



## DATA SHEET

# ALC-4

## Automatic Load Controller



**1. General information**

1.1 Automatic Load Controller, ALC-4.....3

1.2 Power management.....3

1.2.1 Applications.....3

1.2.2 Operating modes.....4

1.2.3 Heavy consumers.....4

1.3 Wiring and configuration.....4

**2. Hardware**

2.1 ALC-4 display.....5

2.2 Hardware options.....5

**3. Technical information**

3.1 Technical specifications.....8

3.2 Unit dimensions in mm (inches).....10

**4. Ordering information**

4.1 Order specifications.....11

4.2 Disclaimer.....11

4.3 Software version.....11

# 1. General information

## 1.1 Automatic Load Controller, ALC-4

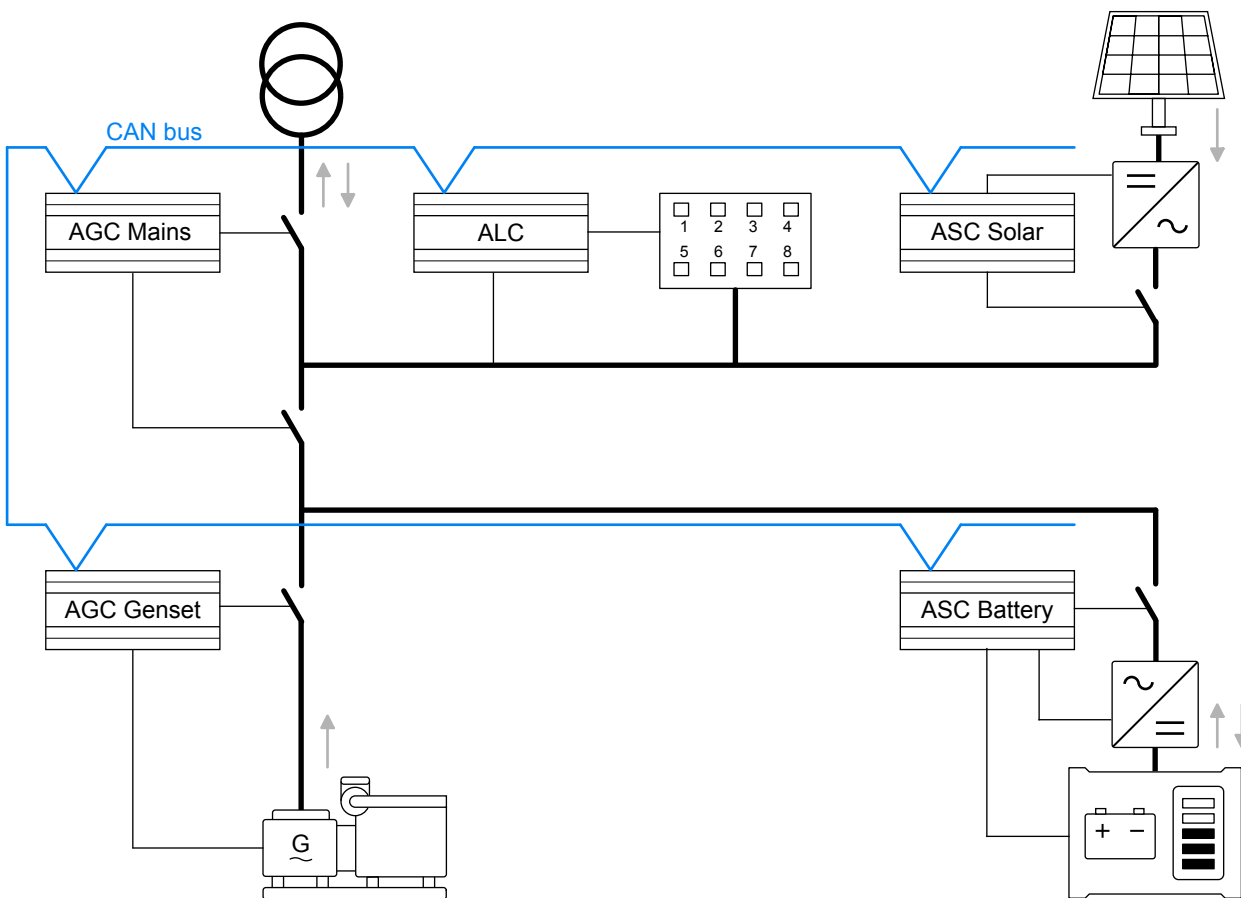
The Automatic Load Controller (ALC-4) is used with other controllers to control the load in critical power installations and other power plants. The ALC can work with AGC-4 Mk II, AGC-4, AGC 150, and ASC-4 to provide a total solution.

Each ALC can control up to 8 load groups (also known as consumer feeders). For each load group, the ALC opens and closes the load group breaker. The ALC can also receive an analogue signal for each load group's consumption.

Each load group can be configured as a Heavy consumer (HC). Each ALC can therefore control up to 8 heavy consumers.

All load groups can be prioritised. The ALC uses the priorities and the available power from the power management system to decide which load groups to connect. If more power is needed, the ALC requests more power from the power management system.

### Energy management system example



## 1.2 Power management

The ALC controllers get information from the DEIF power management system. This includes the produced power, available power, and stand-by power (that is, non-running but ready generators). Each ALC can request power. The power management system starts gensets as required.

The load group breaker positions are defined in the USW plant setup. The power management system knows where each ALC is located in the system. The ALC can therefore adapt to the new section when BTBs are opened.

### 1.2.1 Applications

The power management system can include up to 40 controllers:

- 32 gensets/mains with breakers: AGC-4 Mk II, AGC-4, and/or AGC 150 (ID 1 to 32)
- 16 automatic sustainable controllers: ASC-4 Solar and/or Battery (ID 25 to 40, ASC SW 4.0.6.0 or greater)
- 8 automatic load controllers: ALC-4 (ID 25 to 40, ALC SW 4.01.0 or greater)

## 1.2.2 Operating modes

### AUTO

The ALC works with the power management system to ensure there is enough power. The ALC automatically opens and closes the load group breakers.

### SEMI mode

Display or Modbus commands can manually open and close the load group breakers.

## 1.2.3 Heavy consumers

The heavy consumer function ensures that enough power is available when the heavy consumers need it. In addition, heavy consumer management minimises the disruption to the rest of the system when the heavy consumers connect.



### More information

See **ALC-4 Designer's handbook** for more information.

## 1.3 Wiring and configuration

The ALC-4 AC busbar voltage terminals must be wired to measure the voltage where the load groups are connected. If the busbar is live, the load groups are connected. If the busbar goes dead, the load groups are disconnected. Note that the ALC can be configured to connect loads to a dead busbar.

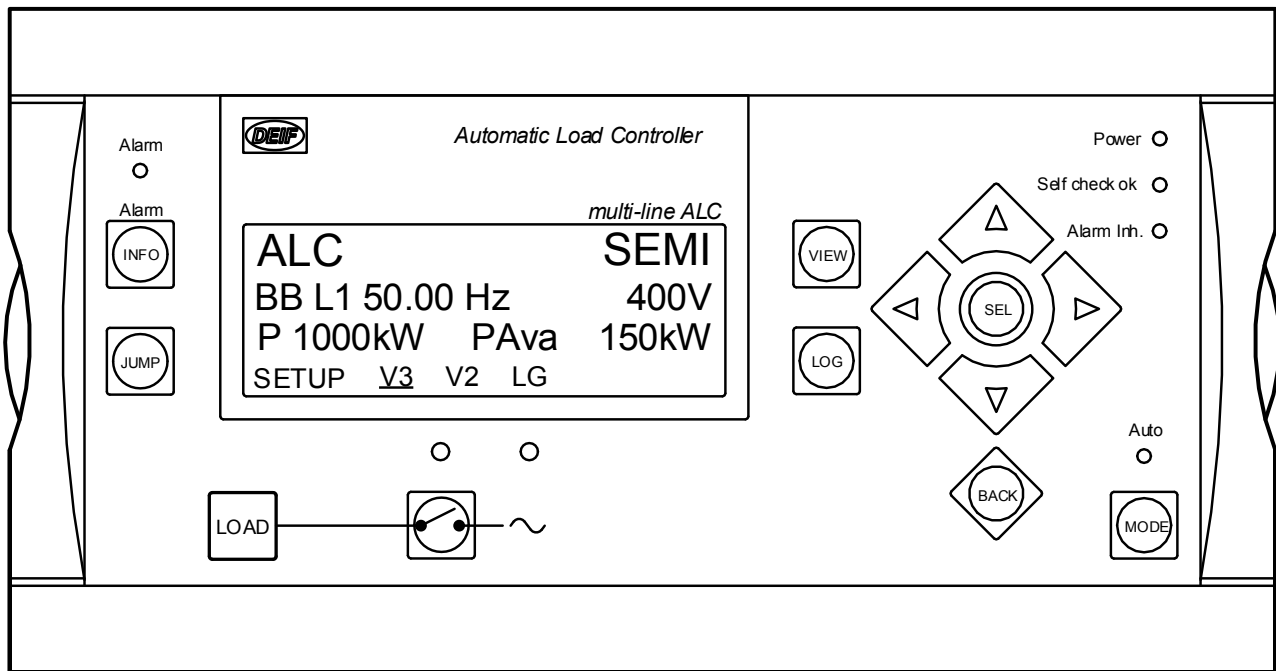
The ALC-4 also includes eight under-frequency protections. Note however that the ALC cannot measure the AC power. If power measurement is required, this must be done by an external device.

For each load group, you can configure:

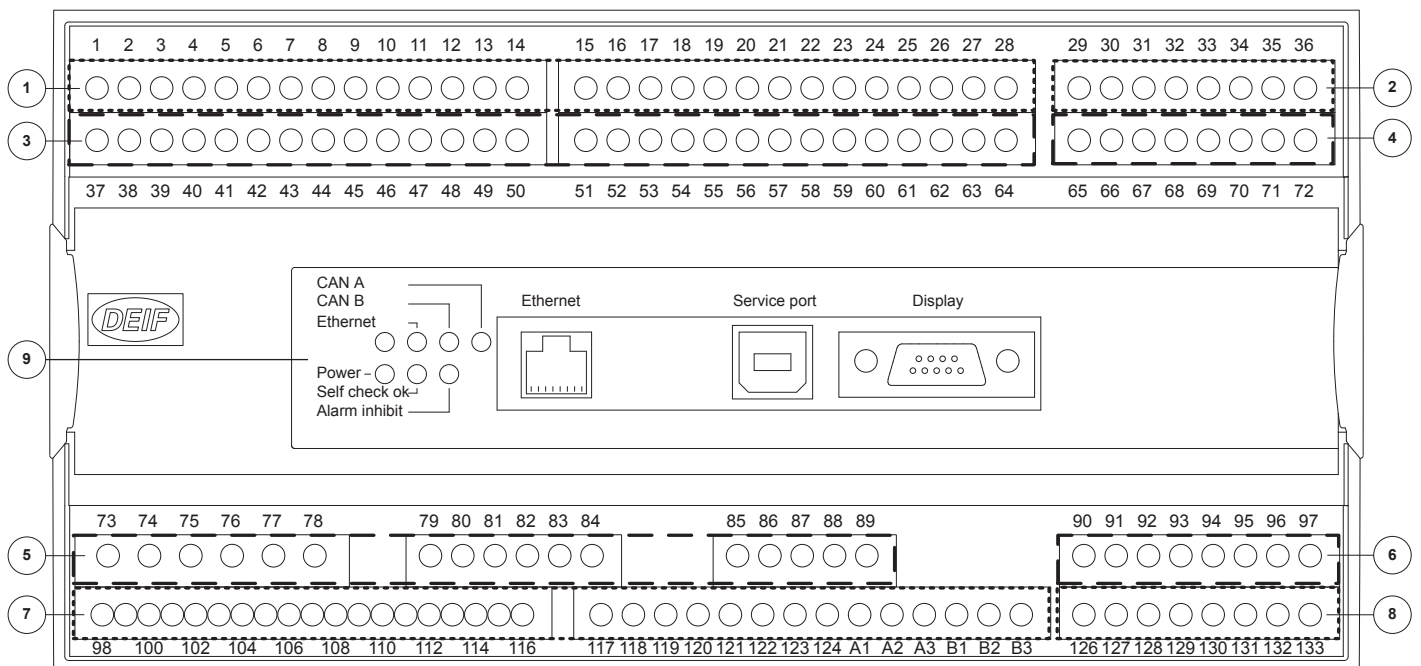
- The nominal power (kW)
- The priority
- A cut-in delay (the delay after conditions are ready for closing)
- A cut-out power level (available power in % of load group nominal power)
- A cut-in power level (available power in % of load group nominal power)
- Optional: An analogue input (for load feedback)

## 2. Hardware

### 2.1 ALC-4 display



### 2.2 Hardware options



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>
	H2	Modbus RTU (RS-485)
	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
<b>5</b>		<b>Terminal 79-89, AC measuring</b>
	Standard	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>
	Standard	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>
	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>
	N	Modbus TCP/IP
<b>Standard accessories</b>		
		AOP-1

Slot #	Option/standard	Description
		DU-2
Additional options		
	W1	One-year extended warranty
	W2	Two-year extended warranty
	W3	Three-year extended warranty

**NOTE** 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.

## 3. Technical information

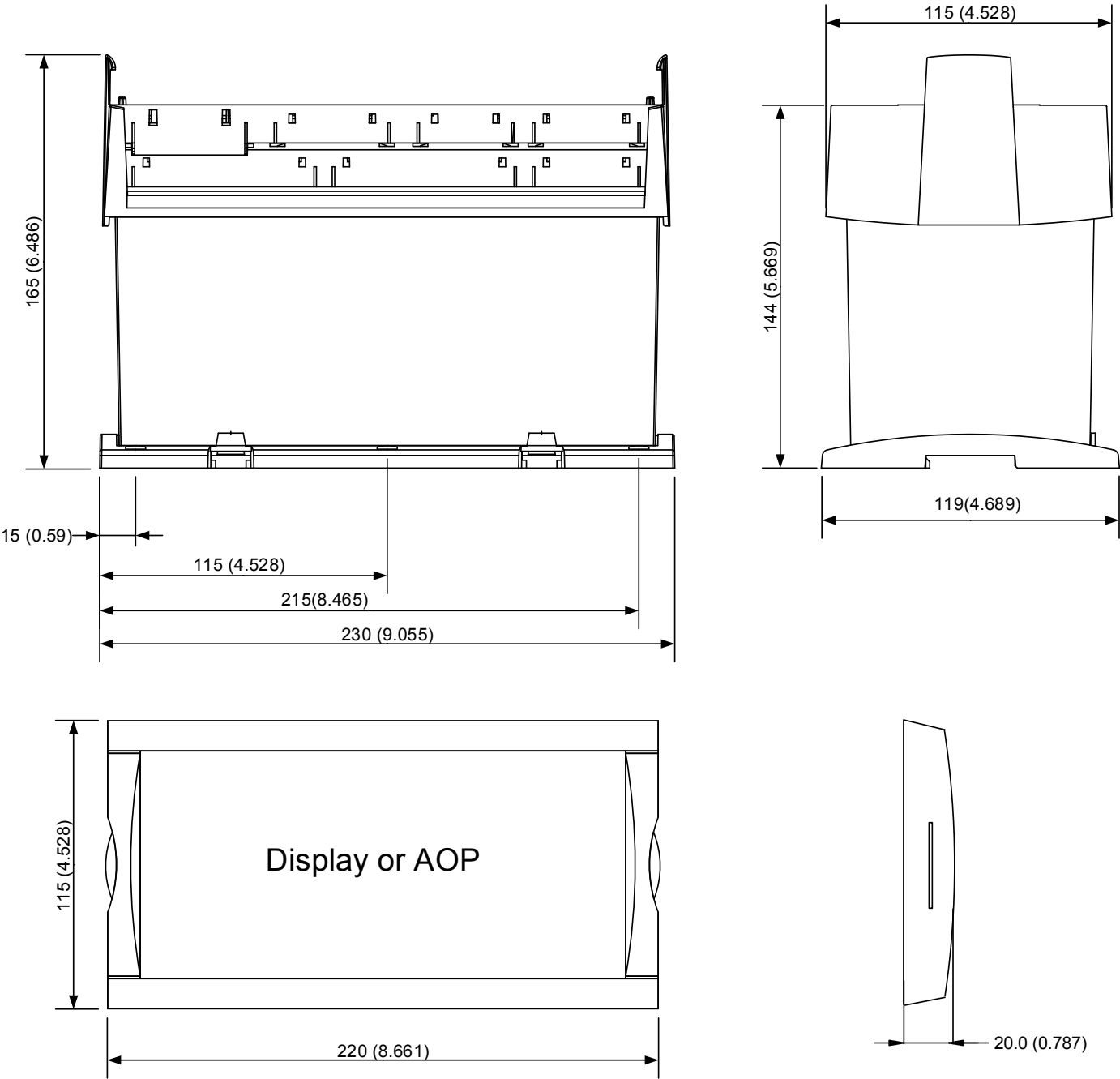
### 3.1 Technical specifications

<b>Accuracy</b>	Class 1.0 -25 to 15 to 30 to 70 °C Temperature coefficient: $\pm 0.2$ % of full scale per 10°C
<b>Operating temperature</b>	-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)
<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>	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
<b>Measuring voltage</b>	100 to 690 V AC $\pm 20$ % (UL/cUL Listed: 600 V AC phase-phase) Consumption: Max. 0.25 VA/phase
<b>Measuring frequency</b>	30 to 70 Hz
<b>Aux. supply</b>	Terminals 1 and 2: 12/24 V DC (8 to 36 V continuously, 6 V 1 sec). Max. 11 W consumption Battery voltage measurement accuracy: $\pm 0.8$ V within 8 to 32 V DC, $\pm 0.5$ V within 8 to 32 V DC @ 20 °C Terminals 98 and 99: 12/24 V DC (8 to 36 V continuously, 6 V 1 sec). Max. 5 W consumption The aux. supply inputs are to be protected by a 2 A slow blow fuse. (UL/cUL Listed: AWG 24)
<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 °C, $\pm 1$ %. Not galvanically separated. To IEC/EN60751. 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 °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>Galvanic separation</b>	Between AC voltage and other I/Os: 3250 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>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 mmpp. 13.2 to 100 Hz: 0.7 g. To IEC 60068-2-6 & IACS UR E10 10 to 60 Hz: 0.15 mmpp. 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>	<p>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)</p> <p>Display: 9-pole Sub-D female  Tightening torque: 0.2 Nm</p> <p>Service port: USB A-B</p>
<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>	<p>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)</p> <p><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)</p> <p><b>DC/DC converter for AOP-2:</b>  Wire size: AWG 22-14  Tightening torque: 0.5 Nm (4.4 lb-in)  Panel door mounting: 0.7 Nm Sub-D screw: 0.2 Nm</p>
<b>Weight</b>	<p>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)</p>

3.2 Unit dimensions in mm (inches)



## 4. Ordering information

### 4.1 Order specifications

#### Variants

Type	Options specification				
Type	Option	Option	Option	Option	Option

#### Example

Type	Options specification				
Type	Option	Option	Option	Option	Option
ALC-4	H2	M14.4	M15.6	M15.8	

### 4.2 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.

### 4.3 Software version

This document is based on ALC-4 software version 4.13.