

G A C OVERNORS MERICA CORP.



Distinction in the World of Engine Governing & System Controls

genset controls & accessories digital management engine systems engine controls custom control systems external & integral actuators throttle body actuators



Governors America Corp. is a leading provider of innovative engine control products to a worldwide list of customers. Our dedication and focus on our world market has resulted in a vertically integrated company with complete design, development, production, and marketing capabilities for its family of electromechanical and electronic devices for precise engine control and system integration. These market focused efforts have resulted in innovative engine control products that are being used in all parts of the

world. GAC product solutions can be found in every imaginable application and in the harshest environments. Some typical applications are generator sets, material handling, marine propulsion, mining, locomotive and off-highway applications.

GAC has developed a broad, technically advanced line of electronic governing and fuel control systems, complete with accessories. Engine control systems range in cost and complexity from single speed isochronous governors to sophisticated multi-engine load sharing /power control systems, full authority drive-by-wire systems, locomotive diesel electric controls, full engine generator military control systems and a great variety of complementing governing and control system accessories.

GAC compliments its innovative designs with a vertically integrated state of the art manufacturing facility. GAC manufacturing combines the latest in technology, equipment and computer systems with an experienced workforce to produce products that exceed our customers' demands for high quality and on time deliveries.

The latest in electronic surface mount and through hole manufacturing methods and equipment combine for an efficient and high quality operation. GAC has implemented a process that allows for maximum flexibility in producing products in either high or low volume to satisfy the customer's ever-changing requirements. The mechanical assembly process has the latest in automatic and semi-automatic production methods and tools that are augmented by GAC's full array of in-house CNC equipment that insures high standards of quality and "just in time" manufacturing methods. Behind all of this are GAC's employees and our commitment to quality. These dedicated individuals are committed to continuous improvements in their areas of discipline. These areas of discipline are engineering, marketing, customer service, production, and quality assurance. Quality at GAC starts at the very beginning, with the design of our products.

All of our designs start with the premise that we must provide our customers with the highest quality product providing the best value available in the world. To do this we design our product to the latest World standards, including ISO 9001:2000, compliant with EMC standards, UL recognition, CSA approval, NFPA compliance, CE approval, and Marine Agency classification. GAC has its own EMC lab to insure our product performance, but always uses an independent test laboratory for third party certification.

GAC is committed to manufacturing in the USA and is currently producing 95% of our products in both the electronic and mechanical product families with this philosophy. The ability to manufacture GAC's products internally allows for stringent quality monitoring and faster response times to our customer's requirements.



Digital Governors



DSC-1000 Series - Digital Engine Control System

- High quality, ruggedly built, microprocessor based fuel control
- Modular software can be customized to the application with a standard PC
- Total fuel management- multiple torque maps, multiple droop/isochronous option
- End of line programming and field configurable design
- Engine emissions control with starting fuel, boost pressure fuel limiting, ramps functions and temperature settings
- Capable of driving two independent actuators
- CANbus data transfer (J1939) for total system integration



BEC-100 Series

- Compact engine controller offers automatic start/stop control
- Cost effective basic engine control system
- Lamp output terminals
- Six Lamp Output Terminals
- One Dual Function Input/Output Terminal
- Built-in crank pause and overspeed switch
- Microprocessor based design
- Dual function input/output terminals



IGC-700 Series

- Integrated engine governor & protection control
- 3 Contacts (starter motor, fuel valve or solenoid output , alarm or preheat)
- SMARTTOUCH® 16 character keypad for easy set-up and troubleshooting
- Password protected for greater security
- LED bar graph for set-up and troubleshooting
- Non-volatile E² memory
- Fixed speeds, plus variable speed range
- Configurable fuel limit control
- Overspeed protection and engine crank control
- Remote starting with battery system starter
- 10 discrete, user configurable signal sensor inputs



SDG-700 / 800 Series

- Microprocessor based design with CANBus operation
- PID parameters for optimized performance
- Highly customizable performance to match each application
- SMARTTOUCH® 16 character keypad for easy set-up and troubleshooting
- Password protected for greater security
- LED bar graph for set-up and troubleshooting
- Non-volatile E² memory
- 3 fixed speeds, plus variable speed range
- Configurable fuel limit control
- Overspeed protection, engine crank control
- Start fuel schedule for minimal exhaust smoke
- Acceleration and deceleration speed ramps for smooth speed changes

Digital Governors

The SDG-500 Series (Smart Digital Governor) is a solid state microprocessor based speed control unit that offers precise ($\pm 0.25\%$) isochronous speed control with fast response to transient load changes. Designed for high reliability and ruggedly built, the SDG-500 Series is hard potted to withstand the harsh engine environment and can be mounted directly in the engine compartment. The SDG-500 Series has several built in configurable features: three fixed and variable speed with correlating droop settings; engine shutdown protection; speed ramping from idle to operation speed; and start fuel control for lower engine exhaust emissions.

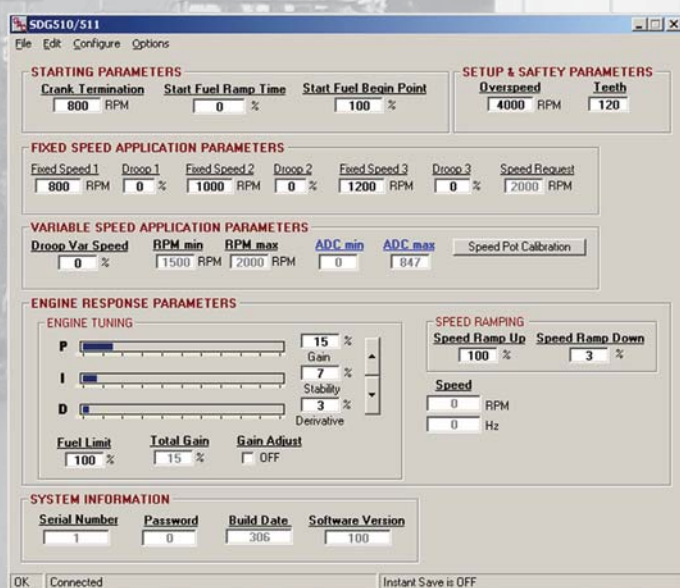
The factory standard SDG-500 Series is pre-programmed to OEM's specifications. The SDG-510 and SDG-511 have no end user modifiable settings. The SDG-512 and SDG-513 are equipped with a single turn gain trim potentiometer for field adjustments.

If needed, configuration and tuning of the SDG-500 Series can be accomplished by the OEM via GAC's SmartVU™ configuration software. The software allows users to save the current configurations and data to disk or file. Saved settings can be utilized for configuring multiple units.

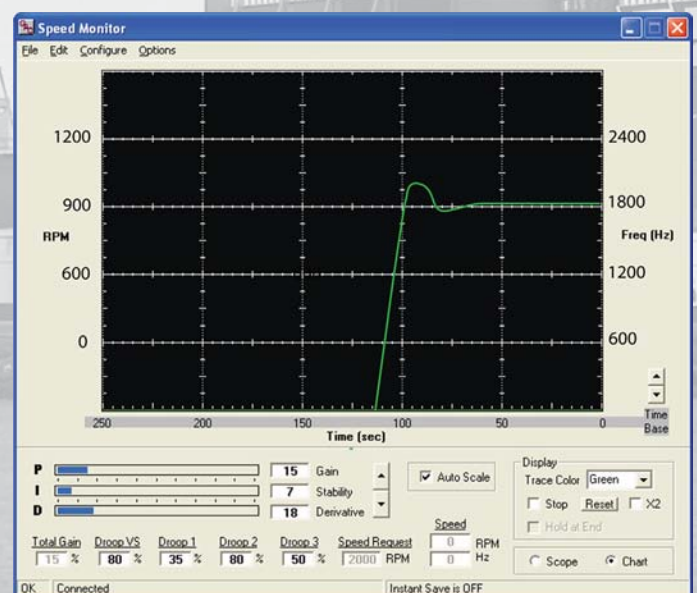


SDG-500 Series - Smart Digital Governor

- Fast, compact digital governor
- Solid-state microprocessor based device designed to control engine speed with precise response to transient load changes
- Configurable parameters by software
- Real-time parameter setting on running engine possible
- Three fixed and one variable speed with correlating droop settings engine
- Overspeed shutdown protection
- Speed ramping from idle to operation speed
- Starting fuel control for lower engine exhaust emissions
- Speed Monitor



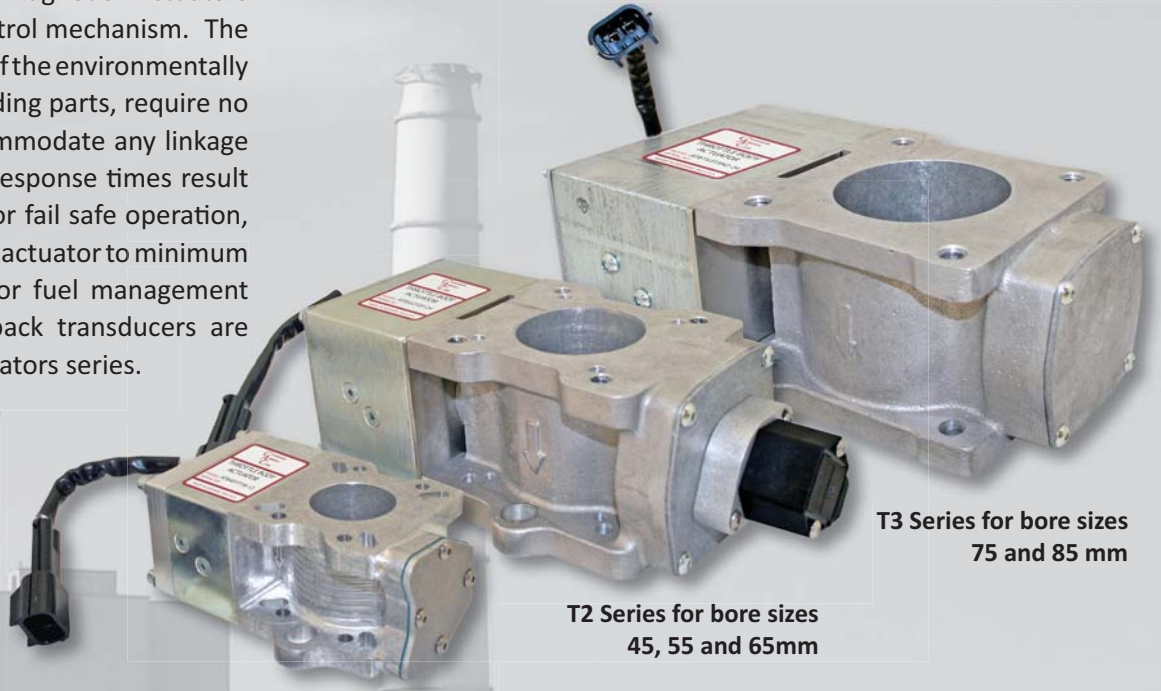
GAC's SmartVU™ Basic Set-Up Screen



GAC's SmartVU™ Real Time Graphic Monitor

Gaseous Fuel Throttle Body Actuators

GAC's Proportional Electromagnetic Actuators position the engine fuel control mechanism. The highly reliable rotary design of the environmentally sealed actuators have no sliding parts, require no maintenance, and can accommodate any linkage configuration. Exceptional response times result in superior performance. For fail safe operation, an internal spring returns the actuator to minimum fuel when de-energized. For fuel management applications, position feedback transducers are available within various actuators series.



**T1 Series for bore sizes
25, 30, 35 and 40mm**

**T2 Series for bore sizes
45, 55 and 65mm**

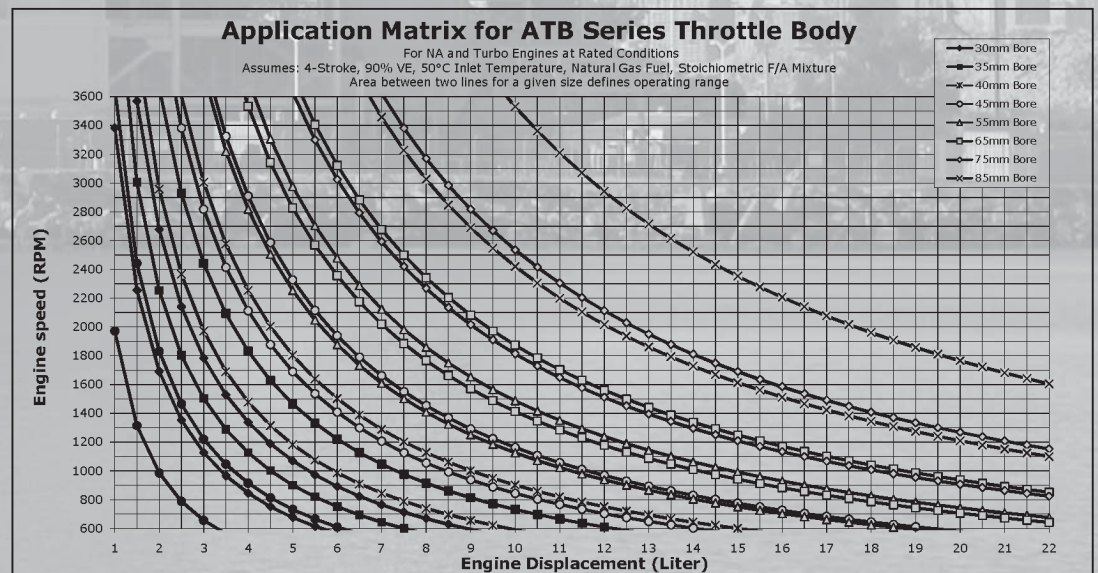
**T3 Series for bore sizes
75 and 85 mm**



**Venturi Mixers for 30mm,
50mm, 60mm and 75mm for
use with T1 and T2
Throttle Body Actuators**

Designed to induce gas flow into the throat of a venturi in which there is air flow. The rate of gas flow is proportional to the rate of air flow and, in theory, remains so as long as the supply pressures of air and gas are equal and the temperatures of the air and gas remain constant. A venturi mixer insures maximum performance, through mixing of the air and gas, and proportioning of the air and gas within limits. For fixed speed applications only.

- Low-Cost, Maintenance Free, Compact Design
- Various Bore Sizes Available (25 - 85 mm)
- Precise, Real-Time Engine Speed Control
- Flexible Design for Engine, Manifold & Fuel Mixer Considerations
- Adaptable to Corrosive Environmental Conditions
- Rapid Response to Transient Load Conditions
- Optional Throttle Position Feedback Sensor
- Mounts in Any Position
- No Mechanical Linkage, No Mounting Brackets
- Idle Adjustment Screw
- Optional High Temp & Sealed Version for Turbocharged Engines



Electric Actuators - Integral



ALR Linear Actuator Series

- Low cost design
- Fast response
- Spring return to minimum fuel
- Maintenance free
- Linear ball bearings
- compact design



100 Series

- Mounts directly to Stanadyne "D" Series pumps
- Actuator replaces fuel shutoff solenoid
- Sealed design prevents contamination of fuel
- Faster response than competitive designs

100 Series for Stanadyne "D" Series pumps



103 Series

- Easy installation requiring minimal time
- Low cost engine governing solution
- Fast response < 45 msec.
- High reliability and proven electromagnetic design

103 Series for DELPHI DPG/DP210G Pumps



175 Series / 176 Series

- Mounts on the pump in place of mechanical governor
- Capable of controlling pumps on engines up to 8-cyl.
- Sealed to protect linkage and electromechanical components
- Connects directly to the fuel rack bellows
- Includes manual shut-off mechanism
- Compact size, fast response
- Cost effective design
- Feedback position available

175 Series for "P" size Bosch style pumps

176 Series for "A" size Bosch style pumps / left hand rack

KT-275 / Field installation kit required for 3000 Series "P" pumps

KT-276 / Field installation kit required for 7000 Series "P" pumps



180 Series

- Replaces existing mechanical governor
- Proven electromechanical design
- Spring balanced system that allows the fuel rack to return to minimum fuel

For DEUTZ 1012 / 1013 / 2012 and VOLVO 520 / 720 engines



110 Series

- Directly replaces engine stop solenoid
- Unique linear electromechanical technology
- Mating half connector consistent with type used by engine manufacturers

For 2, 3, and 4 cyl. DEUTZ 1011 / 2011 engines



275 Series

- Mounts on the pump in place of mechanical governor
- Capable of controlling pumps on engines up to 12-cyl.
- Sealed to protect linkage and electromechanical components
- Connects directly to the fuel rack bellows
- Includes manual shut-off mechanism
- Position feedback transducer is available
- Optimum performance for inline pumps
- MW pump adapter kit available

275 Series for "P" size Bosch style pumps

KT-275 / Field installation kit required for 3000 Series "P" pumps

KT-276 / Field installation kit required for 7000 Series "P" pumps

Electric Actuators - External



ALN-025 / 050 Linear Actuators

- 1/4 ft-lb and 1/2 ft-lb, 22mm stroke, fast response
- Designed with high quality anti-friction bearings
- Cost effective design
- Replaces competitive models



150 Series

- Compact, low cost design
- 25° rotation
- Designed for YANMAR and other small engine applications
- Unique rope start provision
- Magnetic assist shut-off feature to ensure engine shutdown



120 Series

- 1.0 lb-ft of torque, 25° rotation, < 32 msec. response
- Small, low cost, low friction model
- Ideal for fuel systems on engines up to 150 hp
- Suitable for rotary or small inline fuel pumps of small carburetors



120-E4-HT Series

- New and improved design, meters fuel to Cummins engines with PT fuel delivery systems
- Fuel deliver capability up to V16 engines
- Relieves fuel rail pressure to ensure fastest governor's response
- Field-proven - best long life design for PT fuel systems



225 Series

- 2.2 lb-ft of torque, 25° rotation, < 45 msec. response
- Low cost, versatile model
- Suitable for multi-plunger fuel pumps and medium size carburetors
- Various models offer a variety of connectors and wiring harnesses, including feedback sensor
- Outstanding reliability and performance
- Feedback sensor available



2001 Series

- 7.5 lb-ft of torque, 35° rotation, < 80 msec. response
- Wide angular travel
- Large bearing system
- Substantial reserve torque (up to 10 lb-ft) to move linkage systems with high inertia and moderate friction loads
- Through-shaft design and universal mounting to simplify installation
- Sized for engines from 400-1800 hp
- Suitable for large carburetors, large fuel pumps, and multiple-injector system

Electronic Speed Controls

GAC's Speed Control Units are precise speed controls designed and manufactured in various configurations to meet application requirements using the latest analog and digital control technologies. Reverse battery polarity and fail-safe protection in the event of loss of speed sensor signal or battery voltage is incorporated in every GAC Speed Control Unit. A wide variety of application needs can be satisfied with GAC's constant or variable speed governing, in isochronous or droop operation.



ECC-326 Series

- Full PID setting (Speed, Gain & Stability Adjustments)
- Designed to Read from Speed Signal/Frequency from an AC Generator



ESD-1000 Series

- 12 or 24 VDC
- Isochronous Operation
- Gain Adjustment
- Rugged, Hard Potted Design
- 12 Pin APM Connector / BC Replacement Available



ESD-2200 Series

- 12 or 24 VDC
- Isochronous Operation
- Adjustable PID Functions
- Rugged, hard potted design
- Light Force Option Available



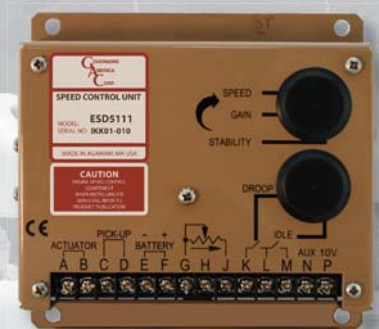
ESD-2300 Series

- 12 or 24 VDC
- Isochronous, Variable & Droop Operation
- Adjustable PID Functions
- Rugged, Hard Potted Design
- Single Element Switch



ESD-2400 Series

- 12 or 24 VDC
- Isochronous Operation
- Adjustable PID Functions
- Idle Speed Adjustment
- Anti-Windup Circuit
- Designed for Non-Feedback GAC Actuators
- Rugged, Hard Potted Design
- Light Force Option Available



ESD-5100 Series

- Multi-Voltage Units
- Isochronous, Variable & Droop Operation
- Adjustable PID Functions
- Selectable Droop Operation
- Idle Speed Adjustment
- Auxillary Accessory Inputs
- Soft Coupling, Light Force, EFC Reverse Acting, and Temperature Compensated Options Available



ESD-5200 Series

- Multi-Voltage Units
- Isochronous, Variable & Droop Operation
- Adjustable PID Functions
- Selectable Droop Operation
- Idle Speed Adjustment
- Auxillary Accessory Inputs
- Single Element Speed Switch
- 10 Amp Relay Option Available



ESD-5300 Series

- 12 or 24 VDC
- Isochronous, Variable & Droop Operation
- Adjustable PID Functions
- Selectable Droop Operation
- Idle Speed Adjustment
- Auxillary Accessory Inputs
- Speed Ramping
- Starting Fuel Control
- Dual Gain
- Unique Actuator Power Dive Circuit
- Light Force Option Available
- Soft Coupling

Electronic Speed Controls



ESD-5400 Series

- Multi-Voltage Units
- Isochronous, Variable & Droop Operation
- Adjustable PID Functions
- Selectable Droop Operation
- Idle Speed Adjustment
- Single Element Speed Switch
- Speed Ramping
- Starting Fuel Limiting
- Designed for Feedback Actuator Operation



ESD-5500E Series

- Multi-Voltage Units
- Isochronous, Variable & Droop Operation
- Adjustable PID Functions
- Selectable Droop Operation
- Idle Speed Adjustment
- Auxillary Accessory Inputs
- Speed Ramping
- Starting Fuel Control
- Soft Coupling, Light Force, Anti-Windup Circuit, and Temperature Compensated Options Available
- Units Available for use with **GACs ATB Series Throttle Body Actuators** and the **SLM-100 Smoke Limiting Module**



ESD-5550/5570 Series

- Multi-Voltage Units
- Isochronous, Variable & Droop Operation
- Adjustable PID Functions
- Selectable Droop Operation
- Idle Speed Adjustment
- Auxillary Accessory Inputs
- Speed Ramping
- Starting Fuel Control
- Speed Switches (One or Two Option Available)
- Soft Coupling, Light Force, and Anti-Windup Circuit Options Available

CAN Bus Reader



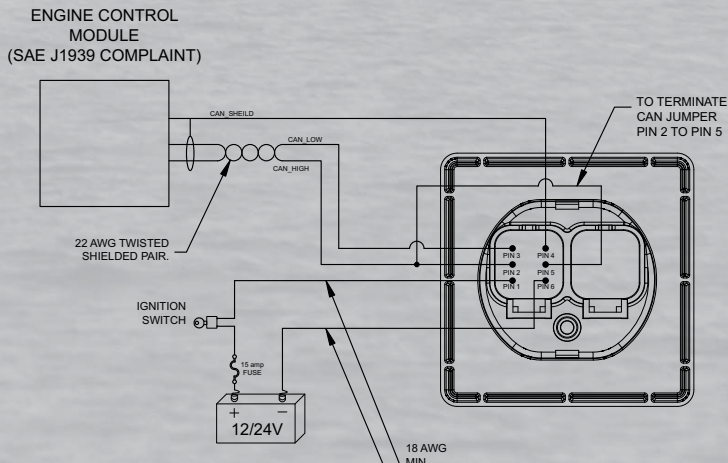
JDR Series - J1939 Readers

The JDR050, is a simple, low-cost universal device that allows users to read standard J1939 Diagnostic Trouble Codes (DTCs) from engines equipped with J1939 compatible Engine Control Units (ECU).

The JDR100, is a dual function data reader, is a low-cost universal device that allows users to read standard J1939 engine parameters and DTC's from engines equipped with J1939 compatible ECU. The JDR100 supports six live engine parameters (RPM, Oil Pressure, Coolant Temperature, Fuel Level, Battery Voltage, Engine Run Hours) along with J1939 stop, warning, malfunction, and protection status messages.

Because the JDR Series is a universal diagnostic code reader, its application is not limited to any particular engine manufacturer or engine size. It is easily installed, which makes it ideal for aftermarket prospects, and, it's extremely rugged so off-limit applications are never an issue for this device.

- Cost effective, Universal J1939 Live Engine Parameter and Diagnostic Trouble Code Reader
- Displays Active and Stored Codes from Up to 10 ECUs
- Display RPM, Oil Pressure, Coolant Temperature, Fuel Level, Battery Voltage and Engine Hours (only JDR100)
- Low Power Consumption
- Wide Temperature Range (-40 to +85 °C)
- Two/Three Button Operation
- Built in CANBus Termination Resistor
- Self Contained, no Configuration Software required
- Sealed Case, Non Fogging Display
- Front is Rated to IP67, Rear is rated to IP69K
- Fits in 2" (51mm) Round Standard Panel Opening
- Simple Slide Latch Mounting Ring



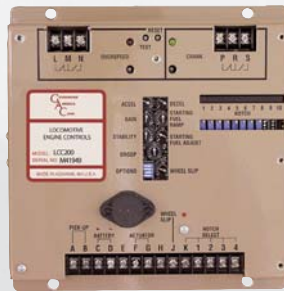
Locomotive Controls

GAC Locomotive Engine Controls provide both variable and eight notch speed control functions. For diesel electric applications, a complete speed and excitation control is available. Smooth speed and load changes are achieved with built-in speed ramping function. Additional functions such as wheel slip, auto reset and speed switches are included.



LCC-107A

- 8 notch speed control with ramping
- Dual wheel slip control inputs
- Generator excitation control up to 100 VDC @ 12 Amps
- Built-in 2 element speed switch
- Isolated circuits for governor and excitation
- Generator voltage and current limiting circuits
- False code protection



LCC-100

- 8 notch speed control with ramping
- Wheel slip control inputs
- Built-in 2 element speed switch
- Speed ramping accel / decel
- Adjustable starting fuel
- Starting fuel ramping to minimize exhaust smoke



LCC-200

- Wide range of seamless speed control
- 0-10 VDC of 0-20 mA speed set inputs
- Speed ramping accel / decel
- Integral 2 element speed switch
- Adjustable starting fuel
- Starting fuel ramping to minimize exhaust smoke

Accessories

Magnetic Speed Sensors



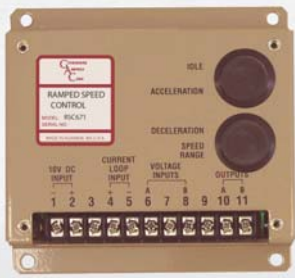
The Magnetic Speed Sensor detects when ring gear teeth, or other ferrous projections, pass the tip of the sensor. Electrical impulses are produced by the sensor's internal coil and sent to the speed control unit. The signal from the magnetic speed sensor, teeth per second (Hz.), is directly proportional to engine speed. Speed sensors are available in various lengths in both U.S. and metric threads. Wire leads, military connectors, automotive connectors or stud terminals are also available. Over 15 styles currently available.

Interface Modules

Interface Modules are available to facilitate the use of GAC products with other manufacturer's governor control systems.

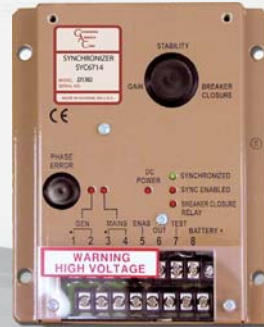


- | | |
|--|--|
| EAM-100 - GAC L.S. / Syn to Cummins EFC | EAM-114 - GAC L.S./Syn to DEUTZ EMR |
| EAM-101 - GAC L.S. / Syn to DYNA1 & 8000 | EAM-115 - GAC L.S./Syn to PERKINS 1306-E87 |
| EAM-103 - Barber Coleman L. S. / Syn to GAC Speed Control Units | EAM-116 - Universal/1.2x0-5VDC, 1x0-10VDC, 1x4-20mA /0.0-5VDC |
| EAM-104 - GAC L.S./Syn to DDEC 3 | EAM-120 - GAC L.S./Syn to Woodward |
| EAM-105 - GAC L.S./Syn to HEINZMANN | EAM-121 - Woodward L.S./Syn to GAC |
| EAM-106 - GAC L.S./Syn to Cummins Digital | EAM-122 - GAC L.S./Syn to VOLVO EMS |
| EAM-107 - GAC L.S./Syn to KCL | EAM-123 - IVECO |
| EAM-108 - GAC L.S./Syn to WOODWARD | EAM-124 - CAT |
| EAM-110 - GAC L.S./Syn to CUMMINS ST30 | EAM-125 - DEUTZ Position |
| EAM-111 - GAC L.S./Syn to MTU | EAM-126 - Voltage / Current |
| EAM-113 - GAC L.S./Syn to CAT HUEI | |



RSC-671 / 672 Ramp Generator

For applications requiring smooth variable speed operation. Accepts process control, 4-20 mA input or voltage ranges from 0 - 10 VDC, wide range, infinite resolution. Adjustable up / down engine speed ramping.



SYC-6714 Auto Synchronizer

Fast, automatic phasing synchronizer. Isolated high voltage with low power consumption. AC inputs. Adjustable dynamics and breaker closure window. LEDs provide status information.



LSM-100 Load Sharing Module

All electric power sensing. Accurately measures true power. Load anticipation and droop adjustment. Small compact in size.



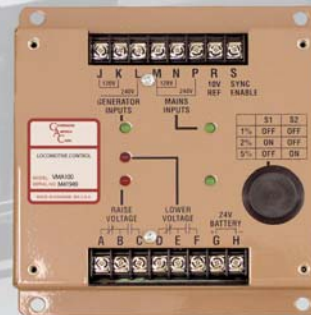
PRC-100A Power Ramp Control

Controls an entire group of engines. Bumpless loading and unloading. Zero power indicator with high and low load limit adjustments.



LSM-200 Series Load Sharing Module

All of the features of the LSM-100, but with added components such as a forward and reverse power monitor with adjustable delay, mains power control with ramp, load ramping (soft loading & unloading), power monitor with LED bar graphs. Built-in parallel cable relay simplifies installation.



VMA-100 Voltage Matching

Voltage matching within selectable triple tolerance bands, out of voltage range with auto shut-off. Transient protected and internal shielding of AC/DC circuits provides a signal to synchronize to form total voltage and phase out control system. Internal raise / lower relays interface to external voltage adjusting circuits.



LSM-670 Series Load Sharing Module

Precise isochronous load sharing, forward and reverse power monitors with relay outputs, load anticipation functions.



SSW-674 (one element speed switch)

High and low selectable speed ranges to suit most control requirements. Selectable latching or no latching relay output, tachometer output voltage signal. Loss of speed sensor protection. Small, compact, low cost.

DFM-100 Dual Fuel Module

Part of a cost effective affordable means of turning diesel engines into diesel / gas engines. Drive two independent feedback equipped electric actuators in conjunction with on GAC ESD and a mag pickup

DDM-100 also available to drive to independent feedback equipped electric actuators (i.e., two independent fuel pumps or two gaseous throttle body actuators).



SSW-675 / 676 (two & three element speed switch)

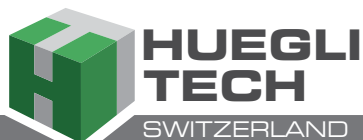
Crank termination with overspeed sensing. SSW676 has a third element for paralleling under frequency or any intermediate speed monitoring. Convenient overspeed test and retest functions.

The products described in this publication are subject to be revised or improved at any moment. Catalogue descriptions and details, such as technical and operational data, drawings, diagrams and instructions, etc., do not have any contractual value. In addition, products should be installed and used by qualified personnel and in compliance with the applicable regulations in force in order to avoid damages and safety hazards.

*due to preexisting agreements not all products are available in every country



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