Genset control
KEA 350 / KEA 350 RP

Data sheet

KEA 3X0 is also available for back panel installation with touch screen remote panel.

General

With the genset controls of KEA 350 Series standards are raised in genset paralleling control and power management system. These controllers come with standardized software that is simple to configure, yet easily customized for individual applications. Enhanced connectivity enables fast, reliable and secure interfacing to other controls and communications systems.

KEA 350 with a dedicated CANopen network for connectivity to up to 16 LS-5 Circuit Breaker Controls, enables control of complex distribution systems having multiple utility feeds and tie breakers, and parallel load sharing of up to 32 generators on up to 32 different bus segments. Redundant load sharing is selectable using Ethernet B and C networks for improved reliability. The control combines complete engine-generator control and protection with advanced, peer-to-peer paralleling functionality and innovative features in a robust, attractive, user-friendly and all-in-one package. The KEA 350 controls are designed to direct connect up to 690Vac and operate to 4000m above sea level without derating.

KEA 350 is available in two packages. Version P1, focused at complex paralleling applications provides redundant Ethernet communication, LS-5 connectivity, and standard I/O set. The Co-Gen/CHP model, Version P2, offers expanded onboard I/O set, 3-ph busbar voltage measurement capability and an interface expansion card slot for an additional interface/protocol. These packages are available without a display in a rugged metal housing suitable for back panel installations (KEA 350RP-P1 and KEA 350RP-P2 respectively). A touch screen remote panel (RP 300) complements them as an operator control panel. A special version of KEA 350 (KEA 350 P1 (LT) and KEA 350 P2 (LT) is designed to operate down to -40 °C for outdoor applications.

Function overview

- Premium genset control for complex paralleling applications of up to 32 gensets and up to 16 MCB/GGB/Tie Breakers in
  - Prime Power & Cogeneration (CHP)
  - Peak shaving operation
  - Emergency operation
  - Import/Export operation
  - Islanded & Utility parallel operation
- Integrated Generator Group Breaker (GGB) control
- Run-Up Synchronization
- Master or Slave control capability
- Complete engine, generator and utility protection
- Up to 9 communication ports: 3xEthernet, 3xCAN (CANopen and J1939), RS-485, USB, Interface expansion card
- Customizable logic, HMI screens, and alarms
- Dedicated low temperature display variants
- UL 61010, UL 6200, RoHs2 and marine (ABS, LR) compliance

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Easy-to-use software tools simplify configuring the genset controls of KEA 3X0 series while making it easy to customize the unit for specific applications.

FlexApp™ – This feature provides the tools to easily configure the number of operated breakers: None, Generator Circuit Breaker (GCB), and Mains Circuit Breaker (MCB).

LogicsManager™ & AnalogManager™ (LM & AM) – LM/AM enables to customize the operation sequences and adapt them to specific needs. The LM/AM accomplishes this by handling a range of measuring values and internal states, which are combined logically with operators and programmable timers and can be cascaded through. This enables to create and/or modify control and relay functions.

FlexIn™ – The analog inputs are configurable to operate with variable resistance sensors (0 to 2000 Ω), (0 to 1V) and/or 0 to 20 mA senders.

Flexible Outputs – Speed and voltage bias outputs are configurable to function with all speed governors and voltage regulators. The outputs can also be used as freely scalable outputs (e.g. for driving external meters).

FlexCAN™ – Advanced network interfaces ensure unsurpassed control performance – from engine control up to total plant operation. The KEA 3X0 series is capable of working with common industrial interfaces, including Ethernet, CAN, USB, and RS-485. The multiple communication proto-cols permit the KEA 3X0 series controls to communicate with a vast majority of engine control units (ECUs), external I/O boards, and PLCs. Modbus TCP, CANopen, SAE J1939, and Modbus RTU are supported.

DynamicsLCD™ – The adaptive and interactive 5.7", 320x240 pixel sharp color graphical LCD display with soft keys and a clear menu structure ensures intuitive user operation and navigation. Customizable screens provide flexibility to program and visualize frequently used data at the press of a button. The face plate with tactile and illuminated buttons enhances the aesthetics and ergonomics of push button operation.

Features

- Full connectivity of up to 32 Generators and 16 LS-5 circuit breaker controls in one application
- Run-up synchronization / Dead Field Paralleling to quickly get several synchronous generators onto the load
- Three-phase true RMS power sensing with Class I accuracy
- Operation modes: AUTO, STOP, MANUAL, and TEST - accessible through face plate or discrete input
- Breaker control: Slip frequency / phase matching synchronization, open / close control, breaker monitoring
- Load transfer: open / closed transition, interchange, soft loading / unloading, Utility parallel
- Load share and device to device communication over CAN or Ethernet (Redundant possible)
- Remote control via interface (Modbus TCP, Modbus RTU) and via discrete/analog inputs for adjusting speed, frequency, voltage, power, reactive power, and power factor set points
- Freely configurable PID controllers for various control purposes, such as heating circuit control (CHP applications), water level, fuel level, pressure and / or other process variables
- Direct support to several ECUs: Scania S6, MTU ADEC ECU7/8/9, Volvo EMS2 & EDC4, Deutz EMR2 & EMR3, MAN MFR / EDC7, SISU EEM, Cummins and Woodward EGS02 ECU
- Field ECU support and additional I/O expansion board connectivity through sequencer files
- “System Update” function for online troubleshooting and adding / removing generator sets
- Time / Date synchronization over Simple Network Time Protocol (SNTP)
- Cylinder head / exhaust temperature monitoring (Temperatures come from J1939 or CANopen devices)
- ToolKit™ software for flexible setup from a single connection to the network. The ToolKit can be accessed either via USB, or via Ethernet, or via CAN ports.
- Multi-lingual capability: English, German, Spanish, French, Italian, Portuguese, Japanese, Chinese, Russian, Turkish, Polish, Slovakian, Finnish, Swedish.

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Related products

- Circuit Breaker Controller LS-511/521 & LS-512/LS-522
  (Product Specification # 37522 and # 37661/37663)
- Remote Panel RP 300 (Product Specification # 37592): P/N 2A300R0700
- ToolKit (Product Specification # 03366)
- I/O Expansion Board IKD1 (Product Specification # 37171): P/N 2RIKD1M000
- Engine Speed Control actiVgen (Product Specification # 03419): P/N 2DVGEN0000
- Load Share Gateway LSG (Product Specification # 37451)
- Electronic Pickup Unit EPU-100 (Product Specification # 37562): P/N 2DEPU10000
- CANbus based Remote Annunciator easYlite 100 (Product Specification # 37279): P/N 2A300REL06
- Power Generation Learning Module (Product Specification # 03412): P/N 2SPGLM0000
- Profibus Gateway ESEPRO (Application Note # 37577): P/N 2GESEPRO00
- Ethernet (Modbus/TCP) Gateway ESENET (Application Note # 37576): P/N 2GESENET00
- CANbus to Fiber Optic Converters (Application Note # 37598):
  DL-CAN P/N 2GDLCANS00 and DL-CAN-R P/N 2GDLCANR00
- Remote Access Gateway (with HMS Netbiter EasyConnect EC250 and EC350)
- Thermocouple Scanner AXIOMATIC AXTC20
- WAGO and Phoenix expansion CAN couplers

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Technical Data

General	
Power supply	12/24 V- (8 bis 40 V–)
Intrinsic consumption	max. 22 W (LT: max. 32 W)
Ambient temperature (operation)	-20 to 70 °C (LT: -40 to 70 °C)
Ambient temperature (storage)	-30 to 80 °C
Ambient humidity	95 %, non-condensing
Voltage (software configurable)	**(⅄/Δ)**
100 Vac Rated (V_{rated})	69/120 V~
Max. value (V_{max})	86/150 V~
and 400 / 600 Vac Rated (V_{rated})	400/690 V~
Max. value (V_{max})	520/897 V~
Rated surge volt. (V_{surge})	6,0 kV
Accuracy	Class 0,5
Measurable alternator windings	3p-3w, 3p-4w, 3p-4w OD, 1p-2w, 1p-3w
Setting range primary	50 to 650.000 V~
Linear measuring range	1,25 × V_{rated}
Measuring frequency	50/60 Hz (30 bis 85 Hz)
High Impedance Input; Resistance per path	2,5 MΩ
Max. power consumption per path	< 0,15 W
Current (Isolated, software configurable)	
Rated (I_{rated})	1A or 5A
Linear measuring range	$I_{gen} = 3.0 \times I_{rated}$
	$I_{mains/ground} = 1.5 \times I_{rated}$
Setting range	1 to 32,000 A
Burden	< 0.10 VA
Rated short-time overcurrent (1 s)	[1] 50×I_{rated}, [5] 10×I_{rated}
Accuracy	Class 0.5
Power	
Setting range	0.5 to 99,999.9 kW/kvar
Accuracy	Class 1.0
Discrete inputs	isolated
Input range	12/24 V_{DC} (8 to 40 V_{DC})
Input resistance	approx. 20 kOhms
Transistor outputs (P2 only)	isolated
Rated switching voltage	max. 24 V_{DC}
Maximum switching voltage	40 V_{DC}
Maximum switching current	300 mA DC
Isolation Test voltage (<1s)	500 V_{AC}
Isolation voltage (continuously)	100 $V_{AC/DC}$
Relay outputs	isolated
Contact material	AgCdO
Load (GP)	2,00 A~@250 V~/ 2,00 A–@24 V– / 0,36 A–@125 V– / 0,18 A–@250 V–

* 3 phase 3 wire - Δ constellations are limited to 600 VAC system

Analog inputs (isolated)	freely scalable
Type 1	0 to 1 V / 0 to 2000 Ohms / 0 to 20 mA
Resolution	16 Bit
Maximum permissible voltage against genset Ground	9 V
Maximum permissible voltage between genset Ground & PE	100 V
Type 2 (P2 only)	0 to 10 V / 0 to 20 mA
Resolution	14 Bit
Maximum permissible voltage against PE (Ground)	100 V
Maximum differential voltage to other DC Analog Inputs	15 V
Type 3 (P2 only)	0 to 250 Ohms / 0 to 2500 Ohms
Resolution	14 Bit
Maximum permissible voltage against PE (Ground)	100 V
Maximum differential voltage to other DC Analog Inputs	10 V
Analog outputs (isolated)	freely scalable
Type 1	± 10 V / ± 20 mA / PWM
Basic insulation voltage (continuously, AVRout)	500 VAC
Reinforced insulation voltage (continuously, AVRout)	300 VAC
Insulation voltage (continuously, Govout)	100 VAC
Resolution	12 Bit
Output ± 10 V (scalable)	internal resistance
Output ± 20 mA (scalable)	maximum load 500 Ohms
Type 2 (P2 only)	0/4 to 20 mA
Insulation voltage (continuously)	100 VAC
Insulation voltage (test; >2 s)	1700 VAC
Resolution	12 Bit
Output	maximum load 500 Ohms
Housing Front panel flush mounting	Plastic housing
Dimensions WxHxD	282 × 216 × 96 mm
Front cutout WxH	249 [+1.1] × 183 [+1.0] mm
Connection	screw/plug terminals 2.5 mm²
Front	insulating surface
Sealing	
Front	IP66 (with screw fastening)
Front	IP54 (with clamp fastening)
Back	IP20
Weight	approx. 1,890 g (P1) / 2.560 g (P2)
Housing Back panel mounting	Powder Coated Sheet metal housing
Dimensions B x H x T P1:	250 × 228 × 50 mm
P2:	250 × 228 × 84 mm
Connection	screw/plug terminals 2,5 mm²
Protection system	IP20
Weight	approx. 1.630 g (P1) / ca. 2480 g (P2)
Disturbance test (CE)	tested according to applicable IEC standards
Listings	CE, UL, EAC, VDE-AR-4105/4110, CSA
Marine	LR (Type Approval), ABS (Type Approval)

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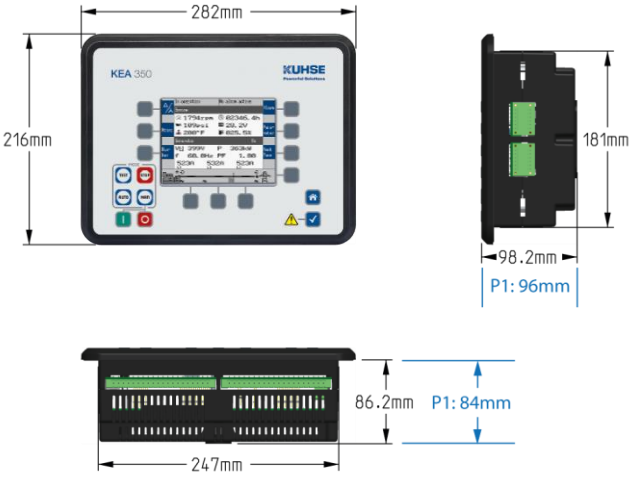
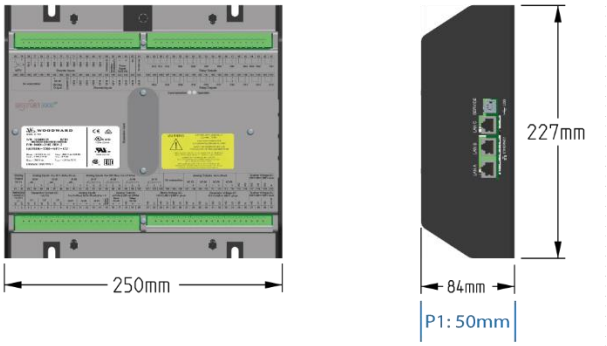
Dimensions

Plastic housing for front panel mounting

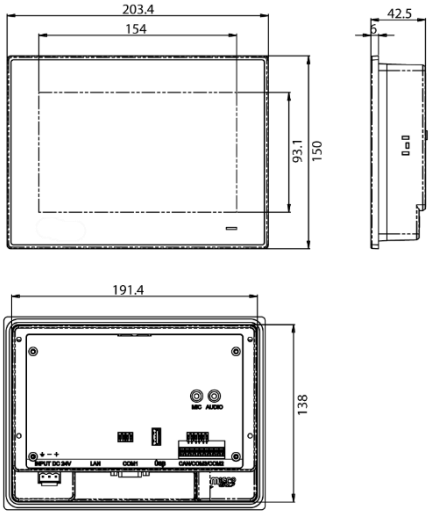


Metal housing for cabinet mounting

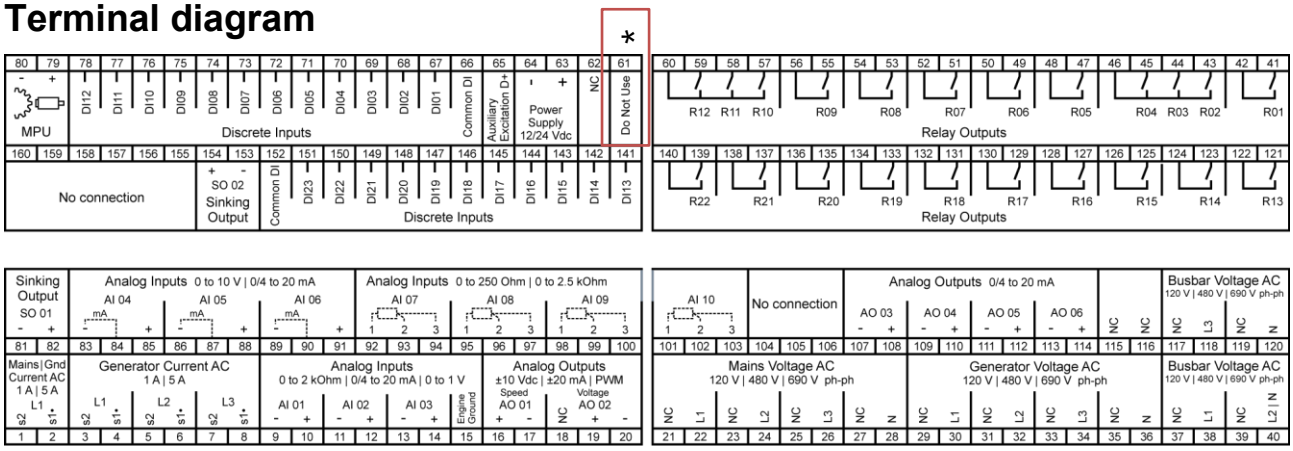


P1 is more compact (note depth/height in **blue**)

Remote Panel



Terminal diagram



P2: Pins 01 – 160 as shown above; P1: Pins 01 – 80 only!

* Pin 61
KEA 350 RP: No connection
KEA 350: Protective earth

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Function overview

	KEA 3X0 Series			
Variant	**350 RP**	**350 RP**	**350**	**350**
Package	P1	P2	P1	P2
Measuring				
Generator voltage (3-phase/4-wire)	120 / 480 / 690 V AC			
Generator current (3x true r.m.s.)	1 / 5 A			
Mains voltage (3-phase/4-wire)	120 / 480 / 690 V AC			
Mains or ground current (1x true r.m.s); Mains or ground current (selectable)	1 / 5 A			
Busbar voltage	2-phase	3-phase	2-phase	3-phase
	120 / 480 / 690 V AC			
Control				
Generator breaker control	✓			
Mains breaker control	✓			
Generator group breaker	✓			
Run-Up Synchronization	✓			
No of supported LS-5-devices [#1] (1 or 2 breaker controls)	16			
Breaker control logic (open and closed transition <100 ms)	3			
Automatic, Manual, Stop, and test operating modes	✓			
Single and multiple-unit operation	✓			
Mains parallel multiple-unit operation (up to 32 units)	✓			
AMF (auto mains failure) and stand-by operation	✓			
Critical mode operation	✓			
GCB and MCB synchronization (±slipping / phase matching)	✓			
Import / export control (kW and kvar)	✓			
Load-dependent start/stop	✓			
n/f, V, P, Q, and PF control via analog input or interface	✓			
Load/var sharing for up to 32 gensets	✓			
Freely configurable PID controllers	3			
HMI				
Display	remote		integrated	
Color Display with Softkey operation	-		✓	
Start/stop logic for diesel / gas engines	✓			
Counters for operating hours / starts / maintenance / active/reactive energy	✓			
Configuration via PC (serial connection and ToolKit software (included))	✓			
Event recorder entries with real time clock (battery backup)	1000			
Operating Temperature	-40 bis 70 °C		(-40/)-20 bis 70 °C	

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Variant		**350 RP**	**350 RP**	**350**	**350**
Package		P1	P2	P1	P2
Protection	**ANSI**				
Generator: voltage / frequency	59/27/81O/81U				
Generator: overload, reverse/reduced power	32/32R/32F				
Generator: Synch Check	25				
Generator: unbalanced load	46				
Generator: instantaneous overcurrent	50				
Generator: time-overcurrent (IEC 255 compliant)	51/51V				
Generator: ground fault (measured ground current)	50G				
Generator: power factor	55		✓		
Generator: rotation field					
Engine: overspeed / underspeed	12/14				
Engine: speed / frequency mismatch					
Engine: D+ auxiliary excitation failure					
Engine: Cylinder temperature					
Mains: voltage / frequency / synch check	59/27/81O/81U/2				
Mains: phase shift / rotation field / ROCOF (df/dt)	78				
Busbar: voltage / frequency / Phase Rotation		✓/✓/-	✓/✓/✓	✓/✓/-	✓/✓/✓
I/Os					
Internal digital I/O expansion board		-	✓	-	✓
Speed input: magnetic / switching; Pickup			✓		
Battery voltage monitor			1		
Discrete alarm inputs (configurable)		12 (9)	23 (20)	12 (9)	23 (20)
Discrete outputs, configurable		max. 12	max. 22	max. 12	max. 22
External discrete inputs / outputs via CANopen			32/32		
Analog inputs [#3], configurable		3	10	3	10
Analog outputs: +/- 10V, +/- 20mA, PWM; configurable		2	2	2	2
Analog outputs: 0-20mA, (0-10V with external 500 Ω resistor)		-	4	-	4
External analog inputs / outputs via CANopen			16 / 4		
Display and evaluation of J1939 analog values, “supported SPNs”			100		
CANbus communication interfaces [#2, #3]			3		
Ethernet Modbus TCP Slave interface [#3]			3		
USB Serial interface			1		
RS-485 Modbus RTU Slave interface			1		
Listings/Approvals					
CE Marked, VDE-AR-4105/4110, EAC			✓		
Part Numbers					
Front panel mounting with display [#4]		-	-	2A350CS100	2A350CS200
Cabinet back mounting without display		2A350RS100	2A350RS200-		
Spare connector kit		2A350PS100	2A350PS200	2A350PS100	2A350PS200

#1 The KEA 350/LS5 communication system allows up to 48 members on the bus. If the KEA count is reduced from 32, the LS-5 count can be increased (up to 32).
#2 CAN#2 freely selectable during configuration between CANopen or J1939; please feel free to request more information
#3 selectable senders: VDO (0 to 180 Ohm, 0 to 5 bar), VDO (0 to 180 Ohm, 0 to 10 bar), VDO (0 to 380 Ohm, 40 to 120°C), VDO (0 to 380 Ohm, 50 to 150°C), Pt100, Pt1000, resistive input (one- or two-pole, 2pt. linear or 9pt. user defined)
#4 a screw and a clamp kit are delivered with the unit for fastening

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