

# AGC 150 Hybrid controller



## Main hybrid features

### Minimum genset load

- Eliminate the risk of reverse power caused by low load

### Perfect for Rooftop installations

- Rebuild your genset with AGC 150 benefits and get PV for free

### Load calculation in terms of solar power

### Automatic genset start/stop

- Based on threshold set points for PV production and mains import/export

### PV included in modes

- MPE (Mains power export/import), AMF (Automatic mains failure), LTO (Load take-over), Fixed power, and Peak shaving

### PV inverter communication support

- Support of more PV inverter communication protocols, including Sunspec

### Mains voltage and current measurement

- One CT/Phase for balanced load

### PV Power emulation

- Try and test the Hybrid functions without a PV plant

### Other PV features:

- Energy Counters, Curtailment
- Inverter monitoring
- POA and BOM for calculating P max
- Weather data presentation

## Other features

### Easy and user-friendly interface

- Adaptive mimic with easy switching between applications
- Only buttons relevant for a function are visible to the user

### New design - Easy to mount

- Compact design making it suitable for all applications

### Three user levels

- With configurable passwords for each parameter, only relevant parameters are shown

### Shortcut menu

- Easy access to frequently used functions (configurable)

### PLC functions

- Programmable and user-friendly functions (M-Logic)

### Alarm and Event logging

- Up to 500 alarms and 500 events

### Graphical Display

- Important information is shown on the easy-to-read display

### Built-in analogue AVR and GOV control

- Eliminates the need for external equipment (voltage and PWM)

### CIO support

- Support of CANbus based I/Os, increases the number of I/Os

### Tier 4 final support

- AGC 150 can be used with the latest electrical Tier 4 Final engines and show values requested by the standard

## General description

The AGC 150 Hybrid is a variant of the well-known and easy-to-use controller, AGC 150. All technical information on this variant is found in the AGC 150 documentation on deif.com.

The AGC 150 Hybrid comes with all the necessary functions for protection and control of a hybrid installation with PV and genset. It can be used as a single unit for PV and up to 2 gensets for synchronising projects, in island or parallel to the mains modes.

The AGC 150 Hybrid handles the power production from PV and genset to give the highest PV penetration and the lowest CO<sup>2</sup> emission, and to ensure safe power production to support the load.

The AGC 150 Hybrid can be used as:

- Hybrid controller mounted directly on the genset with full control of PV, genset and mains
- PV integration controller with power measurement and breaker feedback from existing controller.

The AGC 150 contains all necessary 3-phase measuring circuits. All values and alarms are presented on the sun proof LCD display.

## Applications

The AGC 150 is a compact all-in-one unit designed for the following hybrid PV and genset applications:

Plant mode	Application
Island mode	Plant with PV inverters and synchronizing generators or a stand-alone generator.
Automatic Mains Failure	Plant with PV inverters, genset(s) and mains. Black start generator
Fixed power	Plant with fixed kW set point for PV inverters.
Peak shaving	Plant with PV inverters, where a generator supplies peak load demand paralleled to the mains.
Load take-over	Plant with PV inverters, where the rest load is moved from mains to generator.
Mains power export	Plant with fixed kW set points for PV inverters and mains.

# AGC 150 Hybrid

## Functions and features

### Key functions and features

- PV power control
- PV active/reactive power counters
- Inverter monitoring
- Weather station support
- Engine start sequences
- Engine and generator protections
- Engine communication via CANbus
- Run coil and crank configurable when using electric engine
- Tier 4 Final support with clear alarm indications
- Diesel and gas genset support
- 3-phase generator and busbar sensing
- Phase compensation for D/Y transformer
- Four current sensing inputs
- Integrated governor and AVR outputs for control
- State-of-the-art synchronisation and load sharing
- Synchroscope and sync check
- Digital voltage regulation support for different DVR
- Voltage and frequency matching
- Three synchronisation methods: Dynamic, Static and Close before excitation
- 12 digital outputs (configurable)
- 12 digital inputs (configurable)
- Two analogue outputs (-10 to 10 V)
- Four multi-inputs:
  - Resistor, 0 to 4000  $\Omega$
  - Voltage, 0 to 10 V
  - Current, 4 to 20 mA
  - Digital input
- Deadbus sensing
- Ground relay
- Mains support for stand-alone system (AMF)
- Analogue load sharing with external box
- ROCOF and Vector jump protection
- Fuel usage monitoring
- Maintenance alarms
- Grid support
- Ethernet interface as standard
- PV inverter communication (Modbus Master) on RS-485 port 2

### Digital AVR support

Together with DEIF's DVC 310 or DVC 550 digital voltage controllers, the AGC 150 supports features such as Engine AID (for the rental market) and fast and secure CBE critical power start-up (run-up syncing).

### Easy overview

- Remote monitoring support with Insight
- Weekly scheduler
- Emulation for testing and frontload commissioning
- Built-in *Guided experience* to help the user
- PV and engine alarms in clear text on the display
- Graphical display:
  - LCD, back-lit
  - High resolution, 240 x 120 pixels
  - Six lines
  - Operating temperature from -40 to +70 °C (-40 to +158 °F)
- Five-key navigation menu
- Event log with 500 entries (can be exported to a CSV file)
- Alarm log with 500 entries (can be exported to a CSV file)

### Highly configurable

- Controller configuration from the front panel (PIN code protected) or with free PC tool via USB, Ethernet & RS485
- PC tool with trending and wizards helping the user with configuration
- 20 configurable display views
- Four fully configurable PID controllers
- CAN flags between controllers
- CANbus based extension module for Inputs/Outputs
- Real time clock
- User configurable logic (lite PLC)
- Ethernet communication for PLC, SCADA or BMS
- Multi-language support (incl. Chinese, Russian and other languages)

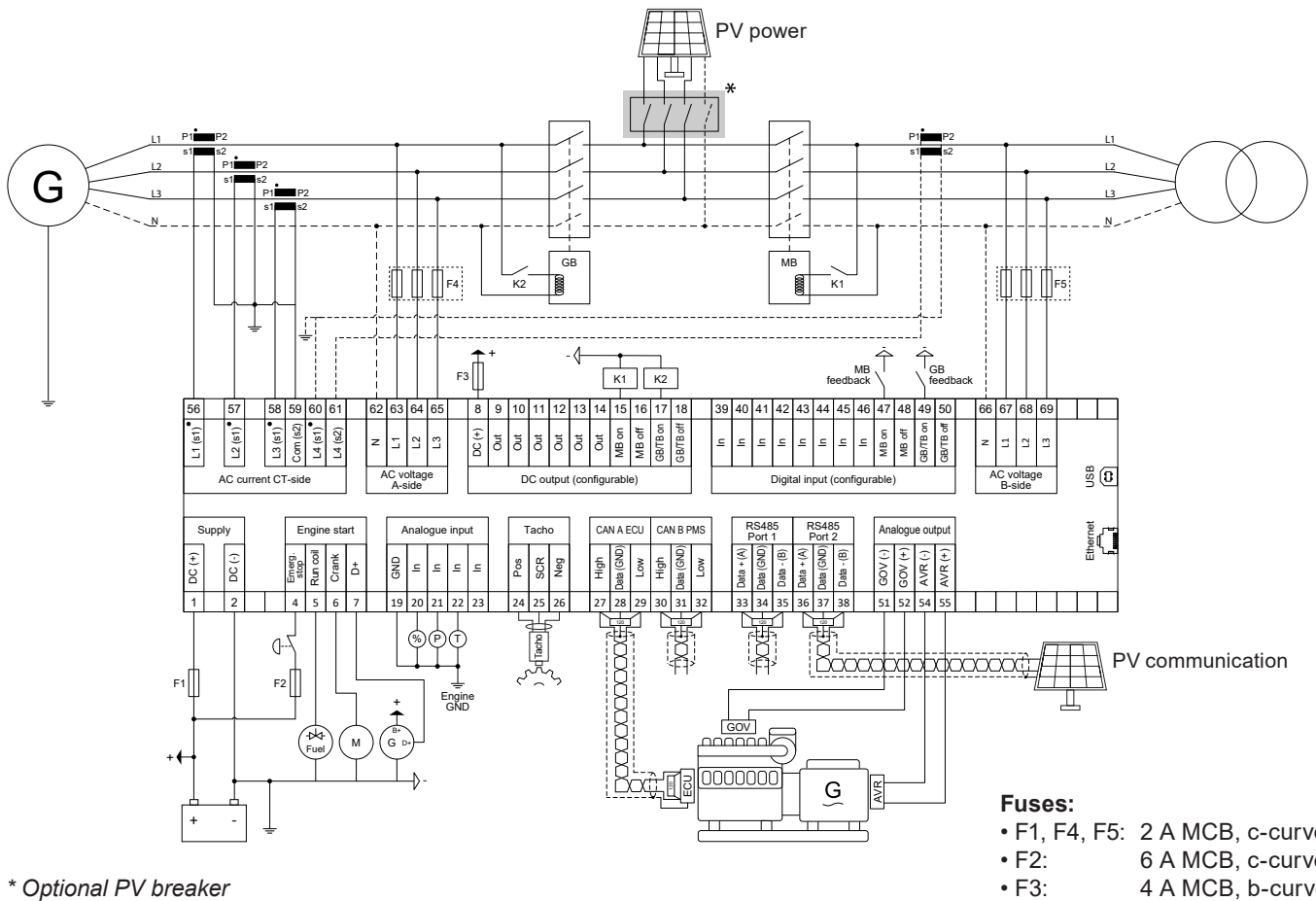
### Software packages

The AGC 150 can be equipped with four different software packages:

- Stand-alone
- Core
- Extended
- Premium

Note that the Hybrid functions are only supported by the **Stand-alone** and the **Core** packages.

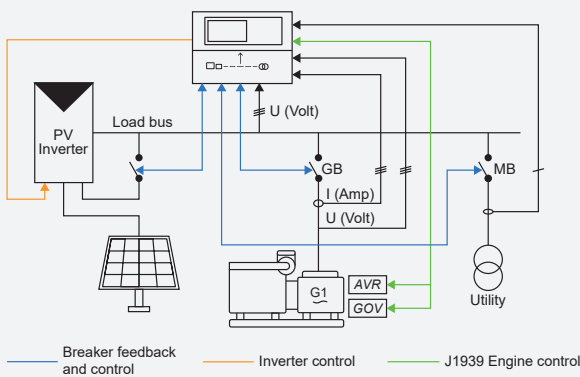
## Typical wiring



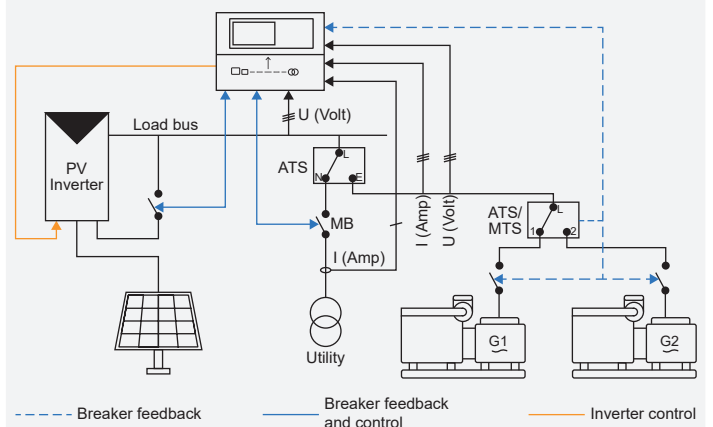
\* Optional PV breaker

## Application examples

### Application with PV inverters and a single generator



### Application with PV inverters and non-synchronising gensets



Designed and made in Denmark.

# AGC 150 Hybrid

## Technical specifications

### Power supply

- Nominal voltage: 12/24 V DC
- Operating range: 6.5 to 35 V DC
- Load dump protection (ISO16750-2)
- Measuring range: 0 to 50 V DC (35 V DC continuously)

### Operating conditions

- Operating temperature: -40 to +70 °C (-40 to +158 °F)
- Storage temperature: -40 to +85 °C (-40 to +185 °F)

### Environment

- Altitude: 0 to 4000 m
- Humidity: 20/55 °C at 95 % RH
- Protection degree: IP65 in panel, IP20 on terminals
- Pollution degree 2
- Self-extinguishing plastic

### Measuring

- Voltage range: 100 to 690 V, phase-to-phase
- Max. measured voltage: 10 to 135 % of nominal
- Voltage accuracy:  $\pm 1$  % of nominal
- Current range: 1 A and 5 A, 2 to 300 %
- Max. measured current: 3/15 A overload
- Current accuracy:  $\pm 1$  % of nominal
- Frequency range: 3.5 to 75 Hz
- Power accuracy:  $\pm 1$  % of nominal

### Inputs/Outputs

- Digital inputs: 12 (max. +50 V, min. -24 V)
- Digital outputs: 2 (15 A inrush / 3 A continuously)  
10 (2 A inrush / 0.5 A continuously)
- Digital common: 12/24 V DC
- Analogue inputs: 4
- Analogue outputs: 2
- CANbus 1 and 2
- RS-485 1 and 2 (PV inverter communication on 2)
- RJ-45 Ethernet
- USB (service-port)

### Approvals

- CE
- cULus Listed to UL508 Industrial control equipment
- cULus recognized to UL6200 controls for stationary engine gensets

### Protections

- 2 x Reverse power . . . . . ANSI 32R
- 2 x Short circuit . . . . . ANSI 50P
- 4 x Over-current . . . . . ANSI 51
- 1 x Voltage-dependent over-current . . . . . ANSI 51V
- 2 x Over-voltage . . . . . ANSI 59P
- 3 x Under-voltage . . . . . ANSI 27P
- 3 x Over-frequency . . . . . ANSI 81O
- 3 x Under-frequency . . . . . ANSI 81U
- 1 x Unbalanced voltage . . . . . ANSI 47
- 1 x Unbalanced current . . . . . ANSI 46
- 1 x Under-excitation or var import . . . . . ANSI 32RV
- 1 x Over-excitation or var import . . . . . ANSI 32FV
- 5 x Overload . . . . . ANSI 32F
- 1 x Earth current . . . . . ANSI 51G
- 1 x Neutral current . . . . . ANSI 51N
- 3 x Busbar/mains over-voltage . . . . . ANSI 59P
- 4 x Busbar/mains under-voltage . . . . . ANSI 27P
- 3 x Busbar/mains over-frequency . . . . . ANSI 81O
- 3 x Busbar/mains under-frequency . . . . . ANSI 81U
- 1 x Emergency stop . . . . . ANSI 1
- 2 x Overspeed . . . . . ANSI 12
- 1 x Low auxiliary supply . . . . . ANSI 27DC
- 1 x High auxiliary supply . . . . . ANSI 59DC
- 1 x Generator breaker external trip . . . . . ANSI 5
- 1 x Tie/mains breaker external trip . . . . . ANSI 5
- Synchronisation failure alarms . . . . . ANSI 25
- Breaker open failure . . . . . ANSI 52BF
- Breaker close failure . . . . . ANSI 52BF
- Breaker position failure . . . . . ANSI 52BF
- 1 x Close before excitation failure . . . . . ANSI 48
- 1 x Phase sequence error . . . . . ANSI 47
- 1 x De-load error . . . . . ANSI 34
- 1 x Crank failure . . . . . ANSI 48
- 1 x Running feedback error . . . . . ANSI 34
- 1 x MPU wire break
- 1 x Start failure . . . . . ANSI 48
- 1 x Hz/V failure . . . . . ANSI 53
- 1 x Stop failure . . . . . ANSI 48
- 1 x Stop coil, wire break alarm . . . . . ANSI 5
- 1 x Engine heater . . . . . ANSI 26
- 2 x Max. ventilation/radiator fan
- 1 x Not in Auto . . . . . ANSI 34
- 1 x Fuel fill check
- 1 x Vector jump . . . . . ANSI 78
- 1 x df/dt (ROCOF) . . . . . ANSI 81R
- 2 x Under-voltage and reactive power, U and Q
- 1 x Positive sequence (mains) voltage low . . . . . ANSI 27
- 2 x Directional over-current . . . . . ANSI 67
- 1 x Negative sequence voltage high . . . . . ANSI 47
- 1 x Negative sequence current high . . . . . ANSI 46
- 1 x Zero sequence voltage high . . . . . ANSI 59G
- 1 x Zero sequence current high . . . . . ANSI 50G
- 1 x Power-dependent reactive power . . . . . ANSI 40
- 1 x IEC/IEEE inverse time over-current . . . . . ANSI 51

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