KOHLER. Power Systems

Generator Set Controller

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

APM802 Controller

Kohler® APM802 Controller

General Description and Function

The generator set controller provides advanced control, system monitoring, and system diagnostics for optimum performance.

The controller meets NFPA 110, Level 1 when equipped with the necessary accessories and installed per NFPA standards.

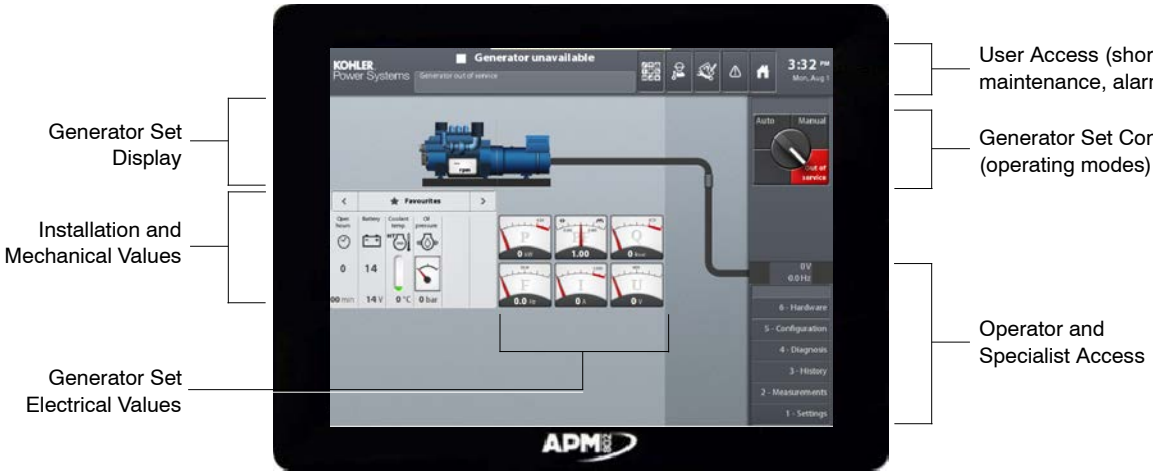
The controller uses software logic to manage alternator thermal overload protection features normally requiring additional hardware. Additional features include:

- 12-inch touchscreen with backlight and wide viewing angle provides easy local access to data.
- System settings are password-protected.
- Measurements selectable in metric or English units.
- User language is selectable:
  - English
  - French
  - Spanish
  - German
  - Portuguese
  - Dutch
  - Russian
  - Norwegian
- Graphic displays show generator set mechanical values including operating hours, fuel level*, battery voltage, coolant temperature, oil pressure, and oil temperature.
- Meter displays provide a visual representation of generator electrical values including power (kW), power factor, reactive power (kVAR), frequency, voltage, and current (amps).
- Two USB ports allow connection of a flash drive, mouse, or keypad.
- Electrical data, mechanical data, and system settings can be saved to a flash drive.
- Recording feature allows data collection of key values.
- Ethernet port allows connection to a PC type computer and/or Ethernet switch.
- Serial (RS-485) port.
- The controller supports Modbus® RTU and TCP protocols.
- Real time clock with battery back-up.
- See page 2 for input and output specifications.

Modbus® is a registered trademark of Schneider Electric.

* Where applicable

Operating Screen



Controller Specifications

- Power Supply Requirements:
  - Nominal voltage: 24 VDC, reverse polarity protected, and
  - 208–240 VAC/60Hz or 230VAC/50 Hz customer-supplied; factory wiring to basic electrical package available
- Operating Temperature: –40°C to 70°C (–40°F to 158°F)
- Storage Temperature: –40°C to 70°C (–40°F to 158°F)
- Humidity: 5% to 95% non-condensing
- Protection Index:
  - IP65 Front
  - IP20 Rear
- Standards
  - NFPA 99
  - NFPA 110, Level 1
  - CSA 282-09
  - UL 508
  - IEC/EN60068-2-52 (salt spray)
  - CE Directive

Display and Touchscreen

- Type: XGA TFT LED LCD
- Screen Size: 305 mm (12 inches)
- Viewing Angle: 140/140 (H/V°)

Inputs/Outputs and Communication

- Ethernet Port: (1) Category 5E for Modbus TCP, VNC, and configuration
- USB Ports: (2) Type A USB connector for flash drive, keyboard, or mouse
- Serial (RS-485) Port: (1) Shielded cable, Modbus RTU
- Digital Inputs: (7) Binary input, connections to ground or 24 VDC
- Resistive Input: (1) 0–500 Ohms
- Analog Input: (1) ±10 VDC/±20 mA, isolated
- Digital Outputs: (3) Form C, 240 VAC/8 A or 30 VDC/8 A or 48 VDC/0.5 A
- Digital Outputs: (3) Form A, 240 VAC/8 A or 30 VDC/8 A or 48 VDC/0.5 A
- Customer Connections: Remote emergency stop, battery power, AC power, and ground

Controller Diagnostics

The controller displays warning and shutdown messages on the HMI screen. See the table below.
Warnings (alarms) signal an impending problem.
Shutdowns (faults) stop the generator set.

Description	Warning	Shutdown
Alternator bearing temperature fault		X
Alternator bearing temperature warning	X	
Alternator winding temperature fault		X
Alternator winding temperature warning	X	
Analog sensor fault input AI #0	X	
Analog sensor fault input AI #1	X	
Analog sensor fault input AI #2	X	
APM internal battery warning	X	
APM802 watchdog		X
Battery charger fault	X	
Common warning	X	
Common fault		X
Emergency push button engaged fault		X
Engine CAN bus communication fault		X
Engine coolant temperature fault		X
Engine coolant temperature warning	X	
First starter warning	X	
Fuel daily tank very high level warning	X	
Fuel leak alarm	X	
Fuel level critically low		X
Genset output greater than 80% of rated	X	
GFCI tripped		X
High battery voltage	X	
High fuel level	X	
Idle mode cancelled before idle timeout	X	
Kohler thermal overload fault		X
Load shed 1 active	X	
Load shed 2 active	X	
Load shed 3 active	X	
Load shed 4 active	X	
Low battery voltage	X	
Low controller temperature	X	
Low coolant temperature warning	X	
Low cranking voltage	X	
Low engine coolant level fault		X
Low oil level warning	X	
Low fuel level	X	
Lube-oil pressure fault		X
Lube-oil pressure warning	X	
Lube-oil temperature fault		X
Lube-oil temperature warning	X	
Not in auto warning	X	
Overcrank		X
Over current fault (51)		X
Over frequency fault (81H)		X

Description	Warning	Shutdown
Over speed fault		X
Over voltage fault (59)		X
Overload active power warning (32PH)	X	
Overload reactive power warning (32QH)	X	
Power plant out of service fault		X
Regulation module 1 communication fault		X
Reverse active power fault (32RP)		X
Reverse reactive power fault (32RQ)		X
Speed detection fault		X
Speed detection first starter warning	X	
Speed detection second starter warning	X	
Under frequency fault (81I)		X
Under speed fault		X
Under voltage fault (27)		X

NFPA Requirements

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

NFPA 110 Common Alarm

- Engine functions:
  - Overcrank
  - Low coolant temperature warning
  - High coolant temperature warning
  - High coolant temperature shutdown
  - Low oil pressure shutdown
  - Low oil pressure warning
  - Overspeed
  - Low fuel (level or pressure) *
  - Low coolant level
  - EPS supplying load
  - High battery voltage
  - Low battery voltage
  - Low cranking voltage
- General functions:
  - Not in auto
  - Battery charger fault *
  - Contacts for common alarm and common fault
  - Audible alarm silence switch
  - Remote emergency stop

* Function requires optional input sensors or kits.

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Inputs and Outputs

Factory settings for the main board inputs and outputs are shown below.

Inputs	Input Type
Aux Shutdown	Digital Inputs
Aux Warning	
Battery Charger Fault	
Breaker Open Status	
Emergency Stop	
Fuel Leak Alarm	
GFCI Tripped	
High Fuel Level Switch	
Idle Mode	
Key Switch Enable	
Load Shed Enable	
Low Fuel Level Switch	
Low Oil Level	
Overcrank Test	
Remote Reset	
Remote Speed Adjust Enable	
Remote Start	
Remote Speed Adjust (+/- 10 VDC)	Analog Input
Ambient Air Temperature	Resistive Input

Digital Outputs	Output Relay Configuration
BCA Excitation	Form A
ECU Fault Reset	
EPS supplying Load	
Generator Running	
High Coolant Temp	
Horn	
Low Coolant Level Fault	
Low Coolant Temp Warning	
Low Fuel Level	
Low Oil Pressure	
Not in Auto	
Shunt Trip	
Start Button Illuminate	
Watchdog	
Common Fault	Form C
Common Warning	
System Ready	

Available Options

- ❑ **AC Wiring.** Factory connection to the basic electrical package (BEP).
- ❑ **Analog Input/Output Module.** Provides:
  - 4 input connections -(0-20 mA/100 ohms) and
  - 2 output connections (0-20 mA/100-600 ohms).

  One analog I/O module can be connected.
- ❑ **Digital Input/Output Module.** Provides:
  - 8 input connections with connection to ground and
  - 4 output connections (Form C, 240 VAC/8 A or 30 VDC/8 A or 48 VDC/0.5 A).

  One digital I/O module can be connected.
- ❑ **Keyswitch with Manual Start/Stop Button**
  - Key switch allows selection of manual, auto, or off modes
  - Start/stop button for engine control in manual mode
- ❑ **Load Shed**
  - Provides 4 load shed outputs for non-critical loads
  - Load shed connections are form C dry contacts
- ❑ **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.
- ❑ **Shunt Trip Relay, 24 VDC.** Provides relay outputs to trip a shunt trip circuit breaker and to signal common fault shutdowns. Contacts are rated 8 Amps at 30 VDC.

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