# InteliGen 500 Microgrid Application Sheet
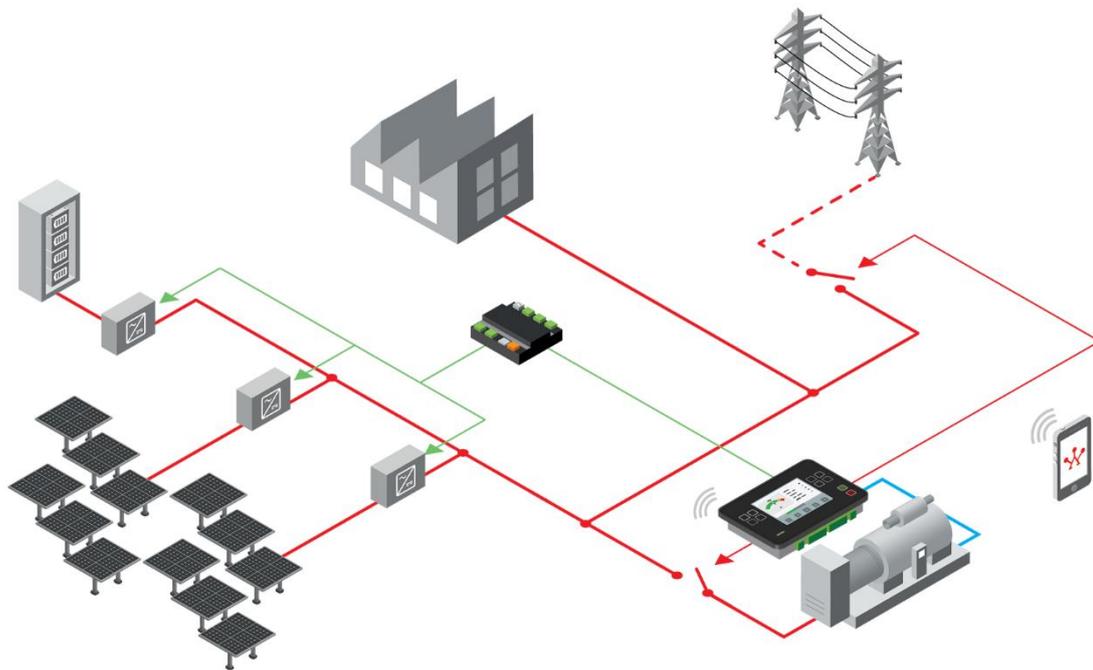
Introduction

InteliGen 500 Microgrid with InteliFieldbus Gateway is designed for use on sites comprising these energy resources:

- PV panels with AC inverter
- Battery pack with AC inverter (optional)
- Mains (optional)
- Genset

Microgrid control functionality description and site operation

The general control approach is focused on maintaining stable power supply to the load while efficiently storing any surplus PV energy in the batteries. When PV power is not available the batteries are discharged until a given threshold is crossed and then the genset starts. This allows for the genset to run only for short periods of time and at optimal fuel efficiency.

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The overall power efficiency of the site is controlled by a built-in energy management algorithm.

On-Grid application

Import/Export control of PV, battery and genset is done when the system operates in parallel with mains. Energy management system controls battery charging/discharging based on available energy mix and it aims to improve overall system operation efficiency.

Off-Grid application

System operates with PV panels and battery as the primary sources and genset is used only when PV panels and battery are not able to handle the load or when battery charging is necessary due to a low battery State Of Charge. The energy management oversees the genset starting and stopping to ensure that battery charging is done as efficiently as possible and it is charged sufficiently.

AMF functionality

Transition between the on-grid and off-grid operation is done without genset start, PV panels and battery are used as the primary sources of energy and genset is used to support them.

Application overview
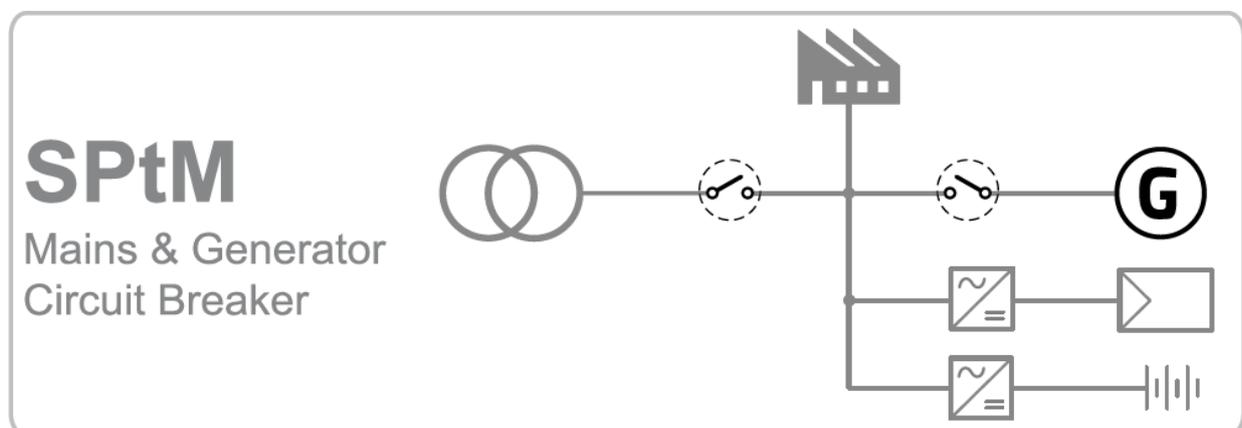
Required ComAp components

The following hardware and software components are necessary to gain full control of the microgrid as per the function description above.

- ▶ InteliGen 500 genset paralleling controller
- ▶ InteliFieldbus Gateway
- ▶ InteliGen 500 Microgrid firmware
- ▶ InteliGen 500 Microgrid Software Key

Wiring

As opposed to standard InteliGen 500 wiring, additional set of relays need to be used. These ensure switching of voltage measurement terminals between Genset/Bus and Mains/Bus to allow synchronization of multiple energy sources such as Genset to Battery, Genset to Mains and Battery to Mains.
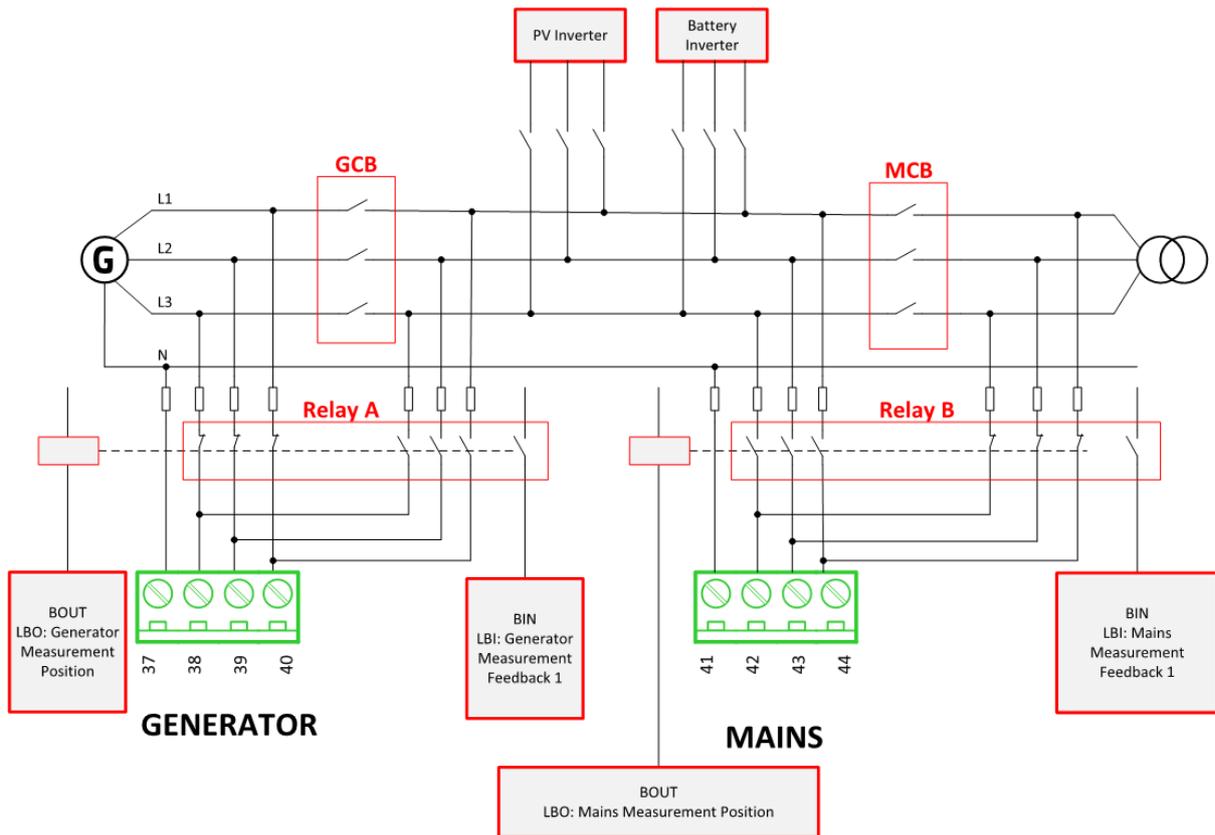
Two 4-pole relays are sufficient in case that switching only of the phase voltages L1, L2 and L3 is required. In that case use only the signals Generator Measurement Feedback 1 and Mains Measurement Feedback 1.

Four relays are necessary, if switching of the phase voltages L1, L2, L3 and neutral N is required. With four relays, it is necessary to use feedback signals Generator Measurement Feedback 1, Generator Measurement Feedback 2, Mains Measurement Feedback 1 and Mains Measurement Feedback 2.

Interconnection of site components

The InteliFieldbus Gateway connects to the InteliGen 500 controller using CAN bus connection (CAN1) and also using Ethernet connection (runs Modbus TCP).

The PV inverters and Battery Energy Storage inverters connect to the InteliFieldbus Gateway using Modbus communication, either over RS485 (Modbus RTU) or using Ethernet connection (Modbus TCP). If multiple devices use Modbus TCP a network switch is needed.

The genset and mains control is done in the same way as when using standard InteliGen 500 controller.
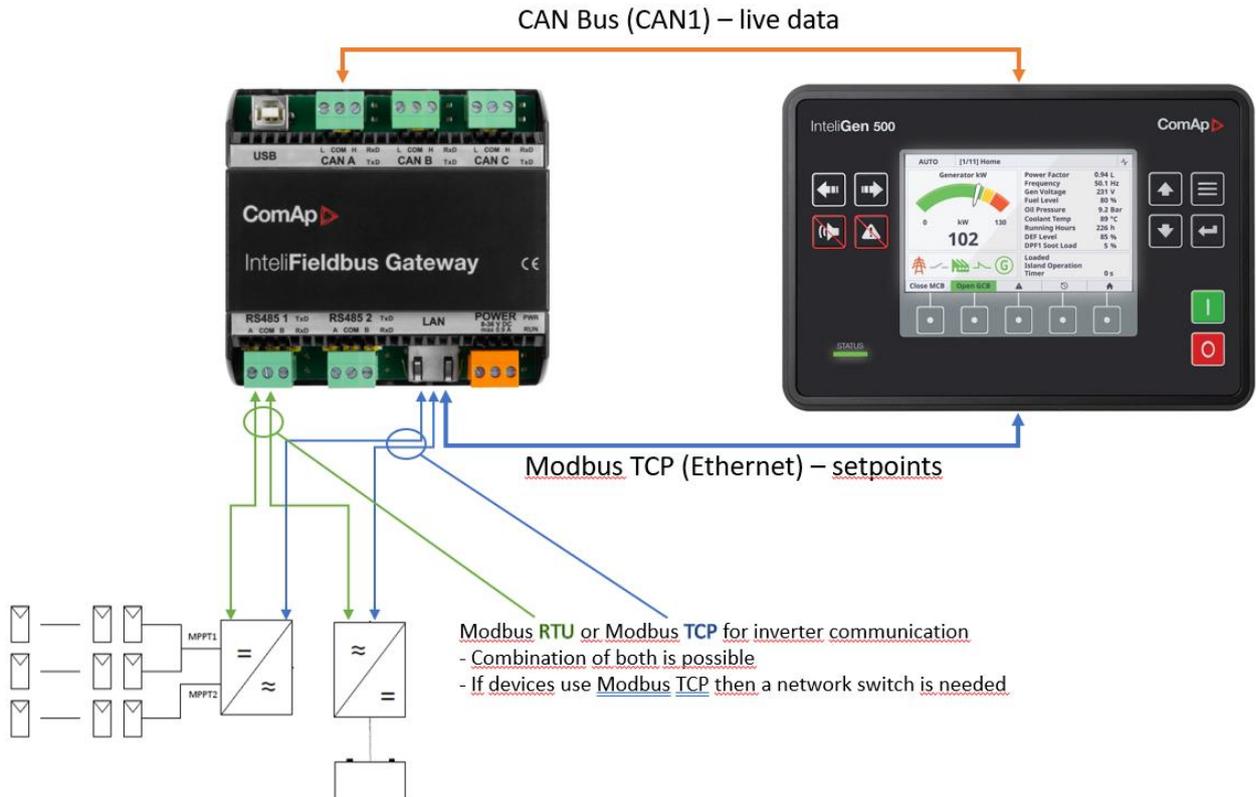
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