Kohler® Decision-Maker® 3000 Controller

General Description and Function

The Decision-Maker® 3000 generator set controller provides advanced control, system monitoring, and system diagnostics for optimum performance.

The Decision-Maker® 3000 controller meets NFPA 110, Level 1 when equipped with the necessary accessories and installed per NFPA standards.

The Decision-Maker® 3000 controller uses a patented hybrid voltage regulator and unique software logic to manage alternator thermal overload protection features normally requiring additional hardware. Additional features include:

- A digital display and pushbutton/rotary selector dial provide easy local access to data.
- Measurements selectable in metric or English units.
- The controller can communicate directly with a personal computer via a network or serial configuration using SiteTech™ or Monitor III software.
- The controller supports Modbus® protocol. Use with serial bus or Ethernet networks.
- Scrolling display shows critical data at a glance.
- Digital display of power metering (kW and kVA).
- Integrated hybrid voltage regulator providing ±0.5% regulation.
- Built-in alternator thermal overload protection.

Modbus® is a registered trademark of Schneider Electric.
**User Interface Controls and Components**

- Emergency stop switch
- Backlit LCD digital display with two lines of 12 characters *(see User Interface Displays for menus)*
- Alarm horn indicates generator set shutdown and warning faults
- Environmentally sealed membrane keypad with three master control buttons with lights
  - Off/Reset (red)
  - Auto (green)
  - Run (yellow)
- Pushbutton/rotary selector dial for menu navigation
  - Rotate dial to access main menus
  - Push dial and rotate to access sub menus
  - Press dial for 3 seconds to return to top of main menu
- Annunciator fault light
  - System shutdown (red)
  - System warning (yellow)
- Alarm silence/lamp test button
  - Alarm silence
  - Lamp test
- USB and RS-485 connections
  - Provides access for diagnostics
  - PC communication using SiteTech™ or Monitor III software
- Dedicated user inputs
  - Remote emergency stop switch
  - Remote 2-wire start for transfer switch
  - Auxilary shutdown
- Integrated hybrid voltage regulator
- Auto-resettable circuit protection mounted on circuit board.
- One relay output standard. Optional five relay output available.
- One analog and three digital inputs standard. Optional two inputs available.

**NFPA 110 Requirements**

In order to meet NFPA 110, Level 1 requirements, the generator set controller monitors the engine/generator functions/faults shown below.

- Engine functions:
  - Overcrank
  - Low coolant temperature warning
  - High coolant temperature warning
  - High coolant temperature shutdown
  - Low oil pressure shutdown
  - Low oil pressure warning
  - High engine speed
  - Low fuel level (level or pressure) *
  - Low coolant level
  - EPS supplying load
  - High battery voltage
  - Low battery voltage
- General functions:
  - Master switch not in auto
  - Battery charger fault *
  - Lamp test
  - Contacts for local and remote common alarm
  - Audible alarm silence button
  - Remote emergency stop *
- Function requires optional input sensors or kits and is engine dependent, see Controller Displays as Provided by the Engine ECM.

**User Interface Displays**

The listing below has ● denoting main menus and ○ denoting sub-menus.

- **Overview**
  - Software version
  - Active shut-downs and warnings (if any are present)
  - Engine run time, total hours
  - Average voltage line-to-line
  - Frequency
  - Average current
  - Coolant temperature
  - Fuel level or pressure *
  - Oil pressure
  - Battery voltage
- **Engine Metering**
  - Engine speed
  - Oil pressure
  - Coolant temperature
  - Battery voltage
- **Generator Metering**
  - Total power, VA
  - Total power, W
  - Rated power, %
  - Voltage, L-L and L-N for all phases
  - Current, L1, L2, L3
  - Frequency
- **GenSet Information**
  - Generator set model number
  - Generator set serial number
  - Controller serial number
- **GenSet Run Time**
  - Engine run time, total hours
  - Engine loaded, hours
  - Number of engine starts
  - Total energy, kWh
- **GenSet System**
  - System voltage
  - System frequency, 50 or 60 Hz
  - System phase, single or three (wye or delta)
  - Power rating, kW
  - Amp rating
  - Power type, standby or prime
  - Measurement units, metric or English (user selectable)
  - Alarm silence, always or auto only (NFPA 110)
  - Manual speed adjust *
- **GenSet Calibration**
  - Voltage, L-L and L-N for all phases
  - Current, L1, L2, L3
  - Reset calibration
- **Voltage Regulation**
  - Adjust voltage, ±10%
- **Digital Inputs**
  - Input settings and status
- **Digital Outputs**
  - Output settings and status
- **Analog Inputs**
  - Input settings and status
- **Event Log**
  - Event history (stores up to 1000 system events)
- **Selector Switch** (requires initial activation by SiteTech™)
  - Function requires optional input sensors or kits and is engine dependent, see Controller Displays as Provided by the Engine ECM.
Controller Features

- **AC Output Voltage Regulator Adjustment.** The voltage adjustment provides a maximum of ±10% of the system voltage.

- **Alarm Silence.** The controller can be set up to silence the alarm horn only when in the AUTO mode for NFPA-110 application or Always for user convenience.

- **Alternator Protection.** The controller provides generator set overload and short circuit protection matched to each alternator for the particular voltage/phase configuration.

- **Automatic Restart.** The controller automatic restart feature initiates the start routine and re crank after a failed start attempt.

- **Common Failure Relay.** This relay is integrated on the controller circuit board. Contacts are rated 2 amps at 32 VDC or 0.5 amp at 120 VAC.

- **Communication.** Controller communication is available.

- **Cyclic Cranking.** The controller has programmable cyclic cranking.

- **ECM Diagnostics.** The controller displays engine ECM fault code descriptions to help in engine troubleshooting.

- **Engine Start Aid.** The starting aid feature provides control for an optional engine starting aid.

- **Event Logging.** The controller keeps a record (up to 1000 entries) for warning and shutdown faults. This fault information becomes a stored record of system events and can be reset.

- **Historical Data Logging.** Total number of generator set successful starts is recorded and displayed.

- **Integrated Hybrid Voltage Regulator.** The voltage regulator provides ±0.5% no-load to full-load regulation with three-phase sensing.

- **Lamp Test.** Press the alarm silence/lamp test button to verify functionality of the indicator lights.

- **LCD Display.** Adjustable contrast for improving visibility.

- **Measurement Units.** The controller provides selection of English or metric displays.

- **Power Metering.** Controller digital display provides kW and kVA.

- **Programming Access (USB).** Provides software upgrades and diagnostics.

- **Remote Reset.** The remote reset function resets faults and allows restarting of the generator set without going to the master control switch off/reset position.

- **RSA II Remote Monitoring Panel.** The controller is compatible with the Kohler® Remote Serial Annunciator (RSA II).

- **Run Time Hourmeter.** The generator set run time is displayed.

- **Time Delay Engine Cooldown (TDEC).** The TDEC provides a time delay before the generator set shuts down.

- **Time Delay Engine Start (TDES).** The TDES provides a time delay before the generator set starts.

- **Voltage Selection Menu.** This menu provides the capability of quickly switching controller voltage calibrations. Requires initial activation using SiteTech™ software. **NOTE:** Generator set output leads require voltage reconnection.

Controller Functions

The following chart shows which functions cause a warning or shutdown. All functions are available as relay outputs.

**Warning** causes the fault light to show yellow and sounds the alarm horn signaling an impending problem.

**Shutdown** causes the fault light to show red, sounds the alarm horn, and stops the generator set.

### Controller Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Warning</th>
<th>Shutdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>System ready</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine started</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPS supplying load</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generator running</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input/output communication loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master switch not in auto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NFPA 110 alarm active</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote start</td>
<td></td>
<td></td>
</tr>
<tr>
<td>System ready</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generator Functions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC sensing loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternator protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground fault input *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kW overload</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locked rotor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overfrequency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overt voltage (each phase)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underfrequency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undervoltage (each phase)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Standard functions**
  - Available user functions
  - Function requires optional input sensors or kits and is engine dependent, see Controller Displays as Provided by the Engine ECM.
- **Items included with common fault shutdown**
Controller Displays as Provided by the Engine ECM (availability subject to change by the engine manufacturer)

<table>
<thead>
<tr>
<th>Display</th>
<th>GM/PSI</th>
<th>Doosan</th>
<th>John Deere (JDEC)</th>
<th>Volvo (EMS II)</th>
<th>Volvo (EDC III)</th>
<th>DD/MTU (ADEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Charge air pressure</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>Charge air temperature</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Coolant level</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coolant pressure</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Coolant temperature</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
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<td>X</td>
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<tr>
<td>Crankcase pressure</td>
<td>X</td>
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<td>X</td>
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<td>ECM battery voltage</td>
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<td>ECM fault codes</td>
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<tr>
<td>Engine model number</td>
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<tr>
<td>Engine serial number</td>
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<tr>
<td>Engine speed</td>
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<tr>
<td>Fuel pressure</td>
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<td>Fuel rate</td>
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<td>Oil level</td>
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<tr>
<td>Oil pressure</td>
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<tr>
<td>Oil temperature</td>
<td></td>
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<tr>
<td>Trip fuel</td>
<td>X</td>
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</tbody>
</table>

Controller Specifications

**Decision-Maker® 3000**—Software Version 3.11 or higher

- Power source with circuit protection: 12- or 24-volt DC
- Power drain: 200 milliamperes
- Humidity range: 5% to 95% noncondensing
- Operating temperature range: -40°C to +70°C (-40°F to +158°F)
- Storage temperature range: -40°C to +85°C (-40°F to +185°F)
- Standards:
  - CE Directive
  - NFPA 99
  - NFPA 110, Level 1
  - CSA 282-09
  - UL 508
  - ASTM B117 (salt spray test)
- Panel dimensions—W x H, 229 x 160 mm (9.0 x 6.3 in.)

**Communication and PC Software Available Options**

Refer to G6-76 Monitor III Software and the communication literature for additional communication and PC software information including Modbus® communication.

- Monitor III Software for Monitoring and Control (Windows®-based user interface)
- **Converter, Modbus®-Ethernet.** Supports a power system using controllers accessed via the Ethernet. Converter is supplied with an IP address by the site administrator. Refer to G6-79 for converter details.
- **Converter, RS-232/RS-485.** Supports a power system using controllers accessed via a serial (RS-232) connection.

**Decision-Maker® 3000 Available Options**

- **Float/Equalize Battery Charger** available with 6 or 10 amp DC volt output. The 10 amp models are available with and without NFPA alarm to signal a battery charger fault.
- **Manual Speed Adjust** available for applications using closed transition ATS.
- **Prime Power Switch** prevents battery drain during generator set non-operation periods and when the generator set battery cannot be maintained by an AC battery charger.
- **Remote Emergency Stop Switch** available as a wall mounted panel to remotely shut down the generator set.
- **Remote Monitoring Panel.** The Kohler® Remote Serial Annunciator (RSA) enables the operator to monitor the status of the generator set from a remote location, which may be required for NFPA 99 and NFPA 110 installations.
- **Run Relay** provides a relay indicating that the generator set is running.
- **Shunt Trip Wiring** provides relay outputs to trip a shunt trip circuit breaker and to signal the common fault shutdowns. Contacts rated at 10 amps at 28 VDC or 120VAC.
- **Two Input/Five Output Module** provides a generator set mounted panel with two inputs and five relay outputs.

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Windows® is a registered trademark of Microsoft Corporation.

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