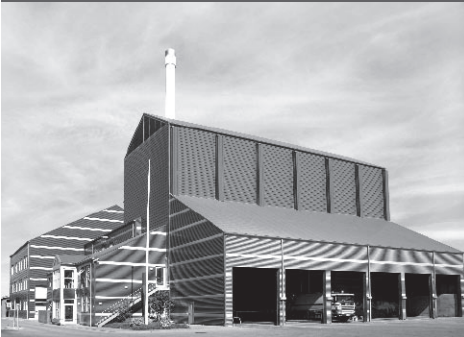




-power in control



## DATA SHEET



### **Automatic Sustainable Controller, ASC-4 a link between sustainable power plants and conventional power plants**



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Document no.: 4921240529D  
SW version: 4.10.0 or later

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# 1. ASC-4 Solar

## 1.1 Product information

The ASC-4 Solar is a controller designed to serve as a link between photovoltaic power plants and conventional power plants.



### Minimum genset load

The ASC-4 Solar will in any operation mode automatically maximise sustainable power penetration, depending on the total load demand to the hybrid without compromising minimum genset load requirement. This is to secure a certain amount of load on the gensets, eliminating the risk of reverse power situations 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 by means of short-term irradiation.

### 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.

### Key features

- PV integration
- Self-consumption & IPP applications
- PV/diesel applications
- Minimum genset load requirement
- Spinning reserve generation
- Green & brown field applications
- Compatible with AGC-4/AGC 200
- Power meter interfacing
- Inverter interfacing
- SunSpec support
- Forecast system interfacing
- Meteorological data representation
- Scalable & flexible
- Easy setup with free PC tool
- Plug & play HMI available

### Hardware

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

## 2. ASC-4 Battery

### 2.1 Product information

#### ASC-4 Battery, introduction

The ASC-4 Battery is designed to integrate electrical storage into hybrid power plants. It features comprehensive charge schemes to determine charge/discharge levels as well as sources of energy which can be used for re-charging the battery.

The ASC-4 Battery can instruct all gensets to be stopped and supply the load from battery alone or in combination with sustainable power production.



#### Energy & power source

When acting as energy source, the battery will seek to act as sole supplier without other sources connected. In case the load level, battery capacity and state of charge conditions are fulfilled, gensets will be instructed to stop.

When battery is discharged or load increases beyond battery capacity, gensets will be reconnected.

When acting as a power source, the battery is used as spinning reserve provider suppressing genset start due to spinning reserve requested by the ASC-4 Solar.

#### AC- or DC-coupled?

The ASC Battery is ideal for AC- as well as DC-coupled applications.

For AC-coupled systems, you can define battery charging and discharging scheme. Using the charge scheme, you'll also be able to define the energy sources (gensets, PV or mains) that you allow for charging purposes.

#### Key features

- Electrical storage integration
- Grid-tied applications
- Micro-grid applications
- Grid-following and grid-forming mode
- AC- and DC-charged systems
- Comprehensive charge schemes
- Compatible with AGC-4/AGC 200
- Spinning reserve provider
- PCS interfacing
- BMS interfacing
- Scalable & flexible
- Easy setup with free PC tool

#### Hardware

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

## 3. Technical information

### 3.1 Specifications and dimensions

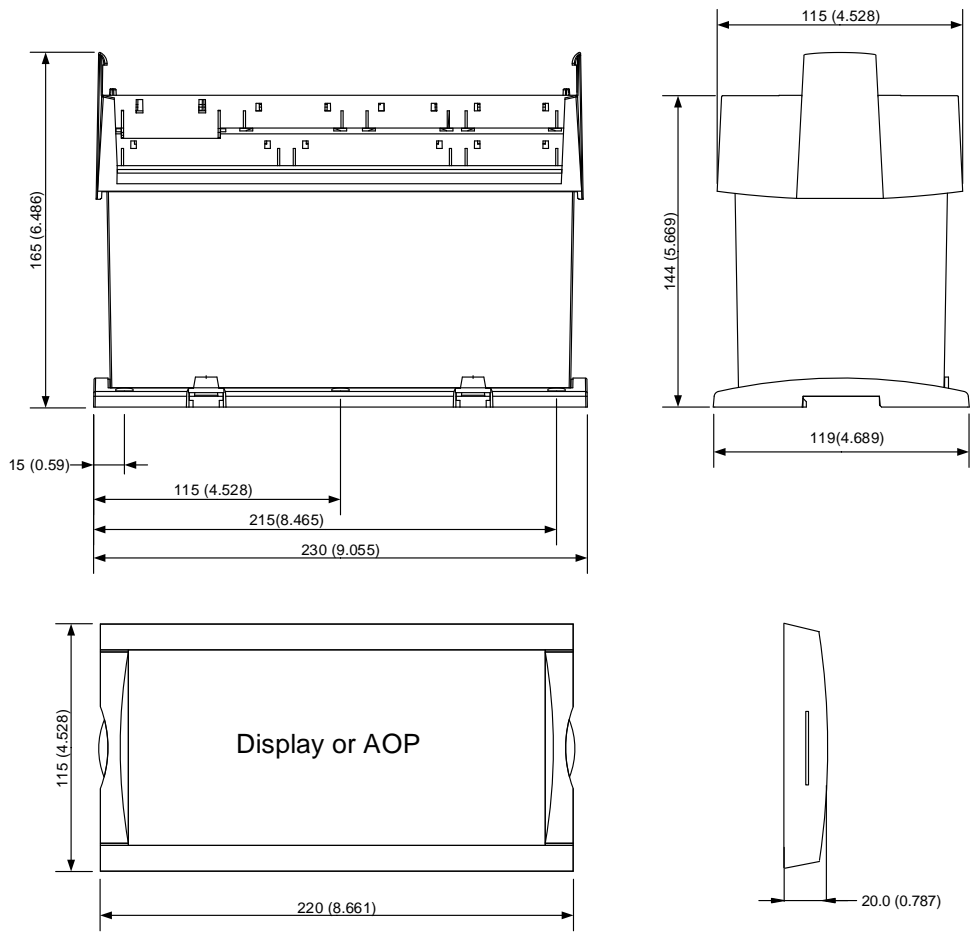
#### 3.1.1 Technical specifications

<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</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 %*In  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>	<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>	-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>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>Measuring current</b>	<p>-1 or -5 A AC  (UL/cUL Listed: from CTs 1 to 5 A)  Consumption: Max. 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 slow blow fuse. (UL/cUL Listed: AWG 24)</p>

<b>Binary inputs</b>	Optocoupler, bi-directional ON: 8 to 36 V DC Impedance: 4.7 k $\Omega$ OFF: <2 V DC
<b>Analogue inputs</b>	-10 to +10 V DC: Not galvanically separated. Impedance: 100 k $\Omega$ (G3) 0(4) to 20 mA: Impedance 50 $\Omega$ . Not galvanically separated (M15.X)
<b>Multi-inputs</b>	0(4) to 20 mA: 0 to 20 mA, $\pm 1$ %. Not galvanically separated Binary: Max. resistance for ON detection: 100 $\Omega$ . Not galvanically separated Pt100/1000: -40 to 250 $^{\circ}$ C, $\pm 1$ %. Not galvanically separated. To IEC/EN60751 RMI: 0 to 1700 $\Omega$ , $\pm 2$ %. Not galvanically separated V DC: 0 to 40 V DC, $\pm 1$ %. 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 $^{\circ}$ C: 2 A: Continuously. 4 A: $t_{on} = 5$ sec, $t_{off} = 15$ sec (Unit 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 $\pm 25$ mA. Galvanically separated. Active output (internal supply). Load max. 500 $\Omega$ . (UL/cUL Listed: Max. 20 mA output) Update rate: Transducer output: 250 ms. Regulator output: 100 ms
<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 binary input groups and other I/Os: 550 V, 50 Hz, 1 min
<b>Response times</b> (delay set to min.)	<b>Busbar:</b> Over-/under-voltage: <50 ms Over-/under-frequency: <50 ms Voltage unbalance: <250 ms  <b>Inverter:</b> Over-current: <250 ms Over-/under-voltage: <250 ms Over-/under-frequency: <350 ms Overload: <250 ms 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 60 Hz: 0.15 mm <sub>pp</sub> . 60 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)
<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>	AC current: 0.2 to 4.0 mm <sup>2</sup> stranded wire. (UL/cUL Listed: AWG 18) AC voltage: 0.2 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 Nm (5-7 lb-in)
Tightening torque	Display: 9-pole Sub-D female 0.2 Nm
	Service port: USB A-B
<b>Protection</b>	Unit: IP20. Display: IP40 (IP54 with gasket: Option L). (UL/cUL Listed: Type Complete Device, Open Type). To IEC/EN 60529
<b>Approvals</b>	UL/cUL Listed to UL508 Applies to VDE-AR-N 4105
<b>UL markings</b>	Wiring: Use 60/75 °C copper conductors only Mounting: For use on a flat surface of type 1 enclosure Installation: To be installed in accordance with the NEC (US) or the CEC (Canada)
	<b>AOP-2:</b> Maximum ambient temperature: 60 °C Wiring: Use 60/75 °C copper conductors only Mounting: For use on a flat surface of type 3 (IP54) enclosure. Main disconnect must be provided by installer Installation: To be installed in accordance with the NEC (US) or the CEC (Canada)
Tightening torque	<b>DC/DC converter for AOP-2:</b> Wire size: AWG 22-14 0.5 Nm (4.4 lb-in) Panel door mounting: 0.7 Nm Sub-D screw: 0.2 Nm
<b>Weight</b>	Base unit: 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) Display: 0.4 kg (0.9 lbs)

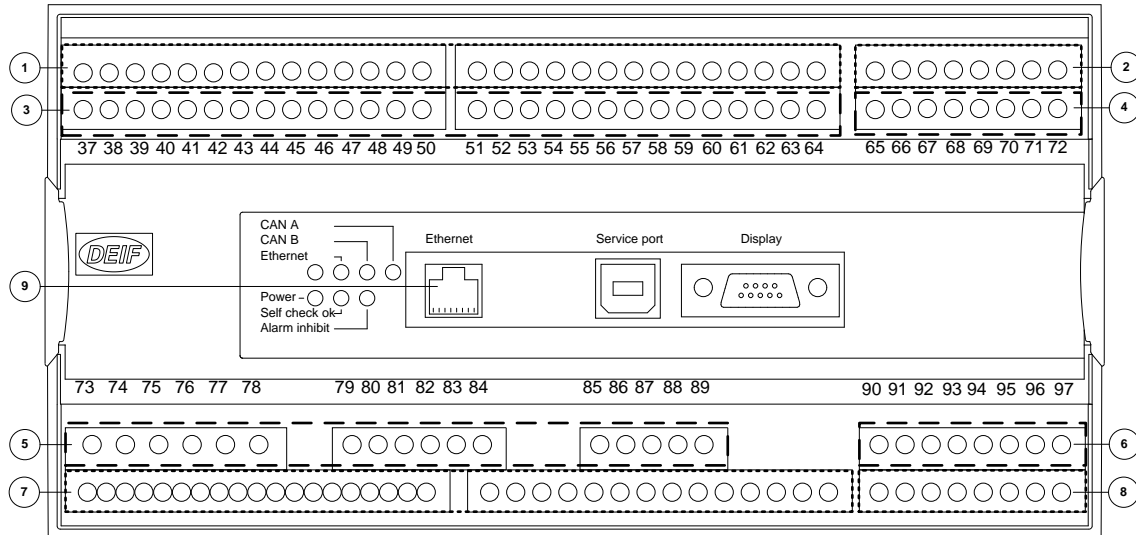
### 3.1.2 Unit dimensions in mm (inches)





## 4. Hardware, software and options

### 4.1 Hardware, software and options, ASC-4 controller



① : The numbers in the drawing above refer to the slot numbers indicated 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 slave or as master for inverter comm.
	M13.2	7 × binary inputs
	M14.2	4 × relay outputs
<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

Slot #	Option/standard	Description
<b>5</b>		<b>Terminal 79-89, AC measuring</b>
	Standard	3 × PV voltage; 3 × busbar voltage
<b>6</b>		<b>Terminal 90-97, inputs/outputs</b>
	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 98-125, 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 slave or as master for power meter comm.
	M13.8	7 × digital inputs
	M14.8	4 × relay outputs
	M15.8	4 × 4 to 20 mA inputs
<b>9</b>		<b>Terminal 73-78, LED I/F AC measuring</b>
	Standard	3 × PV current
	N	Modbus TCP/IP
<b>Accessories</b>		
		AOP-1
		DU-2
<b>Additional options</b>		
	Q1	Class 0.5 calibration
	I1	System emulation
	G5	Power management
	W1	One-year extended warranty
	W2	Two-year extended warranty
	W3	Three-year extended warranty



There can only be one hardware option in each slot. For example, it is not possible to select option H2 and option M13.2 at the same time, because both options require a PCB in slot #2.

## 5. Ordering information

### 5.1 Order specifications and disclaimer

#### 5.1.1 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	H2	M14.4	M13.6	M15.8	

#### 5.1.2 Disclaimer

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