

Direct Current Billing Meter DCBM series

Ref: DCBM 100

$I_{max} = 80 A$

DCBM 100 series is a direct connected energy meter dedicated to DC applications. The range of operating currents and operating temperatures offered by the DCBM 100 series facilitate integration and meet the specific constraints of electric vehicle charging systems. The DCBM 100 series offers a power loss compensation system, and is particularly suited for DC Wallbox charging Electric Vehicles. The product offers HTTP communication with a full set of APIs for quick start-up and easy integration, and OCMF format compliant with S.A.F.E verification software.



CE cULus RoHS



Features

- Voltage measurement 150 ... 1000 V DC
- Current range 80 A
- Bi-directional energy metering
- Accuracy Class B, -40 °C to +80 °C
- Cable loss compensation
- Ethernet communication with HTTP
- Signed data readouts in OCMF
- Monitoring of Status/ current / voltage / temperature / energy
- Integrated high contrast display
- Transaction handling with start & stop tags, user data fields tariff identification, and authentication
- Auxiliary power supply range +12 ... +24 V DC
- DIN rail 35 mm and screw mounting
- Sealing of terminals and interfaces.

Advantages

- OpenAPI for easy integration into systems
- Flexible integration with cables
- OCMF readouts compliant with S.A.F.E
- Compliant for energy billing or parking time billing
- MessEV and MID approved
- System monitoring.

Applications

- Electric Vehicle Charging infrastructures
- Data centers
- DC grids & Energy Monitoring
- Energy storage, renewables.

Standards

- EN 50470-1: 2006
- EN 50470-3: 2006
- PTB-A 50.7
- PTB-A 20.1
- CISPR32 Class-B emission
- Directive 2014/32/EU (MID)
- IEC 62052-11: 2003
- IEC 61000-6-2: 2016
- IEC 61000-6-3: 2016
- IEC 62052-31:2014
- UL FTRZ 2/8
- UL94-V0
- UL 61010-1: May 11, 2012: 2019.
- UL 61010-2-030:2018
- CAN/CSA-CSA C22.2: 2018.

Application Domains

- Industrial
- Renewable energies.

Safety



Caution

In order to guarantee safe operation of the product and to be able to make proper use of all features and functions, please read these instructions thoroughly!

Safe operation can only be guaranteed if the product is used for the purpose it has been designed for and within the limits of the technical specifications.

Ensure you get up-to-date technical information that can be found in the latest associated datasheet under www.lem.com. The used data link cable between product's elements shall be the one delivered by LEM.

Time source to set product's time must be provided by the customer. Product must be time synchronized to operate. Product's Ethernet interface mustn't be exposed to a public network; network must be private and secured.

To ensure proper operation, product's logbook completion must be checked periodically; the maximum number of entries is 40000; product's operation stops if logbook is full.

The meter must be installed in an enclosure IP51 (indoor) or IP54 (outdoor) according to EN 50470-1: 2006.



Caution, risk of electrical shock

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel.

No responsibility is assumed by LEM International SA for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

When installing or changing the product, the conductor to which the product is connected must be de-energized.

Ignoring the warnings can lead to serious injury and/or cause damage!

The appropriate torque as defined by the manufacturer shall be applied on product's terminals.

Operating conditions

Meter

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Ambient operating temperature	T_A	°C	-40		+80	
Ambient storage temperature	$T_{A\text{st}}$	°C	-40		+80	at -40 ... +70 °C for UL
Relative humidity	RH	%			95	Non condensing
Mass	m	g			317	±10 %
Impact rating				IK05		According to IEC 62262
Ingress protection rating				IP20		

Insulation coordination

Parameter	Symbol	Unit	Value	Comment
Pollution degree		PD	2	
Rated altitude		m	3000	
Rated insulation voltage	U_{Nm}	V DC	1000	
Case material			V0	According to UL 94
Insulation between live parts and accessible parts				Overvoltage limitation ensured by charging station, according to IEC61851-23:2014, §11.4.101
- Insulation type			Reinforced	
- Overvoltage category			II	
- Impulse withstand voltage	U_{Ni}	kV	5.96	Insulation between SELV and HV
- RMS voltage for AC insulation test (5s)	U_d	kV	3.24	100 % tested in production
Insulation between voltage terminals				Insulation between VP and VN
- Insulation type			Basic	
- Impulse withstand voltage	U_{Ni}	kV	3.75	

General electrical specifications

Meter

Parameter	Symbol	Unit	Min	Typ	Max	Comment
Supply voltage	U_C	V DC	+12		+24	±5 %
Supply current	I_C	mA	30		80	Min @ +24 V DC/-40 °C Max @ +12 V DC/+80 °C
Supply bridging time		ms	30			Without going in power fail state
Start-up time ¹⁾	t_{start}	s			10	@ +24 V DC

Note: ¹⁾ Start-up time is the wait to get communication functionality over the HTTP interface after power is restored.
Power supply must be stable during this period.
Product must be powered-up at nominal voltage during this time before starting a transaction.

Definition of typical, minimum and maximum values

Minimum and maximum values for specified limiting and safety conditions have to be understood as such as well as values shown in “typical” graphs.

On the other hand, measured values are part of a statistical distribution that can be specified by an interval with upper and lower limits and a probability for measured values to lie within this interval.

Unless otherwise stated (e.g. “100 % tested”), the LEM definition for such intervals designated with “min” and “max” is that the probability for values of samples to lie in this interval is 99.73 %.

For a normal (Gaussian) distribution, this corresponds to an interval between -3 sigma and +3 sigma. If “typical” values are not obviously mean or average values, those values are defined to delimit intervals with a probability of 68.27 %, corresponding to an interval between -sigma and +sigma for a normal distribution.

Typical, maximal and minimal values are determined during the initial characterization of the product.

Energy measurement and accuracy

Parameter	Symbol	Unit	DCBM 100	Comment
Accuracy class			B	According to EN 50470-3: 2006 and EN 50470-1: 2006
Meter type			Direct connected meter	
Energy measurement bandwidth			DC	
Current specification				
- Starting current	I_{st}	mA	64	
- Minimum current	I_{min}	A	0.8	
- Transitional current	I_{tr}	A	1.6	
- Reference current	I_{ref}	A	16	
- Maximum current	I_{max}	A	80	
Voltage specification				
- Range voltage	U_{ref}	V DC	150 ... 1000	
- Maximum limit range of operation	U_{max}	V DC	1100	
- Minimum limit range of operation ¹⁾	U_{min}	V DC	135	
Cable loss compensation ²⁾		mΩ	0-35	By steps of 5 mΩ, imported and exported energy. Selectable by charging station or fix value (see product designation)
Test Output LED ³⁾		Imp/kWh	10 000	
Counting direction			Bidirectional	Imported and exported energy registers

Notes: ¹⁾ Creep mode is enabled if DC bus voltages goes below 110 V DC.

²⁾ Depending on product reference, fix or dynamic cable loss compensation is available, refer to product's name and codification to select cable loss compensation type.

With dynamic compensation, the value is selected between 0 - 35 mΩ (by step of 5 mΩ) at start of transaction.

With fix compensation, the value is locked to the fix value.

Cable loss compensation is enabled only during a transaction

(between start and stop tags), outside of a transaction no compensation is applied.

³⁾ After reboot, the test output LED is lit as long as the creep mode conditions are met.

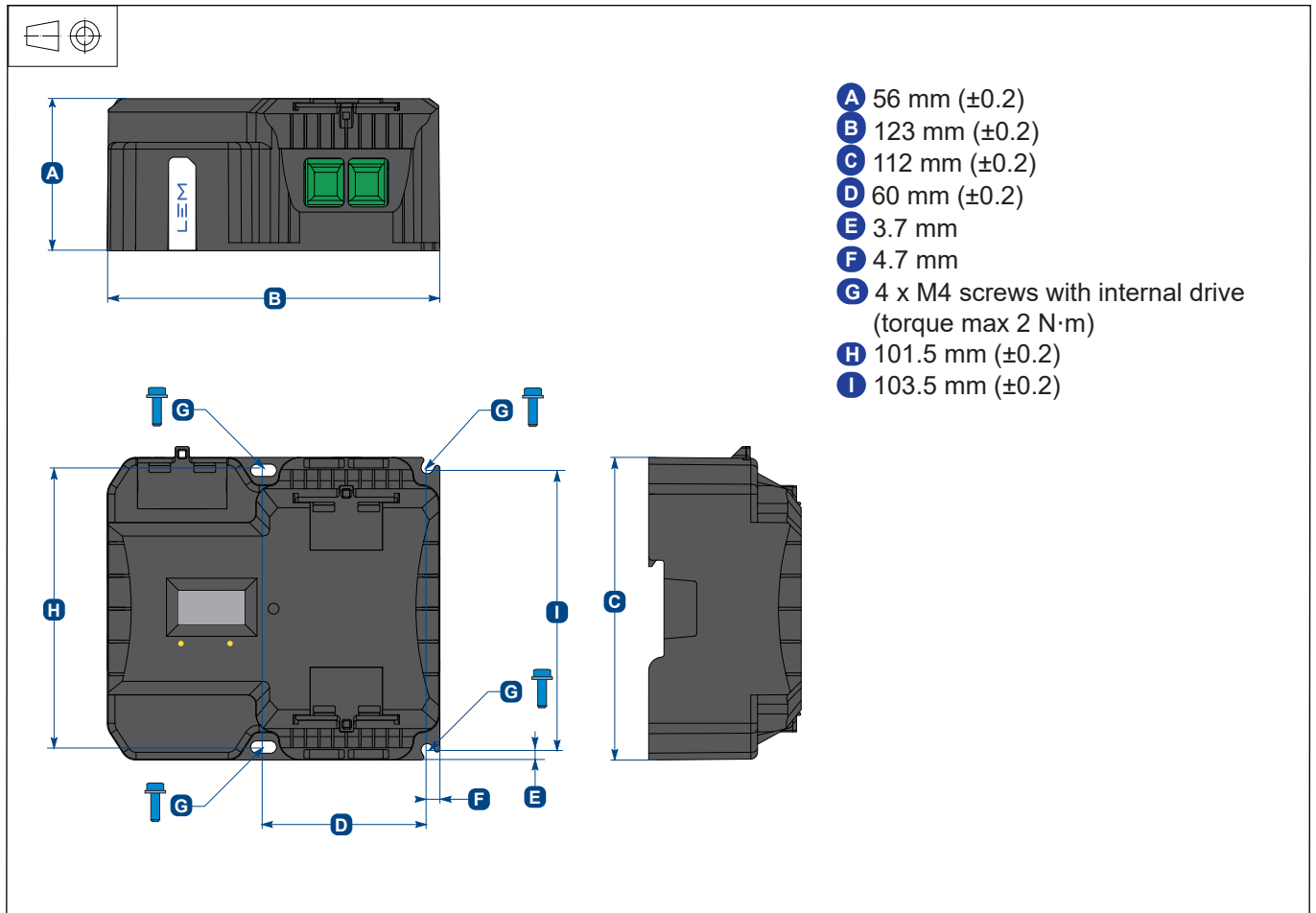
Connection and terminals
Meter

Parameter	Value	Comment
Ethernet interface	RJ45	
Power supply terminal		
- Type	Screw terminal	
- Rated cross section	0.14 - 1.5 mm ²	
- Maximum tightening torque	0.6 N·m	

Interfaces and communication

Parameter	Value	Comment
Display technology	OLED	
Ethernet interface	HTTP	REST APIs with Json content
IP settings	Static IP / DHCP	
System monitoring	Status/Current / Voltage / Temperature / Power / Energy	at 10 Hz refresh rate
Readout data format	OCMF	OCMF format compliant with S.A.F.E. transparency software.
Data authenticity	Asymmetric cryptography with public key	
Number of transactions stored	50	Acknowledgment of backend save mandatory for authorizing new transactions
Logbook entries	204000	New transactions are blocked when logbook is full.
Time synchronization	SNTP / from API	Time synchronization with SNTP service, or set with the "/setting" API.
Transaction status LED	Active during transaction	a power failure is stopping, signing and saving a transaction.

Meter dimensions



Product description and Codification

All codifications are included in DC Meter table.

For example, DCBM_N0M_0800W00_0000C0 codification includes the following elements:

	D	C	B	M	-	N	0	M	-	0	8	0	0	W	0	0	-	0	0	0	0	C	0	0
Meter family DCBM: Direct Current Billing Meter	█	█	█	█																				
Time Source N: Time synchronization NTP or API						█																		
Cable Loss compensation 0: Dynamic 1: No compensation 2: Fix compensation – 5 mR 3: Fix compensation – 10 mR 4: Fix compensation – 15 mR							█																	
Certification 0: CE Marking (Generic product for EU market, without legal metrology certification) + UL recognized M: Legal metrology (EU) certification								█																
Current Range 08: 80 A 0 / 1: Direct I1 → I2 or reverse I1 → I2 0: Reserved										█	█	█	█											
Delivery Option W: without accessory														█										
Cable length 00: Without cable or accessory																█	█							
Series 0000: Serie 1																				█	█	█	█	
Reserved field C: Reserved																						█		
Reserved field 00: Reserved																							█	█

Below tables summarize the codifications for products.

For other references, minimum quantities apply, please contact your local LEM support.

CLEM N°	Product name
90.W1.31.000.0	DCBM_N00_0800W00_0000C00
90.W1.31.001.0	DCBM_N00_0810W00_0000C00
90.W1.31.002.0	DCBM_N0D_0800W00_0000C00
90.W1.31.003.0	DCBM_N1D_0800W00_0000C00
90.W1.31.004.0	DCBM_N0D_0810W00_0000C00
90.W1.31.005.0	DCBM_N1D_0810W00_0000C00

CLEM N°	Product name
90.W1.31.200.0	DCBM_N0M_0800W00_0000C00
90.W1.31.201.0	DCBM_N1M_0800W00_0000C00
90.W1.31.202.0	DCBM_N0M_0810W00_0000C00
90.W1.31.203.0	DCBM_N1M_0810W00_0000C00
90.W1.31.204.0	DCBM_N4M_0800W00_0000C00