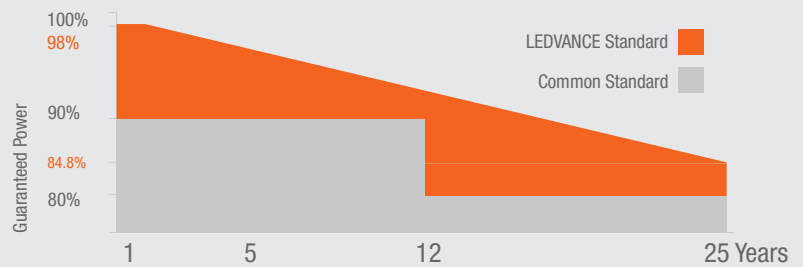


# M440~460P60LM-BB-F3

120CELLS HALF-CUT  
Monocrystalline PERC PV Module  
Full Black



**12 YEARS** Product guarantee

**25 YEARS** Output guarantee

**440-460Wp** Power range

**21,24%** Maximum efficiency

**0,55%** Yearly degradation

**MBB** Excellent Cell Efficiency  
Multi Bus Bar technology increases the efficiency of the modules

**Resistance to power degradation**  
Resistance to power degradation caused by Potential-Induced Degradation PID effect, thanks to strict quality control in the module production process and other subassemblies

**Better Weak Illumination Response**  
More power output in weak light conditions, such as haze, clouds and early morning

**Adapted to harsh outdoor environments**  
Resistant to harsh environments such as salt, ammonia, sand, high temperatures and high humidity environments

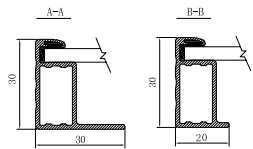
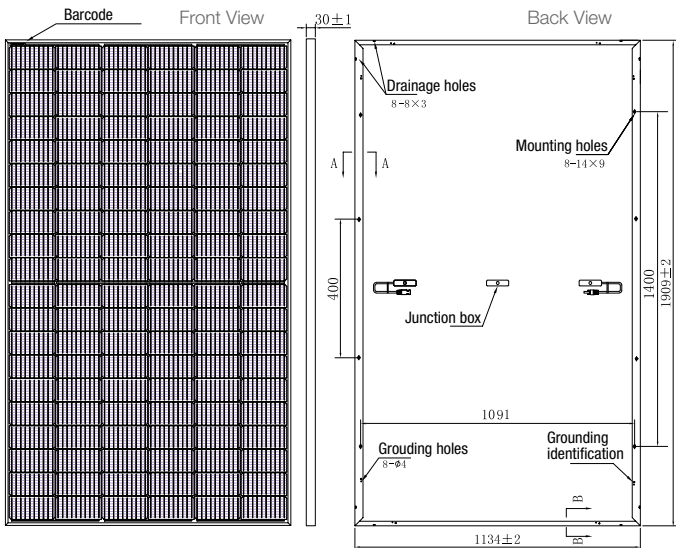
**Highest production standards**  
Guarantees of operational reliability and quality module implementations go far beyond requirements specified in certificates



IEC 61215: Design suitability and type approval  
IEC 61730: Safety qualification  
IEC 61701: Salt mist corrosion testing  
IEC 62716: Ammonia corrosion testing  
IEC 60068: Environmental testing: Dust and sand

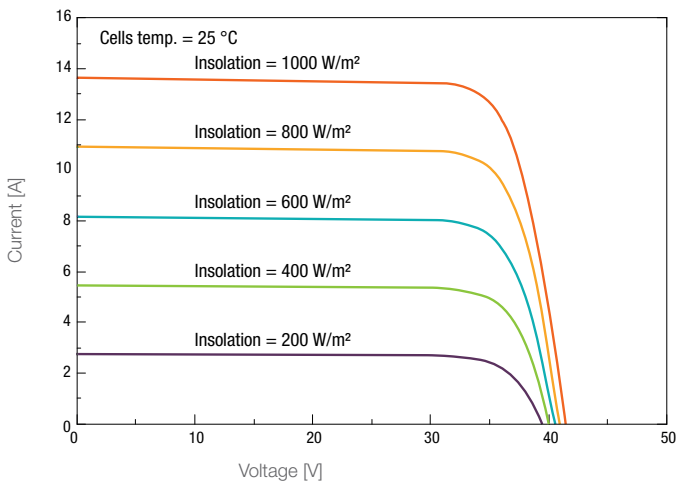
With subsidiaries in more than 50 countries and business activities in over 150 countries, LEDVANCE is committed to supplying reliable and durable PV products to customers to create together a greener planet.

## Dimensions of PV module (mm)

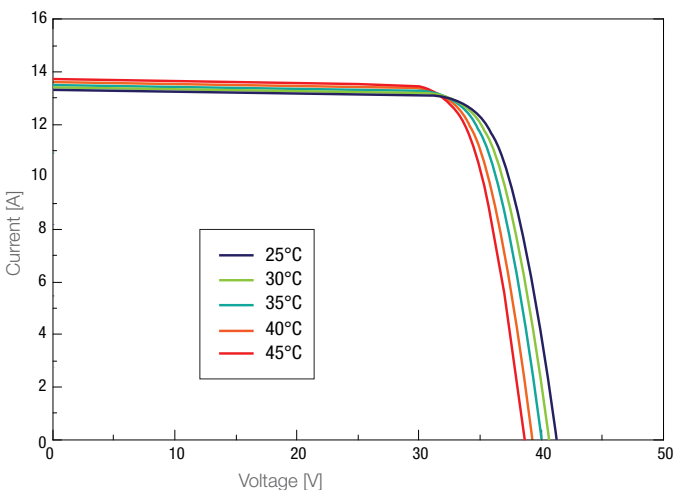


**NOTE:**  
Frame color and cable length can be customized.

## Current-voltage curve of the module by different insolation



## Current-voltage curve of the PV module by temperature



## ELECTRICAL CHARACTERISTIC | STC <sup>1)</sup>

Power Level	440	445	450	455	460
Nominal power Watt $P_{max}$ (Wp)	440	445	450	455	460
Maximum power voltage $V_{mpp}$ (V)	34.71	34.93	35.16	35.39	35.61
Maximum power current $I_{mpp}$ (A)	12.68	12.74	12.80	12.86	12.92
Open circuit voltage $V_{oc}$ (V)	41.51	41.73	41.96	42.19	42.41
Short circuit current $I_{sc}$ (A)	13.43	13.49	13.55	13.61	13.67
Module efficiency $\eta$ (%)	20.32	20.55	20.78	21.01	21.24

Measuring tolerance:  $\pm 3\%$

## ELECTRICAL CHARACTERISTIC | NMOT <sup>2)</sup>

Power Level	440	445	450	455	460
Maximum power $P_{max}$ (Wp)	333	337	341	344	348
Maximum power voltage $V_{mpp}$ (V)	32.43	32.63	32.85	33.06	33.27
Maximum power current $I_{mpp}$ (A)	10.27	10.33	10.38	10.41	10.46
Open circuit voltage $V_{oc}$ (V)	38.78	38.98	39.20	39.41	39.62
Short circuit current $I_{sc}$ (A)	10.90	10.95	11.00	11.05	11.10

Measuring tolerance:  $\pm 3\%$

## WORKING CONDITIONS

Maximum system voltage	1500 V DC
Operating temperature	-40 °C ~ +85 °C
Operating humidity	5~85%
Maximum series fuse	25 A
Front/Rear side load	5400 Pa / 2400 Pa

## MECHANICAL DATA

Solar cells	Mono PERC
Number of cells	120 (6x20) pcs
Size of cells	182 x 91 mm
Module dimension	1909 x 1134 x 30 mm
Color	BB – full black
Weight	22.3 $\pm$ 1 kg
Glass	3.2 mm tempered glass, anti-reflective coating
Type of frame	Anodized aluminum alloy
Junction box	IP68, 3 diodes
Cables	4 mm <sup>2</sup> , 300 mm or 1200 mm
Connectors	Stäubli MC4 EVO 2

## TEMPERATURE RATINGS

NMOT	44 $\pm$ 2 °C
Temperature coefficient of $P_{max}$	-0.35% / °C
Temperature coefficient of $V_{oc}$	-0.275% / °C
Temperature coefficient of $I_{sc}$	0.05% / °C

## PACKAGING CONFIGURATION

Piece / Box	36
Size of packing	1940 x 1135 x 1255 mm
Weight of packing	848 kg
Piece / Container (40'HC)	864

## FOOTNOTES:

- 1) STC (Standard Test Conditions): 1000W/m<sup>2</sup> solar irradiance, cell temperature 25°C, AM 1.5G
- 2) NMOT (nominal cell operating temperature): insolation 800W/m<sup>2</sup>, ambient temperature 20°C, AM 1.5G, wind speed 1m/s

## CAUTION:

- Do not connect two or more strings of modules to one fuse.
- The electrical data in this product sheet does not refer to a single module and is not part of the offer, it is used to compare different types of modules only.
- Due to continuous technical innovation, development and product improvement, technical data contained in this product sheet is subject to change at any time without notice and may not be the basis for any damage claims.