

# InteliGen<sup>NT</sup> GeCon InteliSys<sup>NT</sup> GeCon

GENERATOR CONTROLLERS FOR LAND-BASED  
AND MARINE APPLICATIONS



## Description

GeCon controllers provide comprehensive generator protection and control for single or multiple gen-sets based on field proven InteliGen<sup>NT</sup> and InteliSys<sup>NT</sup> platforms.

With GeCon software installed the primary function of the controller is to manage and protect the generator in preference to the engine, which is not a direct concern, and as such, can be used in applications where engine management or protection is not required or in cases where the generator is powered by another source such as a turbine controlled by an external PLC.

Two versions of the GeCon are available (land-based or marine applications) allowing customers to select a tailored solution for their application. There is also the option to modify certain parameters for critical applications.

A built-in synchronizer and digital isochronous load sharer allows for a total integrated solution for gen-sets in standby, island parallel or mains parallel. The GeCon allows parallel operation of up to 32 gen-sets in one group with power management and load sharing.

For critical applications, it is possible to arrange the controllers so a 'hot-standby' controller takes over the generator protection and control in case of failure of the main controller.

A powerful graphic display with user-friendly controls allows any user, whatever their ability to find the information they need.

GeCon software can be installed on the following controllers:

- ▶ **InteliGen<sup>NT</sup>**
- ▶ **InteliGen<sup>NT</sup> Marine**
- ▶ **InteliGen<sup>NT</sup> BaseBox**
- ▶ **InteliGen<sup>NTC</sup> BaseBox**
- ▶ **InteliSys<sup>NT</sup> BaseBox**
- ▶ **InteliSys<sup>NT</sup> BaseBox Marine**
- ▶ **InteliSys<sup>NTC</sup> BaseBox**



Land-based applications



Marine applications



ComAp is a member of AMPS  
(The Association of Manufacturers  
of Power generating Systems).



ComAp products meet the highest standards, with every stage of production undertaken in accordance with the ISO certification obtained in 1998.

## Benefits

- ▶ Excellent configurability enables users to customise to the needs of their application
- ▶ Option to read information from ECU
- ▶ Power management over various engines from different producers
- ▶ Configurable protections
- ▶ Optional set the frequency by step 0,1 Hz
- ▶ Choice of communication options ensures easy remote supervising and servicing
- ▶ Optional redundant 'hot standby' controller guarantees uninterrupted generator control in case of failure of the primary controller
- ▶ Built-in PLC functions remove the need for an external PLC controller
- ▶ Perfect price/performance ratio
- ▶ Gen-set performance log for easy problem tracing
- ▶ Blackout start of engines<sup>1)</sup>
- ▶ Running of SPI and SPTM applications without dongle<sup>2)</sup>

## Generator monitoring and control

- ▶ Independent engine controller (e.g. IntelliDrive DCU) is required
- ▶ Generator measurement: U, I, Hz, kW, kVA, PF, kWh, kVAh
- ▶ Bus/Mains measurement: U, I, Hz, kW, kVA, PF
- ▶ Manual, Semi-auto<sup>1)</sup>, Auto and Test operational modes
- ▶ Automatic Load sharing and Power management in MINT applications<sup>3)</sup>
- ▶ Automatic synchronizing and Voltage control in Auto mode
- ▶ Automatic synchronizing and Voltage control in Semi-auto mode<sup>1)</sup>
- ▶ Power management: kW, kVA or % load based – in Auto mode
- ▶ Baseload, Import/Export<sup>4)</sup>, Peak shaving<sup>4)</sup>
- ▶ All binary/analog inputs are configurable for various protection types

## Generator protections

- ▶ 3 phase generator over/under voltage
- ▶ 3 phase generator over/under frequency
- ▶ Generator overload, Short current and IDMT overcurrent
- ▶ Voltage and current unbalance<sup>4)</sup>, Bus voltage unbalance<sup>4)</sup>, Reverse power<sup>4)</sup>, Earth fault current protection<sup>4)</sup>, ROCOF<sup>4)</sup>
- ▶ Additional 160 user configurable generator and bus/mains protections

Key:

- 1) for Marine version only
- 2) for sw version 3.0 and higher
- 3) with LSM+PMS dongle only
- 4) for Land-based version only

## Communication and PC tools

- ▶ RS232/RS485 interface with Modbus support
- ▶ Analog/GSM/ISDN/CDMA modem support
- ▶ Ethernet/Internet interface via IG-IB/LB+/InternetBridge-NT module or directly on IntelliGen<sup>NTC</sup> BaseBox or IntelliSys<sup>NTC</sup> BaseBox controller
- ▶ **InteliMonitor** – free PC SCADA software for supervision of single or multiple controllers, configurable site structure, easy site overview, common history log, direct/modem/Internet connection
- ▶ **PLC Monitor** – great tools for watching states in your PLC logic. Part of InteliMonitor.
- ▶ **GenConfig** – free configuration tool; allows full configuration of the controller and its peripherals modules; it is possible to prepare the configuration off-line without the controller
- ▶ **WinScope** – PC oscilloscope with up to 32 traces, any signal available in the controller can be visualized

## Extension modules and remote displays

- ▶ up to 4x **I-AOUT8** – analog output module
- ▶ up to 4x **IGL-RA15** – remote annunciator
- ▶ up to 4x **IGS-PTM** – input/output module
- ▶ up to 10x **IS-AIN8** – analog input module
- ▶ up to 6x **IS-BIN16/8** – binary input/output module
- ▶ up to 4x remote display units – see table on page 3

## Upgrade kits

- ▶ **IGS-NT-LSM+PMS** dongle or **IGS-NT-GECON-LSM+PMS** dongle for sw version IGS-NT-GeCon-Marine 3.0 and higher or IGS-NT-GeCon-LandBased 3.0 and higher
  - Load Sharing and Power Management for MINT and Combi applications
- ▶ **IGS-NT-GECON-LSM+PMS** dongle for sw version IGS-NT-GeCon 2.1 and lower
  - Load Sharing and Power Management for MINT and Combi applications
- ▶ **IGS-NT-GECON-PCM** dongle for sw version IGS-NT-GeCon 2.1 and lower
  - Enables GeCon sw to run on the controller single parallel with mains in SPI, SPTM and PROT<sup>1)</sup> applications

## Order instructions

To run the GeCon software you need to order one of the IntelliGen or IntelliSys controllers listed below, and then install the GeCon software which is available on the ComAp website. It is important to install the correct software for the type of installation you have – either land-based or marine.

Controller	Order code
IntelliGen <sup>NT</sup>	IG-NT GC
IntelliGen <sup>NT</sup> BaseBox	IG-NT-BB
IntelliGen <sup>NTC</sup> BaseBox	IG-NTC-BB
IntelliSys <sup>NT</sup> BaseBox	IS-NT-BB
IntelliSys <sup>NTC</sup> BaseBox	IS-NTC-BB
IntelliGen <sup>NT</sup> Marine	IG-NT MARINE
IntelliSys <sup>NT</sup> BaseBox Marine	IS-NT MARINE

## Extension displays

The table below shows all the available display options for the RS 485 terminal and CAN bus terminal. There is one of each terminal on the controllers so your choice is limited to one of each type.

### CONTROLLERS FOR LAND-BASED APPLICATIONS

Controller	Display						
	InteliVision 5 (via RS 485 terminal)	InteliVision 5 RD (via RS 485 terminal)	InteliVision 5 CAN Backlit* (via CAN bus)	InteliVision 8 (via RS 485 terminal)	InteliVision 8 (via CAN bus)	IG-Display LT GC (via RS 485 terminal)	IS-Display (via RS 485 terminal)
InteliGen <sup>NT</sup>	1	1	4	1	4	1	–
InteliGen <sup>NT</sup> BaseBox	2	2	4	2	4	2	–
InteliGen <sup>NTC</sup> BaseBox	2	2	4	2	4	2	–
InteliSys <sup>NT</sup> BaseBox	3	3	4	4	4	–	3
InteliSys <sup>NTC</sup> BaseBox Marine	3	3	4	4	4	–	3

\*) InteliVision 5 CAN Backlit can be connected to the controllers listed above when GeCon software is installed.

### CONTROLLERS FOR MARINE APPLICATIONS

Controller	Display				
	InteliVision 5 CAN Backlit (via CAN bus)	InteliVision 8 Marine (via CAN bus)	InteliVision 8 Marine (via RS 485 terminal)	IG-Display LT GC (via RS 485 terminal)	IS-Display Marine (via RS 485 terminal)
InteliGen <sup>NT</sup> Marine	4	4	1	1	–
InteliSys <sup>NT</sup> BaseBox Marine	4	4	3	–	3

## InteliGen<sup>NT</sup> controller line

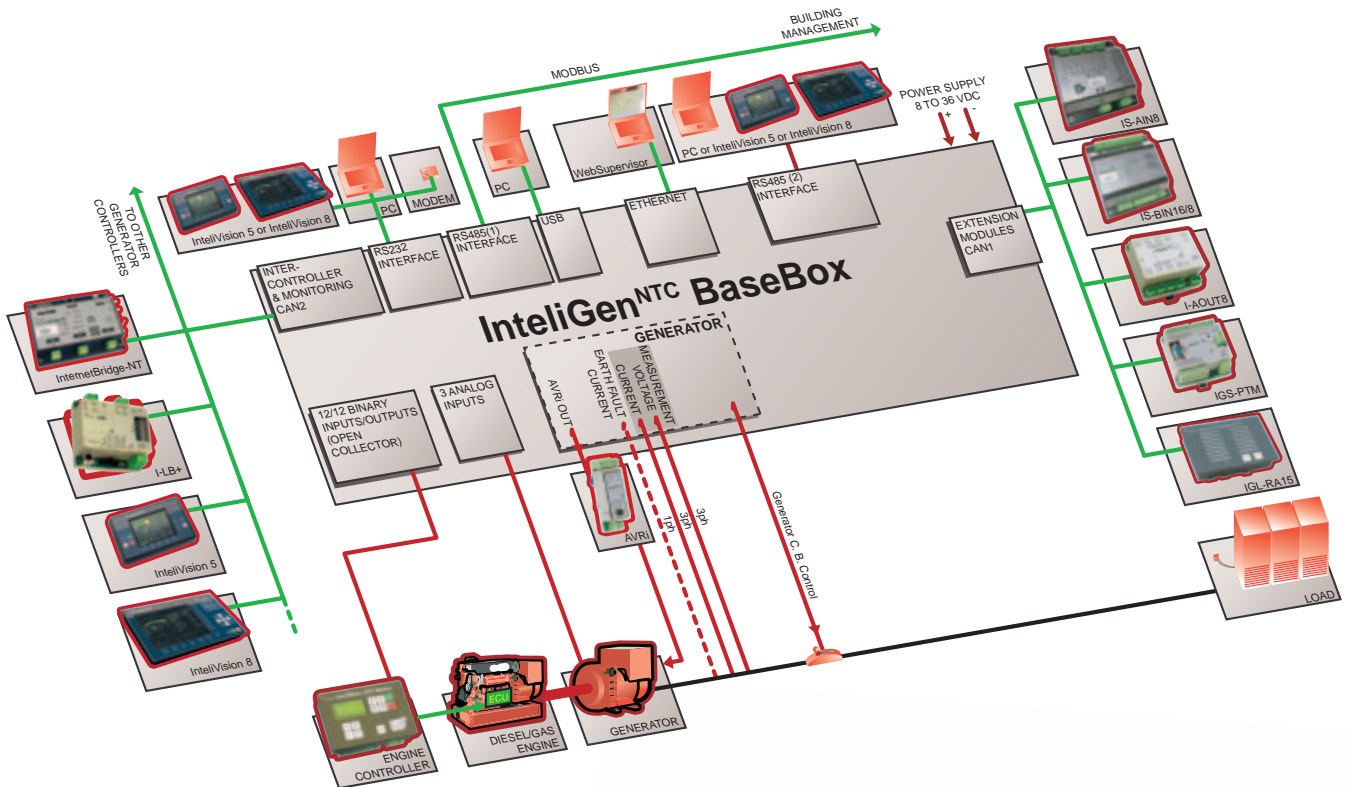
- ▷ InteliGen<sup>NT</sup>
- ▷ InteliGen<sup>NT</sup> Marine
- ▷ InteliGen<sup>NT</sup> BaseBox
- ▷ InteliGen<sup>NTC</sup> BaseBox
- ▷ Event-based history with configurable list of stored values up to 500 (1000\*) records deep
- ▷ Integrated standard PLC programmable functions
- ▷ 3x U generator – 400 V ph-ph
- ▷ 3x U bus/mains – 400 V ph-ph
- ▷ 3x I generator – CT /5A, (/5 or /1A)\*
- ▷ 1x Earth Fault/ import/export current – CT /5A, (/5 or /1A)\*
- ▷ 12 binary inputs
- ▷ 12 binary outputs
- ▷ 3 analog inputs
- ▷ Options of binary outputs. High side or Low side\*
- ▷ RS232/485
- ▷ USB 2.0\*
- ▷ Ethernet port\*
- ▷ ModbusTCP / SNMP\*

\* only for NTC models

## InteliSys<sup>NT</sup> controller line

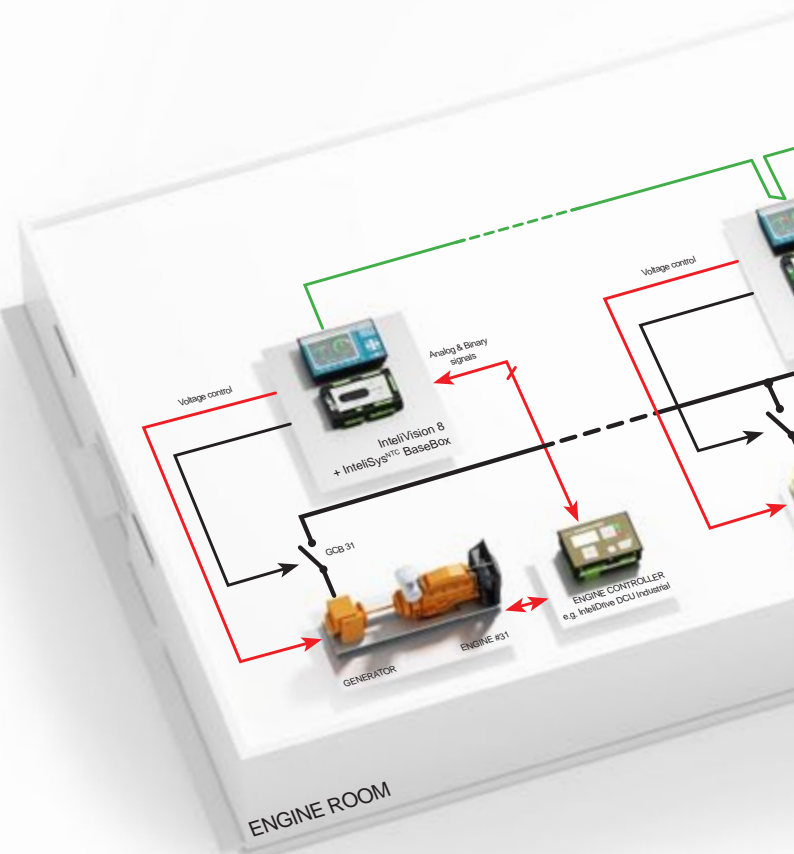
- ▷ InteliSys<sup>NT</sup> BaseBox
- ▷ InteliSys<sup>NT</sup> BaseBox Marine
- ▷ InteliSys<sup>NTC</sup> BaseBox
- ▷ Event-based history with configurable list of stored values up to 1000 (4000\*) records deep (post mortem history)
- ▷ Integrated extended PLC programmable functions
- ▷ 3x U generator – 400 V ph-ph
- ▷ 3x U bus/mains – 400 V ph-ph
- ▷ 3x I generator – CT /5 or /1A
- ▷ 1x Earth Fault/ import/export current – CT /5 or /1A
- ▷ 16 binary inputs
- ▷ 16 binary outputs
- ▷ 4 analog inputs
- ▷ 1 analog output
- ▷ Options of binary outputs. High side or Low side\*
- ▷ RS232/485
- ▷ USB 2.0
- ▷ Ethernet port\*
- ▷ ModbusTCP / SNMP\*

## Schematic diagram

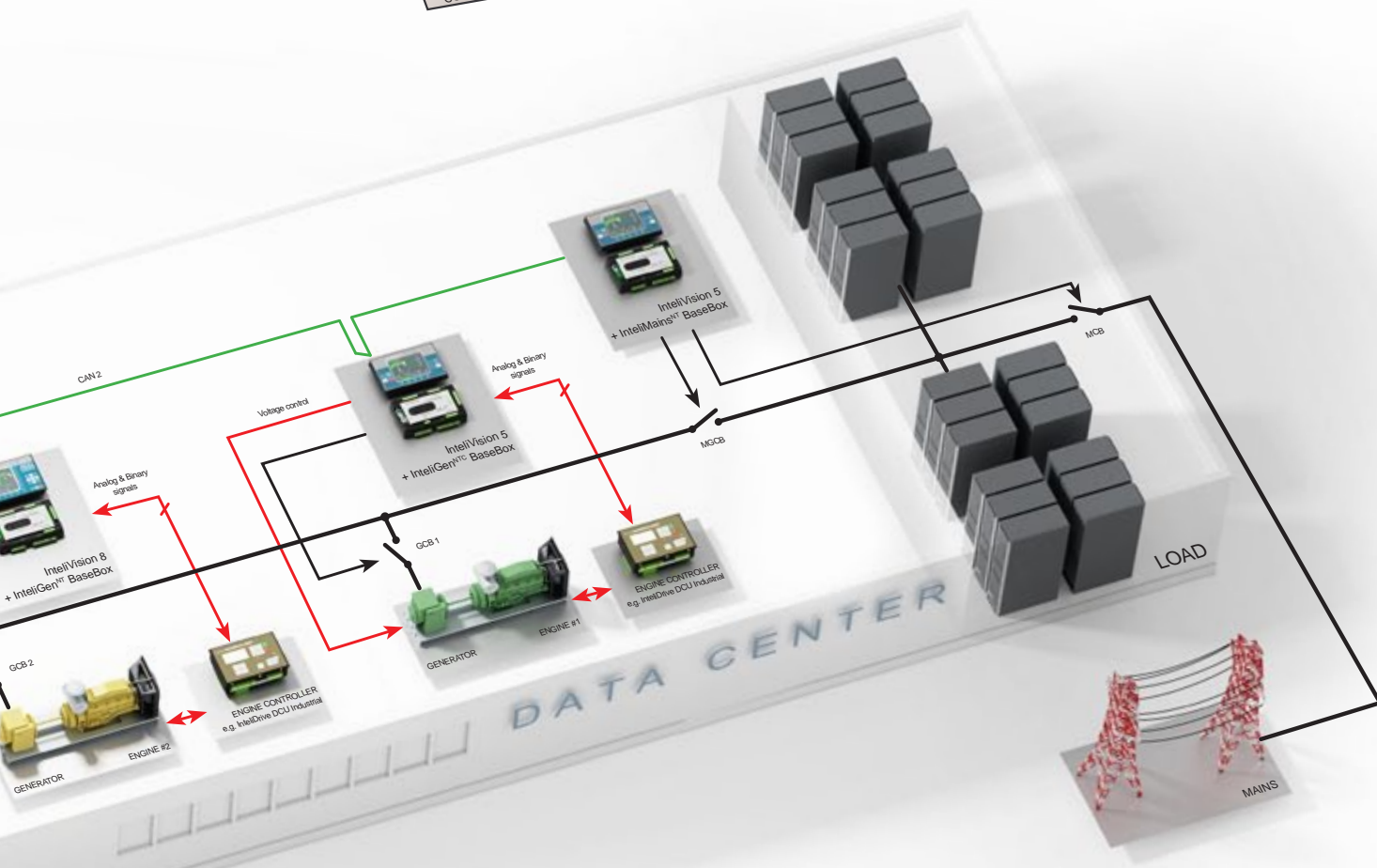
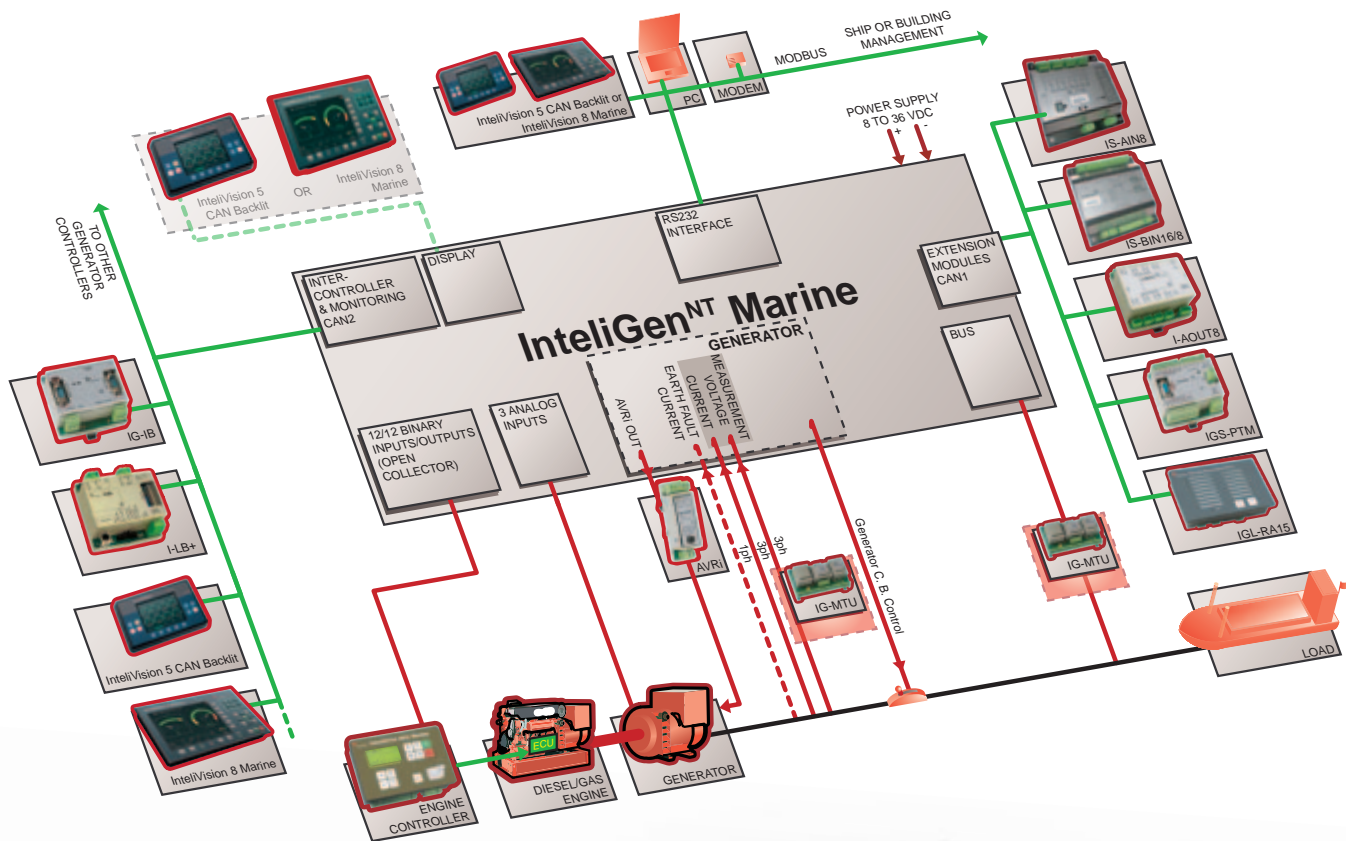


## Land-based application

- ▶ Typical use of GeCon software is on sites, where are several kinds of engines (various producers) and the customers need to have over all control off all gen-sets.
- ▶ Some engines have their own engine control unit (e. g. IntelliDrive DCU or PCC) and can not install standard IntelliGen<sup>NT</sup> or IntelliSys<sup>NT</sup> controller.
- ▶ At the engines with engines control unit (e. g. IntelliDrive DCU) is used IntelliGen<sup>NT</sup> or IntelliSys<sup>NT</sup> controller with sw GeCon which causes possibility to connect this gen-set e.g. to the gen-sets with IntelliGen<sup>NT</sup> or IntelliSys<sup>NT</sup> controller with standard software or the next engines from different producers with GeCon controller.
- ▶ Generators are controlled by GeCon controllers in (MINT) configurations.
- ▶ With this we can control all gen-sets and use power management and all features of IntelliGen<sup>NT</sup> or IntelliSys<sup>NT</sup> controller.
- ▶ GeCon controllers have the following modes:
  - MAN-synchronizing and load-sharing is automatic; genset start/stop in manual
  - AUTO-complete automatic control
  - Power Management System continuously evaluated load reserve on the bus and control of all working gen-sets throughout installation.



# Schematic diagram



## Marine applications

### POWER MANAGEMENT SYSTEM OF THE SHIP

Two auxiliary generators and one shaft generator deliver electricity for systems of the ship. Generators are controlled by GeCon controllers in MINT configurations.

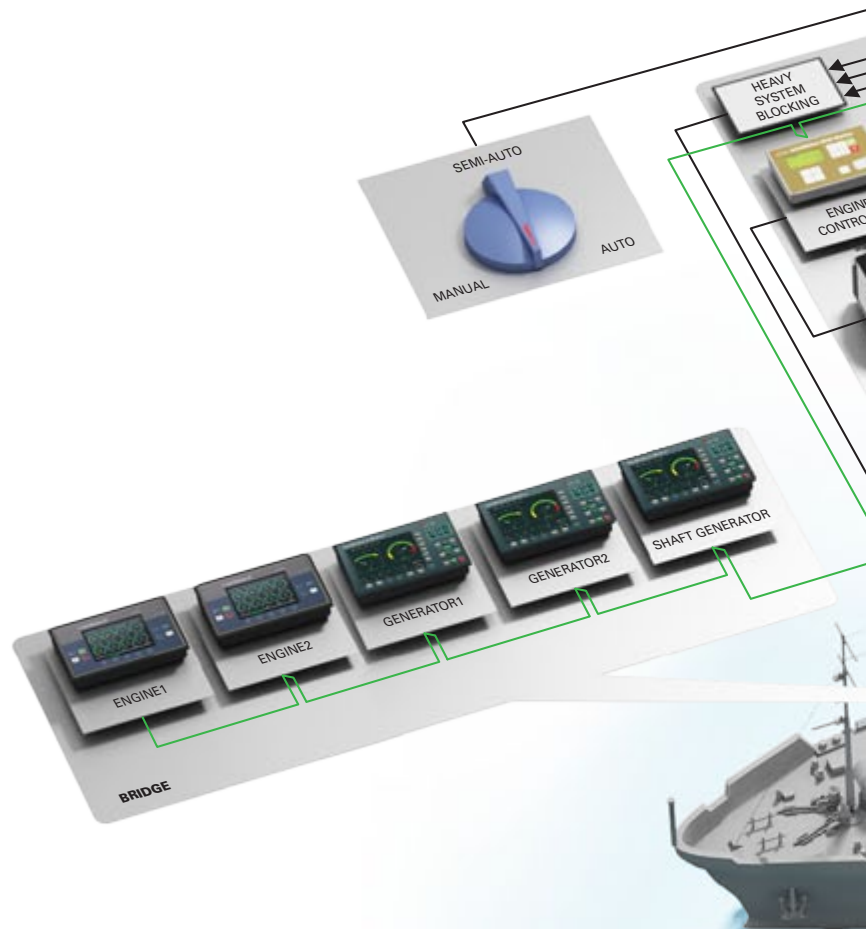
Controllers can work in three basic operational modes:

- ▶ **MANUAL** – controller does not control the generator, options switch off/on of protections
- ▶ **SEMI-AUTO** – synchronizing and load-sharing is automatic; genset start/stop and load transfer between aux and shaft generators in manual
- ▶ **AUTO** – complete automatic control

Power management system continuously evaluates load reserve on the bus and blocks start of the bow thruster if the load reserve is insufficient. Load shedding automatically trips the non-essential systems, if the power system is overloaded.

Load shedding can control up to 10 independent circuits of non-essential systems.

Freely programmable built-in PLC functions are used to accomplish load transfer between shaft and auxiliary generators.



### GENERATOR CONTROL WITH MASTER AND HOT STANDBY CONTROLLERS

The engine is controlled by an independent controller. Two GeCon controllers are used to control and protect the generator. Both GeCon controllers are in MINT configuration. One controller (Master) provides complete control and protection of the generator. The second controller (Redundant) is used as 'Hot standby', always ready to take over the control of the generator in case of failure of the master controller.

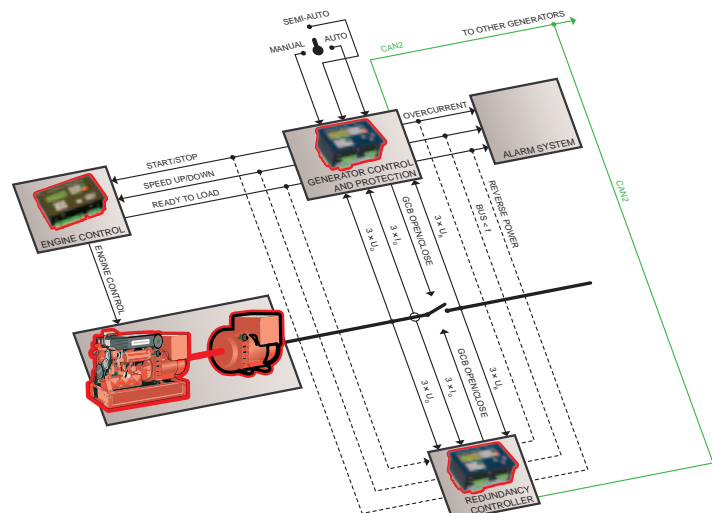
Generator can operate in three basic modes:

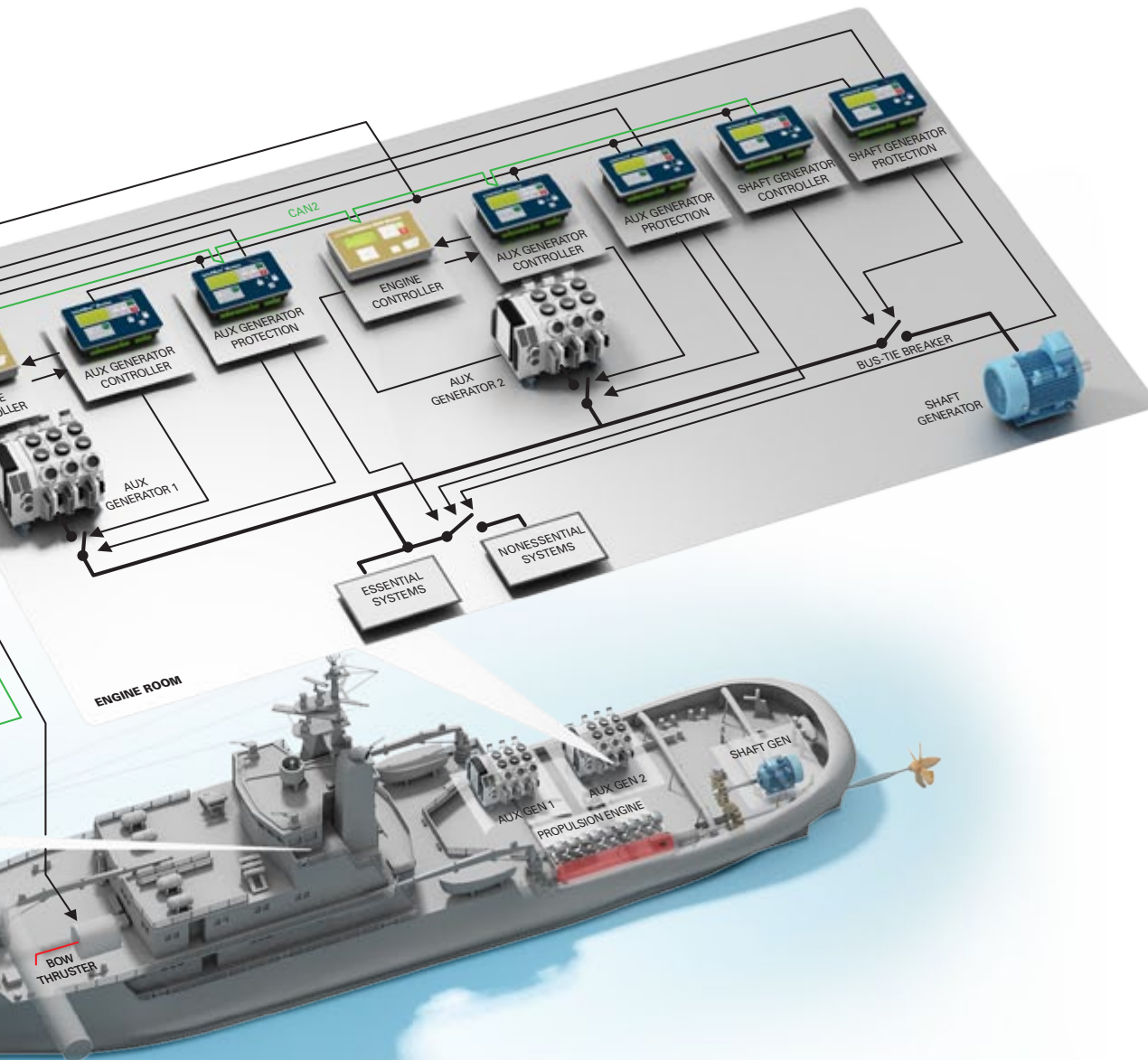
- ▶ **MANUAL**
- ▶ **SEMI-AUTO**
- ▶ **AUTO**

The same way as in the installation described above. Both Master and Redundancy controllers are connected to CAN bus.

The Redundant controller checks and evaluates CAN bus messages from the Master controller. It immediately takes over control of the generator in case of detection of failure of the Master controller. The period

between the failure of the Master controller and the take over by the redundancy controller is typically less than 300 milliseconds – ensuring minimal disturbance of generator voltage and current.





## GENERATOR CONTROL WITH INDEPENDENT PROTECTION AND MASTER CONTROLLERS

The engine is controlled by an independent controller. Two GeCon controllers, the first is used for control and protect the generator, the second for independent protection of the generator only. First GeCon is in MINT configuration, the second is in PROT configuration.

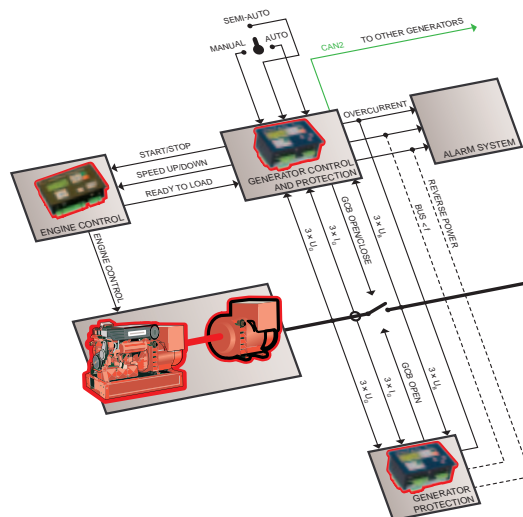
▷ **First GeCon in MINT configuration controls and protects the generator in three modes:**

- **MANUAL**
  - The controller does not control the generator and GCB, protections are active only
  - Start and Stop are controlled externally
- **SEMI-AUTO**
  - The controller protects the generator
  - Synchronization and load-sharing via CAN is automatic
  - Start and Stop are manual

- **AUTO**
  - The controller protects the generator
  - Synchronization, load-sharing and power management is automatic

▷ **Second Gecon in PROT configuration:**

- The controller has MANUAL mode only
- The controller evaluates the protection all the time and in case of any red alarm opens GCB



## Reference



### **French Polynesia** **EDT Power Station Bora Bora**

In some instances, ComAp controllers need to be able to operate in parallel with other gen-sets and provide power management without the option of replacing the existing control systems. This was the case when Greenbird Technology upgraded the control system for the EDT power station on Bora Bora Island in French Polynesia. Two of the sets were brand new, still under warranty, and had a fully integrated control system which could not be removed or altered.



To accommodate this unusual situation, Greenbird installed an IntelliSys control system operating in GeCon mode. AC measurements were derived at the existing main switchboard and all other parameters are obtained via a MODBUS interface to the Wartsila control system. This includes commands for pre-start, start, stop, speed control and voltage control. Note that this is the only connection to the generator.



Then after an initial pre-start command, the GeCon waits until a ready to start status is received. After this, an engine start command is sent to the Wartsila. The entire engine start-up, stabilisation, synchronising and CB control is performed by the Wartsila. Once online, the GeCon will bias the speed and voltage to maintain power levels according to the operational mode (load sharing or baseload).



### **Poland** **Reedbank**

The US Anchor Handling Tug Supply (AHTS) vessel, build in Gdansk, Poland by Northern Shipyard (Stocznia Północna SA), member of REMONTOWA Group, is equipped with ComAp PMS systems and independent generator protection units.

The AHTS vessel is equipped with total of 4 generators, 2 of them Shaft generators running in parallel and Load sharing. All the generators are controlled by ComAp IntelliSys<sup>NT</sup> GeCon units, providing the generator protections in case of diesel generators, and synchronizing, load control and load sharing in case of shaft generators.

The generators are linked together via bus tie, controlled by ComAp IntelliMains<sup>NT</sup> Marine control unit.

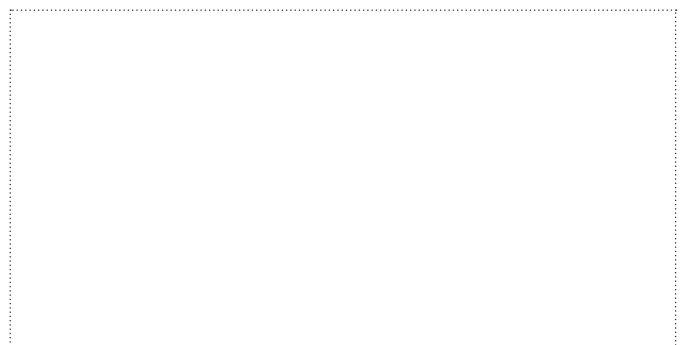


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