GAC PRODUCT APPLICATION GUIDE
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D722 VARIABLE SPEED ENGINE
D722 DIESEL ENGINES
V2203 ENGINES
KUBOTA WG752 3-CYLINDER, 0.74L ENGINE

LIMMAT
12 CYLINDER MARINE ENGINE

LOMBARDINI
KOHLER (LOMBARDINI) KDW1003 DIESEL ENGINE
LDW 2004 ENGINE

LOVOL
LOVOL DIESEL GEN SET ENGINES

MAN
D2842LE201 with ACE275HD-24 ACTUATOR
2876 COMBINED HEAT AND POWER AMERIGEN 150
2842 and 2866 ENGINES
MAN E3268 COMBINED HEAT AND POWER

MILITARY
JOHN DEERE 40457F151 and 6068TF151 GENERATOR

MITSUBISHI
L3E ENGINE
S4L2 POWERING MILLER WELDER

MITSUBISHI HEAVY INDUSTRY
MHI S6R2 (VOLVO D30) ENGINES
S4S and S6S MHI ENGINES
MHI S4S INJECTION PUMP INSTALLATION
S12A2, S12R, and S16R MHI ENGINES
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MTU
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NOELL
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OVERVIEW

ABOUT THIS GUIDE
This guide is divided by engine manufacturer and then engine and include simple descriptions of solutions GAC has provided. The back of this guide details the cross reference list of GAC products that either directly replace or can be used to replace original manufacturer equipment or other similar equipment.

ABOUT INLINE DIESEL FUEL INJECTION PUMPS
The basic types of mechanical governors used are min-max or variable speed controllers.

Min-Max Governors have mechanical limits and only govern the maximum speed and low idle speed.

Variable Speed Controllers control the engine speed at all times. (All speed controllers)

These mechanical governors are replaced with electro-magnetic proportional pump-mounted GAC Actuator.

<table>
<thead>
<tr>
<th>GAC Actuator</th>
<th>Recommended GAC Speed Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>175 Series</td>
<td>ESD5500E, 5500-II, 5511, 5550, or 2401</td>
</tr>
<tr>
<td>176 Series</td>
<td>ESD2210, 5500E, 5500-II, 5111, 5550, 2401, or 2241-24</td>
</tr>
<tr>
<td>275 Series</td>
<td>ESD2210, 5500E, 5500-II, 5111, or 5550</td>
</tr>
<tr>
<td>295 Series</td>
<td>ESD5330, 5340, or 5500E</td>
</tr>
</tbody>
</table>

Rotary Fuel Pumps

Stanadyne Fuel Pumps
Three types of mechanical governors are used with Stanadyne fuel pumps, 3 to 5% droop Speed Controller for generator set application and all-speed governors on agricultural / industrial engines. Min-max Speed Controller are used on automotive applications.

Delphi DPG Fuel Pump
Delphi DPG fuel pumps have all speed mechanical governors. These are replaced by electric 103 Series GAC Actuator. The 103 Series are mounted directly onto the fuel pumps.

<table>
<thead>
<tr>
<th>GAC Actuator</th>
<th>Recommended GAC Speed Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>103 Series</td>
<td>ECC328, ESD2402, 5520, 5120, 5500-II, 5570, 2244-12/24</td>
</tr>
</tbody>
</table>

Engine Mounted Fuel Pumps
GAC engine mounted Actuator are designed for high temperature applications.

<table>
<thead>
<tr>
<th>GAC Actuator</th>
<th>Recommended GAC Speed Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>110 Series *</td>
<td>ECC328, ESD2244, 2402, 5120, 5520, 5570, 5500-II</td>
</tr>
<tr>
<td>180 Series **</td>
<td>ESD5500E, 5111, 5500-II, 5550</td>
</tr>
<tr>
<td>ALR Series</td>
<td>ECC328, ESD2402, 5520, 5120, 5500-II, 5570, 2244 &amp;…</td>
</tr>
</tbody>
</table>

* Deutz 1011
** Deutz 1012/1013 & 2012, and Volvo 520/720

GAC GOVERNOR BASIC TERMS
Number of Teeth: Used to determine RPM and/or control frequency through the magnetic speed sensor (MSP) on Flywheel Ring Gear Teeth.

\[ \text{Frequency} \times 60 / \# \text{ of teeth} = \text{RPM} \]

Rated Speed: The operating speed of the engine.
Variable Speed: Applications that operate over a range of speeds. RPM can be set externally with either a resistive (potentiometer) or voltage input.

Crank Termination RPM: The speed at which the Speed Controller begins to regulate speed.

Pulse-Width Modulation (PWM): Equates to a percentage of battery output supplied to the actuator.

Overspeed: Safety parameter to turn off fuel to the engine if it reaches the defined over-speed setting.

Light Force: Speed Controller specifically designed for low current, less than 2.5 amps, fast responding, small Actuator. These governors are designed with a specific PID range, so the Actuator are precisely tuned under all speed and load conditions.

Reverse Acting: Reverse acting governors react the opposite of traditional governors by reducing actuator duty cycle to increase engine speed and increase duty cycle to bring the engine to minimum fuel.

Electronic Fuel Control (EFC): Cummins PT fuel system where actuator/valve assemblies have been optimized to work with the existing Cummins fuel system.

GAC GOVERNOR FEATURES

Fuel Ramp: The fuel ramp rate between the start fuel parameter and the rated speed.

Isochronous: Fixed speed control not load dependent.

Droop: governs with a decrease in speed as load increases. Without droop, the engine could be unstable. GAC governors have the option to simulate droop with dedicated input and adjustment.

- Droop %: This sets the speed decrease based on a percentage of rated speed at full engine load.
- Droop Switch: External Droop enable switch is on or off.

PID: Control loop with Proportional (P), Integral (I), and Derivative (D) terms. Measures and minimizes the error between the desired and actual speed.

Gain (P): Initial response of the control to changes in load or speed.

Stability (I): Response of the control to reach steady state also used to avoid periodic variations in speed.

Dead Time (D): Changes the transient response of the engine and affects the stability during transient load changes.

Starting Fuel: Starting fuel position sets the needed amount of fuel to start the engine easily without black exhaust smoke.

Speed Ramp: An adjustment to optimize the rate of acceleration and avoid RPM overshoot.
Idle: Speed the engine will run at if the idle select input is activated.

AUX Input: A 0-10 V reverse polarity signal used for load sharing and synchronizing multiple generators.

Speed Trim Control: The ability to use a potentiometer to vary the engine speed remotely.

Speed Switches: Relay contacts that are set to switch state at a set speed. Typically come in single, dual and/or triple element speed switches.

Soft Coupling: Averages out the engine noise/instabilities and gives better steady-state performance using a steady speed reference for the PID routine. Activating the soft coupling feature eliminates the effects of drive train resonance.

Lead Circuit: Speed anticipation which enables the Speed Controller to be more responsive and allows higher gain. This provides more active control and improves the performance of slower engines.

Dual Gain: Independent gain adjustments for idle and rated speeds.

Dead Time Compensation (DTC): GAC Speed Controllers have the ability to set various levels of DTC. Digital Speed Controller have the ability to set a full range of dead-time values based on engine speed and load.

Multi PID: Feature for digital Speed Controller allowing independent PID values to be set throughout the speed and load range.

Fuel Limit: Limit the actuator position based on speed or load.

Dither: Speed Controller commands a small variation to the actuator output to keep it constantly moving back and forth to overcome mechanical friction points at fuel systems or throttle body butterfly.

Temperature Compensated: Internal component to eliminate drift due to extreme temperature swings.

Foot Petal: Foot petal input controls mobile equipment engine over a wide range of operating speeds, used with ESD2300 Series controllers.
## ARROW

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>ACTUATOR</th>
<th>SPEED CONTROLLER</th>
<th>MSP</th>
<th>ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A32 and A42</td>
<td><strong>ATB T2 45</strong></td>
<td><strong>ESD2401</strong></td>
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<tr>
<td>A54</td>
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<td>A90</td>
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GAC APPLICATION NOTE

A-32, A-42, and A-62 GENERATOR

Customer / OEM: Arrow Engine Company
Application(s): Generator
Engine Make / Model:
- A-32 3.2L
- A-42 4.2L
- A-62 6.2 L
Fuel System Type & Make / Model: Natural Gas
Operating Speed(s):
- A-32 1000-1200 RPM; 3 cylinder
- A-42 1000-1800 RPM; 4 cylinder
- A-62 1000-1800 RPM; 6 cylinder
Battery Voltage: 12 or 24 V DC
Installed Products:
- Actuator: ATB T2 Series Integral Throttle Body Actuator with optional position feedback sensor.
  - A-32 -
  - A-42 -
  - A-62 -
- Speed Controller: ESD2401

Summary
Arrow engines, building natural gas engine solutions, have used GAC products for over 30 years to control the flow of fuel, working in tandem with the carburetor. GAC ESD2401 speed control unit, located in an enclosed box on the side of the flywheel housing, makes it easy to update if required.

ARROW A-42 ENGINE WITH ATB T2
**GAC APPLICATION NOTE**

**A-54 GENERATOR ENGINE**

<table>
<thead>
<tr>
<th>Customer / OEM:</th>
<th>The Governor Shop</th>
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<tbody>
<tr>
<td>Application(s):</td>
<td>Generator</td>
</tr>
<tr>
<td>Engine Make</td>
<td>A-54</td>
</tr>
<tr>
<td>Equipment Make / Model:</td>
<td>Oil Field</td>
</tr>
<tr>
<td>Fuel System Type &amp; Make / Model:</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>Operating Speed(s):</td>
<td>A-54 1000-1800 RPM; 6 cylinder</td>
</tr>
<tr>
<td>Battery Voltage:</td>
<td>12 or 24 V DC</td>
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</tbody>
</table>

**Recommended Products:**
- Actuator: ATB T2 Series Integral Throttle Body Actuator 45 mm with optional position feedback sensor.
- Speed Controller: EEG6550

**Summary**
The Governor Shop in Canada modified an Arrow A54 to a gaseous generator using a GAC ATB T2 in an oil field. The engines use a process input (4-20 mA) from a Lufkin panel controlled by a GAC EEG6550.

**COMPLETED PUMP WITH ATB T2**

![Completed Pump with ATB T2](image)

**EEG6550**

![EEG6550 Image](image)
GAC APPLICATION NOTE

A-90 GENERATOR ENGINES

Customer / OEM: SES ARROW
Application(s): Custom Generators
Engine Make / Model: Arrow A-90 1000-1800 RPM; 6 cylinder
Equipment Make / Model: 25KW
Fuel System Type & Make / Model: Natural Gas
Battery Voltage: 12 or 24 V DC
Installed Products:
- Actuator: ATB T2 Series Integral Throttle Body Actuator (45 mm)
- Speed Controller: ESD5131

Summary
SES Arrow Generator builds custom generators for Oil and Gas. This 25KW unit uses a GAC throttle body controlled with the GAC ESD5131 speed controller.

ARROW A-90 WITH ATB
<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
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<tbody>
<tr>
<td>BSA6D170</td>
<td><strong>ACE275K</strong></td>
<td>ESD5403</td>
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GAC APPLICATION NOTE

BSA6D170 INDUSTRIAL ENGINE

Customer / OEM: BEML Limited
Application(s): 50 Ton Dump Truck
Engine Make / Model: BSA6D170, 6 cylinder, 23.1L (Komatsu License)
Equipment Make / Model: 50-Ton Dumper Truck
Fuel System Type & Make / Model: Diesel, ZEXEL Inline Fuel Pump
Operating Speed(s): 535 kW, 2100 RPM
Battery Voltage: 24 V DC
Installed or Recommended Products:
  • Actuator: ACE275K
  • Speed Controller: ESD5403
  • Magnetic Speed Pickup

Summary: Conversion from mechanical to an electronic control system was performed by BEML under direction from The Indian Ministry of Defense in order to save fuel, improve drivability and performance. The ACE275K was selected for its heavy-duty bearings and position feedback sensor that work with the ESD5403 to achieve fuel limiting for mobile equipment.

50-TON DUMPER TRUCK

ACE275K
## CATERPILLAR

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
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<tbody>
<tr>
<td>3054</td>
<td>ADC100-24</td>
<td>ESD5111</td>
<td>or ECC328-24</td>
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<tr>
<td>3304 and 3306</td>
<td>ADD22SGSC-24</td>
<td>ESD5500E</td>
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<td>ESD2244</td>
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GAC APPLICATION NOTE (all of the components specified are sold separately)

**C2.2 ENGINE**

Customer / Oem: Caterpillar
Applications: Water Pump Drives, Power Generation
Engine Make, Model: Caterpillar C2.2 Engine
2.2L, 41.6 – 66.1 BHP
Fuel System: Indirect fuel injection, Bosch PF Pump
Operating Speed(S): Idle to 3200 rpm
Battery Voltage: 12 or 24 V DC
Installed or Recommended Products:
- Actuator: ALR190-P04-12 / 24 (pull type)
- Speed Controller: EEG6550
- Magnetic Speed Pickups (2): MSP6741

Summary: ALR190 Series Actuator and EEG6550 Speed Control provides a complete Electronic Governing System for a Caterpillar C2.2 engine. The EEG6550 digital governor was selected for having the most applicable combination of features. The speed ramping control significantly reduces visible exhaust smoke as the engine is accelerated under load. The Light Force governor feature scales the PID governor range of adjustment for these small, low current, actuators providing the best resolution for ease of tuning these governor response parameters.

**CATERPILLAR C2.2 ENGINE BEFORE AND AFTER GAC ELECTRONIC GOVERNING SYSTEM**

BEFORE

AFTER
CATERPILLAR C2.2 ENGINE AFTER GAC ELECTRONIC GOVERNING SYSTEM INSTALLATION
GAC APPLICATION NOTE

3054 GEN SET ENGINE

Customer / OEM: CATERPILLAR
Application(s): Gen-Set
Engine Make / Model: 3054, 4.4L Naturally Aspirated Inline 4 Cylinder
Fuel System Type & Make / Model: Stanadyne Rotary Pump, Diesel
Operating Speed(s): 1500 / 1800 RPM
Battery Voltage: 24 V DC
Installed or Recommended Products:
- Actuator: ADC100
- Speed Controller: ECC328
- Magnetic Speed Pickup: No MSP required

Summary: GAC Actuator ADC100–12/24 is designed to replace the pump’s governor cover and acts directly on the mechanical governor linkage arm. There are several light force speed control options available: the ECC328 Speed Controller with the input from the gen-set’s electrical frequency, a magnetic pickup is not required with this controller.

ADC100-24 INSTALLED ON CATERPILLAR 3054 GEN-SET ENGINE

AD100

ECC328 Speed Controller
GAC APPLICATION NOTE

3304 and 3306 INDUSTRIAL ENGINES

Customer / OEM: CATERPILLAR
Application(s): Various
Engine Make / Model: 3304, 3306 Engines
Fuel System Type & Make / Model: Diesel
Operating Speed(s): 218 HP @ 2000 RPM
Battery Voltage: 24 V DC
Installed / Recommended Products:
  • Actuator: ADD225GSC-24 w/ Packard Connector, or ADC225GS-24 w/ Commercial Connector
  • Controller: ESD5500E

COMPLETED INSTALLATION
**ENGINES WITH CATERPILLARS OWN MECHANICAL GOVERNOR**

GAC actuator ADD225GSC-24 is installed on a solid bracket near the mechanical governor and linked to the stop lever. The throttle lever must be blocked in a forward position, resulting in a speed that is 200 - 300 RPM above the nominal operating speed.

**ENGINES WITH EXTERNALLY FITTED WOODWARD PSG HYDRAULIC GOVERNOR**

The PSG hydraulic governor must be removed. A steel plate must cover up the PSG drive hole. The GAC ADD225GSC-24 actuator lever is linked to the throttle lever.
Customer / OEM: Caterpillar
Application(s): Industrial Natural Gas Engine
Engine Make / Model: 14.64L, 6 cylinder
Fuel System Type & Make / Model: Natural Gas
Operating Speed(s): Idle to 3600 rpm
Battery Voltage: 12/24 V DC
Installed Products: • Actuator: ATB652T2N-24
                      • Speed Control: ESD5526
                      • Interface Module: EAM121

Summary: The Governor Shop of Canada upgraded a 14.64L, 6 cylinder Caterpillar G3406 engine to a GAC control system, noting its ease of installation and superior performance. The EAM121 allows transparent compatibility with the existing controller.

BEFORE AND AFTER NATURAL GAS CONVERSION OF G3406 ENGINE

BEFORE

AFTER
3406 INDUSTRIAL ENGINE

Customer / OEM: CATERPILLAR

Application(S): Industrial, Generator
Engine Make, Model: Caterpillar 3406, Inline 6 cylinder, 14.64 L
Fuel System Type & Make, Model: Diesel
Operating Speed(S): 472 HP @ 2100 RPM
Battery Voltage: 12 or 24 V DC

Recommended Products:
- Actuator: 225 Series: ADC225GS-24
- Speed Controller: ESD5111, ESD5500E, or EEG6500
- Magnetic Speed Pickup: MSP6720
- Installation Kit: KT230
- 5K Potentiometer (optional): TP501

Summary: Complete electronic governor replacement of an existing Caterpillar governor without removing the fuel pump. The KT230 provides the necessary bracket and hardware to install the GAC 225 series actuator. The ESD5111, ESD5500E, or EEG6500 speed control units provide precise control adjustments. Complete instructions are available on the GAC website.

GAC 225 SERIES ON CAT 3406
GAC APPLICATION NOTE

3408 NATURAL GAS GENERATOR

Customer / OEM: CATERPILLAR
Application(s): Generator
Engine Make / Model: CAT 3408, 18 L, V-8, 136 flywheel teeth
Fuel System Type: Natural Gas
Operating Speed(s): 1500 RPM, 1800 RPM, or variable
Battery Voltage: 24 V DC
Installed Products:
• Actuator: ACB2001
• Speed Controller: ESD5330
• Ignition Control Module: ICM200-4
• Ignition Coils: CL600 for 24 V DC or CL601 for wasted spark
• Spark Plug Wires: SPW100
• Spark Plugs: SPG100-002 (Iridium Tip, Turbo Applications)

Summary: Application with GAC Ignition System running in wasted spark i.e. crankshaft triggering.

CAT 3408 WITH GAC IGNITION SYSTEM AND ACB2001

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GAC APPLICATION NOTE (all of the components specified are sold separately)

3408 GOVERNOR REPLACEMENT

Customer / OEM: Fishing Vessel
Application(s): Marine
Engine Make / Model: CAT3408
Battery Voltage: 12 or 24V
Recommended Products:
• Actuator: ADB225
• Speed Controller: ESD2244-24
• Magnetic Speed Pickup: MSP6723C

Summary: A fishing vessel needed a cost-effective replacement to their aging Woodward PSG but a one-for-one replacement was expensive and installation time consuming. Instead they chose GACs external mount ADB225 and the ESD2244-24, saving both downtime and money.

ESD2244-24  ADB225
GAC APPLICATION NOTE

3412 ENGINE

Customer / OEM: CATERPILLAR
Application(s): Power Generation
Engine Make / Model: Caterpillar 3412, 27.02 L, V12
Fuel System Type & Make / Model: Caterpillar Mechanical Governor, Diesel
Operating Speed(s): 1500/1800 RPM
Battery Voltage: 24 V DC

Installed or Recommended Products:
- Actuator: ADC225GS-24 (with lesser rate return spring)
- Speed Controller: ESD5111, ESD5500E w/ start fuel and speed ramping adjustments, or ESD5550 w/ over-speed switch

Summary: This solution replaces a PSG governor assembly only. The pump rack control lever is required for this solution. The mechanical Caterpillar Governor is not replaced.

ADC225GS-24 INSTALLED ON CATERPILLAR 3412 ENGINE
GAC APPLICATION NOTE

3512 and 3516 ENGINES

Customer / OEM: CATERPILLAR
Application(s): Industrial
Engine Make / Model: Caterpillar 3512, 51.8L V-12, and 3516, 69L V-16 Engines
Fuel System Type & Make / Model: Caterpillar Mechanical Governor, Diesel
Operating Speed(s): Multiple
Battery Voltage: 24 V
Installed Products:
- Actuator: ACB2001
- Speed Controller: ESD5330

ACB2001 ACTUATOR ON CAT 3512 ENGINE

Note: Installed on a bracket near flywheel housing
GAC APPLICATION NOTE

DPA-DPD DELPHI DPG PUMP

Customer / OEM: CATERPILLAR (PERKINS)
Application(s): Various
Engine Make / Model: Various
Fuel System Type & Make / Model: Diesel, Delphi DPA/DPD Pump
Operating Speed(s):
Battery Voltage: 12 or 24 V
Installed Products: Actuator: ADD103B-12/24

Summary: The 103 Series Integral Actuator is designed to mount directly to the Delphi DPA/DPD (fixed speed-versions). No external linkage or brackets are required to install this actuator. By internally moving the fuel metering valve to the no fuel position, when de-energized, the 103 Series electric actuator provides the function of fuel shutoff solenoid.

Installing the 103 Series actuator does not defeat the engine’s mechanical governor operation. During the installation process, the mechanical governor is set to a higher speed than the electric governor’s operating speed. In this configuration the mechanical governor acts as a speed limiter. The electromechanical design used in the 103 Series is field proven and provides a proportional actuator movement based on the actuator coil current.

INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.

ADD103B SERIES ACTUATOR ON DELPHI PUMP
GAC APPLICATION NOTE

DPA-DPD – DP210 ROTARY EXTERNAL PUMP REPLACEMENT

Application(s): Agricultural, Industrial and Power Generation Equipment
Engine Make / Model / Displacement / Rating: Multiple rating, with 3-, 4-, and 6-cylinder off road engines
Fuel System Type & Make / Model: Delphi DP210, DPA, DPS, DPD
Operating Speed(s): 600-3600 RPM
Battery Voltage: 12 or 24 V DC
Installed Products:
- Actuator: ALN050
- Speed Controller: ESD2402, ESD5120, EEG6500
- Magnetic Speed Pickup: MSP675
- Mounting Kit: BK266

Summary: Perkins, Caterpillar and other 3-, 4-, and 6-cylinder engines in off-highway applications with the DP210, DPA, or DPD pumps are mechanically governed.

They can be replaced with the GAC ALN050 or 120 Series universal actuator by mounting them to the pump’s throttle lever.

DP210 AND DPA ROTARY PUMP

ALN050 MOUNTED WITH BRACKET ON PUMP
GAC APPLICATION NOTE

3516 69L V16 MARINE

Customer / OEM: ICELAND
Application(s): Tugboat propulsion control
Engine Make / Model: Caterpillar 3516, 69L V16
Installed Products:
- Actuator: ACB2001 (2)
- ESD5330 (2)

Summary: A Tugboat in Iceland replaced the main propulsion control system for its two Caterpillar 3516, 69L V16 engines, balanced the output of both engines connected to a single drive train, and controlled with a single potentiometer. The solution uses two GAC ACB2001 actuators and two ESD5330 controllers connected with a harness that was specifically designed for the application with potentiometers to adjust and balance the engines individually and a single potentiometer to control the speed of both engines at once.

The connection to the fuel control racks were modified and each engine fitted with an ACB2001 actuator. Each of these actuators provide 12.0 Ft-Lbs. (16.3 Nm) of torque over 35° of shaft rotation.

All sea trials were successfully completed after the GAC control system was installed. The Tugboat was returned to service and continues to perform without incident and the captain reported the fastest cruising speed ever.
2001 Series Actuators:
12.0 Ft-Lbs. of Torque & Lever P/N LE200

- Max Travel Position
- Linear Travel mm
  - Inches

- No Fuel/ Stop Position -
- 35° Rotation

Forward Force
From the stop
Position When
Energized

Spare LE200 Lever
Included with the Actuator

6 x M6 Diameter
Through Hole

198 N
41 Lbs.

214 N
48 Lbs.

363 N
81 Lbs.

427 N
96 Lbs.

611 N
144 Lbs.

53.4
2.104

45.3
1.893
38.2
1.503
30.5
1.202
22.9

0.902
0.502
0.301

0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25

160
120
80
40

Lever Force from Stop Position

2001 Series Actuator
12.0 Ft-Lbs Torque & LE200 Lever
## CHEVROLET

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<td></td>
<td></td>
<td>ESD5526</td>
<td>KT1932</td>
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<td></td>
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<td>ESD5500</td>
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<td>454 natural gas or propane</td>
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<td>EEG6500</td>
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<tr>
<td>Combined heat and power solution using 8.1L</td>
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GAC APPLICATION NOTE (all of the components specified are sold separately)

CHEVROLET 350 IN³ ENGINE, NATURAL GAS OR PROPANE

ELECTRONIC GOVERNOR SOLUTION WITH GAC ATB (REF. KT350ATB)

Application(s): Power Generation, Water Pump, Forklift, others
Engine Make, Model: Chevrolet 350 in³ (5.7 L), 8 cylinders
Fuel System Type & Make, Model: Impco 225 gas carburetor mixer (customer supplied)
Operating Speed(s): Idle to 3600 RPM
Battery Voltage: 12 or 24 V DC

Installed or Recommended Products:
- Speed Controller: ESD5159, ESD5526, ESD5500-II or EEG6500
- Throttle Body: ATB452T2N-12 or 24 V DC
- Magnetic Speed Pickup: MSP6729
- Installation Kit: KT41761
- Mating Connector: EC1300
- 5K Potentiometer (optional): TP501
- Adapter for spread bore intake manifold (if necessary): KT1932

Summary: This a complete Electronic Governing system for the natural gas or propane fueled Chevrolet 350 in³ engine using a Governors America Throttle Body with a Customer supplied Impco 225 carburetor- mixer.

INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE

COMPLETE ELECTRONIC GOVERNING SYSTEM FOR CHEVROLET 350 IN³ NATURAL GAS OR PROPANE ENGINE

![Diagram of Governors America Throttle Body and Customer supplied Impco Carburetor]
GAC APPLICATION NOTE (all of the components specified are sold separately)

CHEVROLET 454 IN³ ENGINE, NATURAL GAS or PROPANE

ELECTRONIC GOVERNOR SOLUTION WITH GAC ATB (REF. KT454ATB)

Application(s): Power Generation, Water Pump, Forklift, others
Engine Make, Model: Chevrolet 454 in³ (7.4 L), 8 cylinders
Fuel System Type & Make, Model: Impco 425 gas carburetor mixer (customer supplied)
Operating Speed(s): Idle to 3600 RPM
Battery Voltage: 12 or 24 v
Installed or Recommended Products:
• Speed Controller: ESD5159, ESD5526, ESD5500-II or EEG6500
  Throttle Body: ATB552T2N-12 or 24 (volts)
• Magnetic Speed Pickup: MSP6729
• Installation Kit: KT41761
• Installation Kit: KT425-T2
• 5K Potentiometer (optional): TP501
• Adapter for spread bore intake manifold (if necessary): KT1932

Summary: This a complete Electronic Governing system for the natural gas or propane fueled Chevrolet 454 in³ engine using a Governors America Throttle Body with a Customer supplied Impco 425 carburetor- mixer.

INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE

COMPLETE ELECTRONIC GOVERNING SYSTEM FOR CHEVROLET 454 IN³ NATURAL GAS OR PROPANE ENGINE
GAC APPLICATION NOTE

CHEVROLET 8.1L COMBINED HEAT AND POWER

Customer / OEM: Aegis Energy Systems
Application(s): Combined Heat and Power (CHP)
Engine Make / Model: Chevrolet 8.1L
Fuel System Type & Make / Model: Natural Gas
Operating Speed(s): 1800 RPM
Battery Voltage: 12 or 24 V DC
Recommended Products:
- Speed Controller: EDG6000, EEG6500, and ESD5111
- Actuator: ATB552T2F14-12/24
- Magnetic Speed Pickup: MSP6732

Summary: Aegis Energy Services provides turnkey installation of modular combined heat and power systems. Each cogeneration module includes a natural gas-fueled Chevrolet 8.1 L engine, induction generator, microprocessor control panel, protective switchgear, and heat recovery equipment. Each module is enclosed in a sound attenuated cover and can be installed indoors or outdoors.

The solution features the GAC an EEG6500 (Digital, Multiple PID, SmartVu, Environmentally Sealed, & Tamper Resistant) EDG6000, or ESD5111 (Analog, Isochronous, Variable, & Droop) controller and an ATB552T2F14 55 mm throttle body to provide strict performance and reliability requirements needed. The ATB552T2F14 features a position feedback sensor used by the air-fuel ratio system to determine the actual throttle position for precise control. Each module is also equipped with an MSP6723 for speed reference.

COMPLETE CHP UNIT
CONTROL PANELS WITH EEG6500 AND ESD5111

TOP VIEW WITH ATB552T2
### CUMMINS

A cross reference to direct replacements with Cummins part numbers to GAC part numbers is located at the end of this guide [here](#).

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<td>855 NA</td>
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</table>
GAC APPLICATION NOTE (all of the components specified are sold separately)

CUMMINS with PT PUMP and EFC FUEL SYSTEM
or PT PUMP WITH MECHANICAL GOVERNOR

Customer / OEM: CUMMINS
Applications: Diesel Engine Generators, Compressors, Marine, others
Engine Make, Model: Cummins NT and KT Series engines with EFC system with a PT pump or mechanical governor.
Fuel System: PT Pump (normally closed or normally open integrated actuators or mechanical governor).
Operating Speed(S): Full RPM range
Battery Voltage: 12 or 24 V DC
Products:
- Actuator: ADB120E4-GAC (EFC system) or ADC225JS-12/24 (mechanical governor).
  - Optional Mounting Bracket for ADB120E4-GAC: BK114
  - Optional Mounting Bracket for ADC225JS-12/24
- Speed Control Options:
  - EFC (normally closed): EEG6500, ESD5522E, ESD5120
  - EFC (normally open): ESD5119, ESD5160
- Speed Controller: EEG6500, EDG6000, ESD2210, ESD5111, ESD5500E, ESD5500-II, ESD5550
- Optional EAM Module: EAM100 (interface module for Cummins EFC to GAC load sharing / synchronizing modules).
- Optional Load Sharing Modules: LSM100, 201 and 672
- Optional Auto Synchronizers: SYC6714
- Optional Throttle Linkage components:
  - Bearing Rod Ends: BR200 (1/4”-28 thread), BR300 (M5 thread), BR400 (M6 thread).
  - Threaded Rod: RD102- Zinc coated ¼”-28 thread precut to 1.0 ft. (0.3 m).
    RD233- Zinc coated M6 thread precut to 8.75 in. (222 mm)

SUMMARY: The ADB120E4-GAC and 225 Series for Cummins NT and KT engines provide an electromechanical actuator used for engine fuel control positioning.

The Cummins P.T. fuel system is controlled with either a mechanical governor or Normally Open or Normally Closed Electronic Fuel Control (EFC) system with its actuator integrated in the P.T. pump. GAC has actuator / governor solutions for each control system offering Isochronous, Droop and Variable Speed operation.

INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.
CUMMINS QSM11 as DUEL GENERATOR SET

CUSTOMER / OEM: CUMMINS
APPLICATIONS: Diesel Engine Generators, Compressors, Marine, others
ENGINE MAKE, MODEL: Cummins QSM11
OPERATING SPEED(S): Full RPM range
BATTERY VOLTAGE: 12 or 24 V DC
INSTALLED PRODUCTS: • LSM201N

SUMMARY: This deep water operations vessel had a question about a new piece of GAC equipment, the LSM201N load sharing module, recently added to a pair of auxiliary generators using QSM11 Cummins engines with the ISM Engine Control Module (ECM).

Balancing power distribution between engines is the primary function of the LSM. It can also provide power control through ramping and monitoring, accurately measuring true engine power.

When one of the two QSM11-DM engines reversed power it was easy to determine the cause. Out of the box the LSM201N interpreted the ECM increased voltage to be a request to decrease power. But the ECM translated increased voltage as a need to increase power. The LSM was built to allow a hardware solution of adding a jumper to change polarity, but like both GACs EEG7000 and the EEG7500 controllers, the ECM was also able to use software to match the LSMs polarity. The issue was easily resolved, and the boat was soon back in service.
GAC APPLICATION NOTE (all of the components specified are sold separately)

QST30G GOVERNING SYSTEM CONVERSION with
BOSCH IN-LINE FUEL INJECTION PUMP

Customer / OEM: CUMMINS
Application(s): Various
Engine Make / Model / Displacement / Rating:
Cummins QST30G / 30.5L, V121 / 760 to 1500 HP / 567 to 1119 kW
Fuel System Type & Make / Model:
Bosch in-line pump with EDC governor
Operating Speed(s):
1500, 1800 and 2100 RPM
Battery Voltage:
24 V
Recommended Products:
- Actuator (2 required): ADD175F
- Speed Controller (1 required): ESD5111 or ESD5221 (overspeed option)
- Dual Driver Module: DDM101
- Magnetic Speed Pickup: 5/8”, 18 thread
- Magnetic Speed Pickup Harness: CH1204
- Bosch EDC Governor Adaptor Kit (2 required): KT197
- K-Type Thermocouples (2 required): STE101
- Feedback Sensor Mating Harness (2 required): CH1243
- Actuator Harness (2 required): CH1215

Summary:
This is a GAC complete electronic governing system conversion kit for Cummins PC controller and Bosch injection pump mounted governor. The GAC parts listed are not compatible with the Cummins PCC controller or the Bosch injection pump mounted actuators. This system acts as a standalone complete dual pump governor system that does not require interaction with the Cummins controller.

Converting to the GAC system includes the installation of an ADD175F actuator on each pump with a KT197 adapter kit, installing a K-Type thermocouple in the exhaust stream of each bank and connecting the actuators, position feedback sensors and thermocouples to the DDM101 module and ESD5111 or ESD5221 governor controller. The DDM101 uses the input from the two thermocouples and two position sensors to balance and maintain an equal output from both banks of the engine while being controlled by a single governor.

The complete conversion installation instructions are in GAC DOCUMENT CUMMINS QST30 GAC CONVERSION INSTALLATION INSTRUCTIONS PIB5119.
KT197 – ADAPTS 175 SERIES ACTUATORS TO BOSCH EDC GOVERNOR HOUSING

ADD175F ACTUATOR MOUNTED ON A QST30 FUEL INJECTION PUMP WITH KT197 INSTALLATION KIT
GAC APPLICATION NOTE

B4.5T ENGINES

Customer / OEM: Taylor Machine Works
Application(s): Forklift
Engine Make / Model: CUMMINS B4.5T-C99, 275 in³ Displacement, 99 HP / 2200 RPM, 10 Ton Taylor Machine Works Forklift
Fuel System Type & Make / Model: Diesel
Operating Speed(s): 800 RPM idle, variable range from 800 to 2200 RPM
Battery Voltage: 12 V DC
Installed Products:
- Speed Controller: ESD2349
- Electronic Foot Pedal: FP100

Summary: The ESD2300 series electronic speed controller provides superior speed regulation over a variable RPM range and an immediate, precise response to transient load changes. The electronic foot pedal interface provides the load signal while a ring gear mounted magnetic Pickup provides the speed input.
- ESD2349-12V is specifically for off-road variable speed applications. It includes adjustable PID governor control and is compatible with foot pedal, GAC part number FP100.
- ESD2351-12V includes integral over-speed contacts, adjustable PID Speed Controller and is compatible with either a Williams vertically mounted foot pedal, GAC part number FP201, or horizontally mounted foot pedal GAC part number FP202.
- ESD2352-12V includes integral over-speed contacts, adjustable PID Speed Controller and is compatible with a Morse foot pedal.

10 TON TAYLOR MACHINE WORKS FORKLIFT

ESD2352-12 Variable Speed Controller
FP201 Vertically Mounted Foot Pedal
FP202 Horizontally Mounted Foot Pedal
GAC APPLICATION NOTE

GTA 8.8L and 855 ENGINES

Customer / OEM: PSS Governor Services
Application(s): Irrigation
Engine Make / Model: Cummins GTA 8.3L and GTA855
Fuel System Type & Make / Model: Cummins PT Fuel System, Natural Gas
Operating Speed(s): 2100 RPM
Battery Voltage: 12 or 24 V DC
Recommended Products:
- Actuator: Two ATB T2
- Speed Controller: Two ESD5221
- Speed Ramping Controller: Two RSC671’s

SUMMARY
PSS Governor Services (PSS) updated Cummins irrigation pump drives on 2 systems. These aftermarket natural gas engines are now controlled by GAC integrated actuator/throttle body assemblies ATB throttle body actuators, RSC671 programmable ramp generators, and ESD5526e governor speed controllers.

GTA 8.3L

GTA855
GAC APPLICATION NOTE

**KT38 ENGINES**

Customer / OEM: Private
Application(s): Tug Boat
Engine Make / Model: Two - Cummins KT38 Engines: V12, 38L (2300 in³) Turbocharged / After-cooled
Fuel System Type & Make / Model: Cummins PT Fuel System
Operating Speed(s): 2100 RPM
Battery Voltage: 12 or 24 V DC
Installed Products:
- Actuator: Two ADB120E4 (Designed for Cummins PT fuel system)
- Speed Controller: Two ESD5221
- Speed Ramping Controller: Two RSC671’s

TUG BOAT “GLACIER WIND” IN COOK INLET, ALASKA
GAC EQUIPMENT ON CUMMINS KT38 ENGINES

ESD5221 SPEED CONTROLLER  RSC671 RAMPING SPEED  ADB120E4 ACTUATOR
GAC APPLICATION NOTE (all of the components specified are sold separately)

37.8L NATURAL GAS GEN SET 500KW

Customer / OEM
Camda

Applications:
Generator

Engine Make, Model:
Cummins

Fuel System:
Natural Gas

Operating Speed(S):
12 or 24 V DC

Battery Voltage:

Installed Products:
• **Actuator:** ACB2001-24
• **Speed Controller:** ESD5330

**SUMMARY**
Camda New Energy Equipment Co. Ltd., a generator manufacturer, a 500 kW gaseous genset built on the Cummins Kt38 37.8L engine uses the GAC ACB2001 controlled by the GAC ESD5330, specifically designed to run the ACB2001, ensures stability and smooth results.
GAC APPLICATION NOTE

B ENGINE with CAV DPA

Customer / OEM: CUMMINS
Application(s): Various
Engine Make / Model: Cummins B with CAV DPA
Fuel System Type & Make / Model: Diesel
Operating Speed(s):
173 HP @ 2500 RPM, B5.9
99 HP @ 2500 RPM, B4.5
124 HP @ 2200 RPM, B3.9
Battery Voltage: 12, 24, or 32 V DC
Recommended Products:
- Actuator: ADC120 with KT101
- Speed Controller: ESD2210, ESD5111, or ESD5500E
- Magnetic Speed Pickup: MSP6724 or MSP6728C

CUMMINS B SERIES ENGINE

ACTUATOR ADC120
GAC APPLICATION NOTE

C ENGINE WITH BOSCH INLINE AND RSV

Customer / OEM: CUMMINS
Application(s): Various
Engine Make / Model: Cummins C with Bosch inline and RSV
Fuel System Type & Make / Model: Bosch P-Series Inline Pump, Diesel
Operating Speed(s): 260 HP @ 2200 RPM
Battery Voltage: 12, 24, or 32 V DC
Recommended Products:
- Actuator: ADC225S, ADC120, ACD175A, or ADD175A
- Speed Controller: ESD2210, ESD5111, or ESD5500E
- Magnetic Speed Pickup: MSP6724 or MSP6728C

CUMMINS C ENGINE AND BOSCH INLINE PUMP
GAC APPLICATION NOTE

B ENGINE with CAV DPA and BOSCH VE STOP LEVER

Customer / OEM: CUMMINS
Application(s): Agricultural and Industrial Equipment (various)
Engine Make / Model: Cummins 4B (T) and 6B (T) Engines
Fuel System Type & Make / Model: CAV/DPA Rotary Pumps
Operating Speed(s):
- 173 HP @ 2500 RPM, B5.9
- 99 HP @ 2500 RPM, B4.5
- 124 HP @ 2200 RPM, B3.9

Battery Voltage: 12 or 24 V DC
Recommended Products:
- Actuator: 120 Series
- KT101
- Speed Controller: ESD2210, ESD5111, ESD5500E or EEG6500 (Digital)
- Magnetic Speed Pickup: MSP6724, MSP6728C

INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.

CUMMINS B SERIES ENGINE

GAC 120 SERIES ACTUATOR

CAV DPA ROTARY PUMP

LINKAGE
6BT ENGINE with BOSCH INLINE

Customer / OEM: CUMMINS
Application(s): Various
Engine Make / Model: 6BT 5.9
Fuel System Type & Make / Model: Bosch Inline Pump, Diesel
Operating Speed(s): 173 HP @ 2500 RPM, B5.9
Battery Voltage: 12 or 24 V DC
Recommended Products:
- Actuator: ADC175A
- Speed Controller: ESD2210, ESD5111, or ESD5500E
- Magnetic Speed Pickup: MSP6724
- Kits: EC1300, KT175-A-R or KT275

CUMMINS 6B/5.9L ENGINE WITH ADD175A ACTUATOR
# GAC APPLICATION NOTE

## NT AND KT ENGINES

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<thead>
<tr>
<th>Customer / OEM:</th>
<th>Cummins</th>
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<td>Application(s):</td>
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<td>Cummins NT and KT engines with mechanical or EFC Systems</td>
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<td>Equipment Make / Model:</td>
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<td>Installed or Recommended Products:</td>
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</table>
  - Actuator: ADB120E4 with BK115  
  - Speed Controller: ESD5522E  
  - Magnetic Speed Pickup: MSP6724 or MSP6728C |

### CUMMINS NT855 WITH ADD120E4

![Image of Cummins NT855 with ADD120E4](image-url)
GAC APPLICATION NOTE

NT, K19, K28, K38, K50 with EFC SYSTEM (PT PUMP)

Customer / OEM: Cummins
Application(s): Various
Engine Make / Model: Cummins NT, K19, K28, K38, K50 with EFC System (PT pump)
Fuel System Type & Make / Model: Diesel, Cummins PT Fuel System
Operating Speed(s): 1500 / 1800 RPM
Battery Voltage: 12 or 24 V DC
Recommended Products:
- Speed Controller: ESD5522E
- Interface Module: EAM100

INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.

CUMMINS K19, K38, AND K50 ENGINES
GAC APPLICATION NOTE (all of the components specified are sold separately)

**4A2.0, 4A2.3 AND 4AT2.3 4 CYLINDER ENGINES**

**Applications:** Generators, Compressors, Marine, others
**Engine Make, Model:** Cummins 4A2.0 (122 in³), 28.6 HP, 4A2.3 (140.3 in³), 33 HP and 4AT2.3 (140.3 in³) 4 cylinder in line engines
**Fuel System:** Indirect fuel injection
**Operating Speed(S):** Idle to 2800 rpm
**Battery Voltage:** 12 or 24 V DC
**Installed Products:**
- **Actuator:** 120 Series-12/24 V Dc: Purchased Separately (Includes Lever Les1501)
- **Bracket** BK234: purchased separately
- **Hardware** kit KT234: purchased separately
- **Linkage** LKS234: purchased separately

**Summary:** DETAILED INSTALLATION INSTRUCTIONS are available on the GAC website for the 120 Series Installation Instructions and Parts List for Cummins 4A2.0, 4A2.3 and 4AT2.3 provide an electromechanical actuator used for engine fuel control positioning.

**FINISHED INSTALLATION**

**GAC 120 SERIES**

**KIT**
GAC APPLICATION NOTE (all of the components specified are sold separately)

3A1.4 & 3A1.7 3 CYLINDER ENGINES

Applications: Generators, Compressors, Marine, others
Engine Make, Model, Displacement: Cummins 3A1.4 (85.4 in³), 19.3 HP and 3A1.7 (103.7 in³), 41 HP, 3 cylinder in line engines
Fuel System: Indirect fuel injection
Operating Speed(S): Idle to 2800 rpm
Battery Voltage: 12 or 24 V DC
Installed Products:
- Actuator: 120 Series-12/24 V Dc
- Bracket BK233: purchased separately
- Hardware KT233: purchased separately
- Linkage LKS233: purchased separately

Summary: DETAILED INSTALLATION INSTRUCTIONS are available on the GAC website FOR THE 120 Series Installation Instructions and Parts List for Cummins 3A1.4 and 3A1.7 provide an electromechanical actuator used for engine fuel control positioning.

FINISHED INSTALLATION

GAC120 WITH LEVER

BRACKET BK233, KIT KT233, LINKAGE
GAC APPLICATION NOTE

4B ENGINE with ZEXEL A

Customer / OEM: CUMMINS
Application(s): Various
Engine Make / Model: 4B 3.3-G1 with Zexel A
Fuel System Type & Make / Model: Inline Diesel Pump
Operating Speed(s): 85 HP @ 2600 RPM
Battery Voltage: 12 or 24 V DC
Recommended Products:
- Actuator: ADC175A with EC1300, KT175-RS-R-Zexel
- Speed Controller: ESD2210 or ESD5111
- Magnetic Speed Pickup: MSP6728C

CUMMINS B3.3 ENGINE WITH ADC175A ACTUATOR

KT175-RS-R-ZEXEL INSTALLATION KIT
GAC APPLICATION NOTE

NA855

Customer / OEM: Johnson Irrigation
Application(s): Generator
Engine Make / Model: CUMMINS NA855
Fuel System Type & Make / Model: Natural Gas
Operating Speed(s):
Battery Voltage: 12 or 24 V DC
Installed Products:
  • Actuator: ATB
  • Speed Controller: ESD5500

Summary
GAC worked with Johnson Irrigation, a third-generation full service engine and generator support house, to determine the optimal natural gas control system for their irrigation engines. The combination of GACs throttle body and EDG5500 speed controller provided a smooth result.

CUMMINS 855 WITH ATB ACTUATOR

ATB652T2N-24

EDG5500
GAC APPLICATION NOTE

4B AND 6BT ENGINES with STANADYNE ROTARY PUMP

Customer / OEM: CUMMINS
Application(s): 4B 3.9, 4B 3.9-G1(2), and 6BT 5.95-G1 with Stanadyne
Engine Make / Model / Displacement / Rating: 4B 3.9, 4B 3.9-G1(2), and 6BT 5.95-G1 with Stanadyne
Equipment Make / Model: Stanadyne Rotary Pump, Diesel
Fuel System Type & Make / Model: Stanadyne Rotary Pump, Diesel
Operating Speed(s): 173 HP @ 2500 RPM, B5.9
124 HP @ 2200 RPM, B3.9
Battery Voltage: 12 or 24 V DC
Recommended Products:
- Actuator: ADC100-12/24
- Speed Controller: ESD5120 or ESD5522E
- Magnetic Speed Pickup: MSP6724 or MSP6728C

CUMMINS B SERIES ENGINES

ACTUATOR ADC100
GAC APPLICATION NOTE

VT1710 ENGINE

Customer / OEM: JIES Johnson Irrigation Engine Service
Application(s): Irrigation
Engine Make / Model: VT1710
Fuel System Type & Make / Model: Natural Gas
Operating Speed(s): 685 HP @ 2100 RPM
Battery Voltage: 24 V DC
Installed Products:
- Actuator: Dual ATB652T2F14-24
- Speed Controller: ESD5111
- Dual Driver Module: DDM101-PIB4134
- Thermocouples: STE101

Summary: The Cummins VT1710 Engine requires two gaseous throttle body Actuator, each receiving equal fuel levels. The Dual Driver Module (DDM101) is used to regulate the fuel in each cylinder using its fuel and exhaust temperature balance. Using the DDM101, none, one, or two actuators can have droop. Two thermocouples measure, track, and therefore trim the balance based on exhaust temperatures.

CUMMINS VT1710 ENGINE

ATB652T2F14-24
KTTA-50L DIESEL ELECTRIC LOCOMOTIVE

Customer / OEM: CUMMINS INDIA LTD.
Application(s): Locomotive
Engine Make / Model: Cummins KTTA50L4, 50L, 16 Cylinder, Equipped with Twin Turbo Chargers / Charge Air Cooled
Fuel System Type & Make / Model: Cummins PT Fuel System, Diesel
Operating Speed(s): Rated at 2000BHP @ 1900 RPM
Battery Voltage: 12, 24, or 32 V DC
Installed Products:
  - Actuator: ADB120E4
  - Speed Controller: LCC107B
Summary: The LCC107B Closed Loop PID Speed Control Features Overspeed Sensing, Start Fuel Adjustments, Speed Selects and Excitation Control. 16 Cylinder, 2000 BHP/1900 RPM C.I.L. Engine Installation. Twin Turbo Chargers / Charge Air Cooled

ACTUATOR - ADB120E4  C.I.L. KTTA-50-L4 ENGINE INSTALLATION
LCC107B MODULE MOUNTED IN CONTROLS CABINET

DIESEL-ELECTRIC LOCOMOTIVE
GAC APPLICATION NOTE (all of the components specified are sold separately)

855 NATURALLY ASPIRATED NATURAL GAS

Application(s): Generators, Compressors, Others
Engine Make, Model, Displacement: Cummins 855 NA (14L)
Equipment Make, Model: Natural Gas
Fuel System Type & Make, Model: Natural Gas
Operating Speed(s): 650 to 2400 RPM
Battery Voltage: 12 or 24 V DC
Recommended Products:
- Speed Controller: ESD5526E
- Actuator: ATB652T2N-12 or 24
- Magnetic Speed Pickup: 5/8-18 UNF-2A
- Adaptor Plates: KT425, KT855

Summary: Complete Electronic Governor using GAC ATB throttle body, Speed Controller, and Customer supplied IMPCO 425 carburetor.
## DETROIT ENGINES

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<th>ENGINE MODEL</th>
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<th>SPEED CONTROLLER</th>
<th>MSP</th>
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<td>V12-71, V8-92 &amp; V12-92</td>
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<td>V16-71, V24-71, V16-92, V12-149 &amp; V16-149</td>
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<td>ESD5330</td>
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<tr>
<td>DDEC Engines</td>
<td>EAM104</td>
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</table>
**3-71, 4-71, 6-71, and V8-71 ENGINES**

**Customer / OEM:** DETROIT DIESEL  
**Application(s):** Various  
**Engine Make / Model:** 3-71, 4-71, 6-71 and V8-71  
**Equipment Make / Model:** Diesel  
**Fuel System Type & Make / Model:**  
**Operating Speed(s):**  
- 84 kW, 113 HP @ 2100 RPM, 3-71  
- 116 kW, 155 HP @ 2100 RPM, 4-71  
- 177 kW, 238 HP @ 2100 RPM, 6-71  
- 237 kW, 318 HP @ 2100 RPM, V8-71  
**Battery Voltage:** 12 or 24 V DC  
**Recommended Products:**  
- Actuator: ADD225, ADB225, or ADC225 with kit KT170  
- Speed Controller: ESD5111 or ESD5500E  
- Magnetic Speed Pickup: MSP6728C or MSP679

**DETROIT 3-71, 4-71, 6-71 AND V8-71 ENGINES**
GAC APPLICATION NOTE

V12-71, V8-92, and V12-92 ENGINES

Customer / OEM: DETROIT ENGINES
Application(s): Various
Engine Make / Model: V12-71, V8-92, V12-92
Fuel System Type & Make / Model: Diesel
Operating Speed(s):
- 355 kW, 553 HP @ 2100 RPM, V12-71
- 321 kW, 430 HP @ 2100 RPM, V8-92
- 522 kW, 700 HP @ 2100 RPM, V12-92
Battery Voltage: 12 or 24 V DC
Installed Products:
- Actuator: ADC225 or ADB225
- Speed Controller: ESD5111 or ESD5500E
- Magnetic Speed Pickup: MSP6728C or MSP679

DETOUR V12-71, V8-92, AND V12-92 ENGINES
GAC APPLICATION NOTE

V16-71, V24-71, V16-92, V12-149, and V16-149 ENGINES

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<th>Customer / OEM:</th>
<th>Detroit Engines</th>
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<td>Actuator: ACB2001 or ADC225</td>
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<td>Speed Control: ESD5330</td>
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<td>Magnetic Speed Pickup: MSP6728C or MSP679</td>
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</tbody>
</table>

DETROIT V16-71, V16-92, V12-149 AND V16-149 ENGINES

ACTUATOR ACB2001

ESD5330

MAGNETIC SPEED PICKUPS MSP6728C AND MSP679
GAC APPLICATION NOTE

DDEC ENGINES

Customer / OEM: Detroit Engines
Application(s): Various
Engine Make / Model: DDEC Engines
Fuel System Type & Make / Model: Various
Operating Speed(s):
Battery Voltage: 24 V DC
Recommended Products: • Interface Module: EAM104

Summary: The GAC interface module EAM104 provides for isochronous parallel operation with GAC auto synchronizer and precision load sharing.

EAM104 INTERFACE MODULE
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<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
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<td>CH1220, CH1230</td>
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GAC APPLICATION NOTE

DEUTZ MWM 616 SERIES

**Customer / OEM:** Deutz MWM  
**Application(s):** Genset  
**Engine Make / Model:** 616 Series Engines- TBD 616 V8/V12  
**Equipment Make / Model:** Diesel, Inline Pump  
**Operating Speed(s):** 1500 / 1800 RPM  
**Battery Voltage:** 24 V DC  
**Installed Products:**  
- Actuator: ACB275H S1 and ACB275G4-24

275 SERIES ACTUATOR ON DEUTZ MWM TBD 616 V8/V12
ACB275H S1 INTEGRAL ACTUATOR ON DEUTZ 616 SERIES ENGINE
GAC APPLICATION NOTE

DEUTZ MWM 620 with BOSCH P9/ P10 PUMP

Customer / OEM: Deutz
Application(s): Various
Engine Make / Model: 620 Engine
Fuel System Type & Make / Model: Diesel, Bosch P9 and P10 Inline Pump
Operating Speed(s): 1500-1860 RPM
Battery Voltage: 24 V DC
Installed Products:
• Actuator: ACE295-24

ACE295-24 ACTUATOR
GAC APPLICATION NOTE

DEUTZ MWM 620 V12 with BOSCH PE12/10/150/100LS54

Customer / OEM: Deutz MWM
Application(s): Industrial
Engine Make / Model: Deutz MWM 620, V-12, 53.2 L
Fuel System Type & Make / Model: Pump Bosch PE12/10/150/100LS54
Operating Speed(s): Multiple
Battery Voltage: 24 V DC
Installed Products:
- Speed Controller: ESD5330
- Actuator: ACB2001

INSTALLED ACB2001

![Picture of ACB2001 installation]
GAC APPLICATION NOTE

912/913 ENGINES

Customer / OEM: DEUTZ
Application(s): Various
Engine Make / Model: 912 and 913 Engine
Fuel System Type & Make / Model: Diesel, Bosch A Inline Pump
Operating Speed(s): 12 or 24 V DC
Battery Voltage: 12 or 24 V DC
Installed or Recommended Products:
Actuator: ADE176AA Series
  o 04233541-12V
  o 04233463-24V

DEUTZ 912 ENGINE
# GAC APPLICATION NOTE

## 1011 and 2011 SERIES GEN-SETS

<table>
<thead>
<tr>
<th>Customer / OEM:</th>
<th>DEUTZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application(s):</td>
<td>50 and 60 Hz Gen Drive Engines</td>
</tr>
<tr>
<td>Engine Make / Model / Displacement / Rating:</td>
<td>1011 and 2011 Series 2-, 3- and 4-Cylinder Engines. 0.73L/Cylinder, 1500, 1800 or 3000 RPM Applications</td>
</tr>
<tr>
<td>Equipment Make / Model:</td>
<td>Bosch Unit Pump, Diesel, Engine Mounted Pump</td>
</tr>
<tr>
<td>Operating Speed(s):</td>
<td>1500, 1800 and 3000 RPM</td>
</tr>
<tr>
<td>Battery Voltage:</td>
<td>12 or 24 VDC</td>
</tr>
<tr>
<td>Recommended Products:</td>
<td>• Actuator: ACD110-12/24</td>
</tr>
</tbody>
</table>

**Summary:** The ACD110 actuator mounts directly on the engine in place of the electric stop solenoid.

## DEUTZ BF4L 1011 ENGINE

![DEUTZ BF4L 1011 ENGINE](image)

## GAC EQUIPMENT ON DEUTZ 1011 SERIES ENGINES

- GAC ACD110-12 = Deutz part number 0428 1525 KV-12
- GAC ACD110-24 = Deutz part number 0428 1524 KV-24

![GAC EQUIPMENT ON DEUTZ 1011 SERIES ENGINES](image)
### Technical data

<table>
<thead>
<tr>
<th>Engine type</th>
<th>F2L 1011F</th>
<th>F3L 1011F</th>
<th>F4L 1011F</th>
<th>SF4L 1011F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed (min⁻¹)</td>
<td>3000</td>
<td>1500</td>
<td>1800</td>
<td>2000</td>
</tr>
<tr>
<td>Frequency (Hz)</td>
<td>50</td>
<td>50</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td><strong>Engine/genset ratings</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous power, ICN (COP)&lt;sup&gt;2&lt;/sup&gt; (kW)</td>
<td>20.0</td>
<td>16.0</td>
<td>20.5</td>
<td>30.0</td>
</tr>
<tr>
<td>Prime power, ICN (PPR)&lt;sup&gt;3&lt;/sup&gt; (kW)</td>
<td>21.0</td>
<td>17.0</td>
<td>22.0</td>
<td>31.0</td>
</tr>
<tr>
<td>Limited-time running power, IFN (LTP)&lt;sup&gt;4&lt;/sup&gt; (kW)</td>
<td>22.0</td>
<td>18.0</td>
<td>23.0</td>
<td>33.0</td>
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<tr>
<td>Typical generator power output (COP)&lt;sup&gt;5&lt;/sup&gt; (kVA)</td>
<td>23.0</td>
<td>18.0</td>
<td>23.0</td>
<td>34.0</td>
</tr>
<tr>
<td>Typical generator power output (PPR)&lt;sup&gt;5&lt;/sup&gt; (kVA)</td>
<td>24.0</td>
<td>19.0</td>
<td>25.0</td>
<td>35.0</td>
</tr>
<tr>
<td>Typical generator power output (LTP)&lt;sup&gt;5&lt;/sup&gt; (kVA)</td>
<td>25.0</td>
<td>20.0</td>
<td>26.0</td>
<td>37.0</td>
</tr>
</tbody>
</table>

### Basic engine data

- Inertia moment J
  - Engine without flywheel (kg·m²) | 0.059 | 0.0678 |
  - Flywheel (kg·m²) | 0.409 | 0.8 | 0.8 | 0.499 | 0.8 | 0.405 |
  - Weight, engine with radiator (kg) | 167 | 208 | 208 | 208 | 249.5 | 249.5 | 249.5 | 256.5 | 256.5 | 256.5 |

### Governing

- Speed drop (static) (%): DEUTZ Regler: 4 |
- Governor electronic (GAC): GAC | GAC | GAC | GAC | GAC |
**GAC APPLICATION NOTE**

**1012 and 1013 ENGINES**

**Customer / OEM:**
DEUTZ / VOLVO

**Application(s):**
Engine

**Engine Make / Model:**
- **Deutz:**
  - BF4M1012, Inline 3.19L 4 cylinder
  - BF6M1012, Inline 4.79L 6 cylinder
  - BF4M1013, Inline 4.76L 4 cylinder
  - BF6M1013, Inline 7.12L 6 cylinder
  - 2012 Engine

- **Volvo:**
  - 520 Inline 7.76L 4 cylinder
  - 720 Inline 7.15L 6 cylinder

**Fuel System Type & Make / Model:**
Diesel, Engine Mounted Pump

**Operating Speed(s):**
1500 / 1800 RPM

**Battery Voltage:**
12 or 24 V DC

**Installed Products:**
- Actuator: ADD180G with KT188
- Speed Controller: ESD5111 or ESD5500E

**ENGINE MOUNTED ADD180G-12 OR -24 ACTUATOR**

![Engine Mounted Actuator Image]
FREEZE PLUG INSTALLATION

Figure 1 - Inner Bore to be Cleaned. Apply Loctite here.

Figure 2 - Freeze Plug. Make sure this surface is clean and free of nicks or burrs. Use Loctite on outer surface.

Figure 3 (left) & 4 (below) - Use a length of 38mm diameter steel pipe to drive the Freeze Plug into the engine’s inner bore.

Figure 5 - Align the Freeze Plug to this edge.
GAC APPLICATION NOTE

BF6M1015GCP - FIMS

Customer / OEM: Deutz 1015 Series Engines
Application(s): LNG / CNG / Biogas Fueled Generator Set
Engine Make / Model: Deutz V6, 11.9L, Model #BF6M1015GCP Turbo Charged / Intercooled
Continuous Rating: 300 kW at 1500 RPM, 295 kW at 1800 RPM
Fuel System / Battery Voltage: Natural gas / 12 V DC
Operating Speed(s): 300 kW @ 1500 RPM, 295 kW @ 1800 RPM

Products:
- ATB552T2N-12 55 mm Throttle Body Actuator
- AFR210 Integrated Venturi Mixer Control / Engine Speed Controller
- MX60-STM 60 mm Mixer with Stepper Motor
- SCI100 Variable Reluctance Speed Sensor
- RPR104 Zero Pressure Gas Regulator
- ICM200-6 Ignition Control Module
- CL602 Ignition Coil
- BK601 Coil Bracket, 6 Cylinder
- SPG100-002 Spark Plugs & Wires
- SPM200-1B 1 Bar MAP Sensor
- STE101 Exhaust Gas Temperature Sensor
- SOX102 O2 Sensor
- SPO100 Oil Pressure Sensor
- STC101 Coolant Temperature Sensor
- GR104 24-1, 68mm Trigger Wheel
- SCI103 Hall Effect Sensor / 90° Connector

Summary: Variations of the Deutz 6 cylinder 1015 LNG / CNG / Biogas fueled engines with GAC Fuel and Ignition Management System components are used in gen-sets, industrial and agricultural applications with wide range of power ratings.

GAC FIMS SYSTEM ON DEUTZ 6 CYLINDER 1015 LNG / CNG / BIOGAS FUELED ENGINE
GAC APPLICATION NOTE

1015 ENGINES

Customer / OEM:
Deutz

Application(s):
Industrial, Mobile Equipment, Construction, Power Generation

Engine Make / Model:
Deutz 1015, V-8 15.87 L, or V-6 11.9L, Water Cooled, Turbocharged

Fuel System Type & Make / Model:
Diesel, Bosch Inline 6 or 8-cylinder, P3000 Series Pump

Operating Speed(s):
1500, 1800 RPM – Generator;
Min idle 550 RPM, maximum nominal speed 2100 RPM: mobile machinery

Battery Voltage:
24 V

Installed or Recommended Products:
- Actuator: ACE275H-24 (standard unit) or ACE275J-24 (with oil drain fitting and high-torque return fitting – contact GAC for selection)
- Speed Controller: ESD5500E
- Mounting Kit: KT275 (P3000 Series Camshaft Bearing Retainer Kit)
- With EDC pump use ACD175A with KT197

ACE275H-24 ON V8 ENGINE
ACE275J-24 ON V6 ENGINE

ACE275J-24

Note: Oil drain on top cover
GAC APPLICATION NOTE

2008 ENGINE with DELPHI PUMP

Customer / OEM: DEUTZ
Application(s):
Engine Make / Model: 2008 Engine, Delphi Pump
Equipment Make / Model:
Fuel System Type & Make / Model: Diesel, Delphi DPG pump
Operating Speed(s): 36 HP @ 3000 RPM
Battery Voltage: 12 or 24 V DC
Recommended Products:
• Actuator: ADD103B

ADD103 SERIES ACTUATOR
GAC APPLICATION NOTE

12L513 ENGINES

Customer / OEM: Alaska Runner Generators
Application(s): Hovercraft
Engine Make / Model: Deutz 12L513, V-12, 19.14 L
Equipment Make / Model: Alaskan AP188 Hovercraft Main Propellers
Fuel System Type & Make / Model: Diesel, Inline Pump
Operating Speed(s): 252-543 HP
Battery Voltage: 24 V DC
Installed Products:
- Actuator: ACE275
- Speed Controller: ESD5221
- Speed Ramping Controller: RSC671

Summary: The Alaskan AP188 Hovercraft uses two RCS671 controllers in conjunction with two ESD5221 controllers driving two ACE275 Actuator installed on the main propulsion engines, Deutz 12L513’s, powering two 9 foot propellers.

ALASKAN AP188 HOVERCRAFT
GAC APPLICATION NOTE

DEUTZ ENGINES with EMR INTERFACE MODULE

Application(s): Engine Control System
Engine Make / Model: Deutz EMR
Fuel System Type & Make / Model: 
Operating Speed(s): 12 or 24 V DC
Battery Voltage: 12 or 24 V DC
Recommended Products: Interface Module: EAM114

Summary: The EAM114 is an electronic interface module that provides signal conditioning to operate the DEUTZ EMR engine control system. It is typically used with a GAC auto synchronizing and load sharing system is connected to the DEUTZ EMR engine control system.

The DC supply for the interface comes from the common battery source for the Speed Controller and the accessory controls. The input to the module (Terminal B) is typically at 5.0 V DC, which represents the auto-sync and load sharing outputs analog signals. The output of the EAM114 to the EMR engine control is 2.5 V DC with the EMR 5.0 V DC reference connected to Terminal 2.

EAM114

TESTING EAM114

WIRING DIAGRAM WD183C
<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1146T</td>
<td>ALN050</td>
<td>ESD5500E ESD5550 ESD5550M</td>
<td>MSP675</td>
<td>KT232R/231L JDR050</td>
</tr>
</tbody>
</table>
**GAC APPLICATION NOTE**

**D1146T ENGINE**

<table>
<thead>
<tr>
<th>Customer / OEM:</th>
<th>Infracore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application(s):</td>
<td>Power Generation</td>
</tr>
<tr>
<td>Engine Make / Model / Displacement / Rating:</td>
<td>Doosan D1146T 8.1L 6 Cylinder 1800 RPM 113 kW Continuous Power, 138 kW Standby 1500 RPM 97 kW Continuous Power, 118 kW Standby</td>
</tr>
<tr>
<td>Equipment Make / Model:</td>
<td>G-Drive</td>
</tr>
<tr>
<td>Fuel System Type &amp; Make / Model:</td>
<td>Zexel In-Line “AD” Pump with RSV All Speed Governor</td>
</tr>
<tr>
<td>Operating Speed(s):</td>
<td>1500 / 1800 RPM</td>
</tr>
<tr>
<td>Battery Voltage:</td>
<td>12 or 24 V DC</td>
</tr>
<tr>
<td>Installed Products:</td>
<td>• Actuator: ALN050</td>
</tr>
<tr>
<td></td>
<td>• Speed Controller: ESD5500E</td>
</tr>
<tr>
<td></td>
<td>• Magnetic Speed Pickup: MSP675</td>
</tr>
<tr>
<td></td>
<td>• Mounting Kit: KT232 mounts an ALN050 to onto a Bosch RSV governor (right side) run/stop lever. Kit KT231 is for left-side governor.</td>
</tr>
</tbody>
</table>

**Summary:** Doosan Infracore engines for power generation are built for maximum power output and durability and are installed in prime and standby generators worldwide.

**DOOSAN D1146T ENGINE WITH GAC ALN050 ACTUATOR AND KT232**

![Image of engine with actuators and governor](image-url)
# FORD

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 natural gas or propane</td>
<td>ATB401T1N-12 or 24</td>
<td>ESD5159, ESD5526, ESD5500, EEG6500</td>
<td>EC1300, TP501, KT425-T2</td>
<td></td>
</tr>
<tr>
<td>460</td>
<td>ATB552T2N-12, 24</td>
<td>ESD5159, ESD5526, ESD5500-II, EEG6500</td>
<td>MSP6729</td>
<td>KT41761, KT425-T2, TP501</td>
</tr>
<tr>
<td>460</td>
<td>ADC225GS -12 or 24</td>
<td>ESD5500E, EEG6500</td>
<td>MSP6729</td>
<td>KT121M, TP501</td>
</tr>
</tbody>
</table>
GAC APPLICATION NOTE (all of the components specified are sold separately)

**FORD 460 IN³ ENGINE, NATURAL GAS**

**Customer / OEM:** The Governor Shop  
**Application(s):** Generator, Power Generation,  
**Engine Make, Model, Displacement:** FORD 460 in³ with Woodward L-Series 8404-2009  
**Battery Voltage:** 12 or 24 V DC  
**Installed Products:**  
- Speed Controller: EEG6500  
- Throttle Body: ATB401T1N-12 or 24 V DC  
- Magnetic Speed Pickup: MSP6729  

**Summary:** The Governor Shop in Edmonton, Canada updated this turbocharged Ford 460 engine with a Woodward L-Series 8404-2009 to respond to load changes. It stalled for any appreciable load change. With the GAC ATB and EEG6500 installed, the engine had no trouble with turbo lag, the delay it had been experiencing during load transients caused by air-fuel ratio change needs.

**FORD 460**

**ATB AND ESD6500 INSTALLATION**
GAC APPLICATION NOTE (all of the components specified are sold separately)

**FORD 300 IN³ ENGINE, NATURAL GAS or PROPANE**

**Customer / OEM:**
Electronic Governor Solution with GAC ATB (ref. KT300ATB)

**Application(s):**
Power Generation, Water Pump, Forklift, others

**Engine Make, Model, Displacement:**
FORD 300 in³ (4.9 L), 6 cylinders

**Equipment Make / Model:**
Various

**Fuel System Type & Make, Model:**
Impco 125 gas carburetor mixer (GAC part no. MX125M-2)

**Operating Speed(s):**
Idle to 3600 RPM

**Battery Voltage:**
12 or 24 V DC

**Installed Products:**
- Speed Controller: ESD5159, ESD5526, ESD5500-II or EEG6500
- Throttle Body: ATB401T1N-12 or 24 V DC
- Magnetic Speed Pickup: MSP6729
- Mating Connector: EC1300
- 5K Potentiometer: TP501
- Air Filter (optional): AIR1-1

**Summary:**
This a complete Electronic Governing system for the natural gas or propane fueled Ford 300 in³ engine using a Governors America Throttle Body with either a Customer or GAC supplied Impco 125 carburetor-mixer. **COMPLETE INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.**

**MOUNTING MIXER-CARBURETOR ON ATB**
The Impco 125 mixer carburetor can be purchased from GAC (MX125M-2) or customer supplied. Use the gaskets included with the carburetor to mount to the ATB.

**OPTIONAL AIR FILTER**
The optional air filter is recommended but not required.
GAC APPLICATION NOTE (all of the components specified are sold separately)

**FORD 460 IN³ ENGINE, NATURAL GAS OR PROPANE**

**Customer / OEM:** Electronic Governor Solution with GAC ATB (ref. KT460ATB)

**Application(s):** Power Generation, Water Pump, Forklift, others

**Engine Make, Model:** Ford 460 in³ (7.5 L), 8 cylinders

**Fuel System Type & Make, Model:** Impco 425 gas carburetor mixer (customer supplied)

**Operating Speed(s):** Idle to 3600 RPM

**Battery Voltage:** 12 or 24 V DC

**Recommended Products:**
- Speed Controller: ESD5159, ESD5526, ESD5500-II or EEG6500
- Throttle Body: ATB552T2N-12 or 24 V DC
- Magnetic Speed Pickup: MSP6729
- Installation Kits:
  - KT41761 (intake manifold to throttle body-open square Holley Pattern)
  - KT425-T2
- 5K Potentiometer (optional): TP501

**Summary:** This a complete Electronic Governing system for the natural gas or propane fueled Ford 460 in³ engine using a Governors America Throttle Body with a Customer supplied Impco 425 carburetor- mixer. COMPLETE INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.

ELECTRONIC GOVERNING SYSTEM FOR FORD 460 IN³ NATURAL GAS OR PROPALE ENGINE
GAC APPLICATION NOTE (all of the components specified are sold separately)

FORD 460 IN³ NA or TURBOCHARGED ENGINE

Customer / OEM: Electronic Governor Solution with GAC 225 Series Actuator (KT460A)

Application(s): Power Generation, Water Pump, Forklift, others

Engine Make, Model, Displacement: Ford 460 in³ (7.5 L), 8 cylinders

Equipment Make, Model: Various

Fuel System Type & Make, Model: Carbureted or Throttle Body

Operating Speed(s): Idle to 3600 RPM

Battery Voltage: 12 or 24 V DC

Recommended Products:
- Speed Controller: ESD5500E or EEG6500
- Actuator: ADC225GS -12 or 24 V DC
- Magnetic Speed Pickup: MSP6729
- Installation Kit: KT121M
- 5K Potentiometer (optional): TP501

Summary: This a complete Electronic Governing system for a carbureted or throttle body equipped Ford 460 in³ naturally aspirated (NA) or turbocharged engine using a Governors America 225 Series Actuator. COMPLETE INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.

COMPLETE ELECTRONIC GOVERNING SYSTEM FOR A FORD 460 IN³ ENGINE
TURBOCHARGED

NATURALLY ASPIRATED
## HATZ

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1B Series</td>
<td>ADD107L01B-12/24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35W Series</td>
<td>ADD107L35W-12/24</td>
<td></td>
<td>MSP6730</td>
<td></td>
</tr>
</tbody>
</table>
GAC APPLICATION NOTE

1B SERIES ENGINES

Customer / OEM: Hatz
Application(s): Various
Engine Make / Model: 1B
Equipment Make / Model: Hatz 1B Series Engines
Fuel System Type & Make / Model: Various
Operating Speed(s): 1.5 to 8 kW at max speed of 3600 RPM
Battery Voltage: 12 or 24 V DC
Installed Products:
• Actuator: ADD107L01B-12/24

Summary: Factory mounted, tested, and released system. (retrofit not recommended)
Isochronous and Droop operation
Works with SDG, IGC and ESD control-units

INTEGRAL ACTUATOR ON HATZ 1B SERIES ENGINE
GAC APPLICATION NOTE

35W SERIES ENGINES

Customer / OEM: Hatz
Application(s): Various
Engine Make / Model: 35W
Equipment Make / Model: Hatz 35W Series Engines
Fuel System Type:
Battery Voltage: 12 or 24 V
Installed Products:
• Actuator: ADD107L35W-12/24
• Magnetic Speed Pickup: MSP6730

Summary: Factory mounted, tested, and released system. (retrofit not recommended)
Isochronous and Droop operation
Works with SDG, IGC, EDG and ESD control-units
Direct Link to the fuel rack

INTEGRAL ACTUATOR ON HATZ 35W SERIES ENGINE

MSP6730 ON HATZ 35W SERIES ENGINE
### JOHN DEERE

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRRIGATION PUMP</td>
<td>ADC120S-12/24</td>
<td>IGC745-02-04</td>
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<tr>
<td>3029, 4045, 6068,</td>
<td>ADC100</td>
<td>ECC328 (no mag pickup</td>
<td>MSP 6728C</td>
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</tr>
<tr>
<td>with Stanadyne D-pump</td>
<td></td>
<td>required)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ESD22444, ESD2402</td>
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<td>ESD5120, ESD520</td>
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<tr>
<td></td>
<td></td>
<td>ESD5500-II</td>
<td></td>
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</tr>
</tbody>
</table>
GAC APPLICATION NOTE

JOHN DEERE DIESEL ENGINE with CAV-DPA ROTARY PUMP

Customer / OEM: Irrigation Pump
Application(s): 2040, others
Engine Make / Model: John Deere
Equipment Make / Model: Diesel, CAV-DPA Rotary Pump
Fuel System Type & Make / Model: 12 or 24 V DC
Operating Speed(s):
Battery Voltage:
Installed Products:
• Actuator: ADC120S – 12/24
• Integrated Governor: IGC745-02-04

IRRIGATION PUMP

IGC ON IRRIGATION PUMP

ADC120S ACTUATOR ON IRRIGATION PUMP

IGC745-02-04

ADC120S Actuator
BACK OF INTEGRATED GOVERNOR

Back View
IGC745-02-04

VALVES

Digital Governors

IGC700 Series
- Integrated engine governor & protection control
- 3 Contacts (starter motor, fuel valve or solenoid output, alarm or preset)
- SMARTOUCH® 16 character LCD for easy set-up and troubleshooting
- Password protected for greater security
- LED bar graph for set-up and trouble-shooting
- Micro-SD card memory
- Fixed speeds, plus variable speed range
- Configurable fuel limit control
GAC APPLICATION NOTE

JOHN DEERE ENGINES WITH STANADYNE PUMPS

Customer / OEM: John Deere and Stanadyne
Application(s): Engine
Engine Make / Model / Displacement / Rating: John Deere 3029, Inline 3 cylinder, 2.9 L / 4045, Inline 4 cylinder, 4.4 L / 6068, Inline 6 cylinder, 6.8 L
Fuel System Type & Make / Model: Stanadyne D-series fuel injection pump
Operating Speed(s): 12 or 24 V DC
Battery Voltage:
Recommended Products: Governor – light force
• ECC328 (no mag pickup required)
• ESD2244 (basic isochronous)
• ESD2402 (basic isochronous with idle and anti-windup)
• ESD5120 (isochronous, variable, and drip with no start fuel / speed ramping)
• ESD5520 (same as 5120 with start fuel and speed ramp control)
• ESD5526 (same as 5520 with anti-windup for gaseous applications)
• ESD5570 (same as 5520 with speed switch contacts)
• ESD5500-II (fusion series – all features of 5500 series)
• Actuator: ADC100-VV
• Magnetic Speed Pickup: MSP 6728C

JOHN DEERE 3029

ADC100 ON PUMP

IVECO
A cross reference a GAC replacement with an Iveco part numbers see the cross reference at the end of this guide [here](#).

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>7450, 7675, 8031 &amp; 8061</td>
<td>ADD225S-12</td>
<td>ESD5111</td>
<td>MSP6721C</td>
<td>KT276</td>
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<td>ADD225S-24</td>
<td>ESD5500E</td>
<td>MSP6728C</td>
<td>KT275</td>
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<td>ADC100-12,-24</td>
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GAC APPLICATION NOTE

7450, 7675, 8031, and 8061 ENGINES

Customer / OEM: Iveco
Application(s): Power Generation
Engine Make / Model: Iveco 7450 Inline 4 cylinder, 5.0 L / 7675, Inline 6 cylinder, 7.5 L / 8031, Inline 3 cylinder, 2.9 L / 8061, Inline 6 cylinder, 5.9 L
Fuel System Type & Make / Model: Diesel, Bosch VE Pump
Operating Speed(s): 1500 RPM
Battery Voltage: 12 or 24 V
Installed Products:
- Actuator: ADD225S-12/24 or ADC225S-12/24
- Speed Controller: ESD5111 or ESD5500E

ADD225S ACTUATOR ON IVECO 7450, 7675, 8031 AND 8061 ENGINES
# KIRLOSKAR

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
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<tr>
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<td>ADC225D1S</td>
<td>ESD5160</td>
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<tr>
<td>DV8, DV10 &amp; DV12</td>
<td>ADD175SA-24</td>
<td>ESD5550</td>
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</tbody>
</table>
GAC APPLICATION NOTE

6SL8800TA ENGINE with INLINE PUMP

Customer / OEM: Kirloskar Oil Engines Ltd. – Pune, India
Application(s): Fire Pump
Engine Make / Model: Kirloskar 6SL8800TA
Fuel System Type & Make / Model: Diesel, Inline pump
Operating Speed(s): 355 HP @ 2100 RPM
Battery Voltage: 24 V DC
Installed Products:
- Actuator: ADC225D1S
- Speed Controller: ESD5160

Summary: The ESD5160 speed control is specifically designed for fire pump applications. It is CE certified, reverse acting and has an extended speed range. It has adjustable PID for either isochronous, variable or droop governing. The ADC225D1S actuator has an extended universal through shaft and internal dual return springs for fail-safe operation.

KIRLOSKAR FIRE PUMPS

Fire Fighting Pump-sets Powered By Kirloskar 6SL8800TA Engines
Rated at 355 HP / 2100 RPM
GAC EQUIPMENT ON KOEL FIRE PUMP APPLICATION

**ESD5160** Speed Controller Designed for Fire-pump Applications CE Certified, Reverse Acting with Extended Speed Range, Isochronous, Variable and Droop Operation.

**ADC225D1S** Actuator with Dual Springs and Extended Travel

KOEL FIRE PUMP

Dual Actuator Return Spring Installation

Enriching Lives
GAC APPLICATION NOTE

DV SERIES ENGINES

Customer / OEM: Kirloskar Oil Engines Ltd – Pune, India
Application(s): Power Generation, Fire Pumps, Hydraulic Drives
Engine Make / Model:
   KOEL DV8: 15.9L, 346 kW/490 HP at 1500 RPM
   KOEL DV10: 19.9L, 448 kW/608 HP at 1500 RPM
   KOEL DV12: 23.9L, 552 kW/750 HP at 1500 RPM
Fuel System Type & Make / Model: Diesel, Bosch inline P-Pump
Operating Speed(s): 1500 RPM operating / 800 RPM idle
Battery Voltage: 24 V DC
Recommended Products:
   • Actuator: ADD175SA-24
   • Speed Controller: ESD5550

Summary: The ADD175SA is designed to mount directly to fuel injection Bosch-style “P” pumps to achieve an integrated proportional fuel control package. Its control arm assembly connects directly to the fuel rack in place of a mechanical governor. The actuator includes a manual shut-off lever.

DV10 ENGINE / GEN-SET DRIVE
TEST STAND MOUNTED “P” PUMP WITH GAC ACTUATOR

ADD175SA-24 ACTUATOR ON DV10 “P” PUMP

“P” PUMP / ADD175SA-24 ACTUATOR ON DV10 ENGINE

DV10 ENGINE INSTALLATION
## KOMATSU

<table>
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<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
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<tr>
<td>SAA 170-G3</td>
<td>ADC225S-24</td>
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<tr>
<td>GEN. SET</td>
<td>ADC225GAS-24</td>
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</table>
GAC APPLICATION NOTE

SAA 170-G3 ENGINES

Customer / OEM: Komatsu
Application(s): Various
Engine Make / Model: SAA 170-G3
Fuel System Type & Make / Model: Diesel
Operating Speed(s):
Battery Voltage: 24 V DC
Installed Products:
  • Actuator: ADC225S-24

ADC225S-24 Actuator
GAC APPLICATION NOTE

KOMATSU GEN SET

Customer / OEM: Komatsu
Application(s): Gen.Set
Engine Make / Model: Komatsu
Fuel System Type & Make / Model: Diesel
Operating Speed(s):
Battery Voltage: 24 V DC
Recommended Products:
• Actuator: ADC225GAS-24

Summary: The GAS model has a lighter spring (G), additional travel (A) and serrated shaft (S).

KOMATSU GEN SET FINISHED INSTALLATION

Light spring pulling stoplever completely in Stop position

ADC225GAS-24 Actuator
<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
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</thead>
<tbody>
<tr>
<td>D905, D1005, D1105, D1105T, V1305, V1505 &amp; V1505-T</td>
<td>ALR190-K04-12/24</td>
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<td>MSP6729</td>
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<tr>
<td>D1503M, D1703M, D1803M, V2003M &amp; V2403M</td>
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<tr>
<td>D722</td>
<td>ADD120S-12</td>
<td>EEG7000</td>
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<td>BK265</td>
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<td>ALN025-12</td>
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<tr>
<td>V2203</td>
<td>ADD120S-12</td>
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<tr>
<td>V3300 &amp; V3800</td>
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<td>Z482</td>
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<td>ESD5500-II</td>
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<td>BK265</td>
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</tbody>
</table>
GAC APPLICATION NOTE

VARIOUS DIESEL ENGINES

Customer / OEM: Kubota, Shibaura, Mitsubishi, Isuzu, Yanmar and Perkins
Application(s): Power Generation, Agricultural, Construction, Industrial, Stationary Power
Engine Make / Model: See Application Chart
Fuel System Type & Make / Model: Diesel, Inline and Unit Pumps
Operating Speed(s): 1500 / 1800 RPM operating, 600 RPM idle, variable range from 1000-2400 RPM etc…
Battery Voltage: 12 or 24 V DC
Recommended Products:
- Actuator: ALR190 Series
- Speed Controller (Light Force): ECC328, ESD2402, ESD5520E, ESD5120, ESD5500-II, ESD5570E, ESD2244-12/24 depending on features needed.
- Magnetic Speed Pickup: Various

Summary: The ALR190 Series Integral Actuator is designed to mount directly onto various injection pumps on small engines. No external linkage or brackets are required for its installation. When de-energized the ALR190 Series actuator provides the function of a fuel shutoff solenoid. This is accomplished by an internal spring loading the fuel-rack to the no fuel position. Installing the ALR190 Series actuator does not defeat the engine’s mechanical governor operation. During the installation process, the mechanical governor is set 200-300 RPM higher than the electric Speed Controller operating speed and acts as over-speed protection and engine-power limiter within the engine manufacturers specifications.

The electromechanical design used in the ALR190 Series is field proven and provides a proportional actuator movement based on the actuator coil current.

KUBOTA: ALR190-K04-XX
MITSUBISHI ‘L’ AND ‘S’ SERIES ENGINES: ALR190-M04-XX

ISUZU ‘C’ AND ‘L’ SERIES ENGINES: ALR190-I03-XX

YANMAR TNV SERIES ENGINES: ALR190-Y04-XX
PERKINS 404 AND 403 SERIES ENGINES: ALR190-P04-XX

ALR190-P403-12

M16x1.5 THREAD

Ø 1.425

.567

.194

2.185

1.070

.197
GAC APPLICATION NOTE

V3800D-IT V3800 ENGINES

Customer / OEM: Kubota
Application(s): Various
Engine Make, Model, Displacement: Kubota V3800 DI-T, 4 Cylinder, 3.8L
Equipment Make, Model: Various
Fuel System Type & Make, Model: In Line
Operating Speed(s): Idle to 2400 rpm
Battery Voltage: 12 or 24 V DC

Installed and Recommended Products:

• Speed Controllers:
  o Digital: EEG6000, EEG6500, EEG7000, EEG7500
  o Analog: ESD5120, ESD5520E, ESD5500E

• Actuator: ALR190-KV03DIT

Summary: An ALR190 actuator specifically designed for the Kubota V3800 D-IT engine.
HOW TO IDENTIFY THE ALR190-KV03DIT-12/24 ACTUATOR

APPLICATIONS CHART – ALL MODELS

**NOTE** Check engine dimensions before selecting or installing an ALR as alterations made to factory engines may impact ALR fit.

<table>
<thead>
<tr>
<th>ENGINE FAMILY</th>
<th>ENGINE MODEL</th>
<th>ACTUATOR MODEL</th>
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**NOTE** IDI model only

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## COMPATIBLE SPEED CONTROLLER MODELS

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<th>MODEL NUMBER</th>
<th>FEATURES</th>
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<tbody>
<tr>
<td>ECC328-12 or -24</td>
<td>Isochronous Operation / No Mag Pickup Needed Uses Genset Frequency 40-80 Hz</td>
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<tr>
<td>ESD2244-12 or -24</td>
<td>Isochronous Operation / Adjustable PID Functions / Speed Trim Input / Hard Potted</td>
</tr>
<tr>
<td>ESD2402-12 or -24</td>
<td>Isochronous Operation / Hard Potted / Idle Control / Adjustable PID Functions / Speed Trim Input /</td>
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<tr>
<td>ESD5120</td>
<td>Isochronous, Droop &amp; Variable Operation / Idle Control / Speed Trim Input / Auxiliary Accessory Input &amp; +10V Supply</td>
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<tr>
<td>ESD5520E</td>
<td>Isochronous, Droop &amp; Variable Operation / Idle Control / Speed Trim Capability / Starting Fuel and Speed Ramping Adjust / Auxiliary Accessory Input &amp; +10V Supply / Soft Coupling / Lead Circuit</td>
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<tr>
<td>ESD5500-II</td>
<td>Isochronous, Droop &amp; Variable Governing / Idle Control / Aux Input &amp; +10V Supply / Starting Fuel and Speed Ramping Adjust / Soft Coupling / Lead Circuit / Selectable Light-Force / Dither / LED Indicators</td>
</tr>
</tbody>
</table>

All digital speed controls are also compatible:
EEG6500, EEG6550, EEG7000, EEG7500, EDG6000, SDG, etc.
GAC APPLICATION NOTE

D722 VARIABLE SPEED ENGINE

Customer / OEM: Kubota
Application(s): Mecc Alte Generator Drive, Variable DC
Engine Make / Model: Kubota D722 Diesel 0.719 L, 3 Cylinder, 14.9 kW (20.0 HP) at 3600 RPM, 12V
Fuel System: Diesel
Operating Speed(s): 14.9 kW @ 3600 RPM
Battery Voltage: 12 V DC

Installed Products:
- Alternator (MECC ALTE): PM5G 48VDC
- Actuator (GAC): ALN025 with BK265 and KT130 clevis kit
- Speed Controller (GAC): EEG7000

Summary: By pairing Mecc Alte’s Permanent Magnet Generator (PMG) with a GAC actuator and speed controller, the team developed a variable speed generator solution that varies a generator's engine speed based on load. This solution, based on a Kubota D722 Diesel 3-cyl engine, can optimize and match the output power with demand and reduce fuel consumption by at least 25%. The result allowed the customer to charge a battery bank while maintaining voltage and maximizing the battery life.

ACTUATOR ALN025-12 AND EEG7000
**D722 VARIABLE SPEED ENGINE**

**EEG7000 ENHANCED ELECTRONIC DIGITAL SPEED CONTROLLER**

- Mini-ECU, J1939 TSC1 Control Capable with Diagnostic Messages (DM).
- Isochronous, Variable, or Customizable Droop Governing.
- 3 Fixed Speeds or Variable Speed with Direct 0-5V, 5kΩ, or 4-20mA Input.
- Built-in USB Port for Easy Configuration with Free Software.
- Black-Smoke Reduction, Speed Ramp Control, Load Sharing / Synchronizing Option, and Cummins EFC Capable.
- Built-in Speed Switch Output for Crank or Overspeed.
- Engine Hour Meter and Service Timer.
- Fully Sealed, IP-67.

**EEG7000 ACCESSORIES**

<table>
<thead>
<tr>
<th>GAC PART NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC1502</td>
<td>EEG7000 14 Pin AMPSEAL mating connector</td>
</tr>
<tr>
<td>CH1520</td>
<td>EEG7000 Cable Harness Assembly</td>
</tr>
</tbody>
</table>

**ALN025 / ALN050 ACTUATOR AND ACCESSORIES**

GAC's ALN linear actuators provide highly accurate precise positioning for closed-loop control with a minimum number of moving parts, prolonging the life of the actuator. With no sliding parts and sealed, reliability is outstanding, and no maintenance is necessary.
GAC APPLICATION NOTE

D722 DIESEL ENGINES

Customer / OEM: Kubota
Application(s): Various
Engine Make / Model: D722
Fuel System Type & Make / Model: Diesel
Operating Speed(s): 14.9 kW @ 3600 RPM
Battery Voltage: 12 V DC
Recommended Products:
- Actuator: ADD120S-12 or ADC120S-12

ACTUATOR ADD120S-12 AND ADC120S-12
**GAC APPLICATION NOTE**

**V2203 ENGINES**

**Customer / OEM:** Kubota  
**Application(s):** Various  
**Engine Make / Model / Displacement / Rating:** V2203 Engine  
**Equipment Make / Model:**  
**Fuel System Type & Make / Model:** Diesel  
**Operating Speed(s):** 35.9 kW @ 2800 RPM  
**Battery Voltage:** 12 V DC  
**Recommended Products:**  
Actuator: ADD120S-12

**ADD120S-12 ACTUATOR ON KUBOTA V2203**
GAC APPLICATION NOTE

KUBOTA WG752 3-CYLINDER, 0.74L ENGINE

Customer / OEM: Kubota
Application(s): Various
Engine Make / Model: WG752
Fuel System Type & Make / Model: Diesel
Operating Speed(s): 35.9 kW @ 2800 RPM
Battery Voltage: 12 V DC
Products Used:
- AFR210
- ATB251T1N1-12
- MSP6827C
- MXB20-STM

SUMMARY
GAC's AFR210 offers an 'Anti-Wind-Up' PID feature that minimizes RPM over-shoot and/or under-shoot to support this combined heat and power (CHP) solution.

GASEOUS CO-GEN CHP POWER
GAC APPLICATION NOTE (all of the components specified are sold separately)

KUBOTA Z482 ENGINE USING ALN025 SERIES ACTUATOR
AND SPEED CONTROLLER OPTIONS

Customer / OEM: Multiple
Application(s): Universal small engine
Engine Make / Model / Displacement / Rating: Kubota Z482 / 479cc / 10.9 HP
Equipment Make / Model: Multiple
Fuel System Type & Make / Model: Bosch MD Type mini pump
Operating Speed(s): 2400 – 3200 RPM operating, 3600 RPM Max Speed
Battery Voltage: 12 V DC

Installed Products:
• Actuator: ALN025-12
• Speed Controller Options (Analog):
  o ECC328-12 No speed sensor – Uses generator frequency, Fixed Speed,
    No Idle (Only for AC Generator Application). No speed sensor necessary.
  o ESD2402-12 Idle function, fixed speed
  o ESD5120 Idle function, fixed or variable speed, load share/sync
  o ESD5500-II Idle function, fixed or variable speed, load share/sync,
    starting fuel, speed ramping
• Speed Controller Options (Digital):
  o EEG6500, EEG7000 or EEG7500
• Optional Starter Mounting Bracket: BK265
• Optional Clevis Kit: KT130
• Optional Threaded Rod: RD102 (1/4”-28) or RD233 (M6 x 1.5mm)

Summary: ALN025-12 actuator is to be mounted in place of the original fuel shut-off solenoid. The
ALN025-12 serves as both the actuator and a fail-safe fuel shut-off.

ALN025-12
ORIGINAL STOP SOLENOID MOUNTED ON KUBOTA Z482

FINISHED INSTALLATION: ALN025-12 MOUNTED ON KUBOTA Z482
# LIMMAT

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 CYLINDER</td>
<td>ADB225</td>
<td>ESD5500E</td>
<td>RSC671</td>
<td>SSW675</td>
</tr>
</tbody>
</table>
GAC APPLICATION NOTE

12 CYLINDER MARINE ENGINE

Customer / OEM: Lake Boat
Application(s): Marine Control
Engine Make / Model: 12 Cylinder
Fuel System Type & Make / Model: Diesel, Mechanical Governor, Inline Pump
Operating Speed(s): Variable
Battery Voltage: 24 V DC
Installed Products:
• Actuator: ADB225
• Speed Controller: ESD5500E
• Speed Ramping Controller: RSC671
• Accessories: SSW675
Summary: ESD used for governing with the RSC for precise acceleration / deceleration control. The SSW used for crank / over speed switches.

PASSENGER BOAT WITH VARIABLE PITCH PROPELLER
MARINE CONTROLS

ADB225 ACTUATOR

ESD5500E  RSC671  SSW675

ADB225
## LOMBARDINI

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>KDW1003</td>
<td>ADC120</td>
<td>ESD5500E, EEG6500 or EEG7000</td>
<td>MSP6729</td>
<td>KT130</td>
</tr>
<tr>
<td>LDW 2004</td>
<td>ADC120S-12</td>
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</table>
GAC APPLICATION NOTE (all of the components specified are sold separately)

KOHLER (LOMBARDINI) KDW1003 DIESEL ENGINE

Customer / OEM: Electronic Governor Solution with GAC ALN025: 12 or 24 V DC Linear Actuator or 120 Series: 12 or 24 V DC Actuator

Application(s): Refrigeration Groups, Excavators, Tractors, Compressors, others

Engine Make, Model, Displacement: Kohler KDW1003, 62.7 in³ (17.5 kW), 3 cylinders

Equipment Make, Model: Various

Fuel System Type & Make, Model: Indirect injection

Operating Speed(s): Idle to 3600 RPM

Battery Voltage: 12 or 24 V DC

Installed Products:
- Speed Controller: ESD5500E, EEG6500 or EEG7000
- Actuator: ALN025 -12/24 (V DC) or 120 Series-12/24 (V DC)
- Magnetic Speed Pickup: MSP6729
- Hardware for ALN025 installation only:
  - Clevis Kit: KT130
  - Bearing Rod Ends: BR200 (¼”-24), BR300 (M5), BR400 (M6) or BR500 (M8)
  - Threaded Rods: RD102 (¼”-28) or RD233 (M6)
  - Mounting Plate (starter): BK265

Summary: This a complete Electronic Governing system for a Kohler (Lombardini) KDW1003 3 Cylinder Diesel Engine

BASIC FUEL PUMP AND GOVERNOR SETUP ON KDW3000 ENGINE
COMPLETE ELECTRONIC GOVERNING SYSTEM FOR A KOHLER (LOMBARDINI) ENGINE
ALN025 CONFIGURATION

ALN025 Linear Actuator

COMPLETE ELECTRONIC GOVERNING SYSTEM FOR A KOHLER (LOMBARDINI) ENGINE
120 SERIES CONFIGURATION

Shut Off Lever

ADC120 SERIES ACTUATOR (INCLUDES LE1400-2LEVER)

Shut Off Lever
ALN025 ACTUATOR AND RELATED PARTS

ADC120 ACTUATOR WITH LEVER

FOR DETAILED INSTALLATION INSTRUCTIONS SEE EACH PRODUCTS INSTALLATION MANUAL

FUEL LEVER AT MID FUEL POSITION DIAGRAM

FUEL LEVER AT FULL FUEL POSITION DIAGRAM
GAC APPLICATION NOTE

LDW 2004 ENGINE

Customer / OEM: Witschi
Application(s): CMT Mobile Loader
Engine Make / Model: Lombardini LDW 2004, 4 cylinder, 2.1L
Equipment Make / Model: Witschi CMT Loader
Fuel System Type & Make / Model: Diesel
Operating Speed(s): 35kW @ 3000 RPM
Battery Voltage: 12 V DC
Installed or Recommended Products:
  • Actuator: ADC120S-12

CMT LOADER

ADC120S-12

LOADER DASHBOARD

LOADER ELECTRIC FOOT PEDAL
## LOVOL

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
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</thead>
<tbody>
<tr>
<td>1003, 1004, 1006, 1106</td>
<td>ADD175A-12/24</td>
<td>ESD5500E</td>
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</table>
GAC APPLICATION NOTE

LOVOL DIESEL GEN SET ENGINES

Customer / OEM: Foton Lovol International Heavy Industry Co., Ltd.
Application(s): Power Generation
Engine Make / Model:
- Lovol 1003 series, 2.99L, NA/Turbo, 26 / 38 kW
- Lovol 1004 series, 3.99L, NA/Turbo, 40 / 60 kW
- Lovol 1006 series, 5.98L, Turbo/Water-cooled, 90 / 110 kW
- Lovol 1106 series, 5.98L, Turbo Air-cooled, 130-158.4 kW (1500RPM)
Fuel System Type & Make / Model: Diesel, Asimco-Tianwei (BYC),
PB Pump (1003, 1004, 1006), P7100 (1106)
Operating Speed(s): 1500 / 1800 RPM rated
Battery Voltage: 12 or 24 V DC
Installed Products:
- Speed Controller: ESD5500E (Lovol T63201004)
- Actuator: ADD175A-12/24 (Lovol T73201202 for 12V, T73201203 for 24V)

Summary: The ESD5500E controller was selected for its ruggedness, reliability and ease of operation, as well as its many essential features, perfect for the China gen set market. It is also a good choice for exporting Chinese-made engines because GAC has world-wide recognition. The ADD175A-12 is a perfect fit for BYC’s PB and P7100 pumps as it was designed specifically to fit Bosch and BYC pumps.

LOVOL 1006TAG

![LOVOL 1006TAG Image]
MAN

A cross reference to MAN part numbers to GAC part numbers is at the end of this guide [here](#).

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
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<tbody>
<tr>
<td>D2842</td>
<td>ACE275HD-24</td>
<td>ESD5330</td>
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<tr>
<td></td>
<td></td>
<td>RSC671</td>
<td></td>
<td></td>
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<tr>
<td>0824 &amp; 0826</td>
<td>ADD120S-24</td>
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<td>2876</td>
<td>ATB652T2F14-24</td>
<td>SDG</td>
<td>MSP6723C</td>
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<td>E3268</td>
<td>ADB335-24</td>
<td>EEG6550</td>
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<tr>
<td></td>
<td>ADC225-24</td>
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</tbody>
</table>
GAC APPLICATION NOTE

D2842LE201 with ACE275HD-24 ACTUATOR

Customer / OEM: MAN Engines / Treviicos Corp.
Application: High Pressure Soil Pump – Pile Driver (Model 7T800)
Engine Make / Model: MAN D2842 LE 201 / 610KW / V12
Equipment Make / Model: Soilmec 7T800
Fuel System: Diesel, Inline Pump
Operating Speed(s): 1500 / 1800 RPM, 750bar 614 liters-per-minute
Battery Voltage: 24 V DC
Installed Products:
- Actuator: ACE275HD-24
- Speed Controller: ESD5330
- Controller: RSC671

Summary
This Soilmec 7T800 pump uses a 21.93L diesel MAN D2842 LE 201 engine to power this 614 liter/min workhorse. The engine is equipped with a GAC ACE275HD actuator (MAN PN 51.11610.6028) with heavy duty bearings to provide the strength and durability this application needs. The GAC ESD5330 works with our RSC671 controller to ensure precise control.

COMPLETED PROJECT
ESD5330 WITH RSC671

ACE275HD-24 MOUNTED ON DIESEL PUMP   MAN 12 CYLINDER ENGINE M/N D2842LE 201
GAC APPLICATION NOTE

2876 COMBINED HEAT AND POWER AMERIGEN 150

Customer / OEM: Co Energy America
Application(s): Combined Heat and Power (CHP)
Engine Make / Model / Fuel System Type & Make / Model: 150 MAN 2876 Natural Gas
Products in Solution:
- Actuator: Throttle Body, 65 mm Bore, Feedback HT Sealed
- Speed Controller: GAC Smart Digital Governors
- Other: Magnetic Speed Pickup

Summary:
Co Energy America has included GAC ATBs in their 150K W Amerigen 1150 CHP solution for over 20 years. Although the engines originally include a control, they needed more precise consistent results, and chose GAC ATBs for that reason.

Co Energy America has placed the Amerigen 150 across New England including Gillette Stadium, Whole Foods, Mass College of Pharmacy, and various Health care facilities.
GAC APPLICATION NOTE

2842 AND 2866 ENGINES

Customer / OEM: MAN
Application(s): Various
Engine Make / Model: MAN 2842, 2866 and 2876 Engines
Fuel System Type: Diesel, Inline Pump
Operating Speed(s): 1500 / 1800 RPM
Battery Voltage: 24 V DC
Installed Products: • Actuator: ACE275HD-24
Summary: HD Version includes heavy duty bearings received by MAN for durability.

ACE275HD-24 ACTUATOR ON MAN 2842      ACE275HD-24 ACTUATOR ON MAN 2866
GAC APPLICATION NOTE

MAN E3268 COMBINED HEAT AND POWER

Customer / OEM: Hatraco
Application(s): Combined Heat and Power
Engine Make / Model: E3268 LE212 and MAN E2876 LE302
Equipment Make / Model: V8
Fuel System Type & Make / Model: Gasoline
Operating Speed(s): 350 kW
Battery Voltage: 24 V DC
Installed Products:
- Actuator: ADC225-24 or ADB335-24
- Speed Controller: EEG6550
- Other: MSP6723C

Summary
CHP based on the gas engine MAN E2876 LE302 with GAC ADC225-24 or ADB335-24, controlled with EEG6500 and MSP6723C.

FINISHED CHP

ENGINE WITH GAC ADC225-24

ENGINE WITH GAC ADB335-24
## MILITARY

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Deere 40457F151 &amp; 6068TF151</td>
<td>ADC101-24</td>
<td>ESD5551</td>
<td>MSP6735</td>
<td>AVR100, AVR400</td>
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<td></td>
<td></td>
<td>MSP6728</td>
<td>LSS100, LSS400</td>
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<td>TCM100, TCM102</td>
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<td>TCM400</td>
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<td></td>
<td>PCI1102</td>
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<tr>
<td></td>
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<td>CH113, CH114</td>
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</tbody>
</table>
GAC APPLICATION NOTE

JOHN DEERE 40457F151 and 6068TF151 GENERATOR

Customer / OEM: Army Mobile Electrical Power
Application(s): Power Generation
Engine Make / Model: 30 kW: John Deere 40457F151, 4 cycle, 4 cylinder, 3.9 L
60 kW: John Deere 6068TF151, 4 cycle, 6 cylinder, 5.9 L
Equipment Make / Model: L-3 Westwood / Cherokee Nation Generator

<table>
<thead>
<tr>
<th>MEP Part Number</th>
<th>NSN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>806B</td>
<td>6115-01-462-0291</td>
<td>60 kW; 50/60 Hz</td>
</tr>
<tr>
<td>816B</td>
<td>6115-01-462-0292</td>
<td>60 kW; 400 Hz</td>
</tr>
<tr>
<td>805B</td>
<td>6115-01-461-9335</td>
<td>30 kW; 50/60 Hz</td>
</tr>
<tr>
<td>815B</td>
<td>6115-01-462-0290</td>
<td>30 kW; 400 Hz</td>
</tr>
</tbody>
</table>

Fuel System Type & Make / Model: Diesel, Engine Mounted Pump, JP-8
Operating Speed(s): 400 Hz – 2000 RPM
50/60 Hz – 1800 RPM
Battery Voltage: 24 V DC Input
Installed Products:
- Speed Controller
- Actuator, D-Series
- Voltage Regulator (50/60 Hz)
- Voltage Regulator (400 Hz)
- Load Sharing (50/60 Hz)
- Load Sharing (400 Hz)
- I/O Interface (50/60 Hz)
- Main Backplane Interconnect
- I/O Interface (400 Hz)
- Power Supply
- Magnetic Speed Pickup
- Cable Harness
Summary: The 60 kW is called MEP 806B for 50/60 Hz applications and MEP 816B for 400 Hz applications. The 30 kW model is called MEP 805B for 50/60 Hz applications and MEP 815B for 400 Hz applications. Skid and trailer mount configurations are available.

30 kW 50/60 Hz: The 30kW TQG Generator Set, MEP-805B, is a fully enclosed, self-contained, skid-mounted, portable unit. It is equipped with controls, instruments, and accessories necessary for operation as a single unit or in parallel with another unit of the same class and mode. The generator set includes a diesel engine, brushless generator, cooling system, excitation system, governing system, fuel system, 24 VDC starting system, DCS, and fault system. The generator set is designed to be used with any piece of equipment requiring a medium source of AC power and operates in a “Hot and Basic” climatic condition range of -25°F to +120°F. This generator set is mobile and requires forklift support.

30 kW 400 Hz: The 30kW TQG Generator Set, MEP-815B, is a fully enclosed, self-contained, skid-mounted, portable unit. It is equipped with controls, instruments, and accessories necessary for operation as a single unit or in parallel with another unit of the same class and mode. The generator set includes a diesel engine, brushless generator, cooling system, excitation system, governing system, fuel system, and 24 V DC starting system, DCS, and fault system. The generator set is designed to be used with any piece of equipment requiring a medium source of AC power and operates in a “Hot and Basic” climatic condition range of -25°F to +120°F. This generator set is mobile and requires forklift support.

60 kW 50/60 Hz: The 60kW TQG Generator Set, MEP-806B, is a fully enclosed, self-contained, skid-mounted, portable unit. It is equipped with controls, instruments, and accessories necessary for operation as a single unit or in parallel with another unit of the same class and mode. The generator set includes a diesel engine, brushless generator, cooling system, excitation system, governing system, fuel system, 24 VDC starting system, DCS, and fault system. The generator set is designed to be used with any piece of equipment requiring a medium source of AC power and operates in a “Hot and Basic” climatic condition range of -25°F to +120°F. This generator set is mobile and requires forklift support.

60 kW 400 Hz: The 60kW TQG Generator Set, MEP-816B, is a fully enclosed, self-contained, skid-mounted, portable unit. It is equipped with controls, instruments, and accessories necessary for operation as a single unit or in parallel with another unit of the same class and mode. The generator set includes a diesel engine, brushless generator, cooling system, excitation system, governing system, fuel system, 24 V DCDC starting system, DCS, and fault system. The generator set is designed to be used with any piece of equipment requiring a medium source of AC power and operates in a “Hot and Basic” climatic condition range of -25°F to +120°F. This generator set is mobile and requires forklift support.
GAC PRODUCTS IN GENERATOR CONTROL CABINET

LSS100 (LSS400)
Load Sharing
Synchronizing Unit
50/60Hz (400Hz)

ESD5551
Speed Control
Unit

TCM102
Backplane

AVR100 (or 400)
Auto Voltage
Regulator

TCM100 (or 400)
I/O Module

PCI102
5 Volt DC
Power Supply

END PRODUCT
30 KW, 50/60 HZ GENERATOR EXAMPLE

30 KW, 400 HZ GENERATOR EXAMPLE
## 60 KW, 50/60 HZ GENERATOR EXAMPLE

![Generator Image](image)

## 30 KW 50/60 HZ SPECS

<table>
<thead>
<tr>
<th>Technical Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generator Set</strong></td>
<td></td>
</tr>
<tr>
<td>Manufacturer:</td>
<td>MEP-II</td>
</tr>
<tr>
<td>Model:</td>
<td>MEP-805B</td>
</tr>
<tr>
<td>Voltage (Volts):</td>
<td>120/208/240/416</td>
</tr>
<tr>
<td>Frequency (Hz):</td>
<td>50/60</td>
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<tr>
<td>Speed (RPM):</td>
<td>1800</td>
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<tr>
<td>Phase:</td>
<td>3</td>
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<tr>
<td><strong>Fuel</strong></td>
<td></td>
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<tr>
<td>Fuel Capacity (Gal):</td>
<td>23</td>
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<tr>
<td>Fuel Consumption (GPH):</td>
<td>2.60</td>
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<tr>
<td>Fuel Requirement:</td>
<td>Diesel/JP-8</td>
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<tr>
<td><strong>Dimensions</strong></td>
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<tr>
<td>Length (in):</td>
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<td>Width (in):</td>
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<td>Height (in):</td>
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<td>Weight (lbs):</td>
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<tr>
<td>Dry:</td>
<td>2732</td>
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<tr>
<td>Wet (coolant &amp; POLs):</td>
<td>2931</td>
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<tr>
<td>Volume (ft³):</td>
<td>90.56</td>
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<tr>
<td><strong>Aural Signature</strong></td>
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<tr>
<td>Audio Rating:</td>
<td>70dBA @ 7 meters</td>
</tr>
<tr>
<td><strong>Replaced Items</strong></td>
<td>MEP-005A, MEP-805A</td>
</tr>
<tr>
<td><strong>Transportability</strong></td>
<td>All variants of the USMC M353 trailer</td>
</tr>
</tbody>
</table>
### 30 KW 400 HZ SPECS

#### Technical Description

<table>
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<tr>
<td>Manufacturer:</td>
<td>MEP-815B</td>
</tr>
<tr>
<td>Model:</td>
<td>MCII</td>
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<tr>
<td>Frequency (Hz):</td>
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<tr>
<td>Speed (RPM):</td>
<td>2000</td>
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<tr>
<td>Phase:</td>
<td>3</td>
</tr>
<tr>
<td><strong>Engine</strong></td>
<td><strong>Dimensions</strong></td>
</tr>
<tr>
<td>Manufacturer:</td>
<td>John Deere</td>
</tr>
<tr>
<td>Model:</td>
<td>4045TF151</td>
</tr>
<tr>
<td>Type:</td>
<td>4 Cycle</td>
</tr>
<tr>
<td>Cylinders:</td>
<td>4</td>
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<tr>
<td>Displacement:</td>
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<tr>
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<tr>
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</tbody>
</table>

**Replaced Items**

MEP-114A, MEP-815A.

**Transportability**

All variants of the USMC M353 trailer.

---

### 60 KW 50/60 HZ SPECS

#### Technical Description

<table>
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<th>Fuel</th>
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<tr>
<td><strong>Engine</strong></td>
<td><strong>Dimensions</strong></td>
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<td>Model:</td>
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**Replaced Items**

MEP-006A, MEP-806A.

**Transportability**

All variants of the USMC M353 trailer.
## 60 KW 400 HZ SPECS

<table>
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<th>Technical Description</th>
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<td><strong>Fuel</strong></td>
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<td>Manufacturer:</td>
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<td>Model:</td>
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<td>Type:</td>
<td>4 Cycle</td>
</tr>
<tr>
<td>Cylinders:</td>
<td>6</td>
</tr>
<tr>
<td>Displacement:</td>
<td>359 in³ (5.9L)</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td></td>
</tr>
<tr>
<td>Length (in):</td>
<td>87</td>
</tr>
<tr>
<td>Width (in):</td>
<td>35.7</td>
</tr>
<tr>
<td>Height (in):</td>
<td>69</td>
</tr>
<tr>
<td>Weight (lbs):</td>
<td>3603</td>
</tr>
<tr>
<td>Dry:</td>
<td></td>
</tr>
<tr>
<td>Wet (coolant &amp; POLs):</td>
<td>4042</td>
</tr>
<tr>
<td>Volume (ft³):</td>
<td>103</td>
</tr>
<tr>
<td><strong>Aural Signature</strong></td>
<td></td>
</tr>
<tr>
<td>Audio Rating:</td>
<td>72dBA @ 7 meters</td>
</tr>
<tr>
<td><strong>Replaced Items</strong></td>
<td>MEP-115A, MEP-816A</td>
</tr>
<tr>
<td><strong>Transportability</strong></td>
<td>All variants of the USMC M353 trailer</td>
</tr>
</tbody>
</table>
**MITSUBISHI**

The following engine application solutions are described in this section. Links to details on the products are located in this table. Links to details of many of the installation steps described are in the corresponding application note.

Mitsubishi part numbers that cross reference to GAC part numbers are referenced in the [MITSUBISHI cross-reference table](#) at the end of this guide.

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>L3E-V363JGH</td>
<td></td>
<td>EDG6000</td>
<td></td>
<td>EAM208</td>
</tr>
<tr>
<td>S4L2</td>
<td>ALR190-M04-12</td>
<td>SDG514-02-02</td>
<td>MSP6738</td>
<td></td>
</tr>
</tbody>
</table>
GAC APPLICATION NOTE

L3E ENGINE

Application(s): Power Generation
Engine Make / Model: Mitsubishi L3E-V363JGH
Fuel System Type & Make / Model: Diesel
Operating Speed(s): Variable Range from 1200-3000 RPM
Battery Voltage: 12 or 24 V DC
Installed or Recommended Products:
- Speed Controller: EDG6000
- Interface Module: EAM208

Summary: The EAM208 accessory module provides an output proportional to power based on the current input from the variable speed DC generator. The EDG6000 is a digital Speed Controller designed for industrial engine applications from generator sets, and mechanical drives, to pumps or compressors.

EXAMPLE: VARIABLE SPEED DC GENERATOR SCHEMATIC

EDG6000 Digital Speed
EAM208 Interface
Battery Pack
Load
Generator
48VDC
AUX
Speed Sensor
Variable Speed Input
Pre-Heat Fuel
Engine Temp.
Oil Pressure
Engine
Magnetic Pick-Up
Max / Min
Fuel
Fuel
Pre-Heat
Actuator
Magnetic Pick-Up
Engine
Generator
48VDC
Battery Pack
Load
GAC APPLICATION NOTE

S4L2 POWERING MILLER WELDER

Customer / OEM: Miller Electric Manufacturing Company
Application(s): Diesel Welder
Engine Make / Model: Mitsubishi S4L2, 1.8L, 4-cylinder In-line, Water-cooled
Equipment Make / Model: Miller Big Blue Series
Fuel System Type & Make / Model: Diesel, Bosch-type inline
Operating Speed(s): 1800 RPM
Battery Voltage: 12 V DC
Installed Products:
- Actuator: ALR190-M05-12
- Speed Controller: SDG514-02-02
- Magnetic Speed Pickup: MSP6738

Summary: The SDG514-02-02 digital speed control is used with the ALR190-M05-12 integrated linear actuator mounted on a Mitsubishi S4L2 engine with Bosch-type pump along with an MSP6738 for speed reference. These are used in a series of compact diesel welders to precisely control engine speed in all load conditions. The ALR190-M05-12 (reverse acting, pull actuator) connects directly to the fuel pump in place of the stop solenoid for seamless integration and incredible transient response. The SDG514-02-02 is a powerful, compact, and tamper-proof Speed Controller with a customer-specific calibration so that every engine off the line performs the same. These generators are used by construction contractors, independent rig owners and fleet managers.

COMPLETED WELDER
ALR CLOSE-UP VIEW

SDG INSTALLED
MITSUBISHI HEAVY INDUSTRY

The following engine application solutions are described in this section. Links to details on the products are located in this table. Links to details of many of the installation steps described are in the corresponding application note.

Mitsubishi part numbers that cross reference to GAC part numbers are referenced in the MITSUBISHI cross-reference table at the end of this guide.

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MHI S6R2 Series</td>
<td>ADC225S-24</td>
<td>ESD5500E</td>
<td>MSP6728C</td>
<td>KT193</td>
</tr>
<tr>
<td>S4S &amp; S6S</td>
<td>ADD225S-12/24</td>
<td>ESD5111</td>
<td>MSP6722C</td>
<td>KT175-AR</td>
</tr>
<tr>
<td></td>
<td>ACD175A</td>
<td>ESD5221</td>
<td>MSP6728C</td>
<td>KT175-RS-R</td>
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<tr>
<td></td>
<td>ADD175A-12/24</td>
<td>ESD5550</td>
<td></td>
<td>KT289</td>
</tr>
<tr>
<td>S4S Injection Pump</td>
<td>ADD175A</td>
<td>ESD5221</td>
<td></td>
<td>KT175-RS-R</td>
</tr>
<tr>
<td></td>
<td>ACD175A</td>
<td></td>
<td></td>
<td>KT289</td>
</tr>
<tr>
<td>S12A2, S12R &amp; S16R</td>
<td>ACB2001</td>
<td>ESD5330</td>
<td>MSP6728C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ESD5340</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L Series &amp; K Series</td>
<td>ADD225S-12/24</td>
<td>ESD2210-12/24</td>
<td>MSP6728C</td>
<td></td>
</tr>
<tr>
<td>S6A3, S6B3, S6R</td>
<td>ADD225S-12/24</td>
<td>ESD5500E</td>
<td>MSP6728C</td>
<td></td>
</tr>
</tbody>
</table>
GAC APPLICATION NOTE

MHI S6R2 (VOLVO D30) ENGINES

Customer / OEM: Volvo Penta
Application(s): Marine Propulsion / Generator Drive
Engine Make / Model: Mitsubishi S6R2, 24.5L In-Line 6 Cylinder Power Ratings Range from 480 to 759 kW at 1500 RPM
Fuel System Type & Make / Model: Diesel, In-line
Operating Speed(s): 1500 / 1800 RPM and Variable Speed
Battery Voltage: 24 V DC
Installed or Recommended Products:
- Actuator: ADC225S-24 (Volvo Part Number 3838271)
- Speed Controller: ESD5500E (Volvo Part Number 3817999)
- Magnetic Speed Sensor: MSP6827C

Summary: The MHI S6R2 engine series fit with a GAC electronic governor systems for superior speed control serves in gen-sets and marine propulsion applications.

VOLVO D30 (MHI S6R2) ENGINE WITH GAC GOVERNOR SYSTEM ON PS6-48 270 PUMP

ADD225S-24 Actuator
VOLVO D30 (MHI S6R2) ENGINE WITH GAC GOVERNOR SYSTEM ON PS6-48 270 PUMP

GAC GOVERNOR SYSTEMS ON VOLVO-MHI ENGINES FOR RETROFIT APPLICATIONS

<table>
<thead>
<tr>
<th>ENGINE</th>
<th>ACTUATOR</th>
<th>SPEED CONTROLLER</th>
<th>MSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>D25A</td>
<td>ADD225S-24</td>
<td>ESD5500E</td>
<td>MSP6728C</td>
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<tr>
<td>D30A</td>
<td>ADD225S-24</td>
<td>ESD5500E</td>
<td>MSP6728C</td>
</tr>
<tr>
<td>D34A</td>
<td>ACB2001</td>
<td>ESD5330</td>
<td>MSP6728C</td>
</tr>
<tr>
<td>D49A</td>
<td>ACB2001</td>
<td>ESD5330</td>
<td>MSP6728C</td>
</tr>
<tr>
<td>D65A</td>
<td>ACB2001</td>
<td>ESD5330</td>
<td>MSP6728C</td>
</tr>
</tbody>
</table>
GAC APPLICATION NOTE

S4S and S6S MHI ENGINES

Customer / OEM: Mitsubishi Heavy Ind.
Application(s): 50 Hz Gen. Set 42 HP at 1500 RPM
Engine Make / Model: S4S 4 cyl. 3.31L and S6S
Fuel System Type & Make / Model: Diesel, Zexel Inline Injection Pump
Operating Speed(s): 1500 / 1800 RPM
Battery Voltage: 12 or 24 V DC
Installed or Recommended Products:
• Actuator: ADD225, ACD175A, or ADD175A-12/24
• Speed Controller: ESD5111, ESD5221 or ESD5550
• Magnetic Speed Pickup: MSP6722C or MSP6728C
• Mounting Kit; KT175-RS-R, or KT289 (included with actuator)

S4S ENGINE
MHI S4S INJECTION PUMP INSTALLATION

Customer / OEM: Mitsubishi Heavy Ind.
Application(s): 50 Hz Gen. Set 42 HP at 1500 RPM
Engine Make / Model: S4S 4 cyl. 3.31L
Fuel System Type & Make / Model: Zexel In-Line Injection Pump
Operating Speed(s): 1500 / 1800 RPM
Battery Voltage:

Installed or Recommended Products:
- Actuator: ADD175A or ACD175A
- Mounting Kits: KT175-RS-R and KT289

Summary: Pump replacement.

MOUNTING KIT KT175-RS-R

Connect the link rack to the fuel rack. The gasket and adaptor plate are then screwed into the mechanical governor housing.

INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE
GAC APPLICATION NOTE

S12A2, S12R, and S16R MHI ENGINES

Customer / OEM: Mitsubishi Heavy Ind.
Application(s): Gen-Set, Industrial and Marine
Engine Make / Model / Displacement / Rating: S12R 2992 in³ / 49L V12
S16R 3989 in³ / 65.37L V16
Equipment Make / Model:
Fuel System Type & Make / Model: Diesel, In-Line
Operating Speed(s): 1500 RPM, 1800 RPM, 2200 RPM Over-speed
Battery Voltage: 24 V DC
Installed or Recommended Products: • Actuator: ACB2001
• Speed Controller: ESD5340
• Magnetic Speed Pickup: MSP6728C

Summary: The ESD5340 Speed Controller offers superior full fuel control from rated operating speed to low idle due to its unique combination of features like dual gain adjustment, one for idle and one for operating speed, with independently adjustable acceleration and deceleration speed ramping controls. The ESD5340 also includes:
• A Two Element Speed Switch
• Dual Speed Ramping from Idle to Operating Speed, with Acceleration and Deceleration Adjustments
• Wide Range Speed Control Compatible
• Start Fuel Control for Lower Exhaust Emissions
• Enhanced Start Circuit for Large Bore Engines
• Variable Speed Governing
• Accessory Inputs for Load Sharing
• High Current Controlled Output, Designed for the ACB2001
• Dual Gain, One at Idle & One at Operating Speed
• Adjustable Chop Frequency for Added Stability

ESD5340

ACB2001 ACTUATOR

SPEED SENSOR
ACB2001 ACTUATOR ON MHI S12R V12 ENGINE (VOLVO PENTA D49)

ACB2001 ACTUATOR ON MHI S12A2 V12 ENGINE (VOLVO PENTA D34)
MHI - S12R: 2,992 CUBIC INCH / 49L DISPLACEMENT V12

MHI S16R-PTA; 3,989 CUBIC INCH / 65.37L DISPLACEMENT V16
GAC APPLICATION NOTE

L-SERIES and K-SERIES ENGINES

Customer / OEM: Mitsubishi Heavy Ind.
Application(s): Various
Engine Make / Model: L-Series and K-Series
Equipment Make / Model: Diesel
Fuel System Type: Diesel
Operating Speed(s): 5.4 to 20.4 HP, 1500 – 3600 RPM, L- Series
Battery Voltage: 12 or 24 V DC
Installed or Recommended Products:
  • Actuator: ADD225S-12/24
  • Speed Controller: ESD2210-12/24
  • Magnetic Speed Pickup: MSP6728C

MITSUBISHI L AND K SERIES ENGINES
GAC APPLICATION NOTE

S6A3, S6B3, and S6R MHI ENGINES

Customer / OEM: Mitsubishi Heavy Ind.
Application(s): Various
Engine Make / Model: S6A3, S6B3, and S6R
Fuel System Type & Make / Model: Diesel
Operating Speed(s):
- 583 HP @ 1960 RPM, S6A3
- 429 HP @ 2000 RPM, S6B3
- 835 HP prime power @ 1800 RPM, S6R
Battery Voltage: 24 V DC
Installed and Recommended Products:
- Actuator: ADD225S-24
- Speed Controller: ESD5500E
- Magnetic Speed Pickup: MSP6728C

S6A3, S6B3, AND S6R ENGINES
MTU

The following engine application solutions are described in this section. Links to details on the products are located in this table. Links to details of many of the installation steps described are in the corresponding application note.

MTU part numbers that cross reference to GAC part numbers are referenced in the MTU cross-reference table at the end of this guide:

<table>
<thead>
<tr>
<th>MTU ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>183 Locomotive</td>
<td>ACB275C</td>
<td>RSC671</td>
<td></td>
<td>LCC109B</td>
</tr>
<tr>
<td>447 &amp; 440 HP</td>
<td>ADC225S-24</td>
<td>ESD5221, ESD5550, LSM201</td>
<td>MSP677</td>
<td>KT276, KT275, PCA157, PCA155, PCA162, PCA156, MRM100, KT6731</td>
</tr>
<tr>
<td>183 Generator Marine</td>
<td>ACE275H</td>
<td>EGS104B, SYC6714</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
GAC APPLICATION NOTE

MTU 183 DIESEL-ELECTRIC LOCOMOTIVE

Customer / OEM: Zermatt-Bahn Cog Railway
Application(s): Locomotive
Engine Make / Model: MTU 183, V-12, 21.93 L
Fuel System Type & Make / Model: Diesel, Inline Pump
Operating Speed(s): Variable
Battery Voltage: 24 V DC
Installed Products:
- Actuator: ACB275H
- Speed Switch: SSW675
- Accessories: LCC109B

LOCOMOTIVE
ACB275H

LCC109B AND SSW675
GAC ELECTRONIC GOVERNOR SOLUTIONS FOR MTU ENGINES
MTU 183 SERIES ENGINES WITH INTEGRAL ACTUATOR

1. Actuator
   ACB275 C

2. Speed Controller
   ESD5221
   ESD5330
   ESD5550

3. Magnetic
   Speed Sensor
   MSP677
   Mating Connector
   EC1100

MTU 396 SERIES ENGINES WITH EXTERNAL ACTUATOR

1. Actuator
   ACB2001

2. Speed Controller
   ESD5330

3. Magnetic
   Speed Sensor
   MSP677
   Mating Connector
   EC1100
GAC APPLICATION NOTE

MTU 447 WOOD CHIPPER

Customer / OEM: LiPPEL: Brazil
Application(s): Wood Chipper
Engine Make / Model: MTU 447, 440HP
Equipment Make / Model: Forestry Drum Wood Chipper PTML 350/550 x 800
Fuel System Type & Make / Model: Diesel, Bosch Inline Fuel Pump
Operating Speed(s): 1800 RPM
Battery Voltage: 24 V DC
Installed Products:
• Actuator: ADC225S-24
• Speed Controller: EDG5500

COMPLETE WOOD CHIPPER
EDG5500

ADC225S-24, FUEL PUMP SIDE VIEW
GAC APPLICATION NOTE

MTU 183 MARINE PROPULSION / GENERATOR DRIVE

Customer / OEM: SES Yacht
Application(s): Marine
Engine Make: 2 MTU 183, 150KW each, Diesel
Battery Voltage: 24 V DC
Installed Products:
- Speed Controller: EGS104B
- Supporting Modules: 2 LSM201 load share modules
- Supporting Modules: 2 SYC6714 synchronizers
- Actuator: ACE275H

Summary: The EGS104B speed controller uses the actuators and synchronizers on each engine to share information and provide a smooth transition between the engines.
<table>
<thead>
<tr>
<th>NOELL ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 CYL.</td>
<td>ACD175</td>
<td>ESD5550</td>
<td>RSC671</td>
<td></td>
</tr>
</tbody>
</table>
**GAC APPLICATION NOTE**

**6 CYLINDER CRANE**

**Customer / OEM:** NOELL Crane Systems

**Application(s):** Crane

**Engine Make / Model:** 6 Cylinder Scania

**Equipment Make / Model:** Container Crane

**Fuel System Type & Make / Model:** Diesel, Bosch Inline Pump

**Operating Speed(s):** 12 or 24 V DC

**Battery Voltage:**

- Actuator: ACD175-12/24
- Speed Controller: ESD5550
- Speed Ramping Module: RSC671

**CONTAINER CRANE**
GAC CONTROLS

ACTUATOR on PUMP

ESD5550

RSC671

ACD175-12/24
PERKINS

The following engine application solutions are described in this section. Links to details on the products are located in this table. Links to details of many of the installation steps described are in the corresponding application note.

<table>
<thead>
<tr>
<th>PERKINS ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
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<tbody>
<tr>
<td>3.1524</td>
<td>ADC100</td>
<td>ESD2244, ESD5120</td>
<td>MSP6728C</td>
<td>EC1350</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ESD5522E, ESD5570</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.236</td>
<td>ADC100, ADD120S</td>
<td>ESD2244, ESD5120</td>
<td>MSP6728C</td>
<td>KT190, EC1350</td>
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<td></td>
<td>ESD5522E, ESD5570</td>
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<td></td>
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<td>403D</td>
<td>ALR190</td>
<td>EEG6500</td>
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<td>1004-4</td>
<td>ADC100</td>
<td>ESD2244, ESD5120</td>
<td>MSP6723C, MSP6728C</td>
<td>EC1350</td>
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<td></td>
<td></td>
<td>ESD5522E, ESD5570</td>
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<td>1006-6</td>
<td>ADC100</td>
<td>ESD2244, ESD5120</td>
<td>MSP6723C, MSP6728C</td>
<td>KT190, EC1350</td>
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<tr>
<td></td>
<td></td>
<td>ESD5522E, ESD5570</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300 SERIES</td>
<td></td>
<td>EAM115</td>
<td></td>
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</tr>
<tr>
<td>1306 (TAG)</td>
<td>ACD175A</td>
<td>MSP6724</td>
<td>KT275</td>
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<tr>
<td>2006</td>
<td>ACE275HD-24</td>
<td>MSP6728C</td>
<td>KT275</td>
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<td>2800 SERIES</td>
<td></td>
<td>EAM113</td>
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<td>3008 (TA)</td>
<td>ACE275HD-24</td>
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<td>KT275</td>
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<td></td>
<td>ACD175A</td>
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<td>3012 SERIES</td>
<td>ADD2255</td>
<td>MSP6728C</td>
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<tr>
<td>4006, 4008 &amp; 4016</td>
<td>ATB552T2N2-24</td>
<td>AFR210</td>
<td>RPR102, MXSB44-STM</td>
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<td>ATB652T2N2-24</td>
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<td>ICM200-6/8</td>
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<td>ATB753T3N14-24</td>
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<td>STE101, SOX103</td>
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<td>CL600, GR104, SPW100</td>
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<tr>
<td>4006 TAG2 ENGINE</td>
<td>ACB2001</td>
<td>ESD5330, ESD5340</td>
<td>SCI101</td>
<td></td>
</tr>
<tr>
<td>Vista A</td>
<td>ADD103B-12/24</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
GAC APPLICATION GUIDE

3.1524 ENGINE with STANADYNE

Customer / OEM: Perkins
Application(s): Various
Engine Make / Model: 3.1524 (T) with Stanadyne 3 cylinder, 2.5 liter
Fuel System Type & Make / Model: Diesel, Stanadyne Rotary Pump
Operating Speed(s): 1500 / 1800 RPM
Battery Voltage: 12 or 24 V DC
Installed or Recommended Products:
• Actuator: ADC100
• Speed Controllers: ESD2244, ESD5120, ESD5522E, or ESD5570
• Magnetic Speed Pickup: MSP6728C and EC1350
Summary: Mounted directly on the rotary pump

PERKINS 3.1524 ENGINE WITH STANADYNE ROTARY PUMP

1- PERKINS 3.1524 ENGINE RATINGS

<table>
<thead>
<tr>
<th>Engine Speed rev/min</th>
<th>Type of Operation</th>
<th>Typical Generator Output (kVA)</th>
<th>Engine Power</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>kVA  kWe</td>
<td>kWm  Gross bhp kWm  Net bhp</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1500</td>
<td>Prime power</td>
<td>27.5  22.0</td>
<td>25.0  33.5  24.5  33.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standby power</td>
<td>30.0  24.0</td>
<td>27.5  37.0  27.0  36.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>Prime power</td>
<td>30.5  24.5</td>
<td>28.0  37.5  27.5  37.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standby power</td>
<td>34.0  27.0</td>
<td>31.0  42.0  30.5  41.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
GAC APPLICATION NOTE

4.236 ENGINE with STANADYNE CAV

Customer / OEM: Perkins
Application(s): Various
Engine Make / Model: 4.236 (T) with Stanadyne CAV
Fuel System Type & Make / Model: Diesel, Stanadyne Rotary Pump
Operating Speed(s): 84 HP @ 2800 RPM
Battery Voltage: 12, 24 or 32 V DC
Installed or Recommended Products:
- Actuator: ADC100 or ADD120S
- Speed Controllers: ESD2244, ESD5120, ESD5522E, or ESD5570
- Magnetic Speed Pickup: MSP6728C and EC1350
- Mounting Kit: KT190

PERKINS 4.236 ENGINE

GAC ACTUATOR ON STANADYNE ROTARY PUMP
GAC APPLICATION NOTE

1004 ENGINE with STANADYNE ROTARY PUMP

Customer / OEM: Perkins
Application(s): Various
Engine Make / Model: 1004-4 (TW) with Stanadyne
Fuel System Type & Make / Model: Diesel, Stanadyne Rotary Pump
Operating Speed(s): 85.5 BHP @ 2600 RPM
Battery Voltage: 12 or 24 V DC
Installed or Recommended Products:
- Actuator: ADC100
- Speed Controller: ESD2244, ESD5120, ESD5522E, or ESD5570
- Magnetic Speed Pickup: MSP6728C, EC1350, or MSP6723C with M16x1.5 thread

Summary: Mounted directly on pump

PERKINS 1004-4 ENGINE WITH STANADYNE ROTARY PUMP AND ADC100 ACTUATOR
GAC APPLICATION NOTE (all of the components specified are sold separately)

CATERPILLAR C1.7 and PERKINS 403D ENGINES

Customer / OEM: Perkins / Caterpillar
Application(s): Industrial Diesel Engines
Engine Make / Model:
- 403D-07 / 3 cyl / .76L / 9-15.3 kW / 2800-3600 rpm
- 403D-15 / 18.4-25.1 kW / 2200-3000 rpm
- 403D-15T / 23.1-30 kW / 2200-3000 rpm
- CAT C1.7 / 23.6 & 26.1 kW / 2400-2600 rpm
Fuel System Type & Make / Model: Diesel
Operating Speed(s): 2200 to 3600 RPM
Battery Voltage: 12/24 VDC
Installed Products:
- Actuator: ALR190-P403-12/24
- Speed Controls: EEG6500 (digital), ESD5111 or ESD5500E (analog)

Summary: ALR actuator easily replaces the Electronic Fuel Stop Solenoid in the Perkins and Caterpillar engines.

BEFORE AND AFTER INSTALLATION OF THE ALR190-P403-12/24 ACTUATOR
GAC APPLICATION NOTE

1006 ENGINE with STANADYNE CAV

Customer / OEM: Perkins
Application(s): Various
Engine Make / Model: 1006-6 (TW) with Stanadyne CAV 6 cylinder in-line
Fuel System Type & Make / Model: Diesel, Stanadyne Rotary Pump
Operating Speed(s): 182.5 BHP @ 2600 RPM
Battery Voltage: 12, 24, or 32 V DC
Installed or Recommended Products:
- Actuator: ADC100 or ADD120S
- Speed Controllers: ESD2244, ESD5120, ESD5522E, or ESD5570
- Magnetic Speed Pickup: MSP6728C, EC1350, or MSP6723C with M16x1.5 thread
- Mounting Kit: KT190

Summary: Mounted directly on pump

PERKINS 1006-6 ENGINE AND STANADYNE PUMP WITH ADC100 ACTUATOR

ENGINE RATINGS

<table>
<thead>
<tr>
<th>Performance Data</th>
<th>Gross Intermittent*</th>
<th>Speed rev/min</th>
<th>Net Intermittent</th>
<th>Speed rev/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Output (kW)</td>
<td>119</td>
<td>2600</td>
<td>107</td>
<td>2600</td>
</tr>
<tr>
<td>Power Output (bhp)</td>
<td>159</td>
<td>2600</td>
<td>143.5</td>
<td>2600</td>
</tr>
<tr>
<td>Peak Torque (Nm)</td>
<td>577</td>
<td>1600</td>
<td>516</td>
<td>1600</td>
</tr>
<tr>
<td>Peak Torque (lbf ft)</td>
<td>425</td>
<td>1600</td>
<td>380</td>
<td>1600</td>
</tr>
</tbody>
</table>

Power output for a run-in engine after 60 hours,
*Rating Standard ISO (TR) 14396
**1300 SERIES with INTERFACE MODULE**

**Customer / OEM:** Perkins  
**Application(s):** Engine Control System  
**Engine Make / Model:** 1300 series  
**Fuel System Type & Make / Model:**  
**Operating Speed(s):** 174-350 BHP  
**Battery Voltage:** 12 or 24 V  
**Recommended Products:** • Interface Module: EAM115  

**Summary:**  
The EAM115 is an interface module that provides conditioned electrical signals for Perkins 1300 Series engine/genset applications (Edi 6e gen set). A typical application is where a GAC load sharing/synchronization system is to be connected to such a Perkins engine control system.

The DC supply for the interface comes from the common battery source for the engine control and the accessory controls. The input to the module (Terminal D) is typically 5.0 V DC, which represents the load sharing, and synchronization signals. The output of the EAM115 to the Perkins control is a 2.5 V DC signal based on the Perkins 5.0 V DC reference signal.

**PERKINS 1300 SERIES ENGINE**  

**EAM115 INTERFACE MODULE**
1306 ENGINE with BOSCH “P” PUMP

Customer / OEM: Perkins
Application(s): Gen. Set
Engine Make / Model: 1306 (TAG)
Fuel System Type & Make / Model: Diesel, Bosch “P” Inline Pump
Operating Speed(s):
- 246 kW, 330 HP @ 1500 RPM
- 261 kW, 350 HP @ 1800 RPM
Battery Voltage: 12 or 24 V DC
Installed or Recommended Products:
- Actuator: ACD175A
- Magnetic Speed Pickup: MSP6724 with ¼-16 UNF
- Mounting Kit: KT275

PERKINS 1306 ENGINE

MSP6724

1300 Series EDi Gen Set Power

<table>
<thead>
<tr>
<th>Engine</th>
<th>@1500 rev/min</th>
<th>@1800 rev/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>1306-E87T</td>
<td>149.0 (200)</td>
<td>171.5 (230)</td>
</tr>
<tr>
<td></td>
<td>160.0 (215)</td>
<td>-</td>
</tr>
<tr>
<td>1306-E87TA</td>
<td>186.5 (250)</td>
<td>201.5 (270)</td>
</tr>
<tr>
<td></td>
<td>205.0 (270)</td>
<td>227.5 (305)</td>
</tr>
<tr>
<td></td>
<td>223.0 (300)</td>
<td>242.5 (325)</td>
</tr>
<tr>
<td></td>
<td>231.0 (310)</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>246.0 (330)</td>
<td>261.0 (350)</td>
</tr>
</tbody>
</table>
GAC APPLICATION NOTE

2006 ENGINE with BOSCH “P” PUMP

Customer / OEM: Perkins
Application(s): Gen. Set
Engine Make / Model: 2006 (TA)
Fuel System Type & Make / Model: Diesel, Bosch “P” Inline Pump
Operating Speed(s): 364 kW @ 1500 RPM
Battery Voltage: 24 V DC
Recommended Products:
• Actuator: ACE275HD-24
• Magnetic Speed Pickup: MSP6728 with 5/8-18 UNF
• Mounting Kit: KT275

PERKINS 2006 ENGINE AND BOSCH “P” PUMP
GAC APPLICATION NOTE

2800 SERIES ENGINE

Customer / OEM: Perkins
Application(s): Engine Control System
Engine Make / Model: 2800 Series
Fuel System Type & Make / Model: Diesel
Operating Speed(s): 514-652 kW
Battery Voltage: 24 V DC
Recommended Products: • Interface Module: EAM113

Summary: The EAM113 interface module is designed to be used between the PERKINS 2800 series engine control and an external control such as a variable speed input or a Load sharing and Synchronizing system. The output of the EAM113 is a current sinking PWM signal that controls the PERKINS engine control.

The EAM113 has two inputs, a 4-20 mA input as well as a 5.0V DC input. The 4-20 mA input serves to provide a wide range of PWM for maximum changes at the PERKINS control. The 5.0 V DC input is a limited range PWM output around 50% duty cycle for trimming of the speed for such usages as GAC load sharing and synchronizing.

A single potentiometer adjustment allows the range of the input signal’s effect on the PERKINS control to be limited from maximum to minimum PWM duty cycle. The PWM frequency is fixed at 500 Hz. Supply voltage for the interface is the same 24 V DC battery that supplies the PERKINS system.

PERKINS 2800 SERIES ENGINE

EAM113 INTERFACE MODULE
GAC APPLICATION NOTE

3008 ENGINE with BOSCH “P” PUMP

Customer / OEM: Perkins
Application(s): Various
Engine Make / Model / Displacement / Rating: 3008 (TA) with Bosch “P”
Fuel System Type & Make / Model: Diesel, Bosch “P” Inline Pump
Operating Speed(s): 468 kW, 628 BHP @ 1500 RPM
Battery Voltage: 24 V DC
Recommended Products:
  • Actuator: ACE275HD-24 or ACD175A
  • Mounting Kit: KT275

PERKINS 3008 ENGINE AND BOSCH “P” PUMP

ENGINE RATINGS

<table>
<thead>
<tr>
<th>Engine Speed rev/min</th>
<th>Type of Operation</th>
<th>Typical Generator Output (Net)</th>
<th>Engine Power</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>kW</td>
<td>kWe</td>
</tr>
<tr>
<td>1500</td>
<td>Continuous Baseload</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Prime Power</td>
<td>500</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>Standby (Maximum)</td>
<td>550</td>
<td>440</td>
</tr>
<tr>
<td>1800</td>
<td>Continuous Baseload</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Prime Power</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Standby (Maximum)</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>
GAC APPLICATION NOTE

3012 SERIES ENGINES

Customer / OEM: Perkins
Application(s): Power Generation
Engine Make / Model: 3012 26.1L V-12
Fuel System Type & Make / Model: Diesel, CAV Maximec
Operating Speed(s): 550 kW, 738 BHP @ 1800 RPM
Battery Voltage: 24 V DC
Recommended Products:
• Actuator: ADD225S-24
• Magnetic Speed Sensor: MSP6728C

Summary: Engine with CAV Maximec fuel pump (to stop lever)

ACTUATOR AND INSTALLATION KIT
GAC APPLICATION NOTE

4000 SERIES METHANE POWER GENERATION

Customer / OEM: Mayphil – Gas Centre of Excellence for Perkins 4000 Series Engines
Application(s): Power Generation, mining
Engine Make / Model / Displacement / Rating:
Perkins 22.9L (1398 in³) 4006 in-line 6 cylinder series
Perkins 30.6L (1865 in³) 4008 in-line 8 cylinder series
Perkins 61.1L (3729 in³) 4016 V-16 cylinder series gas engines
Fuel System Type & Make / Model:
Air/Fuel mixer with zero pressure regulator and mixture adjustment
Actuator throttle body, Ignition system with individual cylinder
ignition coils, spark plugs and electronic engine Governor
Operating Speed(s):
1500 / 1800 RPM
384 kW @ 1200 RPM, 415 kW @ 1500 RPM, 4008 inline
912 kW @ 1500 RPM, 4016 V-16
Battery Voltage:
24 V DC
Recommended Products:
• Zero pressure gas regulator GAC RPR102
• Venturi mixer and fuel control valve assembly GAC MXSB44-STM
• Actuator throttle body GAC ATB552T2N2-24, ATB652T2N2-24 and
  ATB753T3N214-24
• Venturi mixer-control / engine speed controller GAC AFR210
• Oxygen Sensor GAC SOX103
• Exhaust gas temperature sensor GAC STE101
• Ignition Control Module GAC ICM200-6/8
• Ignition Coils GAC CL600
• Spark Plug Wires GAC SPW100
• Camshaft trigger wheel GAC GR104
• Camshaft sensor GAC SCI101
Summary:
From their UK headquarters in South Wales, Mayphil and their regional facilities have
been appointed Perkins 4000 Series Centre of Excellence for engines capable of operating
on a wide range of methane based gases: landfill gas, digester gas biogas and coal bed
mine gas.

MAYPHIL / PERKINS 4000 SERIES GAS ENGINES

4006 SERIES  4008 SERIES  4016 SERIES
GAC ESD5500 SERIES AND ACTUATOR THROTTLE BODY
On Mayphil / Perkins 4006 Engine prepared for shipment
**GAC APPLICATION NOTE**

**N844 4 CYLINDER ENGINE**

**Customer / OEM:** Private  
**Application(s):** Power Generation  
**Engine Make / Model:** N844  
**Fuel System Type & Make / Model:** Diesel  
**Battery Voltage:**  
**Recommended Products:**  
  - Actuator: **ALR160-S04**  
  - Speed Controller: **SDG725**  

**Summary:**  
The Puma Ocean Racing Team installed a Perkins N844 four cylinder engine to adjust the keel on one of their sailboats. GAC’s ALR160-S04 actuator and SDG725 Smart Digital Governor supports the application which required a fast, compact, flexible variable speed system that can be controlled from above or below deck. The ALR160 actuator replaced the shut off solenoid in the PF pump housing, acting directly on the fuel control rack.

**FINISHED INSTALLATION**
### DORMAN 6 SETCA 2 / PERKINS 4006 TAG2 ENGINE

<table>
<thead>
<tr>
<th>Customer / OEM:</th>
<th>Perkins / Dorman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application(s):</td>
<td>Industrial, Gen-set Engine</td>
</tr>
<tr>
<td>Engine Make / Model:</td>
<td>4006 TAG2 6 Cylinder 22.9L, 587 kW at 1500 RPM</td>
</tr>
<tr>
<td>Fuel System Type &amp; Make / Model:</td>
<td>Diesel</td>
</tr>
<tr>
<td>Operating Speed(s):</td>
<td>1500 RPM</td>
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<tr>
<td>Battery Voltage:</td>
<td>24 V DC</td>
</tr>
<tr>
<td>Installed or Recommended Products:</td>
<td></td>
</tr>
<tr>
<td>• Actuator: ACB2001</td>
<td></td>
</tr>
<tr>
<td>• Speed Controllers:</td>
<td>ESD5330 (Standard) or ESD5340 (Full Fuel at Start-up)</td>
</tr>
</tbody>
</table>

**Summary:** The Perkins Engine Company Limited acquired Dorman Diesels of Stafford; they incorporated the SE engines into the Perkins system as the 4000 Series.
GAC APPLICATION NOTE

VISTA A with DELPHI DPA

Customer / OEM: Perkins
Application(s): Various
Engine Make / Model: Vista A 1453
Fuel System Type & Make / Model: Diesel, Delphi DPG Pump
Operating Speed(s):
Battery Voltage: 12 or 24 V DC
Installed Products: • Actuator: ADD103B-12/24
Summary: 3230F570T Perkins Vista A 30 KVA Delphi DPA Fuel Pump
## SCANIA

<table>
<thead>
<tr>
<th>SCANIA ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>D9, D11, DSC 14 &amp; DSI 14</strong></td>
<td>ADC225S-24</td>
<td>ESD5131 ESD5500E</td>
<td>MSP675</td>
<td></td>
</tr>
<tr>
<td>Scania DSC 1000</td>
<td>ACE275K-24</td>
<td></td>
<td></td>
<td>DSC1004</td>
</tr>
<tr>
<td>Scania 12L</td>
<td>ATB652T2N1-24V</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Scania S6</td>
<td></td>
<td></td>
<td>EAM127</td>
<td></td>
</tr>
<tr>
<td>Sanfirden SGI-12-ST</td>
<td>ATB652T2N1-24</td>
<td>ESD5526E RSC671</td>
<td>MSP677</td>
<td>EC1100 CH1204-L3 CH1206-S PCI105 KT276 CH1203-B CH1206A-L6 CH1208-6 DSC1002 DSC1002C</td>
</tr>
</tbody>
</table>
GAC APPLICATION NOTE

DC13 072A ENGINES

Customer / OEM: Scania
Application(s): Generator
Engine Make / Model: DC13 072A
Equipment Make / Model: 6 Cylinder, 12.7L
Fuel System Type & Make / Model: Natural Gas
Operating Speed(s): 326-406 kW
Battery Voltage: 24 V DC
Installed Products:
• Actuator: ATB752T2N-24
• Speed Controller: AFR201
• MLXB75

Summary: Two Scania DC13 072A engines and GAC AFR solution supports three water pumps in a Brazilian town. The GAC ATB driven by an AFR keeps the engine running for this town. Running in a lean mixture the AFR allows for updates using the free GAC configuration software.

FINISHED ENGINE
GAC APPLICATION NOTE

D9, D11, DSC 14, and DSI 14 ENGINES

Customer / OEM: Scania
Application(s): Various
Engine Make / Model / Displacement / Rating: D9, D11, DSC 14, DSI 14
Fuel System Type & Make / Model: Diesel
Operating Speed(s): 700 RPM low idle, variable range from 700-2200 RPM
Battery Voltage: 24 V DC

Recommended Products:
- Actuator: ADC225S-24
- Speed Controllers: ESD5131 or ESD5500E
- Magnetic Speed Pickup: MSP675

SCANIA D9

1 Actuator
   ADC225S-24
2 Control Unit
   ESD5131 or
   ESD5500E
3 Speed Sensor
   MSP675
1 Actuator
ADC225S-24
2 Control Unit
ESD5131 or ESD5500E
3 Speed Sensor
MSP675

1 Actuator
ADC225S-24
2 Control Unit
ESD5131
3 Speed Sensor
MSP675
SCANIA DSI 14

1 Actuator
   ADC225S-24
2 Control Unit
   ESD5131
3 Speed Sensor
   MSP675
GAC APPLICATION NOTE

DSC1000 SERIES ENGINE CONTROL SYSTEM

Customer / OEM: Scania, Deutz, MWM, BEML…
Application(s): Marine, Power Generation, Off Road Mobile Equipment
Fuel System Type & Make / Model: Diesel, Bosch Inline P-Pump
Operating Speed(s): 800 RPM idle, variable range from 1000-2400 RPM
Battery Voltage: 24 V DC
Installed Products: Actuator: ACE275K-24
- Position Feedback Sensor
- Heavy Duty Bearings
- Manual Shut-Off
Speed Controller: DSC1004
- Cranking Fuel and Crank Termination Adjustments
- Speed Ramping
- Fully Programmable – GDS Software
- Fuel Mapping Based On RPM and Boost Pressure / Boost Limits
- Temperature Dependent Start Fuel
- Temperature dependent Torque Curve (De-Rated Temp. Control)
- Fault Codes / Fault Logging / MIL w/ Flash Codes
- Load Sharing / Synchronizer Input
- Droop or Isochronous Selection
- Oil, Air and Exhaust Temp. Measurement w/ Adjustable Thresholds

Summary: Marine Installation on water taxi.

THE MONMOUTH OUT OF WEEHAKEN, N.J.
DSC1004 CONTROLLER PANEL INSTALLATION

DSC1004 Controller

ACE275K ACTUATOR MOUNTED ON BOSCH “P” PUMP

ACE275K Actuator
GAC APPLICATION NOTE

12 LITER GAS ENGINE

Customer / OEM: Scania
Application(s): Various Gen Set
Engine Make / Model: 12L Gas Engine
Fuel System Type & Make / Model: Natural Gas
Operating Speed(s):
Battery Voltage: 24V
Recommended Products:
Actuator: ATB652T3N1-24

Summary:
SCANIA 12 liter gas engine with GAC electronic governor using an ATB652T3N1-24 V DC Integral electric throttle
GAC APPLICATION NOTE

SCANIA S6 ENGINE

Customer / OEM: Scania
Application(s): Engine Control
Engine Make / Model: S6
Operating Speed(s):
Battery Voltage: 24 V DC
Recommended Products:
  • Interface Module: EAM127

Summary: The EAM127 is an electronic interface module designed for use with the SCANIA S6 engine control system. The module accepts a nominal 5 VDC input signal and converts this signal to a 1.589 V DC analog signal for the S6 control across a galvanic isolated barrier. Typical usage is as a signal conditioner between a GAC auto-synchronizer / load sharing system and the S6 engine control. The power to operate the interface comes from the 24 V DC on the COO module.

EAM127 INTERFACE MODULE
SANFIRDEN BIO GAS ENGINE - SCANA SGI-12-ST

Customer / OEM: Sanfirden / Scania
Application(s): Gen-Set
Engine Make / Model: Scania 12L SGI-12-ST / 205 kW at 50 Hz and 220 kW at 60 Hz
Fuel System Type & Make / Model: LNG, CNG, LBG, Natural Gas. 45% to 60% Methane
Operating Speed(s): 1500 / 1800 RPM
Battery Voltage: 12 or 24 V DC

Installed or Recommended Products:
- Actuator: ATB T2 - 65mm Bore Diameter, High Temperature / Sealed with optional positions feedback sensor
- Speed Controller: ESD5526E
  - Anti-Wind-Up Circuit (for use with ATB gas applications)
  - Switchable Droop Control, Start Fuel Control
  - Speed Ramping, Soft Coupling, Over-speed Control Switch

Summary: See http://www.youtube.com/watch?v=sszuUNz5ltU for a live demonstration.
The following engine application solutions are described in this section. Links to details on the products are located in this table. Links to details of many of the installation steps described are in the corresponding application note.

Volvo part numbers that cross reference to GAC part numbers are referenced in the [VOLVO cross-reference table](#) at the end of this guide.

<table>
<thead>
<tr>
<th>VOLVO ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>D5A, D7A, TD 420, TAD 420, TAD 520, TAD 531, TAD 720 &amp; TAD 731</td>
<td>ADD180G-12/24</td>
<td>ESD5500E, ESD5111, ESD5500-II, ESD5550</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D25A &amp; D30A</td>
<td>ADD225S-24</td>
<td></td>
<td>MSP6728C</td>
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</tr>
<tr>
<td>D34A, D49A &amp; D65A</td>
<td>ACB2001</td>
<td>ESD5330</td>
<td>MSP6728C</td>
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<tr>
<td>TD610, TWD610, TD710, TWD710, TAD721, TAD730, TD740, TD741, TD1010, TAD1030, TAD1031, TAD1032, TWD1211, TAD1230, TAD1231 &amp; TAD1233</td>
<td>ACB275H-24, ACD175A-24</td>
<td>ESD5500E, MSP6728C, KT275, KT276</td>
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</tr>
<tr>
<td>TAD 520 &amp; TAD 720</td>
<td>ADD225S-24</td>
<td>ESD5500E</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
GAC APPLICATION NOTE

TD 420, TAD 420, TAD 520, TAD 531, TAD 720 AND TAD 731 ENGINES

Customer / OEM: Volvo / Deutz
Application(s): Marine Gen-set and Industrial Applications
Engine Make / Model: Volvo Industrial: 4.76L 4 Cylinder and 7.15L 6 Cylinder
TD 420, TAD 420, TAD 520, TAD 531, TAD 720 and TAD 731
Volvo Marine Gen-Set: D5A and D7A
Deutz: 1012, 1013 and 2012

Equipment Make / Model: Marine Gen-set and Industrial Applications
Fuel System Type & Make / Model: Diesel, Engine Mounted Pump
Operating Speed(s): 1500 / 1800 RPM
Battery Voltage: 12 or 24 V DC

Recommended Products:
- Actuator: ADD180G-12/24
- Speed Controller: ESD5500E, ESD5111, ESD5500-II, or ESD5550

Summary: The 180 SERIES Integral Actuator is designed to mount directly to Deutz 1013/2012 and Volvo 520/720 engines. The existing mechanical governor is removed from the engine and the 180 SERIES integral actuator is mounted in its place.

ADD180G INSTALLED ON A VOLVO ENGINE

GAC ADD180G
Actuator installed on Volvo 720GE
GAC APPLICATION NOTE

VOLVO D30 (MHI S6R2) ENGINES

Customer / OEM: Volvo Penta
Application(s): Marine Propulsion / Generator Drive
Engine Make / Model: Mitsubishi S6R2, 24.5L In-Line 6 Cylinder Power Ratings Range from 480 to 759 kW at 1500 RPM
Fuel System Type & Make / Model: Diesel
Operating Speed(s): 1500 / 1800 RPM and Variable Speed
Battery Voltage: 24 V DC
Recommended Products:
  - Actuator: ADC225S-24 (Volvo Part Number 3838271)
  - Speed Controllers: ESD5500E (Volvo Part Number 3817999)
  - Magnetic Speed Pickup: MSP6827C

Summary: The MHI S6R2 engine series fit with a GAC electronic governor systems for superior speed control serves in gen-sets and marine propulsion applications.

VOLVO D30 (MHI S6R2) ENGINE WITH GAC SPEED CONTROLLER AND ACTUATOR ON PS6-48 270 PUMP
VOLVO D30 (MHI S6R2) ENGINE WITH GAC SPEED CONTROLLER AND ACTUATOR ON PS6-48 270 PUMP

GAC GOVERNOR SOLUTIONS ON VOLVO-MHI ENGINES FOR RETROFIT APPLICATIONS

<table>
<thead>
<tr>
<th>Engine</th>
<th>Actuator</th>
<th>Speed Controller</th>
<th>MSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>D25A</td>
<td>ADD225S-24</td>
<td>ESD5500E</td>
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GAC APPLICATION NOTE

D34A, D49A, and D65A ENGINES for MARINE APPLICATIONS

Customer / OEM: Volvo
Application(s): Marine Main Propulsion and Generator Drive
Engine Make / Model:
  - D34A – V12, 33.9L, 964 HP at 1500 RPM and 1126 HP at 1800 RPM
  - D49A – V12, 49L, 1319 HP at 1650 RPM
  - D65A – V16, 65.4L, 2190 HP at 1800 RPM
Equipment Make / Model: Multiple Vessel Manufacturers
Fuel System Type & Make / Model: Diesel, In-line Injection Pump
Operating Speed(s): 1500 / 1800 RPM operating, variable range from 900-1800 RPM
Battery Voltage: 24 V DC
Recommended Products:
  - Actuator: ACB2001
  - Speed Controller: ESD5330
  - Magnetic Speed Pickup: MSP6728C

Summary
The actuator is mounted on stiff rubber elements (shore 60) and connected to the original MHI linkage with 2-SF8 ball-links, with a manual stop lever.

ACB2001 ON VOLVO PENTA D49 V12 MHI S12R-MPTK ENGINE

ACB2001 Actuator
GAC MSP6728C Magnetic Speed Sensor
Magnetic Speed Sensor
GAC APPLICATION NOTE

TD/TWD610, TD/TWD710, TAD721, 730, 740, TD1010, and TD1030 ENGINES

Customer / OEM:
Volvo

Application(s):
Industrial, Gen-Set, Marine

Engine Make / Model:
TD/TWD610-5.5L 6 Cylinder
TD/TWD710- 6.7L 6 Cylinder
TAD721, 730 and 740-7.3L 6 Cylinder
TD1010, 1030, 1031 and 1032-9.6L 6 Cylinder

Equipment Make / Model:
Multiple applications

Fuel System Type & Make / Model:
Diesel, MW Pump, Bosch P3000 and P7000 Inline Pumps

Operating Speed(s):
1500 / 1800 RPM operating, 600 RPM idle, variable range from 1000-2400 RPM

Battery Voltage:
24 V DC

Installed Products:
- Actuator: ACD175A-24 or ACB275H-24
- Speed Controller: ESD5500E
- Magnetic Speed Pickup: MSP6728C
- Mounting Kit: KT275 or KT276

VOLVO TAD1032 ENGINE: 397 HP AT 1500 RPM / 390 HP AT 1800 RPM

VOLVO PENTA GENSET ENGINE

ACB275H-24 Actuator (Volvo P/N 3827082)
GAC APPLICATION NOTE

TAD 520/720 ENGINES

Customer / OEM: Deutz / Volvo
Application(s): Engine
Engine Make / Model: Volvo TAD 520/720
Fuel System Type & Make / Model: Diesel
Operating Speed(s): 102 kW, 139 HP @ 1500 RPM, 110 kW, 150 HP @ 1800 RPM, TAD520
153 kW, 209 HP @ 1500 RPM, 163 kW, 222 HP @ 1800 RPM, TAD720

Battery Voltage: 24 V DC
Recommended Products:
• Actuator: ADD225

VOLVO TAD 520 AND TAD 720 ENGINES
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<td>Wanco- Light Tower</td>
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<td>TCM050</td>
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GAC APPLICATION NOTE

WANCO LIGHT TOWER

Customer / OEM: Wanco
Application(s): Light Towers
Engine Make / Model :: Multiple Engines
Fuel System Type & Make / Model: Diesel
Operating Speed(s): 1800 RPM
Battery Voltage: 12 V DC
Installed Products:

• EAM / Other: TCM050

Summary: Wanco purchased the TCM050, which is produced and programmed at GAC, and enclosed it in their own rugged exterior for use on their light towers. Features include:

• Fully integrated display and configuration, non-volatile memory for fast recording and real-time clock.
• Relays – starter, pre-heat, fuel, fault
• Warnings - start, ready-to-load, load energized, crank, fault, and LEDs
• I/O Low fuel warning, auxiliary shutdown, remote start, magnetic speed pickup

WANCO LIGHT TOWER

INSTALLATION LOCATION
TCM050

TCM050 IN CASE
## WISCONSIN MOTORS

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<th>ENGINE MODEL</th>
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<td>AFR201 JDR100</td>
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GAC APPLICATION NOTE

TM27 ENGINES

Customer / OEM: Wisconsin Motors
Application(s): Power Generation, Compression
Engine Make / Model: Wisconsin Motors TM27, 4-cylinder, 2.7 L
Fuel System Type & Make / Model: LP or Natural Gas
Operating Speed(s): 52 HP, 1500, 1800, 2000-2400 RPM
Battery Voltage: 12 V DC
Recommended Products:
• Actuator: ATB401T1N-12
• Magnetic Speed Pickup: MSP 6729
• FIMS: AFR201, ICM200-4, CL602, MXS B26-STM, RPR102, SOX102, SPM201-2B, SPW100, JDR100 (Part of panel SDU1100 or SDU1101)

Summary: The use of GAC’s FIMS500 fuel management system means the engine is EPA certified to run down to 60% methane content in the fuel.

NATURAL GAS CONFIGURATION – VARIABLE SPEED

![Diagram of engine with highlighted components]

- ATB401T1N-12
- MXSB26-STM
- SPM201-2B
CONSTANT SPEED ENGINE

INSTALLED IGNITION SYSTEM
EPA CERTIFICATE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2013 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT OF 1990

Certificate Issued To: Wisconsin Motors, LLC
(U.S. Manufacturer or Importer)
Certificate Number: DWM2.002.7TM-004

EFFECTIVE DATE: 06/10/2013
Expiration Date: 12/31/2015

Byron J. Baker, Division Director
Compliance Division

Certificate Type: Emission (Part 60)

Engine Family: DWM2.002.7TM

Certifications:

- Testing
- Compliance
- EPA

- NMHC = 0.11 g/100 mi
- NOx = 0.02 g/mile
- CO = 0.15 g/mile
- HC = 0.01 g/mile

Emergency Use Only: N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7577) and 40 CFR Part 60, 1068, and 860, (emission only and combined emissions and mobile) and subject to the terms and conditions prescribed in these provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following emission units, by engine family, as more fully described in the documentation required by 40 CFR Part 60 and produced in the model year.

This certificate of conformity covers only those new nonroad spark ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.30 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended void ab initio for other reasons specified in 40 CFR Part 60.

This certificate does not cover nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.
CONTINENTAL ADVANTAGE
EPA and CARB Certified for stationary applications
Four Cylinder OHV
Liquid-Cooled
Stellite exhaust valves
Drive-by-wire throttle control
On-Board electronic
Engine management and Diagnostics
Precise engine speed control
Optional control center is available

Your Heavy-Duty Power Source

Continental TM27
52 HP Natural Gas Configuration

WORLDWIDE PARTS AND SERVICE
We back our engines with a world wide service network. Experienced Continental representatives are always ready to meet your needs.

Industrial by Design
EPA and CARB certified engines
WISCONSIN MOTORS
Your Heavy-Duty Power Source

Continental TM27
Performance Specifications

Standard Features
- Four cylinder OHV
- Liquid-cooled
- Heavy-duty cast iron block & cylinder head
- Five main bearings
- Stellite exhaust valves
- Closed-loop air/fuel ratio control
- Precise engine speed control
- On-board electronic engine management and diagnostics
- Post-catalyst O₂ sensor based diagnostics
- Low oil pressure & high coolant temp. shutdown protection
- SAE #4 flywheel housing (Standard)
- High volume oil pump
- Full-flow oil filter
- 63 amp. alternator with internal regulator

Power Output: Natural Gas

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<th>RPM</th>
<th>HP</th>
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Power Output
Maximum dynamometer gross brake horsepower of the basic engine corrected to a pressure reading of 29.3 in Hg (99 kPa) dry barometer and temperature of 77°F (25°C) when tested in accordance with SAE Test Code J1995 (June 95). Engine output can be demonstrated within 5% at the factory under standard rating conditions. Power will decrease 5% for each 1,000 ft (305 m) above 500 feet (152.4 m) and 1% for each 10°F (12.2°C) above standard temperature of 77°F (25°C). For continuous operation, applications should be limited to 80% of power shown.

EPA and CARB certified
The Continental TM27 is EPA and CARB certified. Wisconsin Motors is committed to a cleaner tomorrow beginning today.

Bore — 3.58 in. (91 mm)
Stroke — 4.06 in. (103.2 mm)
Piston Displacement—164.7 cu. in.
## XINCHAI

<table>
<thead>
<tr>
<th>ENGINE MODEL</th>
<th>GAC ACTUATOR</th>
<th>GAC SPEED CONTROLLER</th>
<th>GAC MSP</th>
<th>GAC ACCESSORIES</th>
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<td>DPG100-VS</td>
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GAC APPLICATION NOTE

VARIABLE SPEED FORKLIFT with DPG100-VS

Customer / OEM: Xinchai
Application(s): Forklift
Engine Make / Model: 45kW / 2500 RPM
Fuel System Type & Make / Model: Shandong Kangda BQ Diesel Fuel Injection System
Operating Speed(s): 600 RPM to 2500 RPM
Battery Voltage:

Installed Products:
- Pump Mounted, integrated actuator/digital governor: DPG100-VS
- Other: Dual trace electric foot pedal FP201

Summary: The DPG mounts directly onto the Kangda BQ injection pump and offers superior speed regulation over a variable RPM range. The controller includes torque limiting flexibility and a fully programmable speed/load matrix for customized throttle response / throttle progressions. Its electronic foot pedal interface provides the load signal while a ring gear mounted magnetic pickup provides speed signal. The DPG’s actuator mechanism includes a rack position feedback sensor for precise, closed-loop control of the fuel system.

XINCHAI - PUMP / DPG AND FOOT PEDAL INSTALLATION

DPG100 Installed on a Kangda BQ Fuel Injection System

DUAL TRACE ELECTRIC FOOT PEDAL KT-FP201

DPG100-VS ON KANGDA BQ INJECTION PUMP
XICHAI FORKLIFT

DPG100-VS PUMP MOUNTED, INTEGRATED VARIABLE SPEED DIGITAL GOVERNOR / ACTUATOR ASSEMBLY
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<td>6CXBM</td>
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GAC APPLICATION NOTE

6CXBM MARINE PROPULSION / GEN SET

Customer / OEM: New Zealand Coast Guard

Application(s): Marine

Engine Make: 2 - YANMAR 500 HP 6CXBM, Diesel

Battery Voltage: 24 V DC

Installed Products: Actuators: 2 - ACB2001

SUMMARY: This NZ Coast Guard vessel needed reliable throttle control with high torque during tight maneuvers. By combining two GAC ACB2001 actuators with an AXIOMATIC AX100310 Unidirectional Digital Control one of Coastguard Bluff’s rescue vessel’s has a reliable solution to a throttle speed control issue.
### VARIOUS

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<tr>
<th>ENGINE MODEL</th>
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<td>175 Series Actuator</td>
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GAC APPLICATION NOTE

VARIABLE SPEED RSC671 AND ESD SERIES WIRING AND ADJUSTMENT

Customer / OEM: Various
Application(s): Marine, Industrial, Agricultural
Engine Make / Model: Various
Fuel System Type & Make / Model: Various
Operating Speed(s): Variable Speed
Battery Voltage: 12 or 24 V DC
Installed or Recommended Products:
- Actuator: All Compatible GAC Actuator
- Speed Controllers: ESD5100, ESD5200, or ESD5500E Series
- Speed Ramping Control: RSC671

Summary: With a 0-10 V DC or a 4-20 mA input to the RSC 671 module a wide range speed control is possible.

WIRING FOR VOLTAGE INPUT

*See Specific Actuator Publication For Proper Wiring Of Actuator Based On Battery Voltage
WIRING FOR CURRENT INPUT ONLY

Wiring For Current Input Only

• Connect terminals K and N on ESD if DROOP is required
• Connect terminals 2 and 3 on RSC if voltage input is used.
• Connect terminals 2 and 3, also 6 and 7 on RSC if current input is used.
• Important: Ground potential of current input (terminal 5 on RSC671) must be equal to terminal E on the ESD (battery -)
GAC APPLICATION NOTE

GAC 175 SERIES ACTUATOR INSTALLATION ON DENSO / BOSCH PUMP

Customer / OEM: Denso / ZEXEL / Bosch
Application(s): Gen-Set, Agricultural, Industrial, Marine
Engine Make / Model: Various
Fuel System Type & Make / Model: In-Line ‘P’ type pump, constant or variable speed
Operating Speed(s): Specific to Individual Engine Application
Battery Voltage: 12 or 24 VDC
Installed or Recommended Products:
• Mounting Kit: KT175RS-R-ZEXEL
• 175 Series Actuator Mounted on RSV Governor housing

GAC 175 SERIES ACTUATOR ON DENSO / ZEXEL / BOSCH PUMP

Pump with Existing Governor Housing. Rack Extension Installed

Adapter Plate From KT 175 RS-R ZEXEL Installation Kit Installed on Governor Housing

175 Series Actuator Installed on ’A’ Size Pump with RSV Governor w/ KT 175 RS-R ZEXEL Adapter Kit

KT175-WRS-R-ZEXEL Installation Kit
# CROSS REFERENCES and GAC REPLACEMENTS

## VARIOUS MANUFACTURERS

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## AMBAC CROSS REFERENCES & REPLACEMENTS

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## WOODWARD CROSS REFERENCES & REPLACEMENTS

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