

# ENGINE GOVERNING SYSTEM

## LSM200 Series Load Sharing Module



- Isochronous Load Sharing (0% Droop)
- Reverse Power Monitoring
- Forward Power Monitoring
- Load Anticipation

- Automatic Power Ramping of its oncoming generator
- Generator Power Ramping to the mains
- Internal bar graph power measurement display
- Power measurement with an external display

### INTRODUCTION

The LSM200 Series controls are multi-function load sharing and power control module accessories. They are intended to be used with Governors America Corp. speed control units on generator set applications requiring isochronous paralleling and for mains power control. Isochronous load sharing is its primary function. The LSM200 Series controls have the following capabilities:

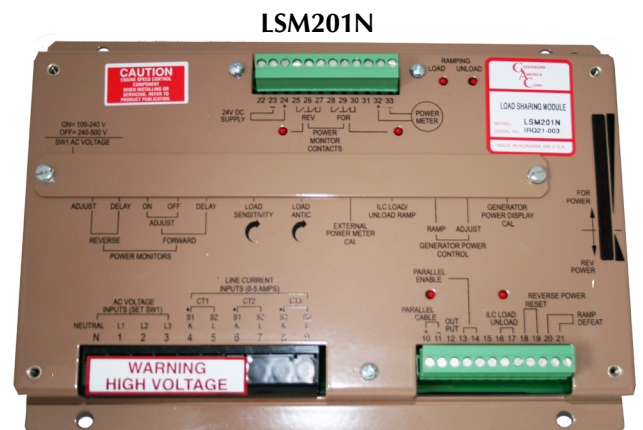
The LSM200 Series is presently available in two models, the LSM201 and the LSM201N. The LSM201 is the latest and current mode/ that meets all the specifications and functions described in this publication and is CE approved. The LSM201N is functionally the same but lacks the extra filtering for CE approval. The LSM201 is supplied unless specified otherwise.

### DESCRIPTION

#### Load Sharing Mode

Engine generator sets with isochronous governors maintain the requested speed very precisely. If synchronous generators are electrically paralleled to increase the total generated power capability, a system to apportion the load is required. Even the finest electric governors will have minor frequency differences among units to be paralleled, which would cause power variations. In this case, one generator set would continuously increase the power it produces, while the other sets would decrease the power they produce. This condition eventually leads to motorizing one or more generator/ engines. The load sharing system continuously adjusts the governor speed settings so that no average power difference exists. The generators are locked together through electrical synchronizing torques. They act as though they are tightly connected through a gear drive.

The load sharing module measures the power that the generator supplies to the main bus. Voltage inputs accept two ranges of three phase voltage. This covers most all applications (see table in the specifications). In the design of polyphase generators, the presence of a third harmonic is possible. This odd order harmonic may cause errors in load sharing systems. To minimize this error and to improve the load sharing, a terminal is provided to connect to the neutral of a Wye configuration generator.



The line current measurements are usually taken from current transformers existing in the equipment such as those used for ammeter circuits.

Internal power measurement circuits develop a D.C. load signal across the parallel cable proportional to the AC power measured. The magnitude and sensitivity of the load sharing is adjustable through the LOAD SENSITIVITY control in the module. Test points TP1 (+) and TP2 (-) adjacent to this control are used to measure the polarity and magnitude of the proportional power signal. This measurement is very important when initially installing a system and these test points may also be used in troubleshooting the system.



Governors America Corp., 720 Silver Street Agawam, MA 01001  
 phone: 413.786.5600 fax: 413.789.7736  
 www.governors-america.com  
 info@governors-america.com



The parallel cable is the interconnection between each generator set. Across this cable, each generator sends its load signal to a common point when the parallel cable's circuit breaker contacts are closed. With all the parallel cables connected, a current flows in the cable that is proportional to any imbalance of load between the generators. The individual load sharing modules detect this imbalance, and a correction signal is sent to each governor to minimize the differences.

Automatic soft loading is a standard feature in the LSM200 Series modules. The oncoming generator set presets its load sharing to zero power until the parallel enable signal is given, then the unit ramps to equalize the loads of all common generator sets. Soft unloading can be commanded via the ILC (Individual Load Control) terminals from service.

The load anticipation feature (Load Pulse) provides a signal that is a derivative function of the load. This load anticipation signal will make the governors more responsive to transient loads on the generator.

Forward and Reverse Power Monitors are provided for convenience and protection in the load sharing module. When a

reverse power condition is sensed by the internal AC power measuring circuits, the internal relay contacts are closed.

The forward power monitor has both "ON" and "OFF" set points, which may be adjusted independently. The internal relay can be used to signal different load points.

**Power Control Mode**

Automatic power ramping is a function provided in the LSM200 Series units. Each time the generator is put online or taken offline, the power can be ramped for a smooth transition.

Mains Power control is also within the capability of this unit. With a slight reconnection, the unit can request its generator to supply a specific power level to the mains. This function can be controlled from local or remote locations. The power transitions are normally ramped up and down but may be made faster for rapid response.

The LSM200 Series of units additionally can be made part of a larger control system to manage a total power system.

Hence this unit can be commanded by other GAC accessories to control the power from a group of engine generators.

**SELECTION CHART**

MODEL	CHARACTERISTICS
LSM201	Extra Filtering/CE Approved
LSM201N	Standard Filtering/Non-CE Approved
LSM201-12	12 Volt Version of LSM201
LSM201N-12	12 Volt Version of LSM201N

**SPECIFICATIONS**

**PERFORMANCE**

Load Sharing.....Adjustable to within ± 2% between sets  
 Operating Modes...Isochronous and droop paralleling and main power control  
 ReversePowerMonitorTripPoint.....Adjustablefrom-2to-20%  
 ReversePowerDelay(InverseTimeDelay).....Adjustablefrom0.5to15seconds  
 Forward Power Monitor Trip Point.....“ON”trippointadjustablefrom20-100%  
 .....“OFF” trip point adjustable from 0-80%  
 Forward Power Delay.....Adjustable from 0.4 to 30 Seconds  
 Power Output Signal.....0 to -1 VDC represents reverse power  
 .....0 to +6 VDC represents forward power  
 Forward and Reverse Power Relay Contact Rating.....FormC, 10Amp290VA  
 ParallelCableRelayContactRating.....GoldClad, 1.25A60VAMax.  
 All Performance specifications are based on 5 amps from the current transformer secondary at full load on the generator.

**ENVIRONMENTAL**

Ambient Temperature.....-40° to 185°F (-40 to +85°C)  
 Relative Humidity.....up to 95%  
 All Surface Finishes.....Fungus proof and corrosion resistance

**RELIABILITY**

Vibration.....5G, 20-500 Hz  
 Testing.....100% Functional Testing

**POWER INPUTS**

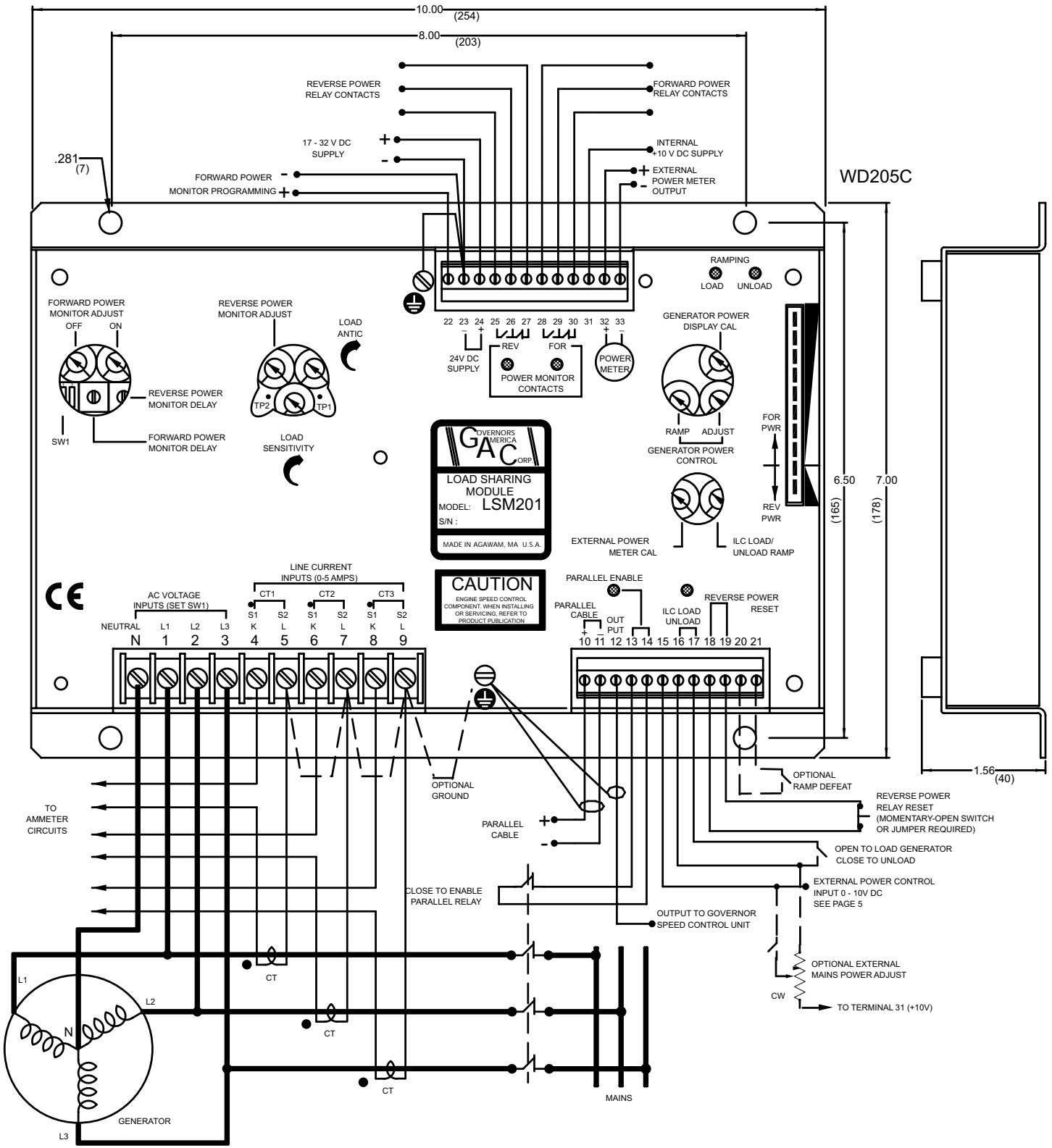
3 phase AC Voltage signals.....Two selectable ranges accommodate  
 100-500 VAC Line to Line  
 Isolated from battery minus by 5000 VDC  
 Isolated from case by 1000 VDC  
 3phaseACLineCurrents.....0-5Ampswith1.25VArequirement  
 Isolated from case by 1000 VDC  
 Common WYE connection to battery ground permitted.  
 DC Supply.....17-32VDC (Transient and Reverse voltage protected)  
 Note: Battery (-) On All Sets Must Be Connected Together In Common  
 12 VDC units available on request.  
 Polarity.....Negativegroundcaseisolated.  
 PowerConsumption-Battery Supply.....160 ma  
 AC Phase Voltage Inputs 2.5 ma  
 ExternalPowerMeter (Voltage Output).....10ma max. current

**PHYSICAL**

Dimensions..... See Wiring Diagram (Fig. 1)  
 Weight.....1.2 lb (0.56 kg)  
 Mounting.....Any Position

DIAGRAM 1 SYSTEM WIRING/OUTLINE

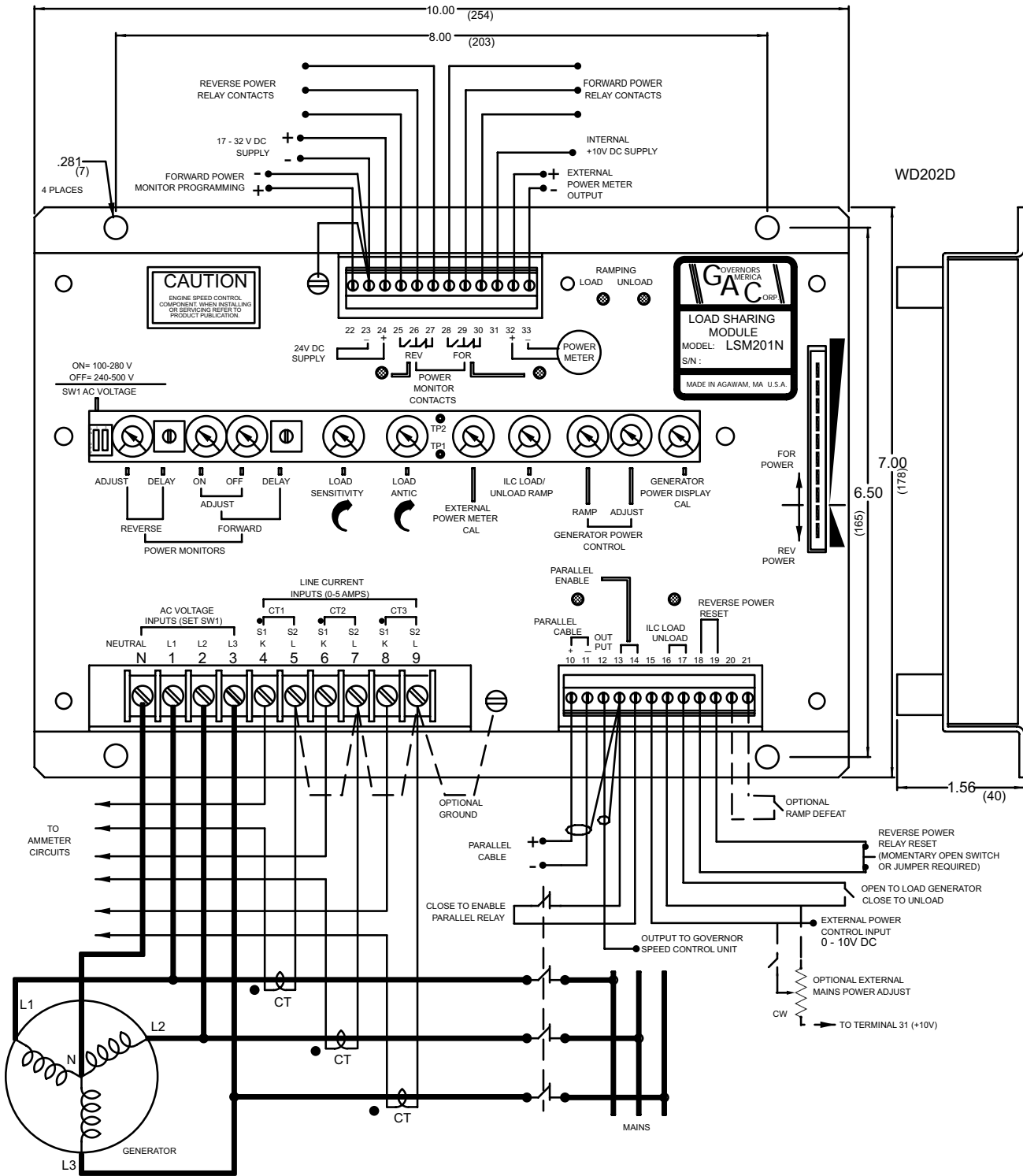
LSM201



This document is subject to change without notice.  
 Caution: None of GAC products are flight certified controls including this item.

DIAGRAM 2 SYSTEM WIRING/OUTLINE

LSM201N



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