

HFXE LED

Combined LED DRIVER and EMERGENCY INVERTER

for Ex-ENVIRONMENT



Barel AS

Revision 1

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www.barel.no/

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1 General

These operating instructions apply to the product listed in 3.1. Barel reserves the right to change technical specifications without further notice. Unauthorized copying or modification of this content is not permitted.

1.1 Manufacturer

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1.2 Applications

State of the art technology is utilized to increase efficiency and long lifetime.

These components are suitable for use in explosive gas atmospheres like:

- Oli industry On- & offshore installations, gas stations, fuel reservoirs, oil tankers
- Chemical industry Production plants

2 Approvals

- QAN/QAR *0470 Nemko 01ATEX452Q/
NO/NEM/QAR08.0001/04*
- Ex protection Code *Ex II 2 G Ex eb mb IIC T4*
- IECEX Certificate *IECEX PRE 14.0039U*
- ATEX no. *Presafe 14 ATEX 5355U*

According to directives and standards listed:

ATEX Directive 2014/34/EU

- EN 60079-0:2018 Explosive atmospheres -- Part 0: Equipment - General requirements
- EN 60079-7:2015 Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
- EN 60079-18:2015/A1:2017 Explosive atmospheres - Part 18: Equipment protection by encapsulation "m"

IECEX Scheme

- IEC 60079-0:2017 Explosive atmospheres - Part 0: Equipment - General requirements
- IEC 60079-7:2015+ AMD1:2017 Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
- IEC 60079-18:2014/AMD1:2017 Explosive atmospheres - Part 18: Equipment protection by encapsulation "m"

EMC-Directive 2014/30/EU

- EN 55015:2013/A1:2015 Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
- EN 61000-3-2:2014 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
- EN 61000-3-3:2013 Electromagnetic compatibility (EMC) -- Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
- EN 61547:2009 Equipment for general lighting purposes - EMC immunity requirements

Low Voltage Directive 2014/35/EU

- EN 61347-1:2015 Lamp control gear -- Part 1: General and safety requirements
- EN 61347-2-7:2012 Lamp control gear -Particular requirements for battery supplied electronic control gear for emergency lighting
- EN 61347-2-13:2014/A1:2017 Lamp control gear - Part 2-13: Particular requirements for dc. or ac. supplied electronic control gear for LED module

RoHS Directive 2011/65/EU

- EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

3 Technical data

3.1 Product range

Name	Barel part number	Input Voltage AC 50/60Hz -DC		LED current in normal operation +/- 7%	Lamp type	Input Current range AC +/-10%	PF at 230V 50Hz	THD% at 230V 50Hz	Battery type	Emergency output 90min (+/- 10%)	Emergency output 180min (+/- 10%)
HFxE LED	11951 * (not for new design - replaced by 11949-200)	110-254VAC	220-250VDC *	200mA	ARC 600	0,16-0,06A	0,84	28	4,8V NiCD 4-5Ah	35mA	28mA
	ARC 1200				0,29-0,12A	0,94	17	28mA		24mA	
	370mA			ARC 600	0,26-0,12A	0,92	22	4,8V NiCD 4-5Ah	60mA	44mA	
				ARC 1200	0,57-0,22A	0,98	10		47mA	25mA	
	200mA			ARC 600	Available on request			7,2V NiCD 4-5Ah	110mA	70mA	
				ARC 1200	44mA	32mA					
	250mA	ARC 600	0,18-0,1A	0,92	26	7,2V NiCD 4-5Ah	110mA	70mA			
		ARC 1200	0,34-0,16A	0,97	14		44mA	32mA			
	370mA	ARC 600	0,26-0,13A	0,96	20	7,2V NiCD 4-5Ah	110mA	70mA			
		ARC 1200	0,57-0,22A	0,99	10		44mA	32mA			

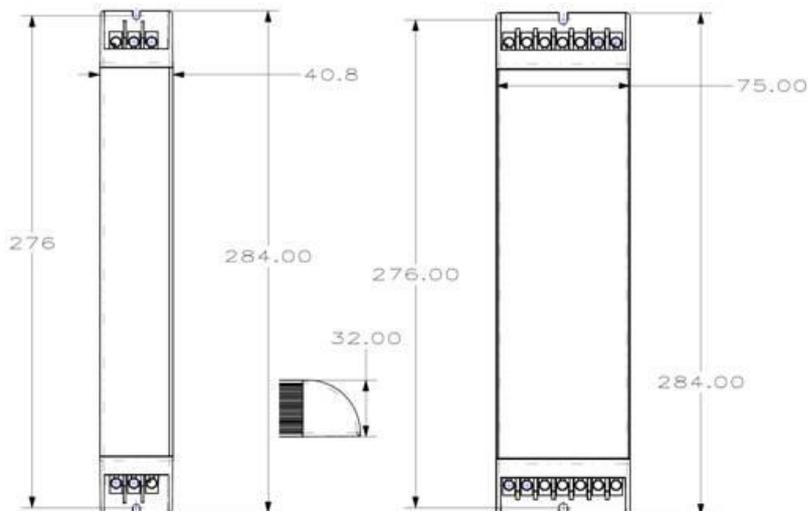
I_k max=1500A

Marking Ex II 2 G Ex eb mb IIC Gb

Ta	Tc	Dimension LxWxH	Weight
-52 to +65°C	80°C	285x75x32mm	960g

3.2 Mechanical data

- Aluminium housing fastened with 2 screws in the plastic end-caps, c-c 276mm.



3.3 Expected lifetime

HFXE LED: At $T_c < 55^\circ\text{C}$ the expected lifetime to survival of $>90\%$ of units exceeds 75.000 hours

Expected lifetime of the system HFXE LED and ARC depends on the following parameters:

- Operation at maximum ambient temperature will decrease lifetime
- Number of switching cycles –
 - Frequent switching causing rapid temperature change will decrease lifetime
- Number of thermal cycles –
 - Frequent and rapid cycling from cold to warm will decrease lifetime
- Constant operation in stable low to medium temperature will increase lifetime
- Mains supply quality, susceptibility for high-voltage spikes in the supply lines

4 **Installation**

These components do not cause harm or injury when used as specified in these instructions. If this equipment is not utilized in a manner specified by the manufacturer, the protection by the equipment may be impaired.

Inrush current and circuit breaker characteristics/amount of units per circuit breaker must be considered in the installation.

Do not energize circuit before all components and LED-modules are connected properly.

In case of no function or malfunction: first de-energize the circuit. Disconnect mains and battery supply before LED modules are disconnected.

- Connect all components, battery and LED module.
- Check that all connections are made to the correct port, tightened to the correct torque and that no wires are loose or damaged.
- The LED module must be connected to correct polarity. Do not operate the unit without LED module properly connected.
- Energize the unit from mains supply.
 - The LED module will light up in normal mode.
- Test of HFXE; The battery must be properly charged before this test – min 24h.
 - Disconnect mains supply, all phases.
 - The HFXE will switch the internal source to battery supply, and LED module will light up in reduced mode.
 - The preset emergency operation time 90 or 180 minutes will be completed before the HFXE will switch of the LED module.
- When mains supply is reconnected the HFXE will stop battery operation and return to normal mode and normal light output.
- Disconnect battery before mains before storage. Battery should be fully charged and disconnected before storage longer period.

4.1 Schedule of limitations

- The temperature of the TC point must not be exceeded
- The minimum operating temperature of the
 - HFXE LED-driver is -52°C
- The HFXE LED have an output rating of 50-130V and 200-370mA. The current is limited to 850mA and breaking capacity of 1500A and has been tested together with Barel ARC LED 600 and 1200, certified Presafe 15 ATEX 6296U and IECEx PRE 15.0014U.
- Charge current is limited to max 200mA
- Charge voltage is limited to 9,3V

- With one fault condition of the charging system, the charging power is limited to 2W by a transformer and the current is limited to 200mA for 11949-XXX.
- Discharge current = 0.5A - 1.75A.
- Discharge cut-off voltage = 1.0V/cell i.e. 6.0V for 7.2V battery,
- The fault current on the battery input is limited to 6.8A.
- The indicator LED outputs has the following nominal ratings: 3V, 14mA and is limited to 5.4V and 18.3mA.
- The LED-driver shall be mounted inside an Ex e luminaire and not directly exposed to light.
- The terminal has a rating of 450V, Torque 0.9Nm and capacity on the screw side of one conductor with dimensions 1.0 - 2.5mm² rigid or flex.

4.2 Electrical connection

Electrical connections of the LED-driver must be done with mains power supply off, and disconnected. The mains supply must be disconnected by an external 2-pole switch (both phases must be off). Connect “GND” to Protective Earth and chassis of the luminaire or to a separate ground connection. The aluminium chassis is internally connected to the gnd pin. DC input: Connect – to “N” and + to “L/L1/L4”. Connect L1 via switch to allow battery charging while light is switched off. Indicator LED to be connected to 5-6 or 5-7 as indicated: (LED module connection according to marking label) (Do not connect HFxE LED to mains supply without LED module connected)



4.3 Battery

Batteries are to be assessed with final certification of luminaire. Charge and discharge characteristics are suitable for use with high-temp NiCd cells, 7,2V 4Ah (6C). Connect battery to correct polarity of HFxE “13” and “14”. Maximum continuous charge current <200mA.

4.4 Operation

Setting of 1.5h and 3h operation is selected by connection of Charging Indicator (LED) to terminals 5, 6 and 7 as described in table below.

For manual operation (no self-test) a single color (green) LED is used. It is recommended to use bidirectional LED, for correct functionality of the charging indicator. For use of the luminaire without connected battery L4 should be disconnected to ensure proper functionality of the green LED.

For a Self-test operation, a bidirectional LED is used (RED / GREEN) connected such that OK = GREEN. For connection of the bicolor LED the green colored LED is referred to as Anode and Cathode.

TEST:

NOTE: A full test should not be activated when the battery is empty or low capacity - this could result in a wrong error-message.

Manual test:

By disconnecting the mains when the battery has been charged for a minimum of 24 hours. Status of the test must be observed manually. In case of failure: repair the problem and re-test or reset unit by disconnecting mains.

Self-test:

By using a bipolar LED connected to the 2 of the 3 pins 5, 6 or 7 as shown above, then a self-test will be performed. This test will automatically run a short test after 24h, then monthly and a full annual test operating the LED module in emergency mode from the battery. The test-timer includes a random-period to avoid all luminaires to self-test at the same time. Disconnection/reset of mains and battery at the same time will reset the test-timer. Test-program is conducted acc to IEC 62034.

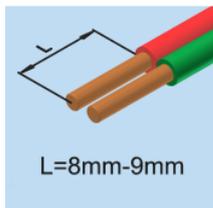
Indicator LED (green) no self-test	Indicator LED (red/green) self-test	System status	Action
Continuous green	Continuous green	System ok	Battery charging ok and no faults apparent.
No light	Continuous blinking red	Battery capacity problem	24 h charge period after last discharge not completed, or faulty battery. Retest system after 24h charging period, or replace battery
No light	Intermittent blinking red	Faulty LED module	Replace faulty or missing LED module.
No light	Continuous red	Charging error	Battery defective or missing. Connect or replace battery.
No light	No light	No function	Connect to mains supply voltage within specified limits.

4.5 Cable

Cable cross sectional area: 1 – 2,5 mm² (solid or multi wire).

Terminal torque: 0,9Nm.

Terminal screw/tool: 0,6x3,5mm Slotted bit of high quality is recommended.



Suitable ferrule should be used to secure the connection of stranded wires.

For Aluminium cables; a bi metallic connector should be used to provide a copper connection.

5 What to do if...

Do not energize circuit before all components are connected properly.

In case of no function or malfunction: first de-energize the circuit. Disconnect mains and battery supply before LED modules are disconnected.

- No light in LED module when connected to mains supply-
 - Make sure all components are the correct type and suitable for driver type, mains supply voltage and frequency range
 - Make sure all connections are correct.
 - Allow a reset of mains supply.

- Some internal protection circuits require a reset of mains supply before resuming operation after a fault is detected.
 - Contact Barel if no fault was found and the reset does not restart the unit.

- Do not attempt to open or repair these units. Both HFXE and ARC should be replaced in case of failure – to avoid premature failure of the other component.

- No light in emergency mode:
 - Reconnect mains supply
 - Check the indicator LED status-
 - If green; There is a fault in the HFXE. De-energize the unit. Disconnect battery before LED module.
 - If red or no light in indicator;
 - Allow the battery to charge 24h
 - Retest emergency mode.

If problems with conducted emission during EMC measurements, contact Barel for assistance.

Important issues are:

- Keep all wires short.
- Separate LED module wires from mains supply wires
- Ground the LED-driver through a short wire connection, and if possible separate from mains cabling internally in luminaire.