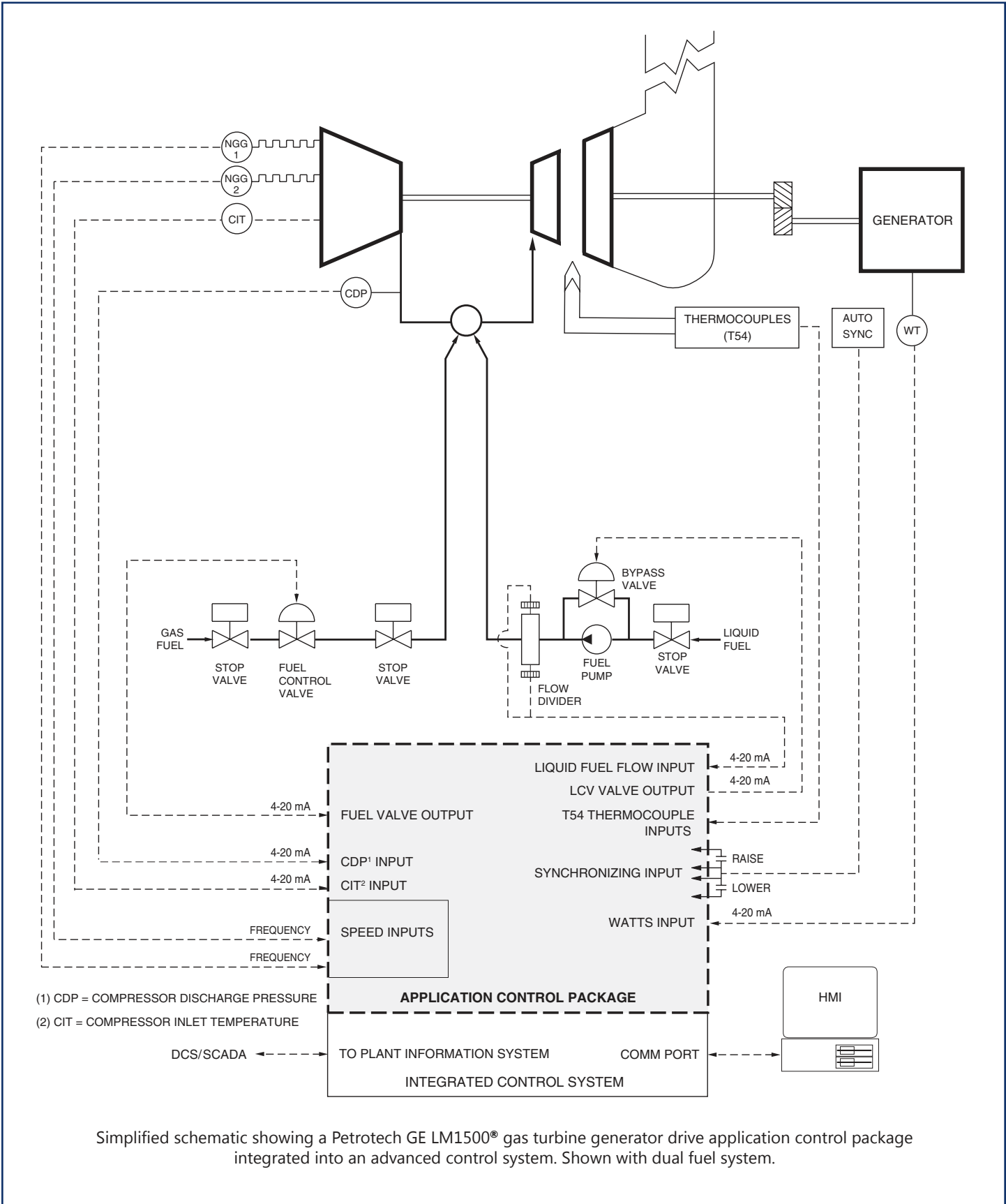


# GE LM1500® GAS TURBINE GENERATOR DRIVE APPLICATION CONTROL PACKAGE



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Simplified schematic showing a Petrotech GE LM1500® gas turbine generator drive application control package integrated into an advanced control system. Shown with dual fuel system.



## APPLICATION

The GE LM1500® gas turbine gen set application control package replaces older mechanical / hydraulic / electronic / pneumatic gas turbine fuel regulators with a modern, reliable application control package which runs on an open architecture advanced PLC-based system. The control package for the gas turbine provides on-line dual fuel control, speed ratio control, and inlet guide vane control based on temperature.

## ADVANTAGES

- **Hardware independent system:**  
Application control package's portability allows customer choice of PLC platform, reducing need for additional spare parts and training expenses. Available PLCs include General Electric 90-70 and 90-30, Siemens, Modicon Quantum and Allen-Bradley.
- **Fault tolerant:**  
Control package is available on fault tolerant controllers for critical control applications.
- **Simplified interface to DCS or SCADA:**  
Communication tasks are handled with a separate, dedicated module in the PLC, increasing data rate and simplifying network installation.
- **Improved fuel regulation:**  
Fast loop sampling rate, combined with modern digital control techniques, improves steady-state setpoint control, and reduces overshoot during transients, allowing full load rejection without driving the unit into overspeed.
- **Improved start-up reliability:**  
Special "lean lightoff" procedure ignites all burners with essentially 100% reliability, and with greatly reduced thermal stress.
- **Improved exhaust temperature monitoring and control:**  
Advanced statistical algorithms detect turbine hot/cold spots and automatically reject failed thermocouples.
- **Fail-safe features:**  
Redundant overspeeds; open/short monitoring of mA and thermocouples; readback monitoring of outputs, and special self-check features improve safety and reliability.
- **Non-proprietary interfaces:**  
Simple 4-20 mA, RTD, thermocouple, and dry contact I/O allow simple interface to existing sequence/protection logic unit, making low-cost partial upgrades practical and system troubleshooting simple.
- **Improved operator information with optional HMI:**  
Optional Human Machine Interface MS Windows-based graphic operator interface displays system status, trending and data logging, which can be used as part of a preventive maintenance program.

## SCOPE OF SUPPLY

The application control package for the GE LM1500® gas turbine generator drive system, includes:

### Analog inputs, 4-20 mA:

- Watts (load control)
- Compressor discharge pressure (PCD)
- Fuel interstage pressure

### Analog inputs, frequency:

- Two (2) redundant NGG

### Analog inputs, mV:

- TSA (EGT) (up to 16 thermocouples)

### Analog outputs, 4-20 mA:

- Speed ratio valve position setpoint
- Fuel control valve position setpoint
- Inlet guide vane position setpoint (if applicable)

### Operating states:

- Firing
- Warm-up
- Accelerate
- Load
- Synchronize

### Status, alarms, and shutdowns:

- Fault
- NGG overspeed alarm
- NGG underspeed shutdown
- NGG overspeed shutdown
- Redundant NGG overspeed shutdown
- ΔNGG alarm
- High T54 alarm
- High T54 shutdown
- Low T54 shutdown
- Low T54 delayed alarm
- Rejected thermocouple (TC)
- Too few thermocouples shutdown
- Thermocouple spread alarm
- Thermocouple spread shutdown
- Manual
- High firing fuel pressure shutdown
- Transmitter failure alarms
- Transmitter failure shutdowns
- Output failure shutdowns
- Control mode



**SCOPE OF SUPPLY - Continued**

**Controllers/special features:**

- Start-up controller for fuel valve
- T54 controller for fuel valve
- T54 acceleration controller for fuel valve
- EGT controller for fuel valve
- EGT rate of rise controller for fuel valve
- T54 controller
- T54 controller for inlet guide vanes (if applicable)
- Combustion monitoring system
- Dual fuel capability with on-line transfer

**Ramps:**

- Firing (lean lightoff) ramp
- Start-up ramp
- Loading ramp
- Cooldown ramp

**OPTIONS FOR COMPLETE CONTROL SYSTEM UPGRADE**

- Gas turbine sequencing and protection discrete logic
- Generator sequencing and protection discrete logic
- Communication interface to DCS or SCADA
- Human machine interface unit with WonderWare InTouch® licensed software package
- Complete custom engineered control panel, factory tested and ready to install
- Fuel valve system upgrade
- Inlet guide vanes actuator system upgrade or retrofit
- Thermocouple upgrade
- Flame sensor upgrade
- Vibration system upgrade
- Installation and commissioning
- Training

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