



MASTER 2.0

All-in-one mains paralleling unit with integrated PLC

The **MASTER 2.0** is a power plant controller for gensets in parallel with one or several mains. This "all-in-one" unit includes all necessary functions:

- Multi mains management, three phase mains failure detection.
- Electrical protection and electrical parameters display.
- Manual and automatic paralleling with mains (frequency, phase and voltage)
- kW power management with several modes:
 - No break changeover with load transfer.
 - Permanent paralleling in base load.
 - Permanent paralleling in peak-shaving mode
- Power factor control when paralleling with mains.
- Dyn11 capabilities (HV phase compensation)
- Analog control for all load sharing modules.



SWITCHBOARD MOUNTED VERSION WITH DISPLAY



Part numbers:

A53Y0 GENSYS 2.0 Switchboard mounted version with display

KEY FEATURES

▶ PROGRAMMABLE EQUATIONS

The **MASTER 2.0** controller is a real PLC unit where 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 input/outputs that can be added is one of the most important on the market. Both digital & analog I/O extension modules can be connected through CAN bus.

▶ MAINS AND POWER PLANT ELECTRICAL PARAMETERS

Not only the **MASTER 2.0** parallels the power plant with mains, but it also protects the power plant and measures electrical parameters.

▶ APPLICATIONS

- Constant generating set power (base load) : In this mode, the generating sets provide constant power. Mains power varies according to the load.
- Constant mains power (peak shaving) : In this mode, the mains power (imported or exported) remains constant. The generating sets vary their power according to the load.
- Power plant control with several mains:
 - 1 MASTER 2.0 per mains.
 - No-break change-over with load transfer.
 - Transfer-switch unit control.

▶ EXTENSIONS - With I/O external modules

A large range of modules are compatible with the **MASTER 2.0** via CAN bus. You can add more than 250 analog and digital I/Os:

- **Analog inputs:** PT100, 0-400Ω, 4-20mA, 0-10V, ...
- **Analog outputs:** 4-20mA, 0-10V, PWM...
- Digital inputs.
- Digital outputs.

▶ CABLES AND CONNECTORS

- **A53W1:** MASTER2.0 to PC cable - USB/USB - 3m.
- **A40W8:** CAN© inter GENSYS 2.0 / MASTER 2.0 cable for 2 generators - DB9/DB9 - 7m.
- **A40W2:** CAN© inter GENSYS 2.0 / MASTER 2.0 cable for more than 2 generators or CANopen© I/O modules - DB9/free wires - 7m.
- **A40W3:** DB9/Terminals connector to be used with more than 2 generators for double connection (with screws).
- **A40W4:** communication cable (RS485, CAN, RS232) – per meter.

▶ INFORMATION DISPLAY

- **Power plant electrical parameters display:**
 - Power plant overview.
 - Generator state.
 - Individual generator alarm.

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

▶ SYNCHRONIZATION

- Manual/Automatic frequency and phase synchronization (differential frequency meter + synchroscope available on screen).
- Manual/Automatic voltage synchronization (differential voltmeter available on screen).
- Active power control (by CAN bus, up to 32 GENSYS 2.0/ MASTER2.0 units)
- Power factor control (by CAN bus, up to 32 GENSYS 2.0/ MASTER2.0 units)
- Power management with several Mains.
- Phase sequence protection.
- Phase shift compensation (ie: Dyn11).
- Short-circuit protection.

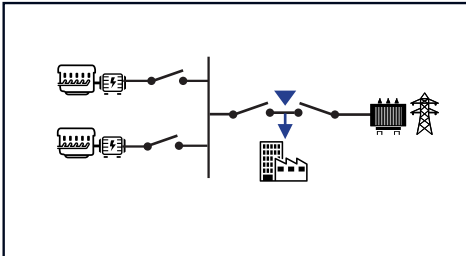
▶ EQUATION

MASTER 2.0 integrates a real PLC unit in which user equations and sequences can be written using a simple text editor or graphically designed using the Easy PLC software.



APPLICATION EXAMPLES

STANDBY GENERATORS WITH PARALLELING MODE WITH CHANGE OVER MODE



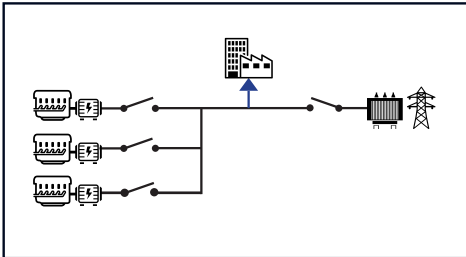
FEATURES

- 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

MULTIPLE GENSETS PARALLELED WITH 1 MAINS / 2 BREAKERS



FEATURES

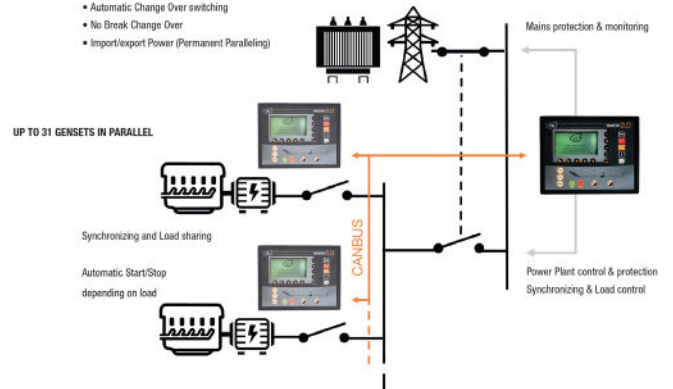
- Start/Stop control
- Genset mechanical & electrical protections
- Breakers management
- Synchronization
- Generator load sharing
- Mains paralleling and power management
- Load shedding

PRODUCTS REQUIRED

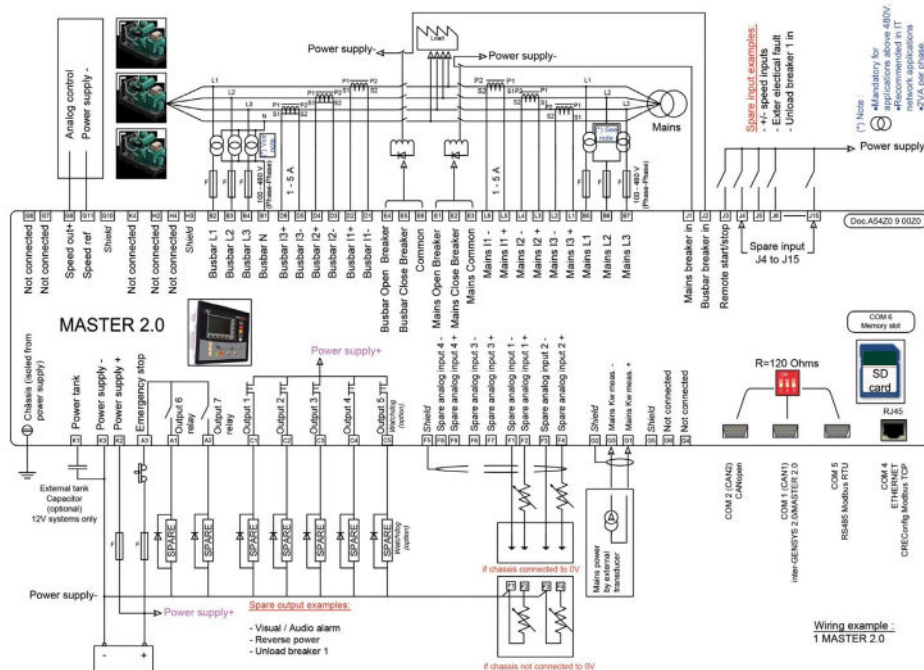
- 3 x GENSYS 2.0 + MASTER 2.0

MASTER 2.0 offers synchronizing and load control of the power plant to the mains power, and an automatic management of the installation.

- Automatic Change Over switching
- No Break Change Over
- Import/export Power (Permanent Paralleling)



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 _{DC}
Current consumption (at 12 V _{DC})	750 mA
Current consumption (at 24 V _{DC})	400 mA

AC VOLTAGE MEASUREMENT

Bus measurement inputs	3ph + N (Neutral optional)
Mains measurement inputs	3ph + N (Neutral optional)
Measurement range	100...480V _{AC}
Current consumption	100 mA max
Frequency range	45 to 70 Hz – 15VAC minimum between phase and neutral.

AC CURRENT MEASUREMENT

Bus measurement inputs	3ph RMS
Mains 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 input (+/-20mA or +/-10V): 50 Ω (current) or 20 kΩ (voltage).
Analog inputs expansion	44 : via CANopen (0-20mA, 0-10V _{DC} , PT100, Thermocouple, ...)

OUTPUTS

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

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)
RS485	For Modbus RTU (read and write)/ male Sub-D9 120Ω resistor selected by micro-switch
Ethernet	Isolated port: PC communication/ModBus TCP
Memory slot	SD card reader

ENVIRONMENT

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

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
Electrical Safety Directive 2014/35/UE	According with EN 60950-1
Vibrations and shocks	According with EN(IEC) 60068-2-6 and IEC 60068-2-27
Temperature	EN (IEC) 60068-2-30; EN (IEC) 60068-2-1; EN (IEC) 60068-2-2; EN 60068-2-78

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)
Panel cut out (W x H)	177 x 228mm (7 x 9cm).

WEIGHT

Controller	0.9kg (2lb)
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LCD DISPLAY CHARACTERISTICS

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

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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