

# ASC-4 Solar

## Data sheet



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## 1. ASC-4 Solar

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# 1. ASC-4 Solar

## 1.1 About

The ASC-4 Solar controller can be used as a single controller to add PV power to an existing site, or with other DEIF controllers in a power/energy management system. The ASC-4 Solar controller controls and protects a photovoltaic (PV) system, with up to 32 inverters per controller.



In a power/energy management system (PMS), the controller is designed for seamless integration of PV power with other power sources. Multiple ASC-4 Solar controllers can be used in each PMS. The PMS makes sure that spinning reserve requirements are met, and responds quickly to load and weather changes. To save fuel, the PMS maximises PV penetration, while making sure that the gensets meet their minimum load requirements.

The controller has built-in AC measurements. There are two sets of voltage measurements (three phases, and (optional) the neutral phase), and one set of current measurements (three phases).

Operators can easily control the system from the display unit. Alternatively, use the communication options to connect to an HMI/SCADA system.

### 1.1.1 Key features

	Single solar controller	Power management systems
<b>Applications</b>	Brownfield	Greenfield
Solar integration in hybrid systems (including microgrids)	●	●
Communicates with PV systems over Modbus <ul style="list-style-type: none"> <li>Monitor and troubleshoot the Modbus communication from the ASC-4 display unit</li> <li>SunSpec support</li> <li>Non-SunSpec support (see compatibility list)</li> </ul>	●	●
Control of PV breaker (optional)	●	●
<b>Using ASC-4 Solar with gensets</b>		
Connect to gensets for PV-diesel	Up to 16 gensets	Up to 32 gensets (with AGC-4 Mk II/AGC 150)
Power meter interfacing	●	Not required
Minimum genset load constraint	●	●
Load-dependent genset start/stop		By PMS
<b>Easy to use</b>		
Simple graphical configuration with the free PC tool	●	●
Highly customisable with user-friendly M-Logic tool	●	●
Effective commissioning with DEIF emulation (use and verify the functions of the real system for design, production and testing)	●	●

	Single solar controller	Power management systems
<b>Optimal operation</b>		
Define and change the priorities of connected power sources	-	●
Uptime guaranteed through spinning reserve	-	●
Maximised sustainable power production	*	●

**NOTE** \* The single solar controller aims for maximum sustainable power production. However, power management systems can better maximise sustainable power production.

### Scalable and flexible

You can easily add controllers to an application, rearrange applications, and move controllers from single controller applications to PMS (or the other way around).

### Ideal for self-consumption applications

While in grid parallel mode, the ASC-4 Solar is capable of feeding surplus PV energy to the grid and generate profit in accordance with grid operator feed-in tariffs. Alternatively, the ASC-4 Solar can regulate the PV production to match the self-consumption, thereby preventing any feed-in of PV power to the grid if prohibited by grid operator regulations.

### Genset load management

In any operation mode, the ASC-4 Solar automatically maximises the sustainable power penetration, depending on the total load demand, without compromising the minimum genset load requirement.

This secures a minimum genset load, to reduce the risk of reverse power, glazing (cylinder liner polishing), and impure combustion and exhaust problems.

### Spinning reserve

The ASC-4 Solar offers spinning reserve support as a percentage of the produced power, as part of an existing superior system (for instance an existing PLC system) or using short-term weather forecasting.

### Weather (optional)

- Forecast system interfacing
- Meteorological data representation

### Hardware

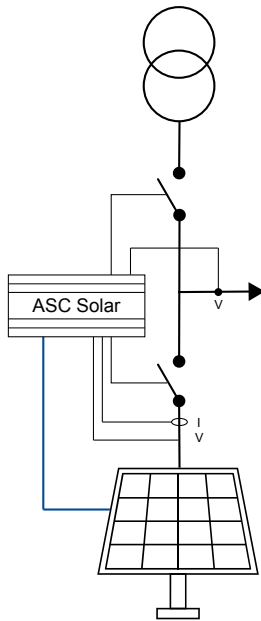
DEIF-developed platform, manufactured in Denmark. Flexible configuration.

## 1.2 Single solar controller

The ASC-4 Solar can operate as a single controller, that is, without power management communication to other controllers. Single controllers are particularly useful for brownfield applications. Single controllers can also be used in greenfield applications.

Single solar controller	
External gensets	16
External mains	16
Photovoltaic breaker (PVB) control (optional)	●
Mains breaker position feedback (paralleling)	●

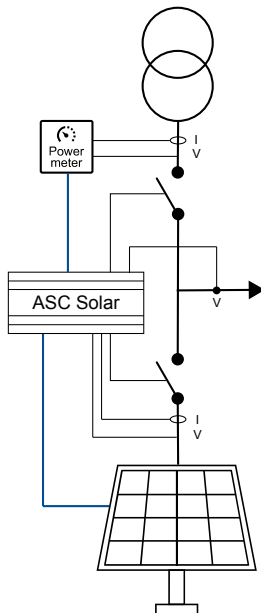
### Example for a single solar controller with fixed power



**Fixed power:** In AUTO mode, the PV breakers close when the busbar voltage and frequency are OK. When the auto start signal is given, the controller ramps up the PV power to the set point. When the stop command is given, the controller ramps the inverters down.

The solar controller gets position feedback from the mains breaker. For fixed power, the controller does not need power measurements from other power sources.

### Example for a single solar controller with peak shaving and mains power export

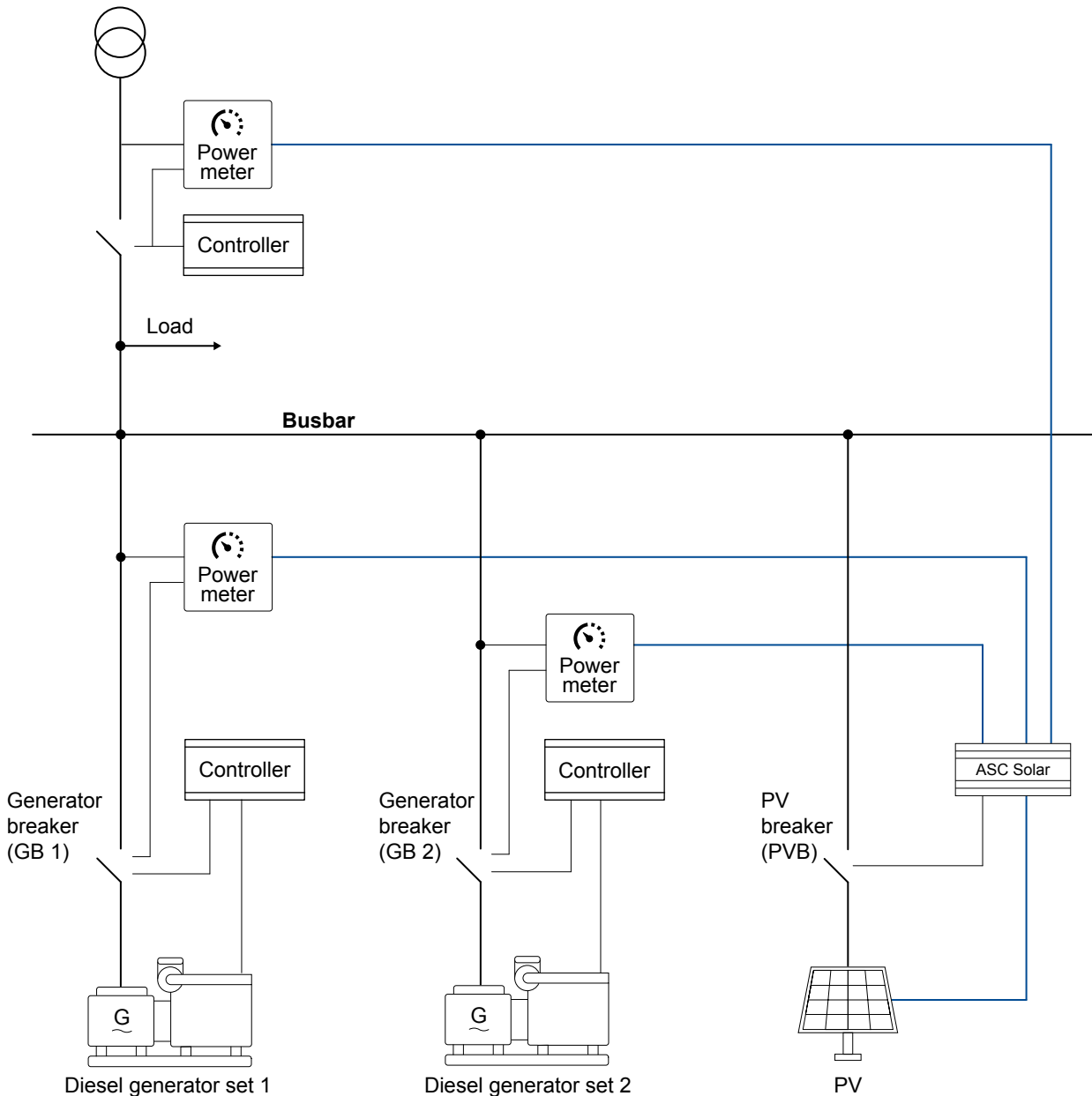


- **Peak shaving:** Power plant where the PV supplies the peak load demand and runs parallel to mains.
- **Mains power export:** The ASC continuously adjusts the PV set point so that the power through the mains breaker is at the fixed power set point.

The solar controller calculates the power set points for the PV power plant based on power readings and breaker positions.

The single controller must get the power measurements and breaker positions for the power sources in the rest of the application. You can use transducers, power meters, or a PLC.

## Adding a single solar controller to an existing plant (brownfield application)



### 1.3 Power management

The power management system ensures that the controllers work together to control all power sources and breakers. Power management can ensure safety, fuel optimisation, easy implementation of plant logic, and so on.

#### 1.3.1 Grid-tied

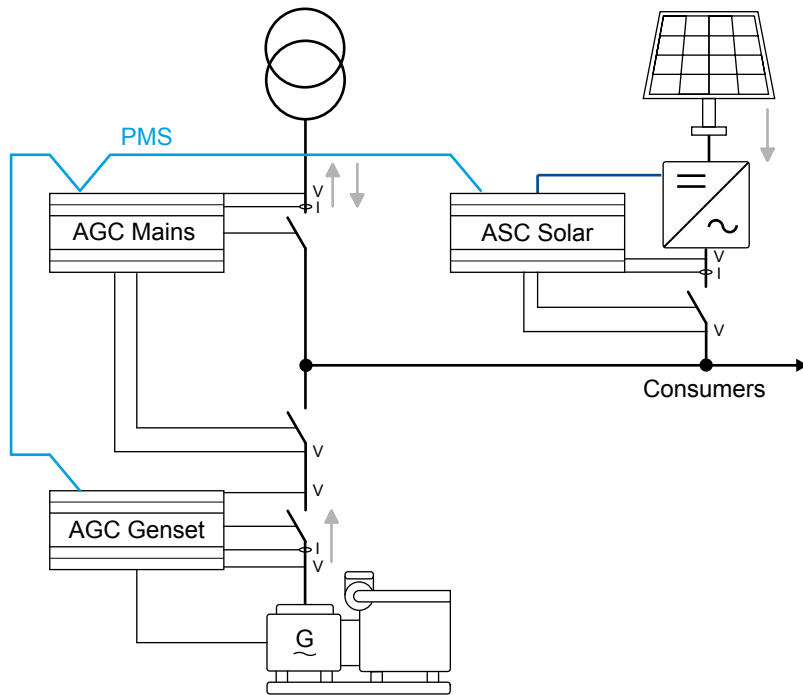
The ASC-4 Solar controllers can integrate seamlessly into grid-tied applications. This includes power management applications with other DEIF controllers using CAN bus communication.

The ASC-4 Solar can feed surplus PV energy to the grid, or charge the energy storage system (ESS). Alternatively, the ASC-4 Solar can regulate the PV production to match the self-consumption, thereby preventing any feed-in of PV power to the grid.

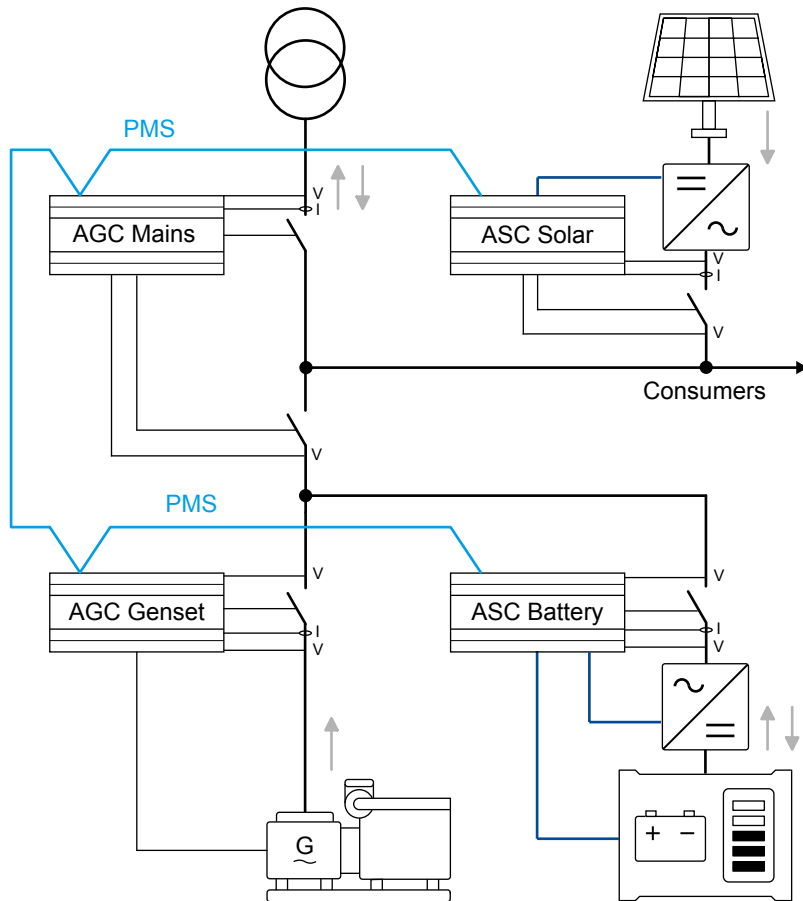
These controller configurations can be used in greenfield applications.

To use these configurations at existing sites, all the genset, mains, battery and solar controllers must be replaced with DEIF controllers. Existing BTB controllers can be replaced, or treated as externally controlled BTBs.

## Grid-tied solar and genset

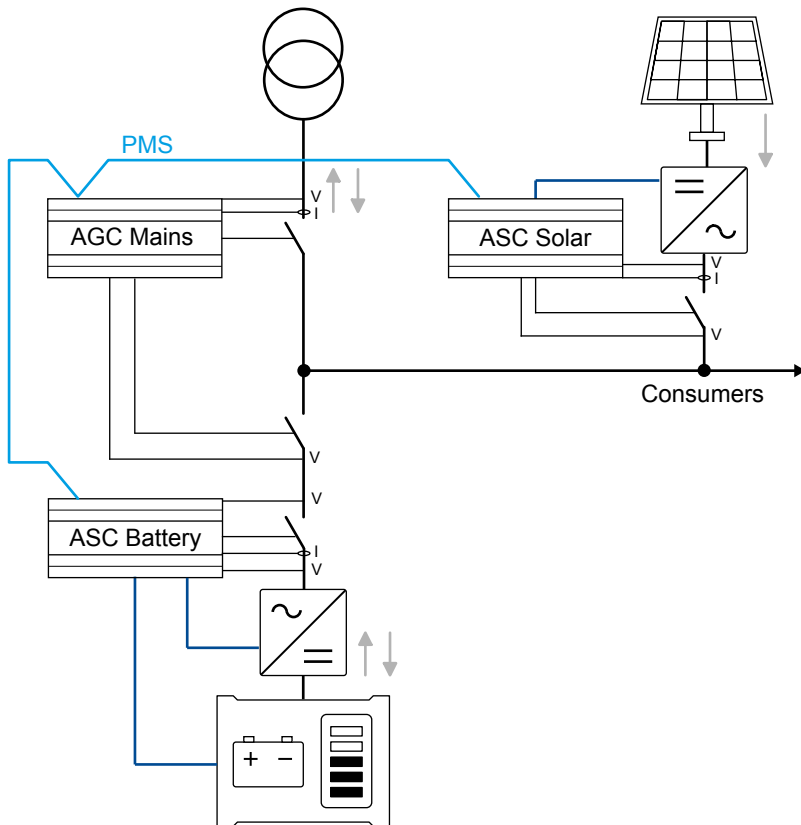


## Grid-tied solar, genset and battery





## Grid-tied solar and battery



### 1.3.2 Off-grid

The ASC-4 Solar controllers provide flexibility for off-grid applications.

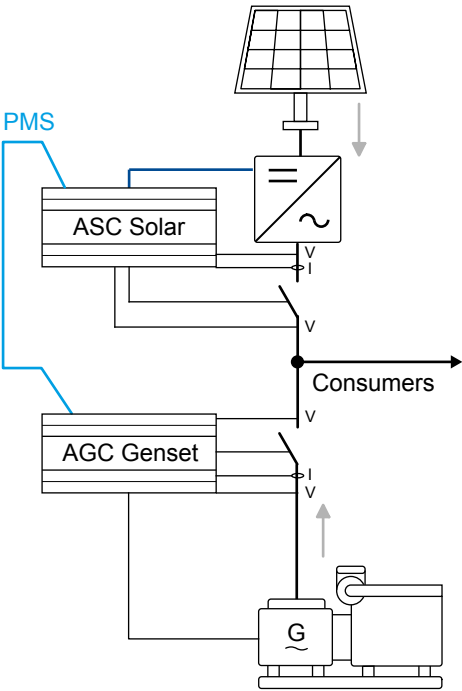
The ASC-4 Solar controller can work with other DEIF controllers to manage the PV power with other power sources. When used with a genset, the ASC-4 Solar controller uses the genset power measurements to calculate the set points for the PV power. When used with storage, the available PV power is combined with the charge/discharge scheme to determine the set point for the PV power.

These controller configurations can be used in greenfield applications.

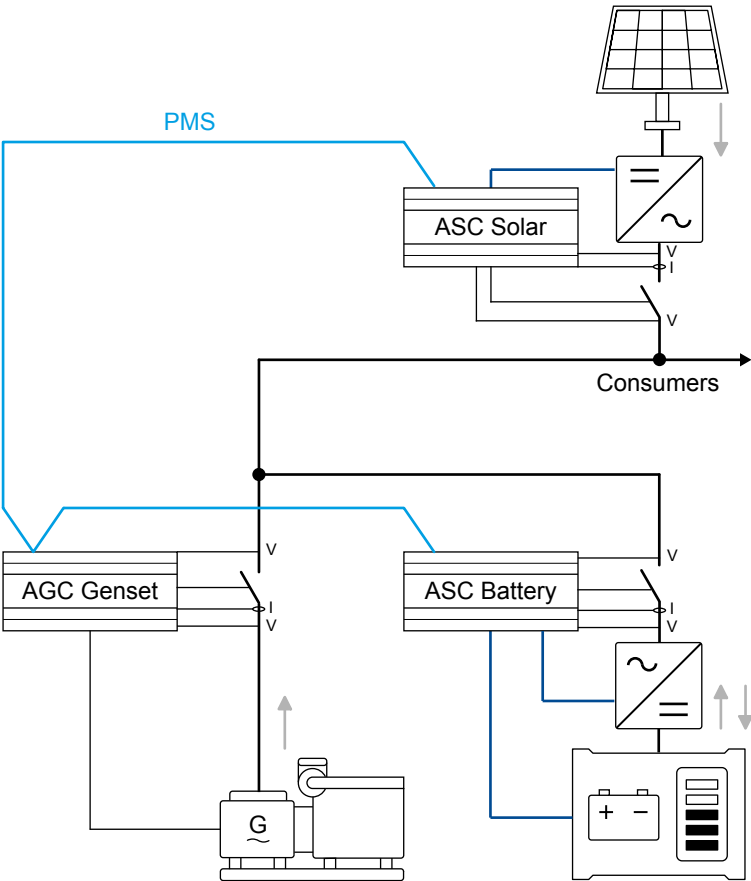
To use these configurations at existing sites, all the genset, battery and solar controllers must be replaced with DEIF controllers. Existing BTB controllers can be replaced, or treated as externally controlled BTBs.



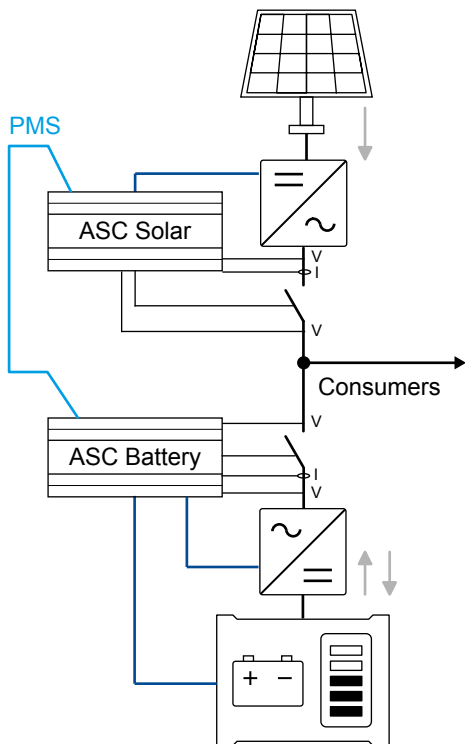
Off-grid with genset(s) and solar



Off-grid with genset(s), solar and battery



## Off-grid with solar and battery



### 1.3.3 Safe power management

#### Multi-master system

The power management system is designed as a multi-master system for increased reliability. In a multi-master system all vital data is transmitted between the controllers, giving all controllers knowledge of the present power management status (calculations and position) in the application. This makes the application immune to failing master controllers and makes the controllers suitable for all types of applications, including emergency standby, and critical power applications.

#### Redundant CAN bus

In critical power and emergency standby applications requiring extra operation reliability, redundant CAN bus communication lines can be used. This ensures reliable CAN bus communication for power management if one of the CAN lines is damaged.

#### Redundant controller

With the Critical Power option (T1) it is possible to have redundant controllers in the application. The redundant controller is connected on the CAN line as a hot standby unit and is therefore always updated with the system status and ready to become the primary controller.

### 1.3.4 Options

To use power management, the ASC-4 Solar controller must include option G5. The ASC-4 Solar controller also supports extended power management (option G7).



#### More information

See **Option G7 Extended power management** for how to use the ASC-4 Solar in an extended power management application.

### 1.3.5 Applications

With power management, the controllers can handle simple or advanced applications for a variety of power plant projects. Applications include synchronising gensets, critical power, emergency standby, and power production.

For power management (option G5), the following can be controlled:

- 32 gensets and/or mains with breakers (ID 1 to 32)
- 8 bus tie breakers on the generator bus or load bus (ID 33 to 40)
- 16 automatic sustainable controllers ASC-4 (solar and/or battery) (ID 25 to 40, ASC SW 4.10.0 or greater)
- 8 automatic load controllers ALC-4 (ID 25 to 40, ALC SW 4.10.0 or greater)

The complete power management system can easily be monitored from the PC utility SW through a graphical supervision page. Running status, hours in operation, breaker status, condition of mains and busbars and fuel consumption are just some of the values that are presented.

### 1.3.6 Plant modes

The plant can be divided by one to eight bus tie breakers. This makes it possible to run the plant with different plant modes. For example, for test purposes, or when splitting up the load in primary and secondary loads.

### 1.3.7 Power management functions

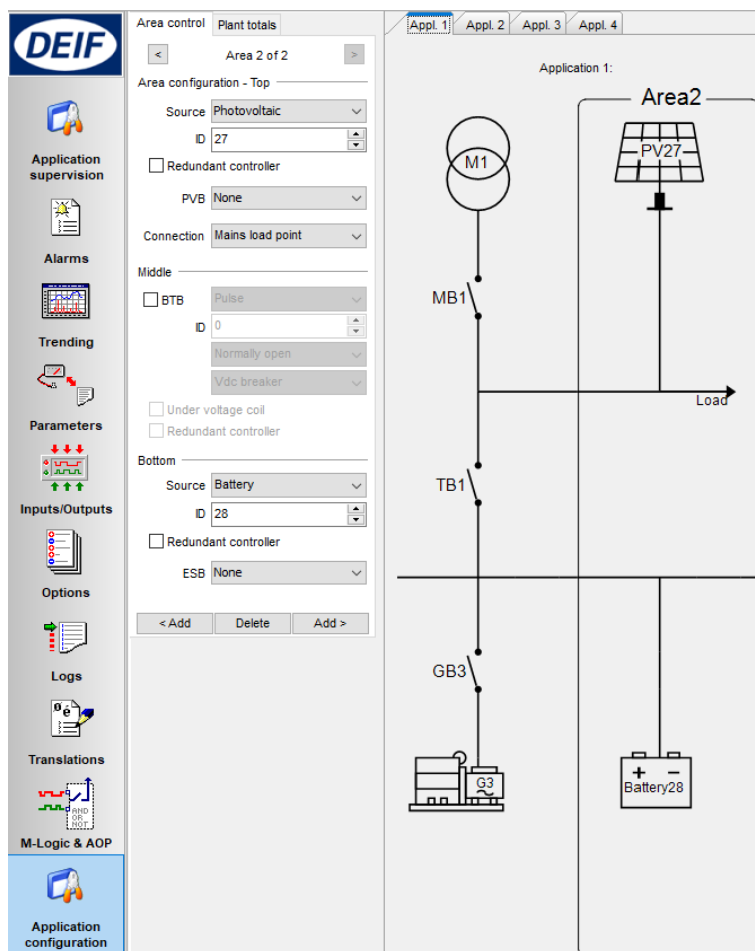
	Genset (G5)	Mains (G5)	BTB (G5)	Group (G7)	Plant (G7)
Multi-master system	●	●	●	●	●
Redundant CAN bus	●	●	●	●	●
Load management	●	●	●	●	●
Load-dependent start/stop	●			●	
<ul style="list-style-type: none"> <li>• Manual priority</li> <li>• Running hours priority</li> <li>• Running hours priority</li> <li>• Fuel optimisation priority</li> </ul>	Absolute/relative Absolute/relative Total/trip/load profiled ●			Absolute Absolute	
Neutral earth relay (Ground relay)	●			●	
Safety stop of genset	●				
N + X (Secured mode)	1-8 extra gensets			1 extra group	
<ul style="list-style-type: none"> <li>• Equal load sharing</li> <li>• Asymmetric load sharing</li> </ul>	● ●			● ●	
Base load running for maintenance (island plants)	●				
Analogue load sharing for backup	●				
Easy connect (for genset application setup)	●				
Short-time parallel	- *	● **			
ATS control		●			●
Plant PF control		●			●
Mains feeder control, feeders paralleled		●			●
Mains feeder control, main-tie-main for critical power		●			●
Section power control			●		

**NOTE** \* For a genset controller, short-time parallel is only possible in a single genset application (that is, without power management). The genset controller must control the GB and MB.

**NOTE** \*\* For a mains controller, short-time parallel is only possible if the controller controls the TB and MB.

### 1.3.8 Easy configuration of single-line diagrams

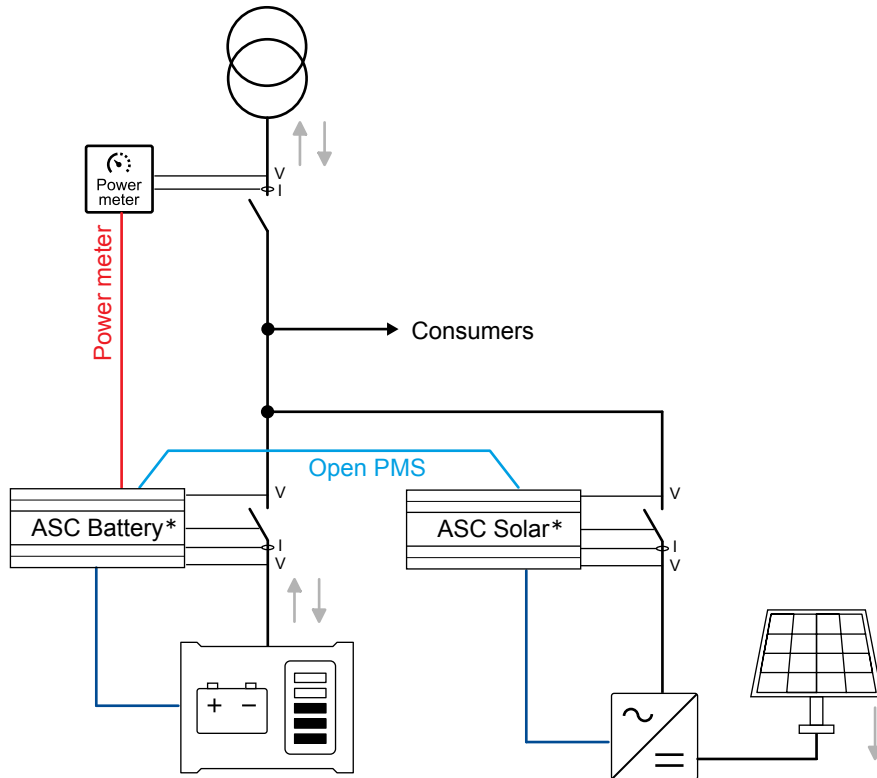
You can easily configure the application using a PC and the DEIF PC utility software. You can then set up the plant control, by using a few basic plant conditions.



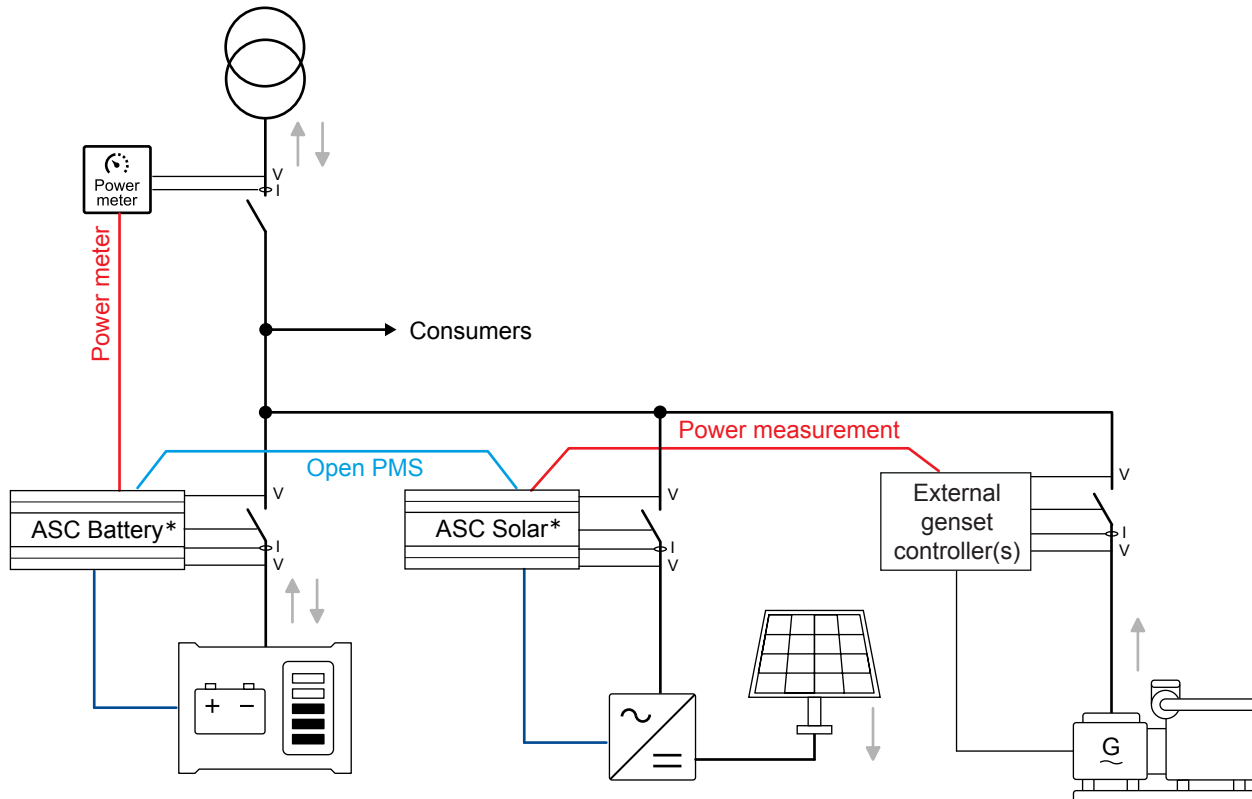
## 1.4 Open PMS

### 1.4.1 Grid-tied open PMS

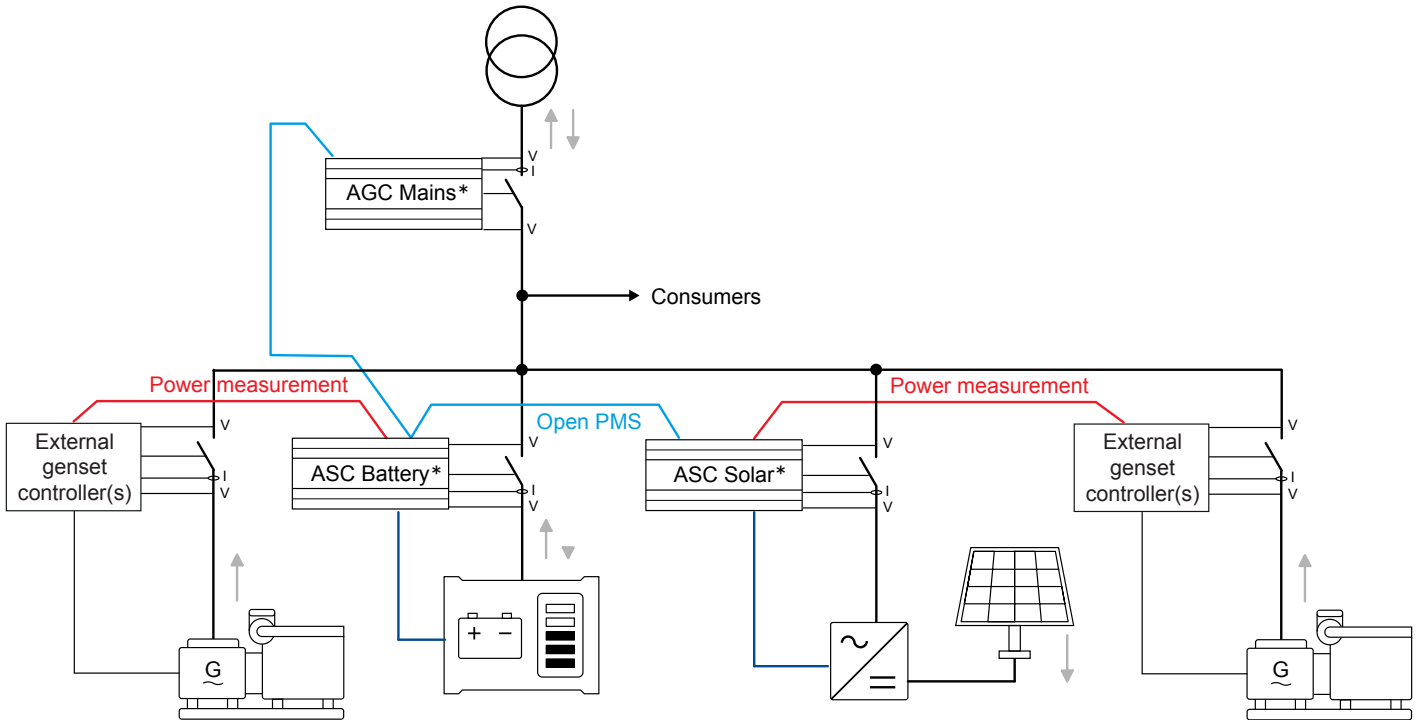
#### Grid-tied solar, storage and external mains



#### Grid-tied solar, storage, external genset(s) and external mains



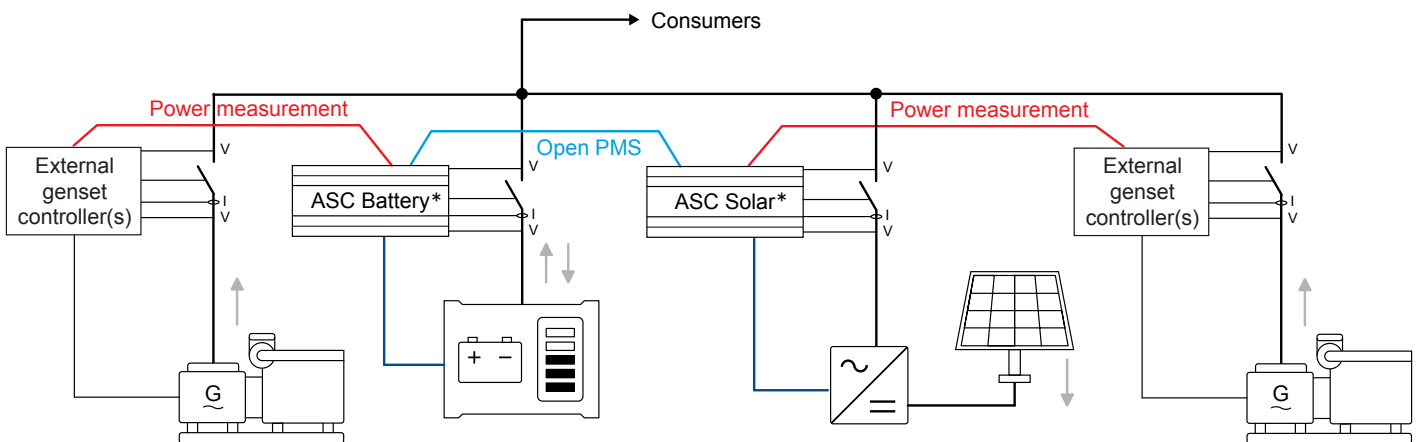
## Grid-tied solar, storage, mains and external genset(s)



**NOTE** \* You can use multiple controllers in the application. Power measurements can be connected to the closest ASC controller.

### 1.4.2 Off-grid open PMS

#### Off-grid solar, storage and external genset(s)



**NOTE** \* You can use multiple controllers in the application. Power measurements can be connected to the closest ASC controller.

**NOTE** If there is a stop signal to a genset, the connected storage controller can change the storage power reference to deload the genset. Similarly, if there is a stop signal to a genset, the connected solar controller can change the solar power reference to deload the genset.

### 1.4.3 Open PMS

Open PMS is a power management system that consists of solar and/or storage controllers (ASC 150 and/or ASC-4). Open PMS can also include a mains controller. The ASC controller(s) get power measurements from the externally controlled power source(s). You can therefore use open PMS to add power management to a brownfield application.

Open PMS automatically supplies the power that is necessary for the load efficiently, safely and reliably:

- Automatically maximises PV power
- Automatically closes and opens breakers
- Balances the loads in the system
- Deploys logic

The open PMS operating data can be shown graphically on the controller display. You can also monitor open PMS from a graphical supervision page in the utility software.

### Open PMS features

Open PMS features	Extended	Premium
Power management operation limits:		
• External generator controllers per solar/storage controller	4	16
• Mains controllers*	32	32
• External mains connections	1	1
• Solar controllers*	16	16
• Storage (BESS) controllers*	16	16
EasyConnect	●	●
External sources included in the available power:		
• Supply the busbar load	●	●
• Charge batteries	●	●
• Minimum and optimal genset load	●	●

### \*Restrictions on controllers

ID 1 to 24	ID 25 to 32	ID 33 to 40
AGC Mains (1 to 32)		
	ASC Solar (25 to 40)	
	ASC Storage/Battery (25 to 40)	

### Plant modes with a mains controller

With a mains controller, open PMS supports:

- Configurable mains power set point
- Configurable mains operating mode
- Auto-start signal for the application to the mains controller
- Standard AGC mains PMS features, including cos phi set points, and mains breaker control

Standard plant modes	Applications
Island mode	Power plant with synchronising generators.
Automatic Mains Failure	Critical power/emergency standby plants, black start generator.
Fixed power	Power plant with fixed kW set point (including building load).
Peak shaving	Power plant where generator supplies peak load demand paralleled to the mains.
Load take-over	Plant mode where the load is moved from mains to generator. For example, peak demand periods, or periods with a risk of power outages.
Mains power export	Power plant with fixed kW set point (excluding building load).

### Plant modes with an external mains

The ASC that is connected to the external mains operates as an *AGC mains lite* and controls the mains mode.



Standard plant modes	Applications
Fixed power	Power plant with fixed kW set point (including building load).
Peak shaving	Power plant where generator supplies peak load demand paralleled to the mains.
Mains power export	Power plant with fixed kW set point (excluding building load).

**NOTE** For an open external mains breaker, open PMS cannot synchronise so that the mains breaker can close. That is, open PMS runs in island mode and cannot back sync.

## 1.5 Communication protocols

### 1.5.1 Compatibility and compliance

DEIF hybrid controllers are compatible with photovoltaic systems from a wide range of manufacturers.

#### SunSpec compliance

All DEIF hybrid controllers are compliant with the SunSpec standards (see [sunspec.org](https://sunspec.org)). DEIF controllers are therefore compatible with new inverters that use the generic SunSpec protocol.

#### Testing

Many PV inverter makers use the same protocol for a wide range of their products. New PV inverters often comply with the older protocol. If a specific inverter is not listed, but the maker is listed, there is a good chance that the DEIF controller is compatible.

If your PV inverter is not listed, DEIF can help to confirm compliance using the Modbus protocol documentation.

#### Implementing new protocols

Since new photovoltaic systems are launched every year, DEIF developers continuously implement new protocols. If your system is not listed, please contact DEIF. We can work with you to quickly implement the required protocol.

### 1.5.2 List of supported protocols

The ASC-4 Solar supports a wide range of PV systems, power meters, power measurements from genset controllers, weather stations, and forecast systems.



#### More information

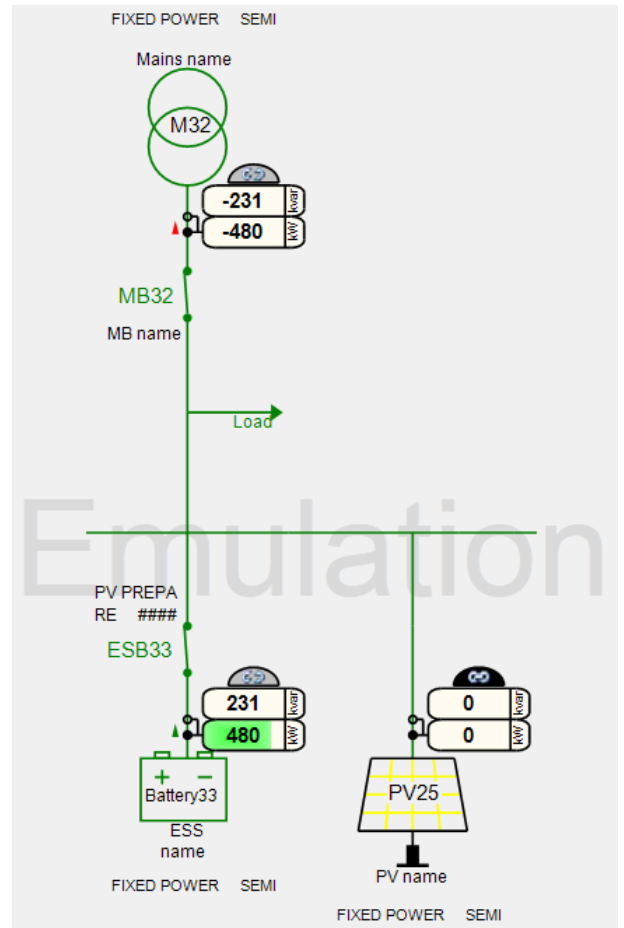
See the **Application note, DEIF hybrid controller compatibility**.

## 1.6 Application emulation

Use the emulation tool to verify and test the functionality. The emulation tool makes it possible to test most of the functions, for example, plant modes and logics, breaker handling, mains and generator operation. Emulation only requires a DC supply and CAN bus between the controllers.

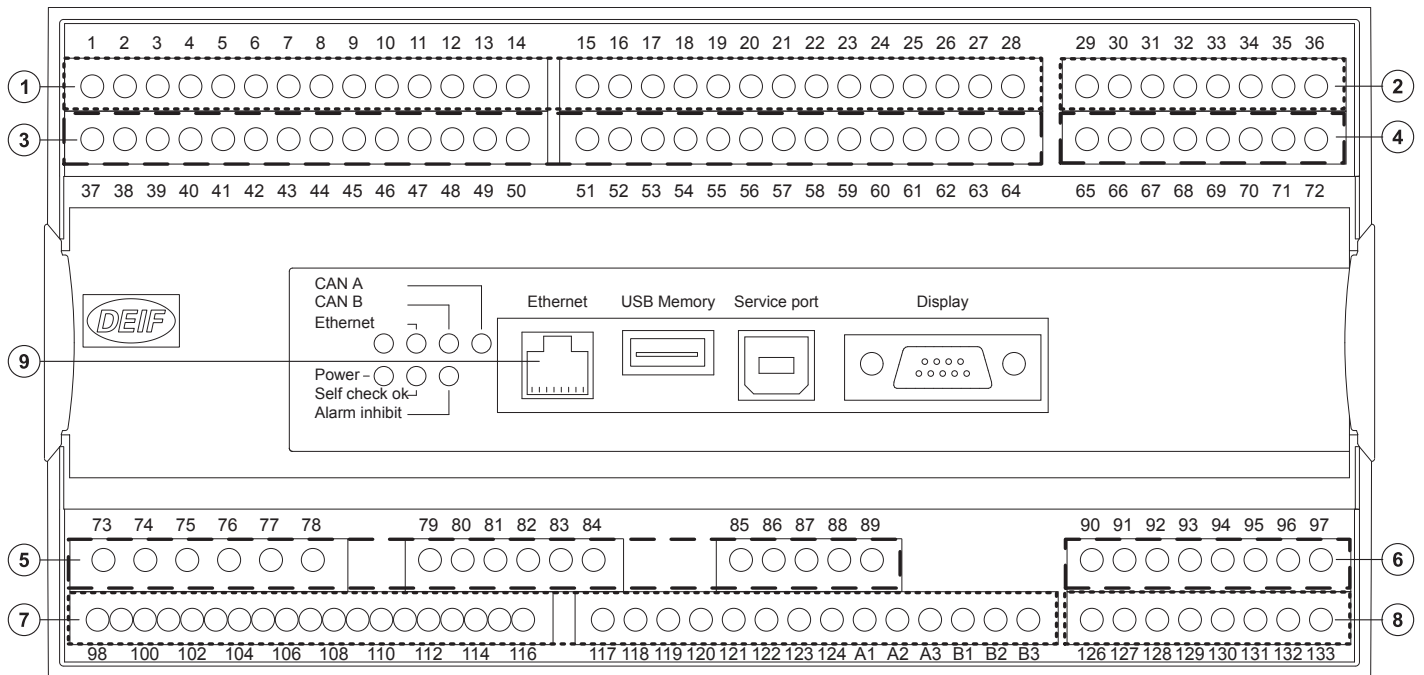
Application emulation is useful for training, customising plant requirements, and testing basic functionality.

In a power management system, the entire plant can be controlled using the PC Utility Software tool, if there is a TCP/IP connection to one of the controllers.



## 2. Hardware and software

### 2.1 Overview and options



① : The numbers in the drawing above refer to the slot numbers shown in the table below.

Slot #	Option/standard	Description
<b>1</b>		<b>Terminal 1-28, power supply</b>
	Standard	8 to 36 V DC supply, 11 W; 1 × status output relay; 5 × relay outputs; 2 × pulse outputs (kWh, kvarh or configurable open collector outputs); 5 × digital inputs
<b>2</b>		<b>Terminal 29-36, communication</b>
	Standard (H2.2)	Modbus RTU (RS-485). Can work as Modbus server or as Modbus client for inverter communication.
<b>3</b>		<b>Terminal 37-64, inputs/outputs</b>
	M12	13 × digital inputs; 4 × relay outputs
<b>4</b>		<b>Terminal 65-72, inputs/outputs</b>
	E2	2 × 0(4) to 20 mA outputs, transducer
	M13.4	7 × binary inputs
	M14.4	4 × relay outputs
<b>5</b>		<b>Terminal 73-89, AC measuring</b>
	Standard	3 × PV current; 3 × PV voltage + N; 3 × busbar voltage + N
<b>6</b>		<b>Terminal 90-97, inputs/outputs</b>

Slot #	Option/standard	Description
	F1	2 × 0(4) to 20 mA outputs, transducer
	M13.6	7 × digital inputs
	M14.6	4 × relay outputs
	M15.6	4 × 4 to 20 mA inputs
<b>7</b>		<b>Terminal 98-124-A1-A3-B1-B3, communication, inputs/outputs</b>
	M4	8 to 36 V DC supply; 3 × multi-inputs; 7 × digital inputs; 4 × relay outputs Power management communication, CAN port A and B
<b>8</b>		<b>Terminal 126-133, inputs/outputs</b>
	H2.8	Modbus RTU (RS-485). Can work as Modbus client for power meter communication.
	M13.8	7 × digital inputs
	M14.8	4 × relay outputs
	M15.8	4 × 4 to 20 mA inputs
<b>9</b>		<b>LED I/F</b>
	N	Modbus TCP/IP
<b>Accessories</b>		
		AOP-1
		DU-2
<b>Additional hardware options</b>		
	Q1	Class 0.5 calibration
	W1	One-year extended warranty
	W2	Two-year extended warranty
	W3	Three-year extended warranty
<b>Software options</b>		
	G5	Power management
	G7	Extended power management
	I1	System emulation
	T1	Critical power (includes redundant controllers)

**NOTE** There can only be one hardware option in each slot. For example, it is not possible to select option H2.8 and option M13.8 at the same time, because both options require a PCB in slot 8.

## 3. Compatible products

### 3.1 Touch display unit: TDU

**TDU** is a pre-programmed touch screen display ([www.deif.com/products/tdu-series](http://www.deif.com/products/tdu-series)). The TDU can be used for these controllers:

- AGC 150 Generator, Mains and BTB
- ASC 150 Solar and Storage
- AGC-4 Mk II Generator, Mains and BTB
- ASC-4 Solar and Battery
- AGC-4 Generator, Mains and BTB

### 3.2 Power management

You can use these controllers together in a power management system:

- **AGC 150 Generator** ([www.deif.com/products/agc-150-generator](http://www.deif.com/products/agc-150-generator))
- **AGC 150 Mains** ([www.deif.com/products/agc-150-mains](http://www.deif.com/products/agc-150-mains))
- **AGC 150 BTB** ([www.deif.com/products/agc-150-btb](http://www.deif.com/products/agc-150-btb))
- **ASC 150 Solar** ([www.deif.com/products/asc-150-solar](http://www.deif.com/products/asc-150-solar))
- **ASC 150 Storage** ([www.deif.com/products/agc-150-storage](http://www.deif.com/products/agc-150-storage))
- **AGC-4 Mk II Genset, Mains, BTB, Group, and Plant** ([www.deif.com/products/agc-4-mk-ii](http://www.deif.com/products/agc-4-mk-ii))
- **AGC-4 Genset, Mains, BTB, Group, and Plant** ([www.deif.com/products/agc-4](http://www.deif.com/products/agc-4))
- **ASC-4 Solar** ([www.deif.com/products/asc-4-solar](http://www.deif.com/products/asc-4-solar))
- **ASC-4 Battery** ([www.deif.com/products/asc-4-battery](http://www.deif.com/products/asc-4-battery))
- **ALC-4 (Automatic Load Controller)** ([www.deif.com/products/alc-4](http://www.deif.com/products/alc-4))

### 3.3 Open PMS

You can use these controllers together in an open power management system:

- **ASC 150 Solar** ([www.deif.com/products/asc-150-solar](http://www.deif.com/products/asc-150-solar))
- **ASC 150 Storage** ([www.deif.com/products/agc-150-storage](http://www.deif.com/products/agc-150-storage))
- **AGC 150 Mains** ([www.deif.com/products/agc-150-mains](http://www.deif.com/products/agc-150-mains))
- **ASC-4 Solar** ([www.deif.com/products/asc-4-solar](http://www.deif.com/products/asc-4-solar))
- **ASC-4 Battery** ([www.deif.com/products/asc-4-battery](http://www.deif.com/products/asc-4-battery))
- **AGC-4 Mk II Mains** ([www.deif.com/products/agc-4-mk-ii](http://www.deif.com/products/agc-4-mk-ii))

You can also use **AGC 150 Generator**, **AGC-4 Mk II Genset** and/or **AGC-4 Genset** as external gensets. That is, the genset controllers are not part of the open PMS. They can send their power measurements to the open PMS controllers over CAN bus.

### 3.4 Power meters

Power measurements are required in single controller applications, as well as in open PMS applications. The controller can receive measurements from these DEIF power meters:

- **MIB 8000** ([www.deif.com/products/mib-8000](http://www.deif.com/products/mib-8000))
- **MIC-2 MKII** ([www.deif.com/products/mic-2-mkii](http://www.deif.com/products/mic-2-mkii))
- **MTR-4** ([www.deif.com/products/mtr-4](http://www.deif.com/products/mtr-4))



#### More information

See **Application note, DEIF hybrid controller compatibility** for supported power meters from other suppliers.

## 3.5 Power measurements from gensets

Power measurements are required in single controller applications, as well as in open PMS applications. The controller can receive measurements from these DEIF genset controllers:

- **AGC 150 Generator** ([www.deif.com/products/agc-150-generator](http://www.deif.com/products/agc-150-generator))
- **AGC-4 Mk II Genset** ([www.deif.com/products/agc-4-mk-ii](http://www.deif.com/products/agc-4-mk-ii))
- **AGC-4 Genset** ([www.deif.com/products/agc-4](http://www.deif.com/products/agc-4))
- **CGC 400** ([www.deif.com/products/cgc-400](http://www.deif.com/products/cgc-400))



#### More information

See **Application note, DEIF hybrid controller compatibility** for supported power measurements from other genset suppliers.

## 3.6 Remote monitoring service: Insight

**Insight** is a responsive remote monitoring service ([www.deif.com/products/insight](http://www.deif.com/products/insight)). It includes real-time genset data, a customisable dashboard, GPS tracking, equipment and user management, email and/or SMS alerts, and cloud data management.

## 3.7 Additional operator panel, AOP-2

The controller uses CAN bus communication to the additional operator panel (AOP-2). Configure the controller using M-Logic. On the AOP-2, the operator can then:

- Use the buttons to send commands to the controller.
- See LEDs light up to show statuses and/or alarms.

## 3.8 Other equipment

DEIF has a wide variety of other equipment that is compatible. Here are some examples:

- **Synchrosopes**
  - **CSQ-3** ([www.deif.com/products/csq-3](http://www.deif.com/products/csq-3))
- **Battery chargers/power supplies**
  - **DBC-1** ([www.deif.com/products/dbc-1](http://www.deif.com/products/dbc-1))
- **Current transformers**
  - **ASK** ([www.deif.com/products/ask-asr](http://www.deif.com/products/ask-asr))
  - **KBU** ([www.deif.com/products/kbu](http://www.deif.com/products/kbu))
- **Transducers**
  - **MTR-4** ([www.deif.com/products/mtr-4](http://www.deif.com/products/mtr-4))

## 4. Technical information

### 4.1 Technical specifications

<b>Accuracy</b>	<p>Class 1.0  -25 to <u>15 to 30</u> to 70 °C  Temperature coefficient: <math>\pm 0.2</math> % of full scale per 10 °C  Class 0.5 with option Q1  Averaged frequency: <math>\pm 10</math> mHz, 15 to 30 °C, 45 to 65 Hz</p> <p>Positive, negative and zero sequence alarms: Class 1 within 5 % voltage unbalance  Class 1.0 for negative sequence current  Fast over-current: 3 % of 350 %<math>I_N</math>  Analogue outputs: Class 1.0 according to total range  Option EF4/EF5: Class 4.0 according to total range  To IEC/EN 60688</p>
<b>Operating temperature</b> (including DU-2 display and AOP)	<p>-25 to 70 °C (-13 to 158 °F)  -25 to 60 °C (-13 to 140 °F) if Modbus TCP/IP (option N) is available in the controller  UL/cUL Listed: Max. surrounding air temperature: 55 °C (131 °F)</p>
<b>Storage temperature</b> (including DU-2 display and AOP)	-40 to 70 °C (-40 to 158 °F)
<b>Climate</b>	97 % RH to IEC 60068-2-30
<b>Operating altitude</b>	<p>0 to 4000 m above sea level  Derating 2001 to 4000 m above sea level:  Max. 480 V AC phase-phase 3W4 measuring voltage  Max. 690 V AC phase-phase 3W3 measuring voltage</p>
<b>Measuring voltage</b>	<p>Nominal value (<math>U_N</math>): 100 to 690 V AC, <math>\pm 20</math> %  UL/cUL Listed: 600 V AC phase-phase  Consumption: Max. 0.25 VA/phase</p>
<b>Voltage withstand</b>	<p><math>U_N + 35</math> % continuously  <math>U_N + 45</math> % for 10 seconds</p>
<b>Measuring current</b>	<p>Nominal value (<math>I_N</math>):  <b>Low:</b> 1 A AC from current transformer  <b>High:</b> 5 A AC from current transformer</p> <p>UL/cUL Listed: From listed or R/C (XODW2.8) current transformers 1 or 5 A  Consumption: Maximum 0.3 VA/phase</p>
<b>Current overload</b>	<p><math>4 \times I_N</math> continuously  <math>20 \times I_N</math>, 10 sec (max. 75 A)  <math>80 \times I_N</math>, 1 sec (max. 300 A)</p>
<b>Measuring frequency</b>	30 to 70 Hz
<b>Aux. supply</b>	<p>Terminals 1 and 2: 12/24 V DC nominal (8 to 36 V DC operational). Max. 11 W consumption  Battery voltage measurement accuracy: <math>\pm 0.8</math> V within 8 to 32 V DC, <math>\pm 0.5</math> V within 8 to 32 V DC @ 20 °C  Terminals 98 and 99: 12/24 V DC nominal (8 to 36 V DC operational). Max. 5 W consumption  0 V DC for 10 ms when coming from at least 24 V DC (cranking dropout)  The aux. supply inputs are to be protected by a 2 A time-delay fuse. (UL/cUL Listed: AWG 24)</p>

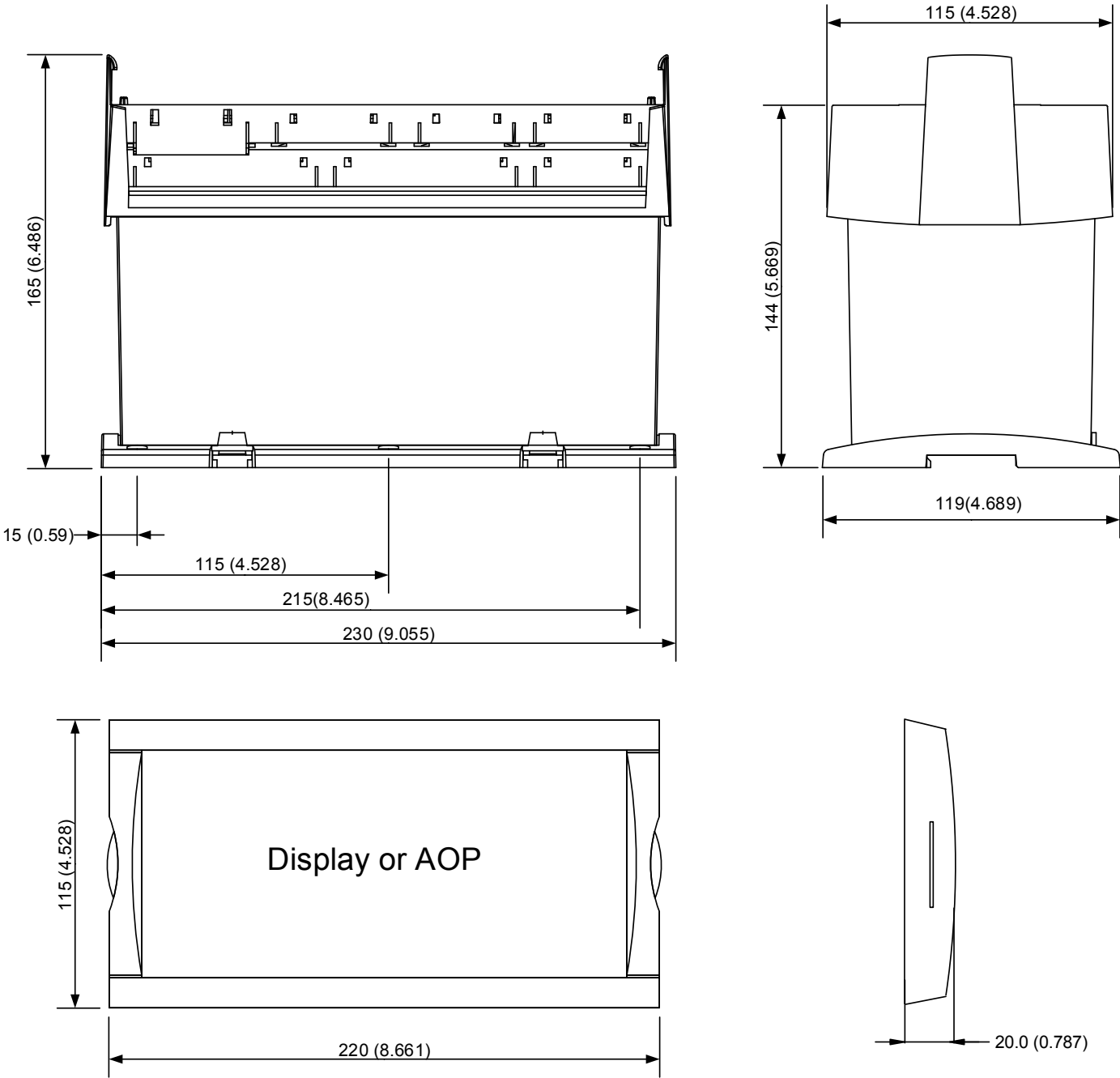


<b>Digital inputs</b>	Optocoupler, bi-directional ON: 8 to 36 V DC Impedance: 4.7 kΩ OFF: <2 V DC
<b>Analogue inputs</b>	-10 to +10 V DC: Not galvanically separated. Impedance: 100 kΩ (M12) 0(4) to 20 mA: Impedance 50 Ω. Not galvanically separated (M15.X)
<b>Multi-inputs</b>	0(4) to 20 mA: 0 to 20 mA, ±1 %. Not galvanically separated Digital: Max. resistance for ON detection: 100 Ω. Not galvanically separated Pt100/1000: -40 to 250 °C, ±1 %. Not galvanically separated. To IEC/EN60751 RMI: 0 to 1700 Ω, ±2 %. Not galvanically separated V DC: 0 to 40 V DC, ±1 %. Not galvanically separated
<b>Relay outputs</b>	Electrical rating: 250 V AC/30 V DC, 5 A. UL/cUL Listed: 250 V AC/24 V DC, 2 A resistive load Thermal rating @ 50 °C: 2 A: Continuously. 4 A: $t_{on}$ = 5 seconds, $t_{off}$ = 15 seconds. (Controller status output: 1 A)
<b>Open collector outputs</b>	Supply: 8 to 36 V DC, max. 10 mA (terminal 20, 21, 22 (com))
<b>Analogue outputs</b>	0(4) to 20 mA and ±25 mA. Galvanically separated. Active output (internal supply). Load maximum 500 Ω. UL/cUL Listed: Max. 20 mA output Update rate: Transducer output: 250 ms. Regulator output: 100 ms  Accuracy: Analogue outputs: Class 1.0 according to total range Option EF5: Class 4.0 according to total range To EN/IEC60688
<b>Galvanic separation</b>	Between AC voltage and other I/Os: 3250 V, 50 Hz, 1 min Between AC current and other I/Os: 2200 V, 50 Hz, 1 min Between analogue outputs and other I/Os: 550 V, 50 Hz, 1 min Between digital input groups and other I/Os: 550 V, 50 Hz, 1 min
<b>Response times</b> (delay set to min.)	<b>Mains/Busbar</b> Over-/under-voltage: <50 ms Over-/under-frequency: <50 ms  <b>Inverter/Power converter</b> Over-current: <250 ms Over-/under-voltage: <250 ms Over-/under-frequency: <350 ms Overload: <250 ms  <b>Other</b> Digital inputs: <250 ms Emergency stop: <200 ms Multi-inputs: 800 ms Wire failure: <600 ms
<b>Mounting</b>	DIN rail mount or base mount with six M4 screws  Tightening torque: 1.5 Nm for the six M4 screws (countersunk screws are not to be used)
<b>Safety</b>	To EN 61010-1, installation category (over-voltage category) III, 600 V, pollution degree 2 To UL 508 and CSA 22.2 no. 14-05, over-voltage category III, 600 V, pollution degree 2
<b>EMC/CE</b>	To EN 61000-6-2, EN 61000-6-4, IEC 60255-26

<b>Vibration</b>	3 to 13.2 Hz: 2 mm <sub>pp</sub> . 13.2 to 100 Hz: 0.7 g. To IEC 60068-2-6 & IACS UR E10 10 to 58.1 Hz: 0.15 mm <sub>pp</sub> . 58.1 to 150 Hz: 1 g. To IEC 60255-21-1 Response (class 2) 10 to 150 Hz: 2 g. To IEC 60255-21-1 Endurance (class 2) 3 to 8.15 Hz: 15 mm <sub>pp</sub> . 8.15 - 35 Hz 2g. To IEC 60255-21-3 Seismic (class 2)
<b>Shock (base mount)</b>	10 g, 11 ms, half sine. To IEC 60255-21-2 Response (class 2) 30 g, 11 ms, half sine. To IEC 60255-21-2 Endurance (class 2) 50 g, 11 ms, half sine. To IEC 60068-2-27
<b>Bump</b>	20 g, 16 ms, half sine. To IEC 60255-21-2 (class 2)
<b>Material</b>	All plastic materials are self-extinguishing according to UL94 V1
<b>Plug connections</b>	<p><b>Controller</b> AC current: 0.75 to 4.0 mm<sup>2</sup> stranded wire. UL/cUL Listed: AWG 18 AC voltage: 0.5 to 2.5 mm<sup>2</sup> stranded wire. UL/cUL Listed: AWG 20 Relays: UL/cUL Listed: AWG 22 Terminals 98-116: 0.2 to 1.5 mm<sup>2</sup> stranded wire. UL/cUL Listed: AWG 24 Other: 0.2 to 2.5 mm<sup>2</sup> stranded wire. UL/cUL Listed: AWG 24 Tightening torque: 0.5 N·m (5-7 lb-in) Service port: USB B Ethernet/Modbus TCP/IP connector: RJ-45</p> <p><b>DU-2 display</b> 9-pole D-sub female Tightening torque: 0.2 N·m</p>
<b>Protection</b>	Controller: IP20. DU-2 display and AOP: IP40 (IP54 with gasket: Option L). UL/cUL Listed: Type Complete Device, Open Type. To EN/IEC 60529
<b>Approvals</b>	<p>UL/cUL Listed to UL508 Applies to VDE-AR-N 4105</p> <p>See <a href="http://www.deif.com">www.deif.com</a> for the most recent approvals.</p>

<b>UL/cUL Listed</b>	<p><b>Controller</b>  A suitable type 1 (flat surface) enclosure is required:  Unventilated/ventilated with filters for controlled/pollution degree 2 environment  Flat surface mounting - Type 1 enclosure  Installation: To be installed in accordance with the NEC (US) or the CEC (Canada)  Use 90 °C copper conductors only  Wire Size: AWG 30-12  Tightening torque: 5-7 lb-in.  All inputs and outputs (except the AC voltage terminals): These must only be connected to limited voltage circuits from a battery protected by a 2 A DC max. time-delay fuse.  Communication circuits: Only connect to communication circuits of a listed system/equipment</p>
	<p><b>DU-2 Display</b>  Flat surface mounting - Type 1 enclosure  Power supply: The controller, or a separate Class 2 source</p>
	<p><b>AOP-2</b>  Wiring: Use 90 °C copper conductors only  Mounting: For use on a flat surface of type 1 enclosure. Main disconnect must be provided by installer.  Installation: To be installed in accordance with the NEC (US) or the CEC (Canada)</p>
	<p><b>DC/DC converter for AOP-2</b>  Tightening torque: 0.5 Nm (4.4 lb-in)  Wire size: AWG 22-14    Tightening torque: Panel door mounting 0.7 N·m, D-sub screw 0.2 N·m</p>
<b>Weight</b>	<p>Controller: 1.6 kg (3.5 lbs.)  Option J1/J4/J6/J7: 0.2 kg (0.4 lbs.)  Option J2: 0.4 kg (0.9 lbs.)  Option J8: 0.3 kg (0.58 lbs.)  DU-2 display or AOP: 0.4 kg (0.9 lbs.)</p>

4.2 Unit dimensions in mm (inches)



## 5. Ordering information

### 5.1 Order specifications

#### Variants

Type	Options specification				
Type	Option	Option	Option	Option	Option

Example:

Type	Options specification				
Type	Option	Option	Option	Option	Option
ASC-4 Solar	M14.4	M13.6	M15.8		

### 5.2 Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

### 5.3 Software version

This document is based on ASC-4 software version 4.27.