



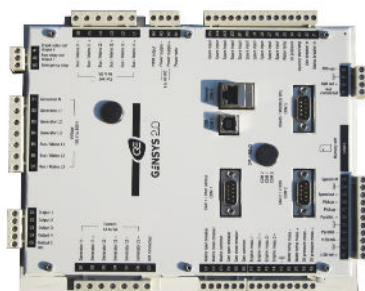
# GENSYS 2.0 RANGE

Paralleling unit with integrated PLC

The **GENSYS 2.0** is a control unit designed for generator electrical panels. It combines all necessary functions:

- Automatic transfer on mains failure, engine start/stop and protection.
- Alternator control and protection.
- Mechanical and electrical parameters display, generator synchronization and load sharing by kW & kVAR control.
- Manual and automatic paralleling with mains (frequency, phase, voltage).
- kW power management with several modes, permanent paralleling in base load & in peak shaving mode.

**GENSYS 2.0** configured via its front panel or via a PC with **CRE Config software**. The unit has analog load sharing inputs and is compatible with all types of analog load sharing modules.



CORE BASE DIN RAIL MOUNTED VERSION



SWITCHBOARD MOUNTED VERSION WITH DISPLAY



**Part numbers:**

- A5320** GENSYS 2.0 Switchboard mounted version with display
- A5321** GENSYS 2.0 Core base mounted version

## KEY FEATURES

### ▶ PROGRAMMING BY EQUATIONS

The **GENSYS 2.0** controller is a PLC on its own rights as logical equations and sequences can be programmed directly by the user with text editor software or Easy PLC software.

### ▶ INPUTS / OUTPUTS WITH NO LIMIT

The number of inputs/outputs that can be added is one of the most important on the market. Extension modules (DIN rail mounting) can be added on the CAN bus. This extends a large number and a large diversity of inputs/outputs up to 128 digital inputs, 64 digital outputs, 44 analog inputs, 32 analog outputs and CANopen standard module.

### ▶ MINIMUM OPTIONS

The **GENSYS 2.0** is offered with a minimum of options to fit all types of application without expensive add-on packages. The standard **GENSYS 2.0** unit is recommended for all types of power plant, from 1 to 32 generators.

For specific needs, the following options are available:

- Mains paralleling
- Phase shift compensation (ie: Dyn11)
- External start module management

### ▶ INTER-UNIT ISOLATED CAN BUS

The **GENSYS 2.0** features an isolated CANbus dedicated to inter-module communication (dead busbar management, kW and kVAR load sharing...)

CANbus technology provides high reliability communication while maintaining low wiring cost and complexity.

### ▶ GENSETS WITH MAINS

When several generators are paralleled with mains, the **MASTER 2.0** is used (using CAN bus communication) for:

- Three phase mains failure.
- Paralleled gensets with several mains control.
- Electrical protection for power plant and mains.
- Electrical parameters display for power plant and mains.
- Manual and automatic paralleling with mains (frequency, phase and voltage)
- Power factor control when paralleling with mains.
- kW power management with several modes:
  - No break change over with load transfer.
  - Permanent paralleling in base load.
  - Permanent paralleling in peak shaving mode (export/import)

### ▶ DISPLAYED INFORMATIONS

- **Engine parameters display:** oil pressure, water temp, speed, hours run meter (5 programmable information pages)

### • Generator electrical parameters display:

- Phase-phase Voltage (3 phase RMS)
- Phase-neutral voltage (3 phase RMS)
- Current (3 phase RMS)
- Frequency.
- Active power (3 phase + total)
- Reactive power (3 phase + total)
- Power factor (3 phase + total)
- Active power energy (kWh)
- Reactive power energy (kVARh)

### • Mains electrical parameters display:

- Phase-phase Voltage (3 phase RMS)
- Current (3 phase)
- Frequency.
- Active & reactive power.
- Power factor.
- Import active power energy (kWh)
- Import reactive power energy (kVARh)

### ▶ EVENTS LOGGER

- The 50 latest alarm and the latest 50 faults are recorded in non volatile memory.
- EEPROM Data logging & SD Data logging.

### ▶ PROGRAMMING FEATURES

- Manual and automatic engine control.
- J1939 compatibility (Cummins, Volvo, Scania, MTU, CAT...)
- Automatic start/stop control depending on load demand.
- Dead busbar management.
- Isochronous or droop kW load sharing control (via CAN bus, up to 32 generators)
- Constant voltage or droop kVAR load sharing control (via CAN bus, up to 32 generators)
- Power factor control when paralleling with mains.
- kW control (base load or peak shaving) when paralleling with mains.

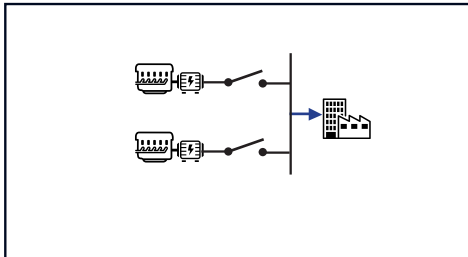
### ▶ SYNCHRONIZATION

- Manual and automatic frequency and phase synchronization (differential frequency meter + synchroscope available on screen).
- Manual and automatic voltage synchronization (differential voltmeter available on screen).



### APPLICATION EXAMPLES

#### STANDBY GENERATORS WITH PARALLELING MODE (PRODUCTION OR EMERGENCY)



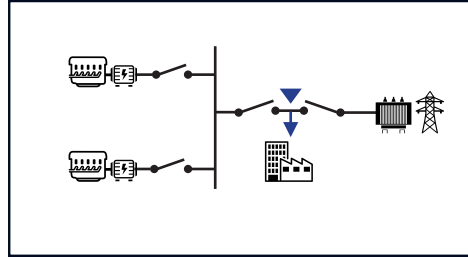
##### FEATURES

- Start/Stop control
- Genset mechanical & electrical protections
- Breakers management
- Synchronization
- Load sharing

##### PRODUCTS REQUIRED

- 2 x GENSYS 2.0

#### STANDBY GENERATORS WITH PARALLELING MODE WITH CHANGE OVER MODE



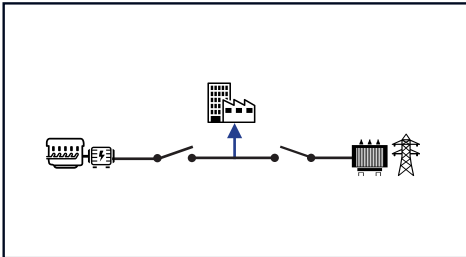
##### FEATURES

- ATS with Mains
- Start/Stop control
- Genset mechanical & electrical protections
- Breakers management
- Synchronization
- Load sharing

##### PRODUCTS REQUIRED

- 2 x GENSYS 2.0 + MASTER 2.0

#### SINGLE STANDBY GENSET WITH MAINS PARALLELING MODE



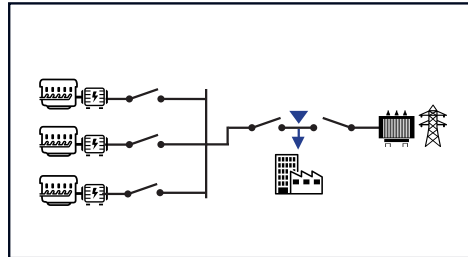
##### FEATURES

- Start/Stop control
- Genset mechanical & electrical protections
- Breakers management
- Synchronization
- Power management

##### PRODUCTS REQUIRED

- GENSYS 2.0

#### MULTIPLE GENSETS PARALLELED WITH 1 MAINS / 2 BREAKERS



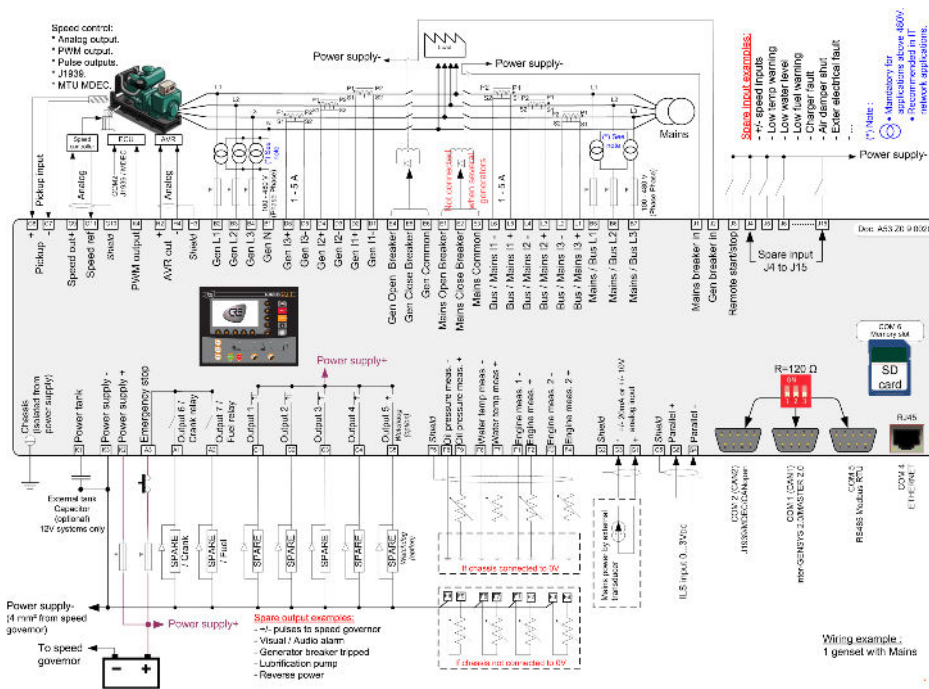
##### FEATURES

- Start/Stop control
- Genset mechanical & electrical protections
- Breakers management
- Synchronization
- Generator load sharing
- Mains paralleling and power management
- Load shedding

##### PRODUCTS REQUIRED

- 3 x GENSYS 2.0 + MASTER 2.0

### WIRING DIAGRAM





### SPECIFICATIONS

#### ELECTRICAL SYSTEM

Electrical system	Compatible with 3 or 4 wires three-phase, or two-phase or single phase systems
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#### DC POWER SUPPLY

Power supply range	4...80 V <sub>DC</sub>
Current consumption (at 12 V <sub>DC</sub> )	750 mA
Current consumption (at 24 V <sub>DC</sub> )	400 mA

#### AC VOLTAGE MEASUREMENT

Generator measurement inputs	3ph + N (Neutral optional)
Mains measurement inputs	3ph + N (Neutral optional)
Measurement range	100...480V <sub>AC</sub>
Current consumption	100 mA max
Frequency range	45 to 70 Hz – 15VAC minimum between phase and neutral.

#### AC CURRENT MEASUREMENT

Generator measurement inputs	3ph RMS
Mains/Bus measurement inputs	3ph
Measurement range	0...5A; 1VA Each phase is isolated from the others.
Overload	Overload 15A during 10s

#### INPUTS

Digital inputs	15 : NO or NC to ground.
Digital inputs expansion	128 : via CANopen
Analog inputs	2 (oil pressure and water temp): 0 to 400 Ω. Calibration is configurable & (Spare 1 / Spare 2): 0 to 10 kΩ.
Analog inputs expansion	44 : via CANopen (0-20mA, 0-10V <sub>DC</sub> , PT100, Thermocouple, ...)

#### OUTPUTS

Digital outputs	(Crank and fuel): 5A. The 24V is provided through the emergency push button & (5Transistor outputs): 350mA, over-current protected.
Digital outputs expansion	64 : via CANopen
Relay outputs (breaker control)	2 : 5A, 230V <sub>AC</sub> max. NO + NC available.
Analog outputs expansion	32 : via CANopen
Analog outputs	2 : +/-10V <sub>DC</sub> : isolated output with adjustable gain and offset
PWM	For CAT and Perkins engines

#### MAGNETIC PICK-UP

Voltage input range	2V <sub>AC</sub> minimum
Frequency input range	100 to 10kHz.

#### COMMUNICATION PORTS

CAN	2 isolated port: - CAN 1: inter-GENSYS/MASTER 2.0 connection (male Sub-D9 120Ω resistor selected by micro-switch) - CAN 2: J1939, I/O extensions (male Sub-D9 120Ω resistor selected by micro-switch)
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RS485	For Modbus RTU (read and write)/ male Sub-D9 120Ω resistor selected by micro-switch
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Ethernet	Isolated port: PC communication/ModBus TCP
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Memory slot	SD card reader
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#### ENVIRONMENT

Operating temperature	-20...70°C (-4...158°F)
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Storage temperature	-40...80°C (-40...176°F)
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Humidity	95% non-condensing
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Altitude	Up to 4000m for 480VAC. Up to 5000m for 400VAC
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IP Front	IP Front: IP65 / NEMA rating 4 - IP20 /NEMA rating 1 for CORE.
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IP Rear	IP20/NEMA rating 1
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#### DIRECTIVES

EMC Directive 2014/30/UE - EMC General Requirements EN 61326-1	Immunity according with EN 61000-6-2 and Emission according with EN 61000-6-4
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Electrical Safety Directive 2014/35/UE	According with EN 60950-1
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Vibrations and shocks	According with EN(IEC) 60068-2-6 and IEC 60068-2-27
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Temperature	EN (IEC) 60068-2-30; EN (IEC) 60068-2-1; EN (IEC) 60068-2-2; EN 60068-2-78
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#### DIMENSIONS - SWITCHBOARD MOUNTED VERSION WITH DISPLAY

Overall (W x H x D)	248 x 197 x 57mm (9.76 x 7.76 x 2.24in)
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Panel cut out (W x H)	177 x 228mm (7 x 9cm).
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#### DIMENSIONS - CORE BASED MOUNTED VERSION

Overall (W x H x D)	248 x 197 x 57mm (9.76 x 7.76 x 2.24in)
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Back size:	250 x 200mm (9.84 x 7.878in)
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#### WEIGHT

Controller	1kg (2.2lb)
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#### LCD DISPLAY CHARACTERISTICS

Size	40 x 70mm (1.50 x 2.75in)
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Pixels	256 x 128. Back light: 50 cd/m <sup>2</sup> typical, configurable.
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Contrast	Configurable
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#### LANGUAGES

Supported languages	English, French, Italian, Spanish in standard. Customs languages available for download.
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## PROTECTIONS

### GENERATOR ELECTRICAL PROTECTIONS

DESCRIPTION	ANSI CODE
Under frequency	81L
Over frequency	81H
Under voltage	27
Over voltage	59
Over current	50
Over current IDMTL (Inverse Definite Minimum Time Lag)	51
Neutral over current	50N
Earth over current	51G
Unbalance current	46
Minimum active power	37P
Maximum active power	32P
Minimum reactive power	37Q
Maximum reactive power	32Q

### MAINS ELECTRICAL PROTECTIONS

DESCRIPTION	ANSI CODE
Under frequency	81L
Over frequency	81H
Under voltage	27
Over voltage	59
Minimum active power	37P
Maximum active power	32P
Minimum reactive power	37Q
Maximum reactive power	32Q

### SYNCHRONIZATION PROTECTIONS

DESCRIPTION	ANSI CODE
Phase sequence	47

## RELATED PRODUCTS

### ADDITIONAL INPUTS/OUTPUTS

BK5150	CANopen bus coupler
KL9010	End connection terminal
KL1488	8 digital inputs - 0 VDC
KL1889	16 digital inputs - 0 VDC
KL2408	8 digital outputs - 24VDC 0.5A
KL2809	16 digital outputs - 24VDC 0.5A
KL3044	4 analog inputs (0-20mA)

### BATTERY CHARGERS

BPXX	3A, 5A, 10A, 20A, 40A. 12VDC, 24VDC
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