

Application Note

Easy Retrofitting Solution for the ECS2100 Provides Enhanced Capabilities

The ECS2100 excitation control system became available in the year 2000 equipped with the latest technology for controlling generator terminal voltage response. Three

digital control boards provided features that otherwise required numerous analog control boards, such as the typical arrangement found in the WTA 300B excitation system. The ECS2100 followed the earlier Westinghouse design by having rectifier bridge drawers, but with one major improvement. Bridge parallel sharing using skip pulse methodology was integrated into the design, eliminating chokes and reactors. The new ECS2100 rectifier drawers used fiber optic SCR coupling to eliminate noise pickup which can occur with a conducting wire and cause misoperation of the SCRs in high power systems.

The ECS2100 consisted of three digital control boards: a Sensor Input Module (SIM), Excitation Control Module (ECM), and Firing Control Interface Module (FCIM). These three boards have been integrated into a single control module called the ECM-2 Excitation Control Module. See Figure 1. The ECM-2 is the heart of the next generation of excitation control, the DECS-2100. This single module combines the capability of the three previous boards found in the ECS2100 with the new features identified in Table 1. The ECM-2 is used in all new DECS-2100 systems and is available as a retrofit option for all previously shipped ECS2100 systems.



Figure 1: Redundant controllers in an ECS2100 (left) and redundant ECM-2 controllers in a DECS-2100 (right).

BESTCOMS™Pro is a powerful software hybrid of the original ccTool and the popular Basler BESTCOMS™. BESTCOMSPro is backwards compatible with ccTool files. The benefit of the new design and interface is that it shortens the startup commissioning process and eases the burden of periodic testing, such as NERC tests now required in many regions of the United States.

The ECM-2

The ECM-2 is a feature rich controller that includes all the benefits of the boards previously found in the ECS2100, but with additional design enhancements in a smaller, efficient, single-package design. See Figure 2. These enhancements include a new automatic tuning tool to assist in the selection of appropriate gains of the automatic voltage regulator to properly affect the generator voltage response. The optional automatic synchronizer monitors the bus and generator voltages and supplies discrete raise or lower correction signals to synchronize the generator to the utility bus. A new generator simulator feature allows the user to validate the operating performance of the ECM-2 without being connected to a generator. By identifying the transfer function of the generator, turbine, and excitation system, an exact replica of the user's system is created. From there, the excitation limiters and protection functions can all be tested as if the machine were in actual operating mode.

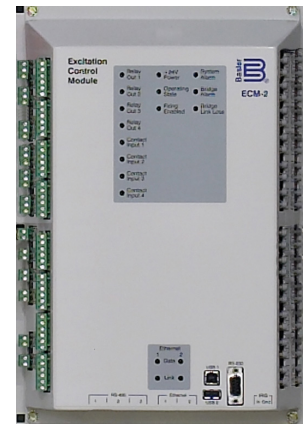


Figure 2: ECM-2 Excitation Control Module

For communications during the commission process, the Ethernet port or the new USB port can be utilized to connect a laptop computer to the unit. A second USB port is available so users can simultaneously download settings to an external storage device such as a USB flash drive.

BESTCOMSPro software is a combination of the ccTool program used with the ECS2100 and the popular BESTCOMS program featured in Basler's DECS product line. "Easy screens" are provided to navigate users through essential menus for tuning the excitation system. For systems where redundant or supervisory channels are included, an additional ECM-2 can be added to replace what would have previously required another group of three control boards.

Another new feature found in the ECM-2 is a real time chart recorder which allows from 1 to 6 machine parameters to be recorded as they occur, eliminating the need for an external chart recorder. For processes like commissioning or NERC testing, the real time chart recorder tool is highly beneficial.

Event recording (oscillography) is provided with the ECM-2. This feature creates records as a function of various available triggers to capture disturbances based on events like terminal voltage and reactive power.

A new, easy to use dynamic system analyzer is included to shorten the time needed for frequency response testing between the generator and excitation system. The frequency response validates the generator transfer function with the excitation system and provides the means to develop the parameter settings required for the power system stabilizer. The ECM-2 has the ability to do two simultaneous frequency responses with different parameters and different inputs and outputs.

New BESTspace™ Tool Provided with BESTCOMS™Pro

The new BESTspace tool provided with BESTCOMSPro allows the user to save multiple operating screens at the same time as they are viewed on a computer monitor. For

example, BESTspace work screens allow a commissioning engineer to pick a preferred combination of screens required for commissioning and view all of them in real time. Users can create and save numerous BESTspace work files which then can be opened to quickly display the parameters most important for the commissioning or test engineer. See Figure 3.

Updating the ECS2100

The new ECM-2 can easily replace the control boards of the ECS2100. The existing files from the ECS2100 are saved and supplied to the Basler factory. Then the existing boards are unplugged. The fiber optic cables going to the rectifier drawers are disconnected. Then the existing SIM, ECM, and FCIM boards are removed and, utilizing the included L-Bracket with the same mounting holes and terminal locations as the existing ECS control boards, the new ECM-2 is mounted and the connectors are reconnected in a relatively quick process. The number of ECM-2 units and L-Brackets included is based on the number of channels used in the current ECS2100.

When retrofitting an ECS2100, a copy of the BESTCOMSPro software is also included. As previously described, BESTCOMSPro is the software that communicates with the ECM-2. To accomplish a smooth transition, a copy of the configuration file being used in the ECS2100 control

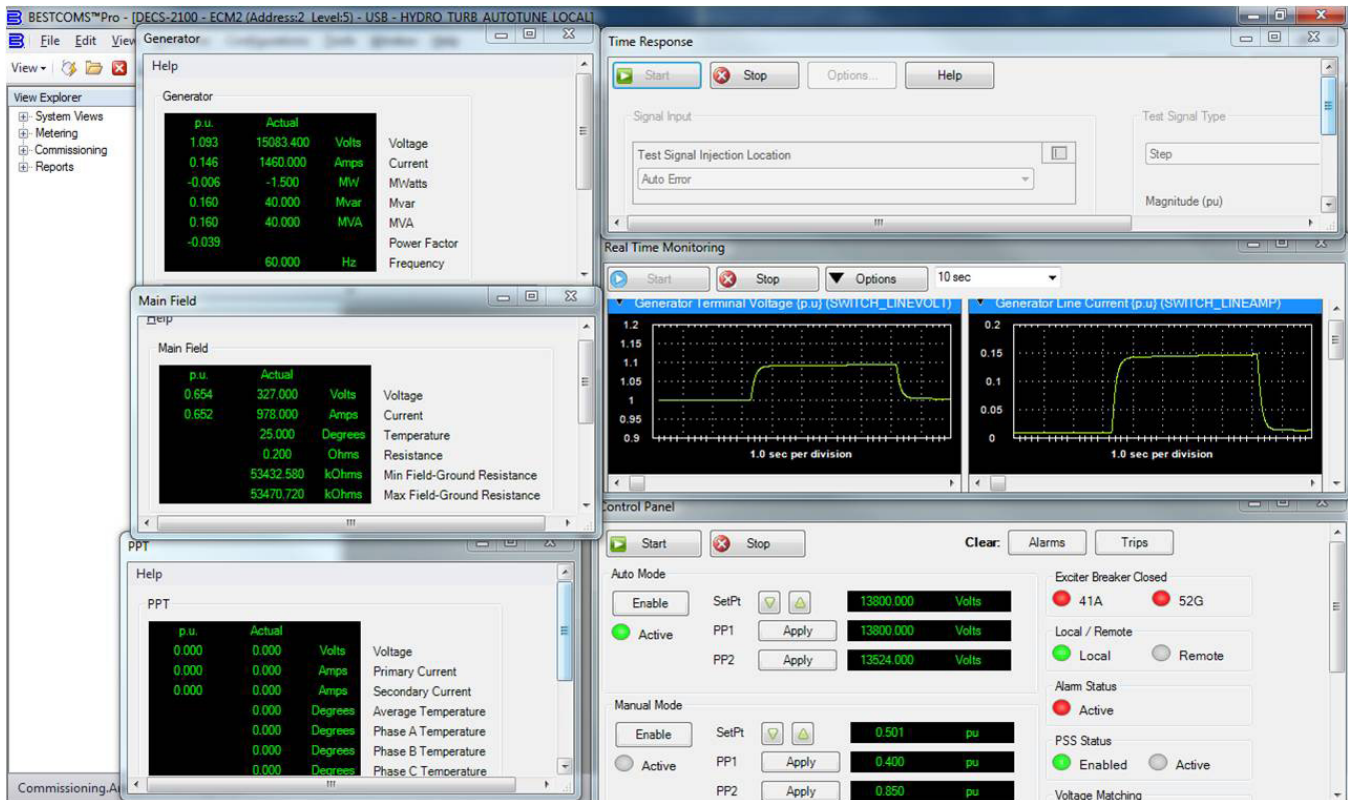


Figure 3: BESTspace work files allow for a combination of menu screens chosen by the user to be viewed in real time.

boards needs to be sent to the Basler factory so it can be implemented into BESTCOMSPro. Finally, the IDP-1500, a Human Machine Interface (HMI), is included as part of the retrofit. The IDP-1500 features enhanced capabilities and communication connections compared to the PanelMate screen found on many existing ECS2100 units. Because the IDP-1500 is slightly larger than the PanelMate, the existing hole needs to be expanded to accommodate the IDP-1500. See Figures 4, 5 and 6.

Features of the New ECM-2

Table 1 provides a list of the features of the ECM-2 compared to the original boards found in the ECS2100.

For more information

For more information, visit www.basler.com to download the ECM-2 instruction manual or the DECS-2100 product bulletin. For assistance with product orders or questions, visit www.basler.com/support/, contact your Application Engineer, or contact Technical Support at +1 618.654.2341.



Figure 4: ECM-2 IDP-1500 installed in an excitation system cabinet

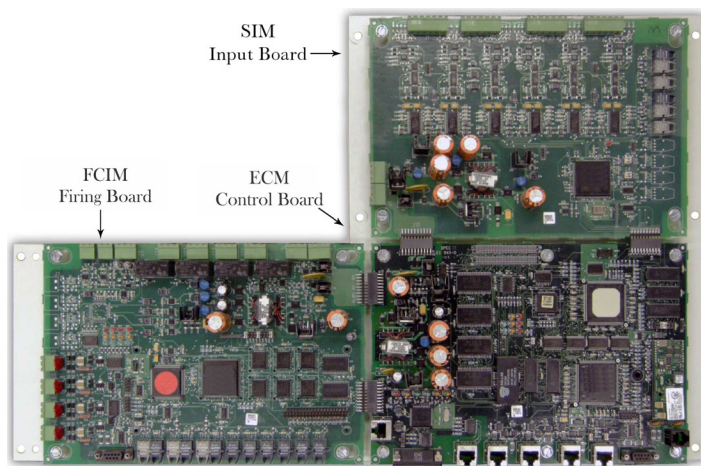


Figure 5: ECS2100 L-bracket

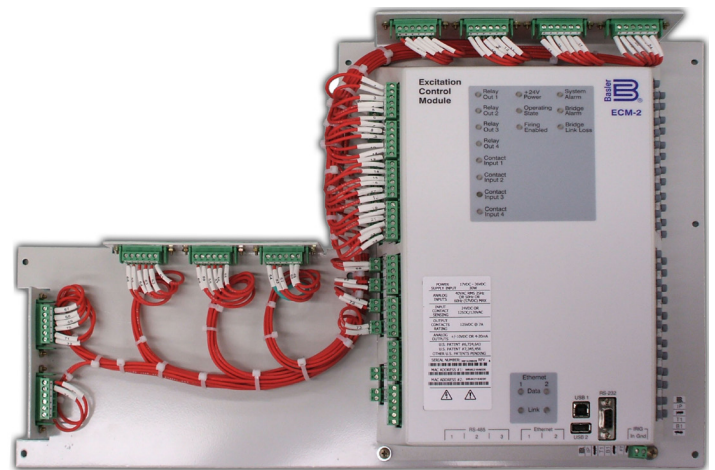


Figure 6: ECM-2 retrofit bracket for the L-bracket

Table 1: Comparison of ECS2100 Control Boards and the ECM-2

EQUIPMENT FEATURES	ECS2100	ECM-2 (DECS-2100)
Voltage Regulation Accuracy % (or better)	0.20%	0.10%
Other Operating Modes		
High Side AVR Mode after synchronized (using high side set of PTs/CTs)		✓
Minimum/Under Excitation Limiter		
Summing Point		✓
Dual Set Points selectable via Programmable Logic		✓
Maximum/Over Excitation Limiter		
Off-Line Excitation Limiter Summing Point, On-Line Excitation Limiter Monitors Field Current Summing Point		✓
Dual Set Points selectable via Programmable Logic		✓
Field and Gen. OEL Simultaneous		✓
Stator Current Limiter - Prevents Extended Stator Overcurrent for Long Periods		
Dual Set Points selectable via Programmable Logic		✓
Dual PID Setting Groups - Allows for programmed changes in PID gain settings for use with Power System Stabilizer or alternate system configurations		✓
Comm-Linked Cross Current Compensation		✓
Six (6) Real Time Monitoring Measured Parameters for Test Analysis		✓
BESTCOMSPro with the BESTspace commissioning tool		✓
Simulation Tool		✓
Autotuning of PID controller		✓
IRIG-B Time Stamping		✓
RS-232 port, three RS-485 ports, two (10/100 Base T) Ethernet ports, and two USB ports.		✓
Easy to use Dynamic System Analyzer		✓
Time response performance screen		✓

NOTE

Basler Electric attempts to make settings and configuration updates as easy as possible for the user. However, product enhancements, updates, and feature additions may create differences between devices. It is recommended that all settings are reviewed and system performance is verified. It is not the intention of this document to identify all changes or differences between devices. For more information, please refer to the appropriate instruction manual. If there are questions or concerns, contact our Technical Sales Support staff for assistance.