POLAR POWER INC.

Exceeding Military Standards without the Cost

Supra Digital Control System

for Polar DC Generators

The Supra Digital Control System is a highly integrated control solution that will improve the reliability, serviceability, and remote controllability of DC Generator based power systems. The Supra Controller can control power to DC loads and serve as a fuel based programmable battery charging system.

The Supra Control System Integrates:

Engine Control

Alternator Voltage Regulation

Auxiliary Power Inputs

Operator Interface

Remote Site Monitoring and Communications

The Supra's high level of circuit integration eliminates separate and independent control modules, simplifying the wire harness and eliminating the typical conflicts between modules integrated from different manufactures. It can be: remotely controlled, monitored, calibrated, and tested, through an industrial modem, cell phone modem, or Ethernet. Communication is accessible locally with a PC Laptop or remotely through the Internet to facilitate site support and reduce costly visits to the site.

The Supra provides a complete log of alarms and operating parameters at the completion of a charge cycle or shutdown due to a fault condition. Alarms can be reset and the generator exercised remotely to help identify potential problems before scheduling a site visit. If an unscheduled maintenance is required, the technician can arrive at the site prepared, reducing the need for a second visit.

The Supra facilitates Hybrid Systems incorporating other sources of power including solar, wind, hydro, and utility. All connections to the controllers are through Amp/Tyco Circular C type connectors facilitating onsite repair through controller swapping (plug and play). The controller circuits were designed to meet the most stringent Military and Telecommunications requirements for EMI, EMP, and Ripple. The Supra Controller can meet the requirements of any type of grounding requirement: negative, positive, or float.

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Supra Digital Control System

Supra Advantages

1. Optically isolated RS 232 and CAN bus communications allow the generator to be controlled (locally or remotely) through a PC computer with Polar's GUI or the customer's own CAN bus.

2. Precision battery charging using control of both the voltage and current output. Battery charging using a single parameter of voltage control is insufficient because small millivolt changes can cause undesirable, large current fluctuations.

3. User configurable battery charging algorithms for different battery technologies. User configurable: current limit in bulk charge, temperature compensation curves, differentiation of load current and battery charge, and float voltages.

4. Control of Engine: RPM, starter motor, glow plugs, choke, fuel racks, fuel and engine block heaters, and cooling fans. Accurate monitoring of temperatures, pressures, coolant, and fuel levels.

5. Digitally controlled variable parameters: Digital control allows the generators, voltages, currents, engine speeds, and sensor calibrations to be remotely calibrated. All potentiometers were eliminated

6. Set points and recalibration can be performed remotely through the Internet, RS 232, Ethernet, or Cell Phone Modem using Polar's GUI interface.

7. Software is field upgradeable.

8. 10 bit A/D converters and optically isolated linear amplifiers provide accurate voltage, current, fuel level, oil pressure, temperature, and engine speed measurements.

9. Sensor and communications ports are isolated, so the failure of an input sensor or communications port will not contribute to system conflicts and issues.

10. High immunity to electrical noise. Sources of noise include the starter motor, spark plugs, lightning, coupling of AC sources, cell phone transmissions, microwave, and radar transmissions.

11. Very low conductance and radiation of EMI: A clean DC Power Source is incorporated for the provisioning of sensors, field coils, and actuators with a resultant effect of a reduced EMI source. This is unlike other controller manufacturers, who typically use an unfiltered PWM source of power. Polar Power also increases EMI suppression by housing the three models 250, 290 and 320 in sealed Aluminum enclosures.

12. Polar's unique circuit provides reliable operation in floating, positive, or negative ground systems. Polar uses switching power supplies to isolate both the positive and negative inputs. Most other controllers use a lower cost 3-pin voltage regulator that creates problems when moving between positive and negative ground systems.

13. The power supplies input and output signals and is fully isolated for up to 1500 Volts, via opto and galvanic couplers. The Supra Control System can tolerate most Hipot testing with controls connected in place.

14. Superior high voltage and current surge immunity from lightning, alternator surges, and load dumps with active voltage clipping circuits.

15. Supra's microprocessor and relays are able to operate under low voltage conditions during engine cranking with a starting battery in poor condition.

16. AMP / Tyco Circular C type connectors are used to maintain a high degree of reliability and provide ease of field service. Signal pins are gold plated and power pins are silver plated, providing low maintenance operation in high humidity, salt fog, and sandy environments.

17. Model 250 and 290 enclosures are gasket sealed to IP67.

18. Conformally coated circuit boards: all components are soldered in place, except for fuses in the Model 290 module.

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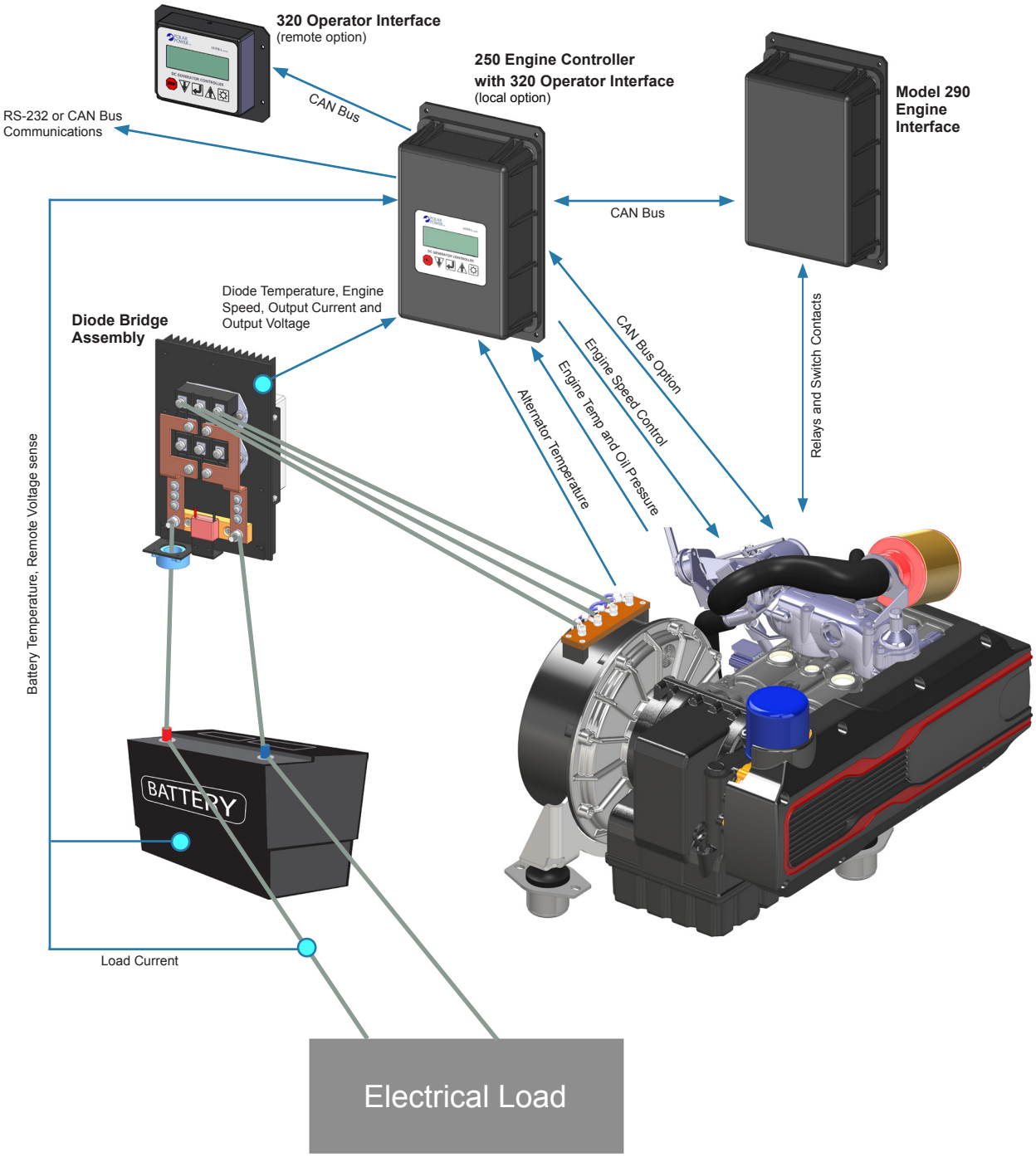
Supra Digital Control System



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Supra Digital Control System

Complete Supra Control System

- 250 Controller
- 290 Engine Interface
- 320 Operator Interface
- Sensors and Cable Harnesses
- Software

Model 250 Controller
This module is the heart of the system providing the primary logic control, analog and switches inputs, communication, and the generator output regulation.

On board the Model 250 is a 15 amp bipolar power supply controlled by the microprocessor to provide the generator's voltage and current regulation. Regulation is achieved either through controlling the field coil as required by the Model 6200 alternators or through an actuator on the engine for speed control as required by the Model 8000 series.

Analog to digital converters read the various engine, alternator, and control sensors for temperature, pressure, voltage, current, and speed.

5 switch inputs to monitor: intrusion, over temperatures, presence of AC grid, solar or wind power, fuel leaks, or other special requirements.

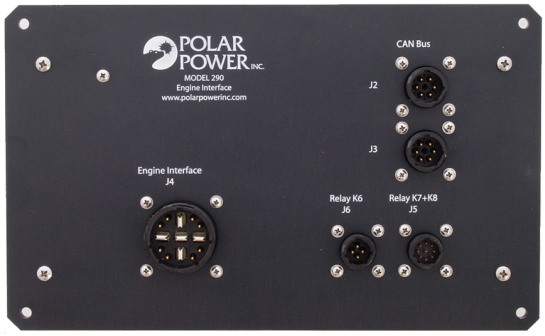
The Model 250 Controller communicates with the 290 Engine Interface, the 320 Operator Interface, and accessory modules through a CAN bus interface.

CAN bus interface is open to users for transmitting operational data or receiving control commands from the user's CAN bus system. The CAN bus protocol is unique to Polar Power.

The Model 250 also has two RS-232 ports. These ports are optically isolated from the system voltage and are used for communicating with the: Model 380 Ethernet module, Cell Phone module, PC type Computer, or other customer devices.

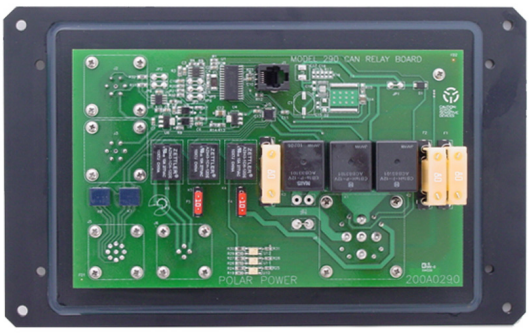
The Model 250 facilitates Hybrid systems incorporating other charging sources of power including solar, wind, hydro, and utility.

Model 290 Engine Interface
This assembly contains the relays and switched contact inputs for the engine control as required for fully automated operation.



The 290 was designed as a separate module to facilitate access to replaceable fuses used to protect the system against catastrophic damage from shorts, over current, or operator error. Starter solenoids, fans, glow plugs, and fuel valves are typical devices that are fuse protected within the 290 module.

Through software, the 8 on board relays and 3 switch inputs can be assigned various functions encompassing: engine speed control, fuel valves, cooling and ventilation fans, engine block heaters, fuel heaters, safety shut down devices, and the normal functions required by a diesel or LPG fueled engine.



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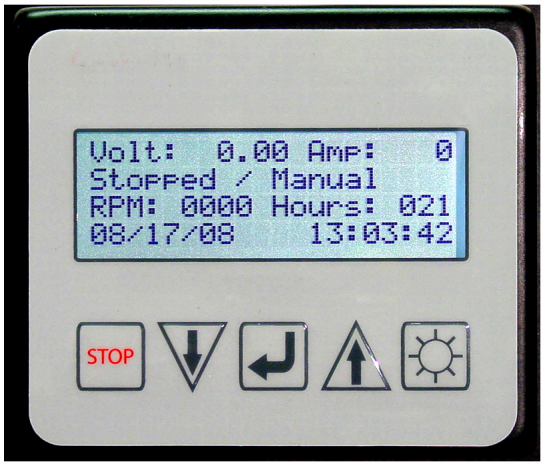
Complete Supra Control System

Model 320 Display / Keyboard
Provides the operator an interface for changing parameters and viewing system status via a 4 line, 20 character display screen. The Model 320 can either be installed on the case of the Model 250 Controller or within its own enclosure. The Model 320 can be located up to 35 meters from the Model 250.



Wide Range of Sensor and Control Accessories
Battery monitor, fuel level or pressure, temperature, pressure sensors, voltage, current, oil pressure, oil level, coolant level, enclosure over temperature, air filter restriction, etc. are available to meet the needs of specific applications.

Software
Internal to the Supra using C Sharp. The Supra Controller has an optional Graphic User Interface (GUI) that allows complete remote control over the DC generator system. There is the capability to remotely change voltage, current, stop and start parameters, and reset alarms.

Our Ethernet module option has password security and offers SNMP communication, which facilitates IT management of the site.

Model 250 Controller

Voltage Control Range
The Supra System can operate generator systems with output voltages of 12 to 600 Vdc. An accessory voltage divider module is required for voltages over 70 Vdc.

Output Power Control Range
There are no maximum power output limitations for Generators operated by the 250 Controller.

Input Voltage
A 16 to 72 Vdc input is required to power the Model 250 Controller. The Model 250 can derive its operating power from the starting battery or the load battery. The load battery is preferred as the Controller's source of power because it is typically a more reliable source than the starting battery. 12 Vdc systems require a boost converter, and for systems over 70 Vdc a buck converter is required to power the Model 250 Controller. Voltage dividers for voltage and power input conditioning are utilized for high voltage generator systems (70 to 600 Vdc).

Quiescent Power Consumption.
The Model 250 has very low power consumption requirements are typically less than 2 watts in the idle mode.

Power Required for Engine Speed Control for 8000 Series Alternators
When regulating engine speed, the Supra can consume up to 80 watts of power driving the actuator on the fuel rack or the butterfly valve on the carburetor, depending on the type of engine and actuator used.

Power Required for the Field Coil for Series 6200 Alternators
Using a high efficiency DC-DC power supply the Supra can output up to 350 Watts of power for driving the alternator's field coil. The field coil is used to regulate voltage and current output of the generator.

Electrical Isolation
The controller has a total of 8 isolated power supplies for the microprocessor / internal logic, analog to digital conversion, sensor / transducers, and communications. Power supplies are fully isolated on both the positive and negative pathways. This feature is essential for Telecomm systems operating in positive ground 48 Vdc systems, but is not present in most other systems.

Communication between modules
The Supra system uses it own CAN bus communication protocol (125 Kbs) to send and receive data and commands

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Supra Digital Control System

Model 250 Controller (cont)

to the modules in the system. The Supra Controller uses the Microchip MCP2515.

Upgrades
Serial programming updates with the Polar Bootloader.

Current Measurement
Hall Effect current transducers are incorporated in the design to replace standard shunts for enhanced electrical isolation, precise measurements, and to eliminate the cooling requirement for hot shunt surfaces. The 250 Controller has multiple current sensor inputs that can be used for generator, battery, solar, wind, or load measurements.

Operational Environments
The Supra System is rated at -40 to +60 Celsius. All electronic components used in the circuits are rated for a minimum service of -40 to 85 C. The microprocessor is rated to 125 C. The control modules can handle a humidity range from 0% to condensing and altitudes up to 14,000 feet.

Durability / Reliability
Power components are de-rated by at least 50% whenever possible (per Military standards). Only 5 electrolytic capacitors are used in the Supra Controller. Avoiding electrolytic capacitors provides for long term reliability and reliable operation over wide temperature ranges.

Temperature Measurement
A KTY-83 sensor is used for accuracy and enhanced electrical isolation. The 250 Controller has a total of 4 temperature sensor inputs that can be used for engine, alternator, enclosure, and battery temperature compensation.

Pressure Measurement
Solid state pressure transducers (no moving parts) were selected by Polar for their high reliability and accuracy. Other pressure senders (Bourdon tube and viable resistor) have a shorter life expectancy, especially on diesel engines. Polar incorporates solid state pressure transducers to measure fuel tank level and oil pressure.

Fuel Level Monitor Option
Polar calculates fuel level in the tank by measuring the column weight of fuel in the tank. A Very accurate (1%) solid state transducer performs this task through a location outside and at the bottom of the fuel tank. Knowing the weight of the fuel column at the top (full) and bottom (empty) of the tank provides us with a percentage of fuel in the tank. The Supra can provide and display an accurate fuel level for any size tank without relying on mechanical devices.

The Supra Controller records the fuel level percent at the start and end of each run cycle. The controller also measures the amount of kilowatt hours produced during the run cycle. Generator efficiency can be easily calculated using these two values. The fuel level option can also alert the operator to theft or leakage of fuel.

Cooling and Enclosure Purging
For safety the Supra Controller can run vent or radiator cooling fan(s) to remove possible flammable vapors from the enclosure before starting the engine. The Supra Controller also monitors the coolant temperature while the generator has cycled off. If the temperature is above the set point the vent fans will run to cool the enclosure and generator. This will prevent the generator from heating up the enclosure after it has shut down. This feature also extends the life and reliability of the generator. While cycled off and exposed to the Sun, the enclosure's temperature can climb to over 100 C, the vent fans can automatically cycle on to reduce the temperature.

Kilowatt and Amp Hour Produced
The Supra 250 Control System monitors the voltage and current then accumulates Kilowatt and Amp Hour values in the log file.

Battery Monitor Option
The Battery Monitor harness accessory includes a current transducer, temperature sensor, and two wires for remote voltage sensing. The Battery Monitor remote option also can automatically compensate for line loss.

Digital Switch Inputs
There are 5 optically isolated switch closure inputs for: fuel leak, enclosure intrusion, low fluids (oil and coolant), fire alarm, low fuel, etc.

The CAN Bus
Capable of connecting up to 128 nodes in a daisy chain fashion over a distance of up to 100 meters. Signal inputs and control outputs can be expanded via the CAN bus.

Engine Speed
Engine Speed is measured through the alternator frequency. Most automatic generators use a magnetic pickup on the flywheel's ring gear to sense speed; however, this creates a maintenance and reliability problem when small chips of steel or other iron particle collect on the tip of the pickup sensor and short the measurement. This is not a problem when using the magnets and stator inside the alternator for engine speed sense.

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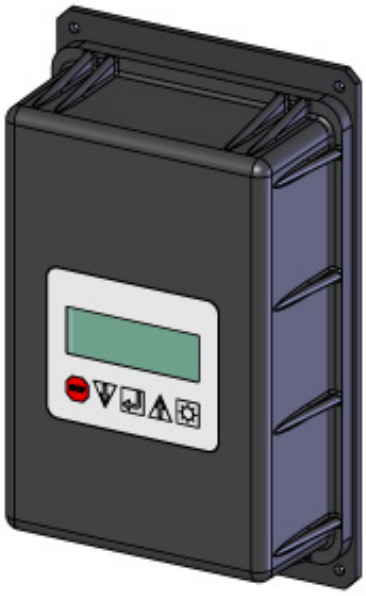
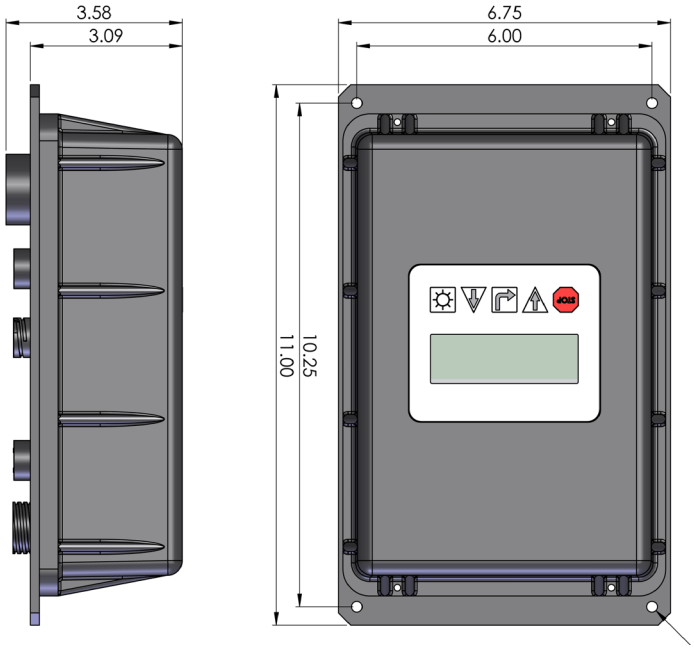
Supra Digital Control System

Model 250 Controller Dimensions



Model 250 Controler with the model 320 Operator Interface integrated



The 250 Controller and the 290 Engine Interface have the same dimensions and construction.

Model 290 Engine Interface

Operating Voltage
The model 290 derives its power from the starting battery. Available in two versions 12 Vdc (7 to 16 Vdc) and 24 Vdc (14 to 32 Vdc). The low voltage capability of the Model 290 allows it to remain in operation during engine starting with a starter battery in poor condition.

Relays
The Model 290 has 8 output relays which are controlled by the Supra 250 via the CAN bus. Multiple Model 290 modules can be daisy chained for increased capacity. Each module has 2 signal relays (Gold plated contacts) for alarms and 6 power relays (Silver plated contacts) that can be used for: speed controls, cooling fans, ventilation louvers, ignition, fuel racks, pumps, solenoids, block and enclosure heaters, starter, glow plugs, as well as other system needs. Relay field coils are monitored for open and shorted circuits.

Fuses and Switch Currents
Power relays have dedicated fuses on the output for safety and system reliability. The 290 module has two 70 amp current relays with fuses, one 40 amp relay with fuse, two 10 amp relays with fuses, and one 10 amp relay without a fuse. There are also two signal relays, which are rated at 1 amp and are without fuses.

Analog Input
The Model 290 measures starting battery voltage.

Digital Switch Inputs
There are 3 optically isolated switch inputs used for over temperature, oil, and air filter restriction.

Model 320 Operator Interface Module

- Characters: 7 or 8 data bits
- Parity: Odd, Even, None
- Stop Bits: 1 or 2
- Modem Control Signals: CTS, RTS, DTR/DCD
- vFlow Control: XON/XOFF (software), CTS/RTS (hardware)
- Programmable IO: 3 GPIO pins (software selectable)

Indicators (LED)
- Link & Activity indicator

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Security
- SSLv3 and SSHv2 Client & Server, Selectable 128/256/512/1024 Bit certificates
- Encryption: AES, 3DES and RC4
- Authentication: SHA-1, MD5, Base-64 User Access Lists

The LCD display on the 320 Module is backlit with white LEDs. The backlight is switch controlled for on / off and brightness.

The CAN bus allows the Model 320 to be located up to 100 meters away from the 250 Control module. The Model is powered through the CAN bus power.

Model 380 Ethernet Interface Module

Our Ethernet module option connects to the RS-232 port on the Model 250 Supra Controller and provides the means of connecting to a hub or switch. Features include:

Password security for access restriction to the generator
Serial to SNMP Ver 2c or 3 conversions Dual path communication for SNMP data and Polar GUI Interface
Opto couple isolation between the RS-232 and the Ethernet output

Power input is fully isolated, 8 to 65 Vdc.

On–board memory
8MB SDRAM/16MB Flash

Serial Interface
- Software selectable data rates from 300 to 921kbps

VIP Access™ Enabled
Seamless integration with ManageLinx™ remote service enablement platform

Software
- Windows 98/NT/2000/XP/Vista-Based Device Installer™
- ComPort Redirector™
- Secure ComPort Redirector

Management
- Internal Web Manager (SSL Option for secure login)
- CLI (over Serial Ports, Telnet or SSH)
- XML Configuration Records via CLI or FTP
- DeviceInstaller™ software
- Firmware: Upgradeable via FTP, Web, and Serial Port
- Flash wear leveling and erase cycle statistics
- Internal Web Server
- Customizable with CGI
- Web content on local file system and updatable through FTP

Power
9 Vdc to 72 Vdc Fully isolated to 1500 Volts

Environmental
Extended Temp: -40° to 85° C (-40° to 185° F)

Regulatory Approvals
- FCC Part 15, Subpart B, Class B – ICES-003 Issue 4 (2004), Class B
- EN55022:2006 and EN55024:1998 + A1:2001 + A2:2003
- AS/NZS CISPR22:2006
- VCCI V-3/2009.04
- EN 61000-3-2:2006, EN 61000-3-3:1995+A1:2001+A2:2005

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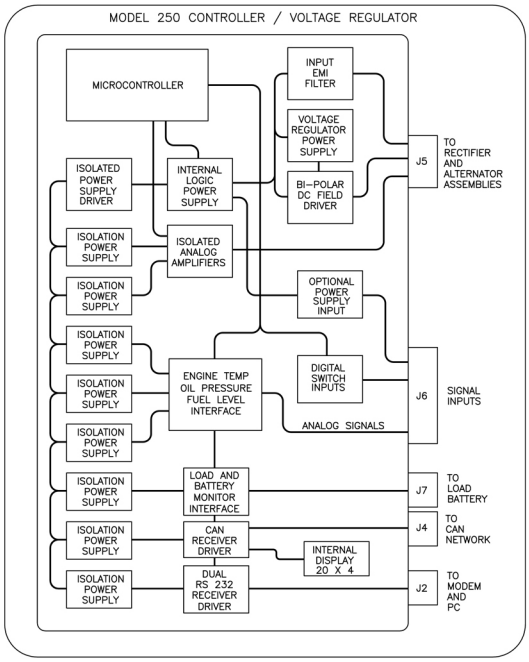
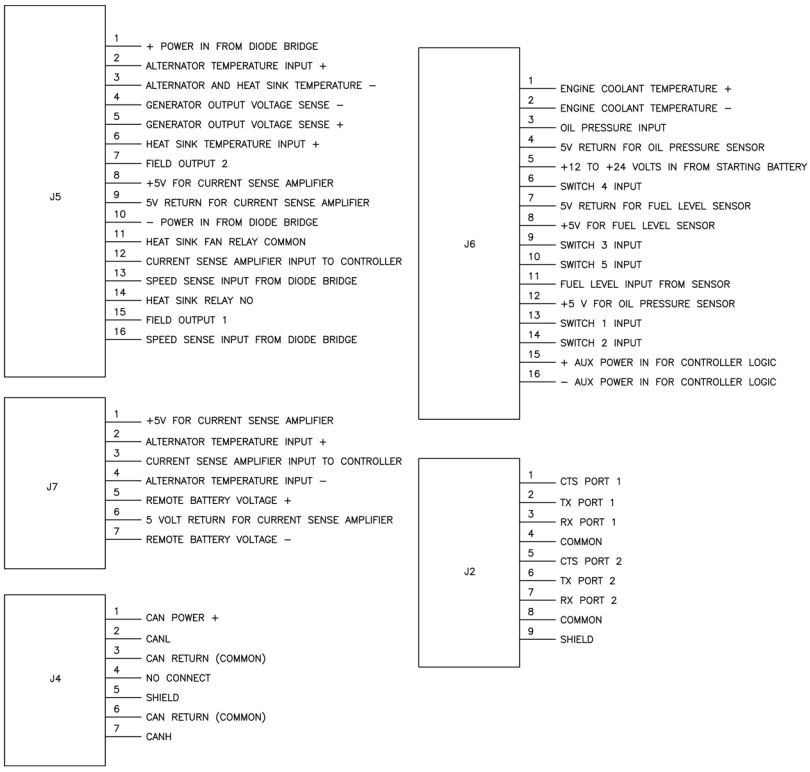
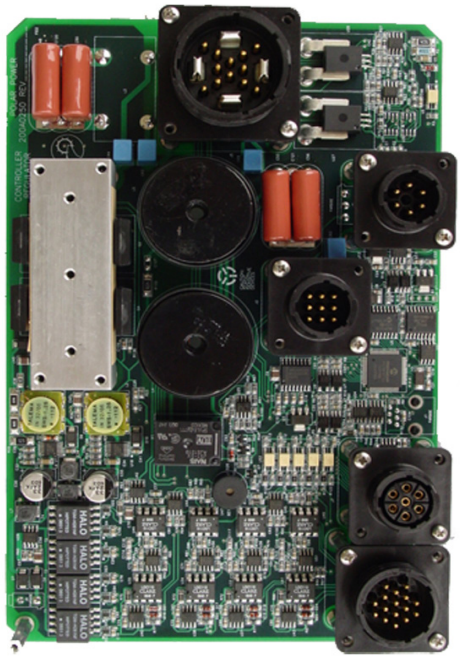
Supra Digital Control System







250 Controller

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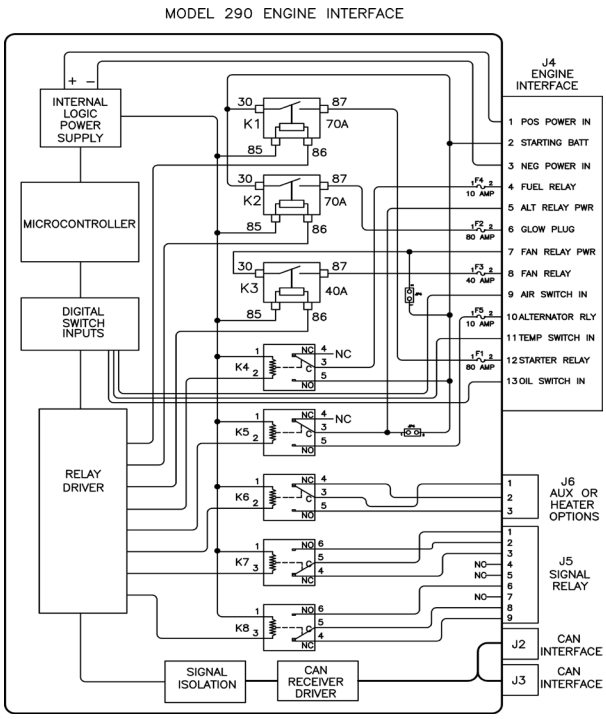

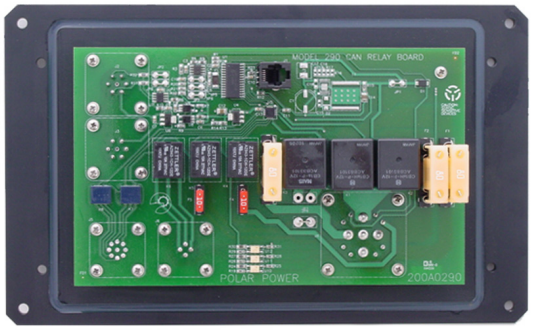

290 Engine Interface

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Charging Control	Description
Alternator Voltage	Sets the voltage output of the alternator
Alternator Current	Sets the maximum current output
Battery High Voltage Stop	Sets the voltage that the battery must reach to start the shutdown sequence, the next stage in shut down is the Low Current Stop
Battery Low Current Stop	Sets the value that the output current must be equal to or below to continue the shutdown sequence
Engine Stop Delay (0 – 32,767)	Sets the seconds that the generator can continue to run after the High Voltage Stop and the Battery Low Current Stop conditions have been satisfied. This countdown timer completes the charge cycle.
Bat Low Voltage Start	The voltage that the battery must be at or below, before starting the timers for a start sequence
Engine Start Delay (0 – 32,767)	Sets the seconds that the battery voltage must be at or below the Low Voltage Start, before initiating the start sequence.
Battery Monitor, Optional	Description
Temperature Compensation	Enabling this option will adjust the Max Voltage output from the alternator, according to the battery temperature.
Volts per Degree	This value is the voltage shift per degree of the battery temperature.
Reference Temperature	This is the baseline temperature value; battery temperature rising above this value will cause the voltage to decrease by the volts per degree value. Temperatures below this value will cause the voltage to increase.
Min Temp Compensation Volts	This is the lowest voltage that the temperature compensated adjustment will be limited to.
Max Temp Compensation Volts	This is the highest voltage that the temperature compensated adjustment will be limited to.
Battery Over Temperature Charge Termination	This is the maximum temperature the batteries can reach, before terminating the charge cycle. This will trigger a “Battery Over Temperature Fault” Alarm.

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Max Charging Current	This is the maximum current charge into the battery. It is calculated from the difference between the output of alternator and the load current.
Generator Start / Stop / Run	Description
Engine Warm-up Time (0 – 255)	Seconds to hold the engine at idle (speed controlled engines) or keep the field coil un-energized (fixed RPM engines) after the engine has started
Engine Cool Down Time (0 – 255)	Seconds to hold the engine at idle (speed controlled engines) or keep the field coil un-energized (fixed RPM engines) before the engine stops
Starter Motor Disengage RPM / Min RPM	The RPM value that defines that engine has started and disengages the starter. If the engine is in a run sequence and the RPM drops below this level, it will trigger a "Low RPM fault" alarm.
Low Speed charging suspension	If the engine speed drops below this value, the charging is suspended until the speed recovers and 15 seconds pass. For 6200 Series Alternators only, not necessary for 8000 Series.
Max RPM	The maximum RPM before triggering the "Over RPM fault". The fuel supply and / or the ignition is then shut off and "Overspeed" alarm is generated.
Idle RPM	Sets the RPM during the warm up period. This is only available for 8000 Series Alternators. For multispeed 6200 Alternators this function in within a secondary controller.
Crank Time	Seconds to keep the starter engaged. If RPM is at or above the Cutoff RPM, it overrides this value and disengages the starter.
Crank Rest Time	Sets the seconds between failed starts due to Crank Time expiring. The glow plug is OFF at this time.
Crank Attempts	Sets the number of attempts to start the engine, before aborting and triggering a "Failed Start fault" Alarm
Lube Oil Pressure Ignore	Seconds to ignore the oil pressure switch or oil pressure sensor. If after this time expires and the switch or sensor still shows low oil, the engine will shutdown, and trigger a "Low Oil fault" alarm.
Glow Plug Pre-Heat	Sets the Glow Plug Pre-Heat duration in seconds. This feature is used only if the "Glow Plug Temperature Compensation" option is not selected. If the Temperature Compensation is selected, this is the value to keep the glow plug engaged after the engine has started to accelerate warm up.

Temperature regulated Glow Plug Pre-heat (1 - 29 seconds)	The pre-heat for the glow plugs is determined by the engine coolant temperature. At -20 C and lower pre-heat is 29 sec and 40 C and higher the Pre-heat is 1 second.
Auto Vent Fan Temperature	This sets the temperature that the vent or radiator fan(s) will start to cool the generator and / or the enclosure. Once the temperature drops below that value, the vent fan will disengage. The vent fan may come on at any time.
Auto Vent Fan Delay	Sets the seconds on the vent fan run before starting the generator and how long to keep the vent fan running after the generator has started. If the engine coolant temperature is above the "Auto Vent Fan Temperature" setting, the count-down timer at the end of the run cycle will not count down until after the engine has cooled off below the set point.
Fuel Level Monitor, Optional	Description
Fuel Level Alarm Set Value	The percent at which the fuel tank will trigger a low fuel alarm. Defaults to 25%. Low fuel can either provide maintenance alarm or shutdown engine.
Fuel Tank Calibration	Sets the "empty" and "full" calibration points of the fuel container. The controller and fuel transducer will interpolate the percentages of fuel between the two calibrated points.
Engine Analog Inputs, Model 250	
Low Oil Pressure, Transducer	Sets the minimum operating oil pressure. If the oil pressure drops below this value, it will trigger a "Low Oil fault" and an alarm event will shutdown the engine.
High Engine Temperature, Sensor	Sets the maximum coolant temperature. If temperature rises above this value it will trigger an "Over Temp fault" and an alarm event will halt the engine.
Engine Switch Inputs on Model 290	Limit 3 Inputs, Description
Coolant Level	SW6. Through an optional level switch in the radiator, this feature can provide a maintenance warning on low coolant level. Alarm event will provide maintenance warning.

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Hi Temperature, Switch	SW7. Monitors either: engine coolant, oil, or enclosure. Alarm event will shut down engine.
Air Filter Restriction, Switch	SW8. Using a vacuum switch we can sense air restriction in the engine air intake filter. An alarm event will provide a maintenance warning.
Low Oil pressure, Switch	SW6. Low oil level using pressure switch in place of the oil pressure transducer. An alarm event will shut down engine.
System Switch Inputs on Model 250	Limit 5 Inputs, Description
Fuel Tank Leak	With a leak detector switch, this can be hooked up to either SW1 or SW2 to trigger a maintenance warning when it detects a leak.
Shut Down Engine	SW3 is used for the presence of alternate power input for charging the batteries. If the unit has started with this switch open and then it closes from an external power detection, it will shut the engine down normally. If the unit has started with this switch closed, the unit will continue to do a full run cycle. Examples of alternate power are: AC line, or Solar / Wind availability
Intrusion Alarm	SW1 and SW2 are customer customizable in the GUI.
Emergency Stop	SW4
Remote Stop	SW5

Weekly/ Monthly Exercise	
Exercise Rate	This setting has 3 selections: None, Weekly, Monthly.
Exercise Day	This setting has different values depending on the Exercise Rate setting. Weekly will give the days of the week, and Monthly will give the days of the month.
Exercise Duration	This is the time in minutes to run the system on the scheduled Rate, Day, and Time.
Exercise Time	These two values set the hour and minute for the system to start the Exercise on the day selected by the Rate and Day settings.

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Service Settings	
Oil Change	Time in Engine Run-time Hours between oil changes
Oil Filter Change	Time in Engine Run-time Hours between oil filter changes
Air Filter Change	Time in Engine Run-time Hours between air filter changes
Start battery Service	Time in Engine Run-time Hours between services of the Starting Battery
Fuel Filter Change	Time in Engine Run-time Hours between fuel filter changes

Data Available on the Display	
Starting Battery Voltage	This is the actual voltage of the starting battery in the system.
Controller Version and Compile Flags	This shows the current firmware version of the controller, GUI, and what compile flags were used.
Date and Time	Date and Time inside the controller
Engine Run-Time Hours	Accumulated hours, minutes, and seconds that the engine has run
RPM	Actual RPM of the engine
KWh Current / Last Run	This shows how many KWh were produced during the last run, or if it is running, the current KWh for this run. This value goes to 0 upon startup sequence.
KWh Accumulated	This shows the total accumulated KWh that the system has produced.
Fuel level	This shows the fuel level, in percent, that is left in the fuel container.
Oil Pressure	Actual oil pressure being read by the Oil Pressure Sensor, if equipped
Engine Temperature	Actual temperature of the engine, read by the Engine Temperature Sensor, if equipped
Diode Bridge Temperature	Actual temperature of the Diode Bridge
Alternator Temperature	Actual temperature of the Alternator
Controller Temperature	Actual temperature inside the controller

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Power Reduction Settings	
Engine Temperature	The temperature at which the system will cut the power output in half, to try to lower the engine temperature (in future updates, it will set a warning). Once it is below this value, it will resume full power. If the temperature continues to rise to the second set point, the system will shutdown with an over temperature alarm.
Supra Controller Over Temp	The temperature at which the system will cut the power output in half, to try to lower the internal temperature of the controller (in future updates, it will set a warning). Once it is below this value, it will resume full power.
Diode Bridge Temperature	The temperature at which the system will cut the power output in half, to try to lower the diode bridge temperature (in future updates, it will set a warning). Once it is below this value, it will resume full power.
Battery Temperature	The temperature that the system will cut the power output in half, to try to lower the battery temperature (in future updates, it will set a warning). Once it is below this value, it will resume full power.
Alternator Temperature	The temperature that the system will cut the power output in half, to try to lower the alternator temperature (in future updates, it will set a warning). Once it is below this value, it will resume full power.
Alarm Contacts, Dry Contact Closure	Either the speed control or Generator Status is available
Generator Fail	K8 is the fault relay that is tripped when any of the above fault conditions occur. To clear this fault, you must toggle between Automatic and Manual mode. On some models that use multi-speed engine control, this fault relay is not used for faults.
Generator Warning	K7 is the warning relay that is tripped when any of the above warning conditions occur. This relay will disengage when the warning has cleared, either on its own or by user intervention. On some models that use multi-speed engine control, this warning relay is not used for warnings.
Speed control for 6200 Series Only	On some models, K7 and K8 are used to change the RPM of the engine to a pre-determined set speed, via digital output. The values can be: off - off off - on on - off on - on

Hi Temperature, Switch	SW7. Monitors either: engine coolant, oil, or enclosure. Alarm event will shut down engine.
Air Filter Restriction, Switch	SW8. Using a vacuum switch we can sense air restriction in the engine air intake filter. An alarm event will provide a maintenance warning.
Low Oil pressure, Switch	SW6. Low oil level using pressure switch in place of the oil pressure transducer. An alarm event will shut down engine.
System Switch Inputs on Model 250	Limit 5 Inputs, Description
Fuel Tank Leak	With a leak detector switch, this can be hooked up to either SW1 or SW2 to trigger a maintenance warning when it detects a leak.
Shut Down Engine	SW3 is used for the presence of alternate power input for charging the batteries. If the unit has started with this switch open and then it closes from an external power detection, it will shut the engine down normally. If the unit has started with this switch closed, the unit will continue to do a full run cycle. Examples of alternate power are: AC line, or Solar / Wind availability
Intrusion Alarm	SW1 and SW2 are customer customizable in the GUI.
Emergency Stop	SW4
Remote Stop	SW5

Weekly/ Monthly Exercise	
Exercise Rate	This setting has 3 selections: None, Weekly, Monthly.
Exercise Day	This setting has different values depending on the Exercise Rate setting. Weekly will give the days of the week, and Monthly will give the days of the month.
Exercise Duration	This is the time in minutes to run the system on the scheduled Rate, Day, and Time.
Exercise Time	These two values set the hour and minute for the system to start the Exercise on the day selected by the Rate and Day settings.

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