995	2000	Present
19-3	BJ-30 ①	█									
19-3	WR-20 ②		█								
19-3	SRA/SRD ①		█								
19-3	WMA ②			█							
19-3	PRX ③					█					
19-3	TRA ③					█					
19-3	WTA ③					█					
	WHS ③					█					
19-3	WTA-300 ③							█			
19-3	WTA-300B ③								█		
19-3	MGR ③								█		
19-3	WDR-2000 ④								█		
19-3	ECS2100 ④									█	
19-3	ECS/VR ④										█

Figure 19-1. Product History Time Line

- ① Electromechanical.
- ② Magnetic amplifier design.
- ③ Solid-state design.
- ④ Digital design.

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System Selection Guide and Renewal Parts

General Information

Table 19-1. Current System Selection Guide

Application selection for various field current requirements. Consult the Asheville Plant for quotation.

Equipment Type	Application		General	Specific	Excitation Features
	AVR ①	SEVR ②			
MGR	●	●	<ul style="list-style-type: none"> New generators Existing generators ③ 	Supplies excitation to single field exciters or generator fields up to 600 amperes	<ul style="list-style-type: none"> Multi-function logic modularity Front access only cubicle Fixed power rectifiers
PRX-400B	●		<ul style="list-style-type: none"> Retrofit applications 	Retrofit for WMA and WR-20 regulators	<ul style="list-style-type: none"> Modular logic Provisions for redundancy
WTA-300B Brushless	●		<ul style="list-style-type: none"> New steam turbine installations > 100 MVA Retrofit applications 	Supplies excitation for generators 100 MVA and up Primary retrofit for WMA brushless systems	<ul style="list-style-type: none"> Modular logic Provisions for redundancy Drawout power rectifiers Drawout ac disconnect
WTA-300B		●	<ul style="list-style-type: none"> New generators Existing generators ③ 	Supplies excitation for generator fields 500 amperes and up	<ul style="list-style-type: none"> Modular logic Provisions for redundancy Drawout power rectifiers Drawout ac disconnect
ECS2100	●	●	<ul style="list-style-type: none"> New generators Existing generators ③ 	Supplies excitation to exciter field or directly to the generator field	<ul style="list-style-type: none"> ECS2100 digital logic Provisions for multi-channels Provisions for redundancy Provisions for drawout design
ECS/PSS		●	<ul style="list-style-type: none"> New generators Existing generators ③ 	Stand-alone power system stabilizer	<ul style="list-style-type: none"> IEEE Type 2 Event recorders Bode plot 19-inch rack-mount design
ECS/VR	●		<ul style="list-style-type: none"> New generators Existing generators ③ 	Supplies excitation for exciter fields up to 100 amperes, BJ-30 replacements	<ul style="list-style-type: none"> Digital logic Fixed power bridge
Portable Excitation Systems	●	●	<ul style="list-style-type: none"> Portable standby excitation systems 	Supplies excitation for systems 6000 amperes and up	<ul style="list-style-type: none"> Supplied in outdoor enclosure Multi-generator design Utilizes WTA-300B system Trailer or skid mounted

- ① AVR — Automatic Voltage Regulator (supplies excitation to exciter field).
- ② SEVR — Static Exciter Voltage Regulator (supplies excitation to generator field).
- ③ Available for any Generator/Regulator application.

Replacement Capabilities



Renewal Parts



TRA Voltage Regulator

Renewal Parts

Eaton’s electrical business offers a complete line of spare parts for current systems as well as parts for some systems not currently manufactured. The table to the right lists systems that have spare parts available. For those systems that do not have spare parts available, the recommended replacement system is listed.

Table 19-2. Renewal Parts Availability

Product	Parts Available		Current Replacement
	No	Yes	
BJ-30	●		ECS/VR
WMA	●		ECS2100
WMA BR ④	●		ECS2100
WR-20	●		ECS2100
Turbo-Graph		●	
SRA/SRD	●		TRA-TRD
TRA/TRD/TRX		●	ECS/VR
XASV		●	XMC
XMC		●	
WTA		●	ECS2100
WTA-300B SEVR		●	ECS2100
PRX-300		●	ECS2100
PRX-302		●	ECS2100
PRX-400		●	ECS2100
MGR		●	ECS2100
WDR-2000		●	ECS2100
ECS2100		●	N/A
ECS/VR		●	N/A

④ WMA brushless.

Further Information

Publication Number	Description
SA-151 SA-231 SA-234	Sales Aid for MGR Excitation Systems Sales Aid for WDR Digital Regulator Sales Aid for WDRT Digital Test Kit
SA-106 SA-247 B.54.02.SE	Sales Aid for Potentiometer Replacement Sales Aid for Voltage Regulation Is Our Business ECS2100 Digital Excitation

Field Service

Eaton - Electrical Services & Systems (E-ESS) has trained technicians nationwide. See **Tab 23** in this catalog for further information about (E-ESS) capabilities.

Pricing Information

Call the Eaton Asheville Plant for pricing, 1-828-687-3304.