

Applicable to the following models:
REZGT and REOZT4 Mobile
REOZK4 and REOZJ4 Stationary

Kohler® Decision-Maker® 3500 Controller

General Description and Function

The Decision-Maker® 3500 generator set controller provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.

The Decision-Maker® 3500 controller meets NFPA 110, Level 1 when equipped with the necessary accessories and installed per NFPA standards.

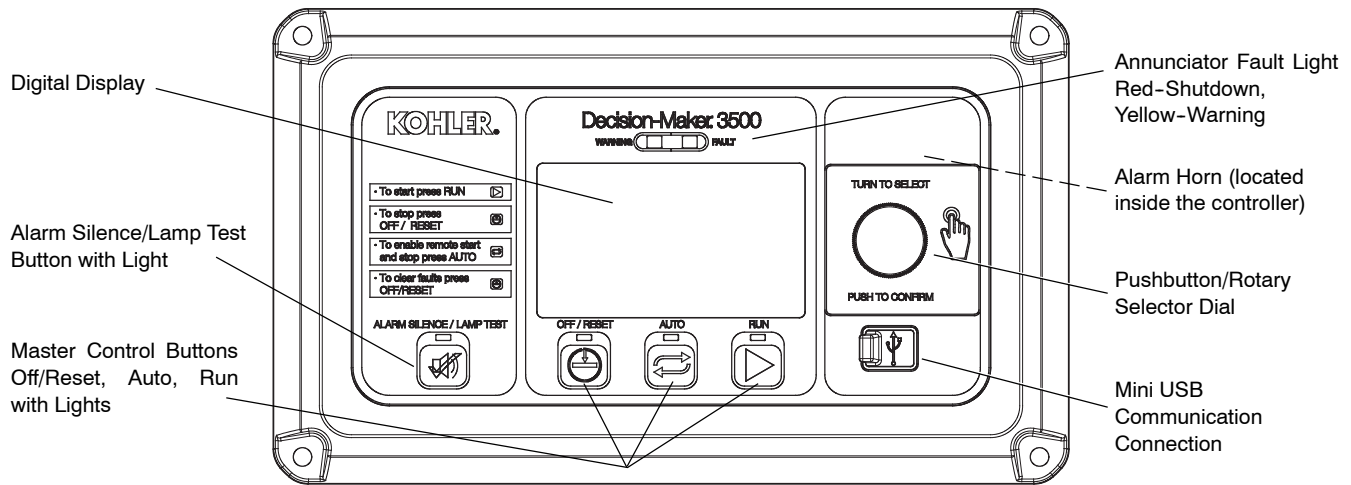


Decision-Maker® 3500

Controller features

- A digital display and pushbutton/rotary selector dial provide easy local access to data.
- The controller supports Modbus® protocol. Use with serial bus or Ethernet networks.
- Integrated hybrid voltage regulator providing $\pm 0.5\%$ regulation.
- Built-in alternator thermal overload protection.
- Encapsulated to protect against dust and dirt with sealed connectors.
- Isochronous (real and reactive) load sharing with other Decision-Maker® 3500 controller equipped generator sets.
- Random first-on logic to prevent two or more generator sets from closing to a dead bus.
- Automatic synchronizer with dead bus closing.
- Soft loading and unloading.
- Integrated Generator Management with Runtime Hour and Fuel Level Equalization
- Integrated Load Management with six priorities.

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Controller Specifications

Decision-Maker® 3500

- Power source with circuit protection: 12- or 24-volt DC
- Power drain: 200 milliamps at 24 volts, 400 milliamps at 12 volts
- Humidity range: 5% to 95% condensing
- 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.)

NFPA 110 Requirements

In order to meet NFPA 110, Level 1 requirements, the generator set controller monitors the engine/generator functions and 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—diesel or pressure—gas) *
 - 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

* Functions require optional input sensors or kits and are engine dependent, see Controller Displays as Provided by the Engine ECM.

† Requires optional RSA for standard NFPA 110 outputs.

‡ Can be disabled for manually operated generator sets.

User Interface Controls and Components

- Backlit LCD digital display with five lines of 35 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
 - Annunciator fault light
 - System shutdown (red)
 - System warning (yellow)
 - Alarm silence/lamp test button
 - Alarm silence
 - Lamp test
 - USB and RS-485 connections
 - Allows software upgrades
 - Provides access for diagnostics
 - PC communication using SiteTech™
 - Dedicated user inputs
 - Remote emergency stop switch
 - Remote 2-wire start for transfer switch
 - Auxiliary shutdown
 - Integrated hybrid voltage regulator
 - Auto-resettable circuit protection mounted on circuit board
 - Six programmable isolated resistive sensor analog inputs §
 - Six programmable isolated digital inputs §
 - Three programmable isolated differential voltage analog inputs §
 - Four programmable relay driver digital outputs §
 - Two isolated RS-485 ports (Modbus® and PGen)
 - One CAN port for optional accessories and/or compatible devices
- § The available number of analog and digital inputs/outputs vary by generator set model.

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Paralleling Functions

- Bus sensing
- First on logic
- Synchronizing
- Communication-based isochronous load sharing
- Droop reactive load sharing
- External controlled load sharing via speed and voltage bias signals

Controller Features

- **AC Output Voltage Regulator Adjustment.** The voltage adjustment provides a maximum of $\pm 10\%$ 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 via Ethernet network or serial configuration connection.
- **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 configurable starting aid feature provides customized 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 $\pm 0.5\%$ 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.
- **Power Metering.** Controller digital display provides voltage, current, power factor, kW, kVA, and kVAR.
- **Programming Access (USB).** Provides software upgrades and diagnostics with PC software tools.
- **Remote Reset.** The remote reset function supports acknowledging and resetting faults and allows restarting of the generator set without going to the master control switch off/reset position.
- **RSA Remote Monitoring Panel.** The controller is compatible with the Kohler® Remote Serial Annunciator.
- **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 to switch the generator output voltage. Requires initial activation using SiteTech™ software. **NOTE:** Generator set output leads may require voltage reconnection.
- **Voltage Selector Switch Support.** The target voltage and alternator protection can be automatically updated based on digital inputs reflecting position of the voltage selector switch.

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.

	Warning Function	Shutdown Function
Engine Functions		
Critically high fuel level (diesel units) *	○	
ECM communication loss		●
ECM diagnostics	●	●
ECM faults (model/address mismatch)		●
Engine over speed		●†
Engine under speed		●
Fuel tank leak (diesel units) *	○	○
High battery voltage	●	
High coolant temperature	●	●†
High fuel level (diesel units) *	○	
Low battery voltage	●	
Low coolant level		●
Low coolant temperature	●	
Low cranking voltage	●	
Low engine oil level *	○	○
Low fuel level (diesel-powered unit) *	○	○
Low fuel pressure (gas units) *	○	
Low oil pressure	●	●†
No coolant temperature signal		●
No oil pressure signal		●
Overcrank		●†
Speed sensor fault	●	
General Functions		
Auxiliary inputs (analog or digital)	○	○
Battery charger fault *	●	
Common fault (includes †)		●
Common warning	●	
Default parameters loaded	●	
Emergency stop		●†
File system error (controller firmware)		●
Input/output communication loss	●	
Internal failure		●
Master switch not in auto	●	
Metering communication loss		●
Generator Functions		
AC sensing loss	●	●
Alternator protection		●
Ground fault input *	●	
kW overload		●
Locked rotor (failed to crank)		●
Overfrequency		●
Overvoltage (each phase)		●
Underfrequency		●
Undervoltage (each phase)		●
(Voltage) regulator comm. loss		●

● Standard functions

○ Available user functions

* Functions require optional input sensors or kits and are engine dependent, see Controller Displays as Provided by the Engine ECM.

† Items included with common fault shutdown

User Interface Displays

The listing below has ● denoting main menus

Metering Menu

- Generator Metering
- Engine Metering
- Battery Charger Meter
- Overview—Non-Tier Applications (with graphical icons)
- Overview—Tier IV Applications (with graphical emissions icons)
- Paralleling Metering

Generator Information Menu

- Generator Information
- Event History
- Generator Configuration
- Protection Configuration
- Battery Charger Configuration
- Voltage Regulation
- Voltage Selector Switch
- Paralleling Operation
- Emissions Information

Controller Configuration Menu

- Controller Configuration
- Communication Setup
- Calibration

Input/Output (I/O) Menu

- Analog Resistive Input Setup
- Analog Differential Input Setup
- Digital Input
- Digital Output

Controller Displays as Provided by the Engine ECM (availability subject to change by the engine manufacturer)			
Display	GM/PSI	Kohler KDI	John Deere (JDEC)
Charge air pressure	X	X	
Charge air temperature	X	X	X
Coolant temperature	X		X
ECM battery voltage	X		
ECM fault codes	X		X
Engine model number			X
Engine serial number			X
Engine speed	X	X	X
Fuel rate	X	X	X
Fuel temperature		X	X
Oil pressure	X		X

Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator set distributor for availability.

Decision-Maker® 3500 Available Options

- Fifteen Relay Dry Contacts** provide a generator set mounted panel with up to fifteen relay outputs to signal various customer-provided devices.
- Float/Equalize Battery Charger** available with 6 or 10 amp DC volt output. Models are available for NFPA capatibility.
- 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.

Communication and PC Software Available Options

- 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.

Mobile Paralleling System

Refer to G6-148 Mobile Generator Set Paralleling Box (GM88594-KP1-QS) for details about the mobile paralleling box features and benefits.

- Mobile Paralleling Box** allows connection of two Kohler® mobile generator sets to one distribution bus. The paralleling box provides contactors to connect to and disconnect from the bus, eliminating the need for motorized breakers for each generator set.

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