

## Solar Turbines

A Caterpillar Company

## SATURN 20

### Gas Turbine Generator Set

POWER GENERATION



#### Package Arrangement

**Gas Turbine**

- Saturn® 20 Industrial, Single-Shaft
- Axial Compressor – 8 Stages
- Annular Combustion Chamber – 12 Fuel Injectors
- Coatings
  - Compressor: Inorganic Aluminum
  - Turbine and Nozzle Blades: Precious Metal Diffusion Aluminide
- Velocity Vibration Transducers
- Main Reduction Drive**
- Epicyclic
  - 1800 or 1500 rpm
  - Acceleration Vibration Transducers
- Generator**
- Salient Pole, 3 Phase, 6 Wire, Wye Connected, Synchronous with Brushless Exciter
- Open Drip-Proof Construction
- Sleeve Bearings
- Velocity Vibration Transducers
- Solid-State Voltage Regulation with Permanent Magnet Generator
- NEMA Class H Insulation with H Rise
- Continuous Duty Rating

**Package**

- Steel Base Frame with Drip Pans
- Direct-Drive AC or Pneumatic Start System
- Natural Gas Fuel System
- Control System
  - Microprocessor-Based PLC
  - Generator Control
  - Vibration and Temperature Monitoring
  - Auto Synchronizing
- Integrated Lube Oil System
  - Turbine-Driven Lube Pump
  - AC Pre/Post Lube Pump
  - Air/Oil Cooler
  - Integral Lube Oil Tank
  - Lube Oil Filter
- Documentation
  - Drawings
  - Quality Control Data Book
  - Inspection and Test Plan
  - Test Reports
  - O&M Manuals
- Factory Testing of Turbine and Package
- Weatherproof Acoustic Enclosure

**Optional Equipment/Services**

- Generator Options:
  - Standby Duty Rating
  - Standard Voltages: 380, 415, 3300 50 Hz; 240, 480 2400, 4160 60 Hz
- Fuel Systems
  - Liquid
  - Dual (Gas/Liquid)
  - Water Injection for NOx Control
  - Alternate Fuels (such as naphtha, propane, low Btu)
- Lube Oil System
  - Water/Oil Lube Cooler
  - Electrostatic Demister
  - Lube Oil Tank Heater
- Control System
  - Remote Display/Control Terminal
  - Heat Recovery Application Interface
  - Serial Link Supervisory Interface
  - KW Control
  - KVAR/Power Factor Control
- Accessory Equipment
  - Turbine Cleaning System: On-Crank and On-line
  - Package Lifting Kit
- Ancillary Equipment: Various Air Inlet and Exhaust Systems
  - Inlet and Exhaust Silencers
  - Self-Cleaning or Prefilter/Barrier Air Inlet Filter
  - Inlet Evaporative Cooler
  - Inlet Chiller Coils
  - Ancillary Support Frame

## Solar Turbines

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## SATURN 20

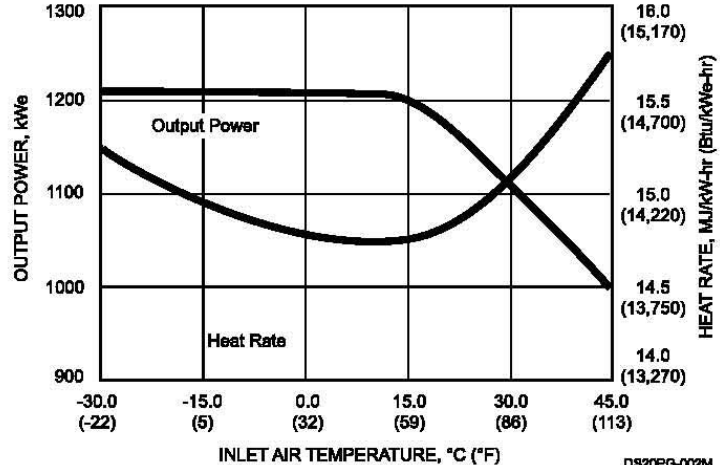
### Gas Turbine Generator Set

POWER GENERATION

| Nominal Performance |   |
|---------------------|---|
| Output Power        | 1210 kWe                                |
| Heat Rate           | 14 795 kJ/kWe-hr<br>(14,025 Btu/kWe-hr) |
| Exhaust Flow        | 23 540 kg/hr<br>(51,890 lb/hr)          |
| Exhaust Temp.       | 505°C<br>(940°F)                        |

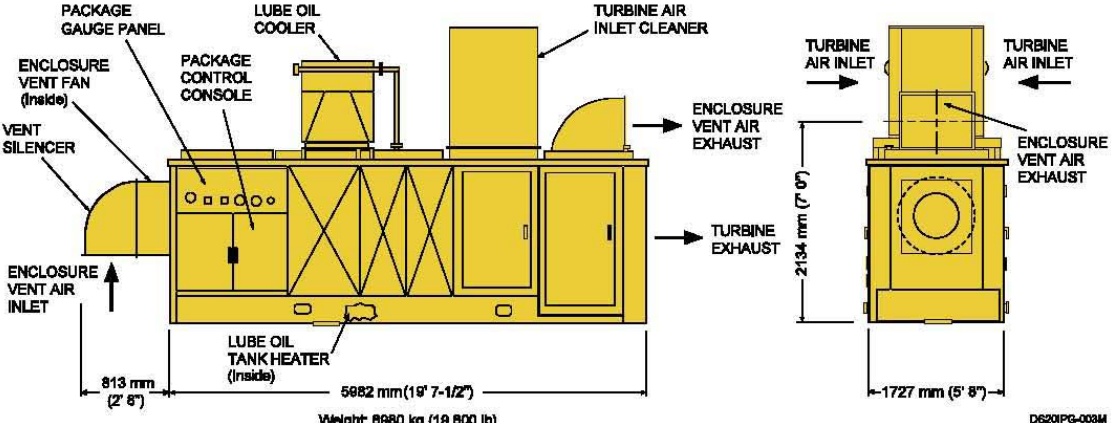
*Nominal Rating – per ISO  
At 15°C (59°F), at sea level  
No inlet/exhaust losses  
Relative humidity 60%  
Natural gas fuel with  
LHV = 31.5 to 43.3 MJ/m<sup>3</sup>  
(800 to 1100 Btu/scf)  
AC-driven accessories  
Engine efficiency: 24.3%*

#### Available Power



D820PG-002M

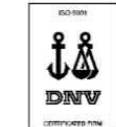
#### Typical Package Configuration



D820PG-003M

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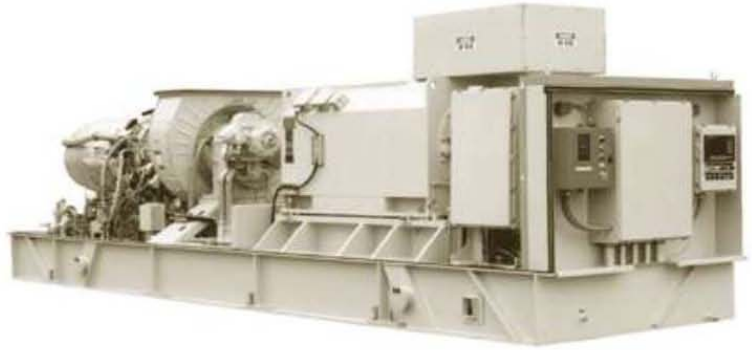
## Solar Turbines

A Caterpillar Company

## CENTAUR 40

### Gas Turbine Generator Set

POWER GENERATION



#### Package Arrangement

**Gas Turbine**

- Centaur® 40 Industrial, Single-Shaft
- Axial Compressor – 11 Stages
- Annular Combustion Chamber – 10 Fuel Injectors
- Coatings
  - Compressor: Inorganic Aluminum
  - Turbine and Nozzle Blades: Precious Metal Diffusion Aluminide
- Velocity Vibration Transducers

**Main Reduction Drive**

- Epicyclic
  - 1800 or 1500 rpm
  - Acceleration Vibration Transducers

**Generator**

- Salient Pole, 3 Phase, 6 Wire, Wye Connected, Synchronous with Brushless Exciter
- Open Drip-Proof Construction
- Sleeve Bearings
- Velocity Vibration Transducers
- Solid-State Voltage Regulation with Permanent Magnet Generator
- NEMA Class F Insulation with F Rise
- Continuous Duty Rating

#### Package

- Steel Base Frame with Drip Pans
- Direct-Drive AC Start System
- Natural Gas Fuel System
- Control System
  - Microprocessor-Based PLC
  - Generator Control
  - Vibration and Temperature Monitoring
  - Auto Synchronizing
- Integrated Lube Oil System
  - Turbine-Driven Lube Pump
  - AC Pre/Post Lube Pump
  - Backup Lube Pump
  - Air/Oil Cooler
  - Integral Lube Oil Tank
  - Lube Oil Tank Heater
  - Lube Oil Filter
- Documentation
  - Drawings
  - Quality Control Data Book
  - Inspection and Test Plan
  - Test Reports
  - O&M Manuals
- Factory Testing of Turbine and Package

**Optional Equipment/Services**

- Generator Options:
  - WPII, TEWAC
  - Standby Duty Rating
  - Standard Voltages:
    - 3300, 6600, 11,000 50 Hz;
    - 4160, 6900, 12,470, 13,800 60 Hz
- Fuel Systems
  - Liquid
  - Dual (Gas/Liquid)
  - SoLoNOx, Dry, Low Emission
  - Alternate Fuels (such as naphtha, propane, low Btu)

- Lube Oil System
  - Water/Oil Lube Cooler
  - Electrostatic Demister
  - Duplex Lube Oil Filters
- Control System
  - Remote Display/Control Terminal
  - Heat Recovery Application Interface
  - Serial Link Supervisory Interface
  - KW Control
  - KVAR/Power Factor Control
  - Turbine Performance Map
  - Historical Displays
  - Printer/Logger
  - Predictive Emissions Monitoring
  - Field Programming Terminal
- Accessory Equipment
  - 24-VDC Battery/Charger System
  - Turbine Cleaning System: On-Crank and On-line
  - Package Lifting Kit
- Weatherproof Acoustic Enclosure
- Ancillary Equipment: Various Air Inlet and Exhaust Systems
  - Inlet and Exhaust Silencers
  - Self-Cleaning or Prefilter/Barrier Air Inlet Filter
  - Inlet Evaporative Cooler
  - Inlet Chiller Coils
  - Ancillary Support Frame

## Solar Turbines

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## CENTAUR 40

### Gas Turbine Generator Set

POWER GENERATION

#### Nominal Performance

|               |   |
|---------------|---|
| Output Power  | 3515 kW                                 |
| Heat Rate     | 12 910 kJ/kWe-hr<br>(12,240 Btu/kWe-hr) |
| Exhaust Flow  | 88 365 kg/hr<br>(150,715 lb/hr)         |
| Exhaust Temp. | 445°C<br>(830°F)                        |

*Nominal Rating – per ISO  
At 15°C (59°F), at sea level  
No inlet/exhaust losses  
Relative humidity 60%*

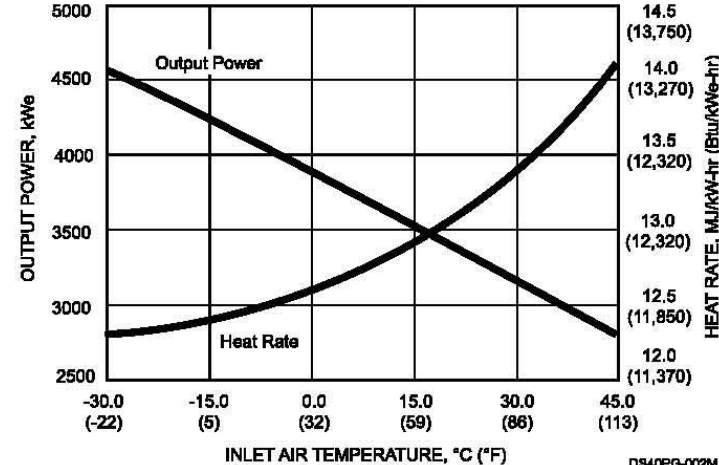
*Natural gas fuel with  
LHV = 31.5 to 43.3 MJ/m³  
(800 to 1100 Btu/scf)*

*No Accessory losses*

*Engine efficiency: 27.9%*

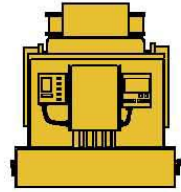
*Standard and high-ambient ratings available*

#### Available Power

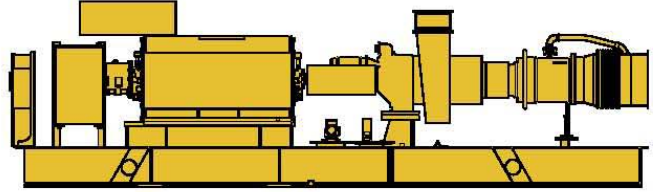


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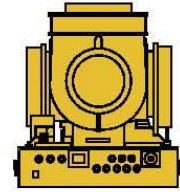
#### Typical Service Connections



Forward End



Left Side



Aft End  
DS40PG-003M

#### Package Dimensions

|                 |                       |
|-----------------|-----------------------|
| Length:         | 9754 mm (32' 0")      |
| Width:          | 2438 mm (8' 0")       |
| Height:         | 2591 mm (8' 6")       |
| Approx. Weight: | 26 015 kg (57,350 lb) |

**Forward End**

- Turbine Control Box

**Aft End**

- Fuel Inlet
- Turbine Cleaning
- Fuel Filter, Combustor and Exhaust Collector Drains
- Auxiliary Air (optional) for:
  - Liquid Fuel Atomizing
  - Self-Cleaning Filter
- AC Power
  - Liquid Fuel Pump (optional)
- Package Ground

**Left Side**

- Lube Oil: Drain, Vent, Cooler
- Generator Control Box, Power
- Generator Drip Pan Drain
- AC Power
  - Lube Tank Heater
  - Pre/Post Lube Pump
  - Backup Lube Pump


**Right Side**

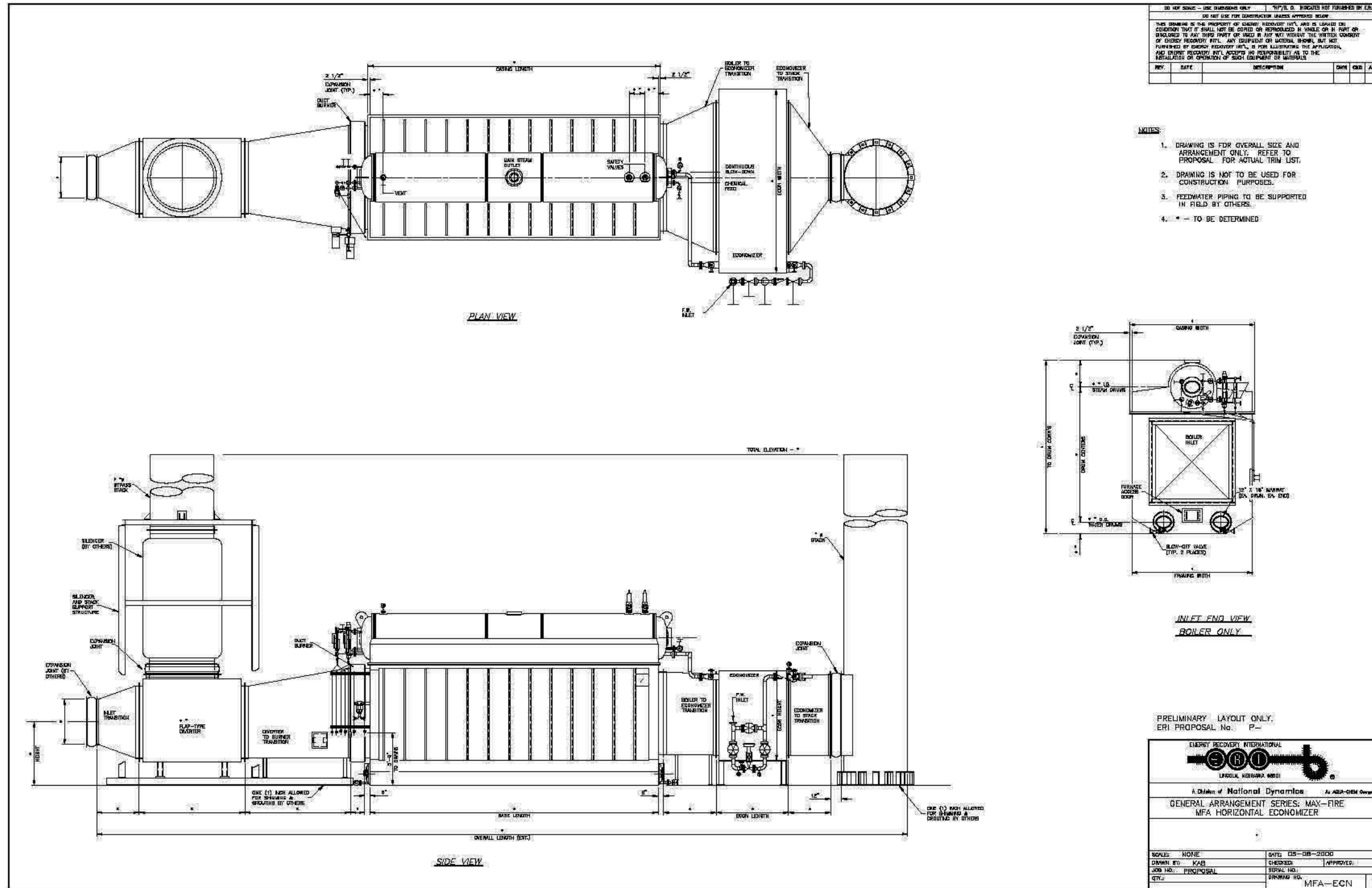
- AC Power - Start Motor
- Generator Monitor Box

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DS40PG1 005/EO

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# Typical Engine-Generator Configurations

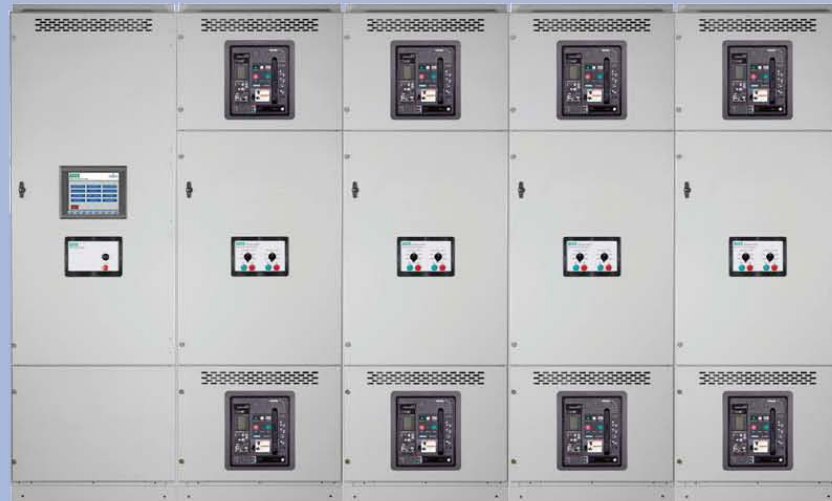
The 4000 Series standard engineering design demonstrates how easily you can customize a system to your specific requirements.

A Master Control module and Dual Generator module comprise digital generator paralleling control switchgear for a two engine-generator emergency, standby, and prime power system.



Two modules—a Single Generator with Master Control and a Dual Generator with redundant control—comprise switchgear for a three engine power system. Three engine systems requiring redundant master control would need three modules—Master Control, Single Generator and Dual Generator.

BELOW  
A Master Control module and four Dual Generator modules comprise switchgear for an eight engine-generator power system.



## 4000 Series System

AS YOU LEARN ABOUT THE 4000 SERIES, IT'S NATURAL TO ASK IF IT CAN SATISFY THE SPECIFIC REQUIREMENTS YOU HAVE FOR A POWER CONTROL SYSTEM.

If the system is for a healthcare facility, for example, can the touch screen quickly access JCAHO® records and information to help satisfy reporting requirements? Does it have automatic load shed control? How about a system one line schematic overview? The answers are, 'Yes.' What are your specific requirements?

### Standard Features

- Load demand with operator adjustment of settings
- Ethernet or RS-485 connectivity to Building Management System
- Test with load
- Test without load
- Automated manual paralleling with graphical synchroscope
- Alarms
- LCD touch screen
- Automatic synchronizing and paralleling controls

### Optional Features

- One touch screen per section
- Remote annunciation
- Redundant master processor
- Load control for up to 64 ATS's

### Controls

- Touch screen is standard with the Master module; optional with Generator modules
- Automatic synchronizing and paralleling controls
- Touch screen has dual processors, one dedicated to logic, one to graphics
- Controls hardware
  - Dual processor control
  - Distributed processing
  - High speed CANbus

### Touch Screen

- 12" color TFT on Master module
- Display on each pair of generators is optional
- System overview screen with one line schematic
- Real time clock
- JCAHO records are available if the generator(s) is/are properly equipped
- Screens:
  - Main Menu
  - System One Line Schematic
  - Metering
  - System Status
  - Alarm Status
  - ATS Status
  - Dual Metering

- kW Trend
- Multi-Trend
- Manual Paralleling
- Log In

### System Control

- Automatic standby
- Load management control
- Automatic load shed control
- Controller on each generator, optional
- Redundant master controllers, optional
- Automatic generator load demand control
- Emergency stop

### Engine-Generator Control

- Engine-generator of your choice
- Automatic engine start
- Adjustable engine cool-down timer
- Automatic synchronizer
- Engine governor control, load sharing, soft loading/unloading
- Voltage regulator control VAR/PF sharing
- Automated manual paralleling

\* Joint Commission on Accreditation of Healthcare Organizations