

## ADEM™ A4 Engine Controller

The ADEM™ A4 is the main Electronic Control Module (ECM) used on select diesel engines. The ADEM A4 is an integral part of the innovative ACERT® Technology that provides higher degree of control over a large number of combustion variables than ever before. The ADEM A4 is designed to control/interface Electronic Unit Injector (EUI) equipped engines. The ADEM A4 engine system is composed of the ADEM A4 ECM, control software, sensors, actuators, fuel injectors, and interface to the generator system. The prime benefit of an ADEM A4 engine system is to better control and maintain the particulate emissions, both steady state and transient, while improving engine performance.



### FEATURES

#### RELIABLE, DURABLE

*All ADEM A4 controllers are designed to survive the harshest environments.*

- Environmentally sealed, die-cast aluminum housing isolates and protects electronic components from moisture and dirt contamination.
- Rigorous vibration testing ensures product reliability and durability.
- Accuracy maintained from -40° C to 85° C
- Electrical noise immunity to 100 volts/meter
- Internal circuits are designed to withstand shorts to +battery and -battery.
- Atmosphere cooled

#### SIMPLE SERVICING

*Each ADEM A4 system works in combination with the Caterpillar® ET service tool software to keep the engine operating at peak performance.*

- Displays measured parameters
- Retrieves active and logged event code documenting abnormal system operation
- Performs calibrations and diagnostic tests
- Supports flash programming of new software into the ADEM A4 ECM

#### SELF DIAGNOSTICS

*Each ADEM A4 ECM has a full compliment of diagnostics. The ECM can detect faults in the electrical system and report those faults to the service technician for quick repair.*

- Self-diagnostic capability pinpoints operational problems in need of attention.

#### ADVANCED FEATURES

- Isochronous or droop speed control
- Enhanced performance from fuel injection timing and limiting
- Adjustable monitoring of vital engine parameters
- Idle/rated speed setting
- Programmable speed acceleration ramp rate
- Adjustable cooldown duration
- Data link interfaces
- Cat Data link
- CAN J1939

#### OPTIONAL FEATURES

- Ether control system support
- Remote monitoring and control support

## DESCRIPTION

The ECM is housed in an environmentally sealed casting. All wiring connections to the ECM are made using two sealed connectors: a single seventy-pin connector and a single one hundred twenty-pin connector.

## ENGINE SPEED GOVERNING

Desired engine speed is calculated by the ECM and held within  $\pm 0.2$  Hz for isochronous and droop mode. The ECM accounts for droop that is requested. The proper amount of fuel is sent to the injectors due to these calculations. The ECM also employs cooldown/shutdown strategies, acceleration delays on startup, acceleration ramp times, speed reference and a low/high idle switch is also available via communications to the EMCP 3.

## FUEL LIMITING

Warm and cold fuel-air ratio control limits are controlled by the ECM. Electronic monitoring system derates, torque limit, and cranking limit, programmable torque scaling, and cold cylinder cutout mode are standard features.

## FUEL INJECTION TIMING

Master timing for injection is controlled by the ECM control. Temperature dependencies are accounted for in the fuel injection calculations.

## ELECTRONIC MONITORING

Electronic monitoring of vital engine parameters can be programmed. Warning, derate, and shutdown event conditions may be customized by the user.

## INFORMATION MANAGEMENT

The ECM stores information to assist with electronic troubleshooting. Active and logged diagnostic codes, active events, logged events, fuel consumption, engine hours, and instantaneous totals aid service technicians when diagnosing electronic faults and scheduling preventive maintenance.

## CALIBRATIONS

Engine performance is optimized through injection timing. Auto/manual sensor calibrations are standard features.

## ON-BOARD SYSTEM TESTS

System tests are available to assist in electronic troubleshooting. These tests include: injector activation, injector cutout, and override of control outputs.

## DATA LINK INTERFACES

The ADEM A4 communicates with the EMCP 3 via the J1939 Communication network. Additionally, the ADEM A4 can communicate with the Cat ET electronic service tool and the PL1000E, PL1000T.

## ELECTRONIC SENSING

The following sensing is available on the ADEM A4: oil pressure, fuel pressure, fuel temperature, atmospheric pressure, air inlet temperature, turbo outlet pressure, engine coolant temperature, engine speed, throttle, position, exhaust temperature, engine control switch position, oil filter pressure differential, fuel filter pressure differential, air filter pressure differential, crankcase pressure, and remote e-stop switch position.

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## SPECIFICATIONS

### Humidity tolerance

0 to 90% relative humidity over operating temperature range

### Impervious to:

salt spray, fuel, oil and oil additives, coolant, spray cleaners, chlorinated solvents, hydrogen sulfide and methane gas, and dust

### Input and output protection

all inputs and outputs are protected against short circuits to +battery and -battery

### Input voltage range (24 VDC nominal)

18 to 32 VDC

### Mounting

engine mounted

### Reverse polarity protected

### Shock, withstands 20 g

### Temperature range

Operating: -40° C to 85° C (-40° F to 185° F)

Storage: -50° C to 120° C (-58° F to 248° F)

### Vibration

withstands 8.0 g @ 24 to 2 kHz

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