IEM-DCC // HIGH-PRECISION ENERGY METER

1. Important information

1.1. Safety instructions

The meter may be used only to measure electrical energy and must not be operated outside the specified technical data (see rating plate).

TOUCHING LIVE PARTS CAN BE FATAL!

The corresponding fuses must therefore be removed and kept so that other persons cannot reinsert them without being noticed. The usual safety regulations in force at the place of operation must be observed. The meter may be installed only by appropriately trained specialist staff.

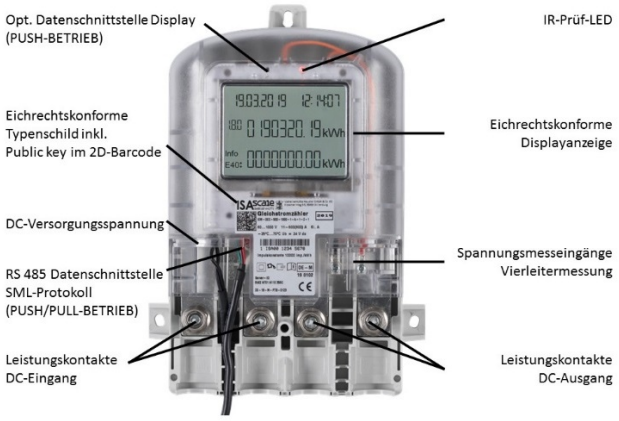
1.2. Maintenance and warranty information

The meter is maintenance-free. In the event of damage (e.g. during transport or storage), the operator must not undertake any repairs itself.

The same will apply should a defect be attributable to other influences (e.g. lightning, water, fire, extreme temperatures and weather conditions, improper or negligent use or treatment).

2. General description / technical data

The IEM-DCC-500 is a direct-measurement one-directional meter with a return stop and without rating for the measurement of energy. Based on the prototype certification issued by the Physikalisch Technische Bundesanstalt Braunschweig, Isabellenhütte hereby declares as manufacturer of the IEM-DCC-500 its compliance with the German law on measurement and calibration (Mess- und Eichgesetz). In conformity with the requirements of DIN EN 50470-3, the meter satisfies the conditions for inclusion in measurement precision class A and B in the temperature ranges stipulated therein. The range of uses of the IEM-DCC-500 is restricted to publicly accessible DC charging stations for electric vehicles. The basic functional characteristics and performance data are represented in the figure and the tables in the annex:



Pursuant to DIN EN 50470, the conditions for inclusion in precision classes A/B are satisfied under the following parameters (I_{tr} = 12 A):

Parameter	Value	Current [A]
I_{st} = Starting current (start of measurement)	≤ 0.04 I_{tr}	0.48
I_{min} = Minimum current rating (minimum value for compliance with precision class I_{min}<I<I_{tr}*)	≤ 0.5 I_{tr}	6
I_{ref} = reference current	= 10 I_{tr}	120
I_{max} = threshold current rating (maximum value for compliance with precision class)	≥ 50 I_{tr}	600

*I_{tr}= transition current → Value above which the precision class is maintained for I_{tr}<I<I_{max}

Parameter	Values range	Unit
Impulse constant IR test LED	10,000	Pulses
Current rating (in operation)	500**	A
Threshold current rating *	600**	A
Measurement voltage (in operation)	1,000**	V
Measurement voltage (max. range)	1,200**	V
Supply voltage (in operation)	10 .. 48	V
Supply voltage (max. range)	-10 .. 60	V

* The maximum permissible temperature may not be exceeded during operation.
** Please note that the meter in question is a unidirectional energy meter with a return stop

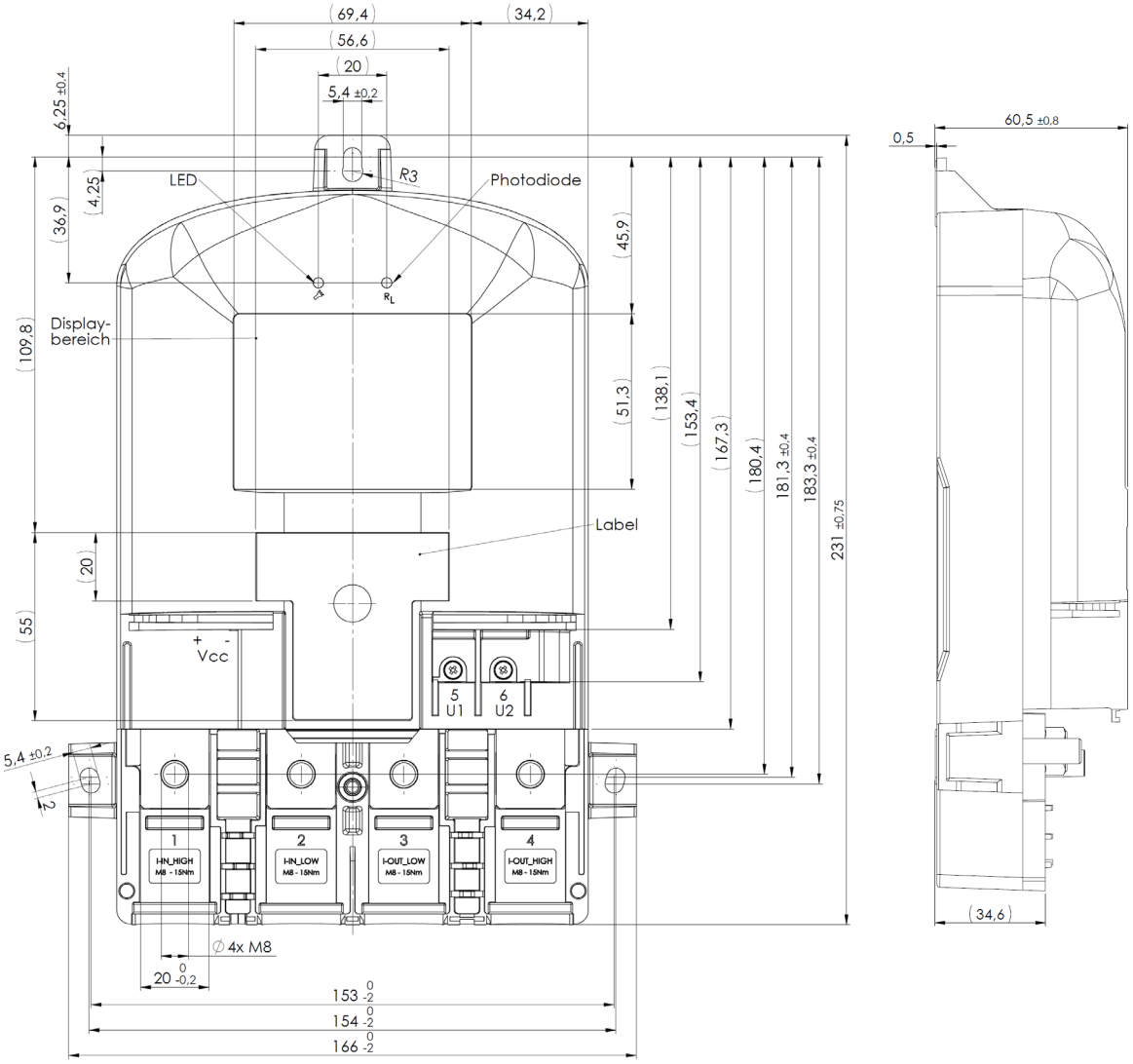
Interface	Speed	Completion	Max. number of units
RS-485	9600 bit/s	124Ω	2

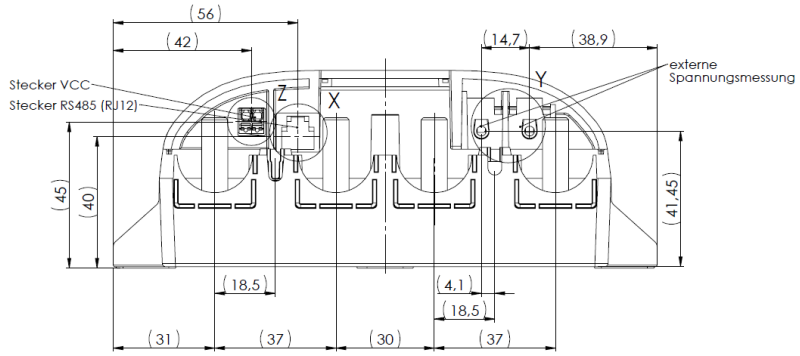
Parameter	Values range	Unit
Operating range terminal busbar IEM-DCC-500	-25° .. 105°	C
Operating range terminal customer-provided connection	max. 60°*	C
Limit for storage and transport	-40° .. 75°	C
Air humidity	max. 95	%**
Housing with terminal cover fitted	30	IP
Installation environment for IEM-DCC-500 charging station manufacturer	51	IP
Product weight IEM-DCC-500	1,420	g

* The customer-provided connection should take the form of a heat sink (can be executed using cooled charging cables).
**non-condensing, pursuant to IEC 62052-11, EN 50470-1 and IEC 60068-2-30

3. Housing

3.1. Dimensions





3.2. Fitting instructions

The IEM-DCC-500 is fitted over 3 positions on the charging unit. The breadth (P2-P3) is defined pursuant to DIN 43857-2.

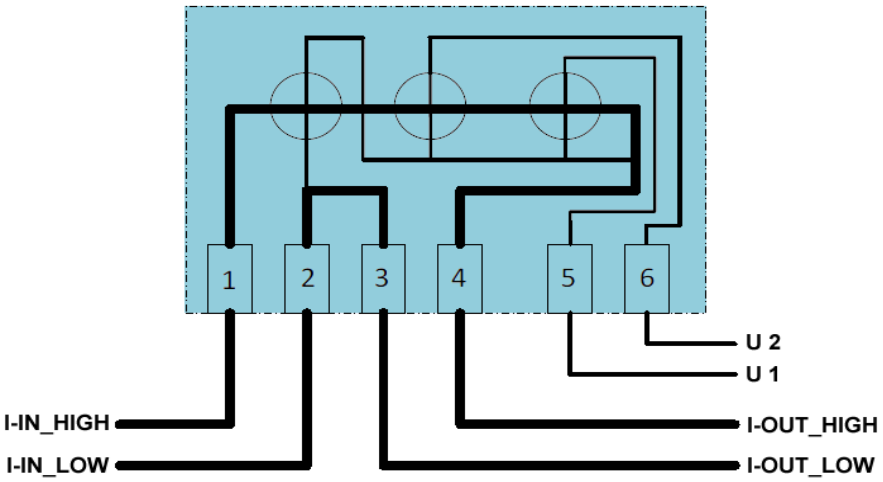
The use of “Hager N94N” screws is recommended for the fitting of the housing. The maximum allowable torque is 15 Nm.

The meter is installed as follows:

1. Remove the front cover from the device.
2. Push the meter onto the adapter plate.
3. Secure the meter using suitable screws at the preset positions.
4. Connect the power contacts, communication and power supply cables and, where applicable, the four-terminal measurement device.
5. Fit the front cover to the meter and tighten the sealing screw. It is no longer possible to displace or reposition the meter in this state.

3.3. Fitting the power contacts

The following connection diagram of the power contacts and measuring lines is located on the inside of the terminal cover:



The connections I-IN_HIGH, I-IN_LOW, I-OUT_LOW, I-OUT_HIGH are made using M8 screws (4x) M8x35. The corresponding self-locking nuts are pre-assembled.

A cross-section of 150 mm² is recommended for the wires.

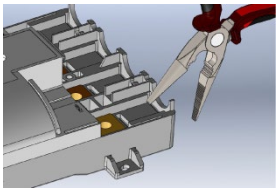
The connection between the cable lug and cable must be covered by the customer with shrink tubing to ensure insulation and tampering protection. The maximum permissible diameter of this connection in the cross-section is 22.5 mm.

The maximum permissible cable diameter of the voltage measurement lines U2 and U1 is 1.5 mm².

An interruption of the high voltage connection U1 or U2 leads to the measurement mode switching over (4-wire to 2-wire). Changes to the measuring mode are registered in the calibration log and the mode currently in use is shown on the display.

3.3.1. Power connection via busbars

The IEM-DCC-500 has four tin-plated busbar connections.



Parameter	Value	Unit
Length	20	mm
Width	20±0.2	mm
Height	10±0.1	mm

The lower and upper housing each have four predetermined breaking points for connecting a busbar or cable lug. When using busbars as a connection method, these breaking points in the lower housing part must be removed using pliers.

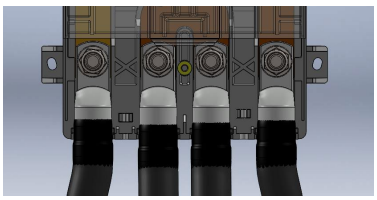
The functional reliability of the IEM-DCC-500 is dependent on the connection quality between the customer's busbar and the meter's conductor bar. To ensure a high-quality and practical connection between the customer's busbar and the IEM-DCC-500, take the following information into consideration:

- It is advised to mount to a busbar (instead of mounting a wire to the meter's conductor rail).
- When bolting the IEM-DCC-500 to the busbar, all mounting holes must be used; never user fewer holes for the screw connection than are available.
- Matching M8 SW13 mm nuts are included in the scope of delivery.
- All screws used for assembly must be tightened with the most identical torque as possible.
- The minimum permissible torque is 19 Nm.
- The terminals of the IEM-DCC-500 and the customer's busbar must be clean and free of grease and may not show any signs of damage or have burrs.

3.3.2. Power connection via cable lug

A second option for connecting to the IEM-DCC-500 is the use of a cable and a cable lug. The "Klauke 10SG8" type cable lug must be used here.

The crimp connection between the cable lug and cable must be covered by the customer with shrink tubing to ensure insulation and tampering protection. In addition, a cable relief must be installed by the customer near the IEM-DCC-500.

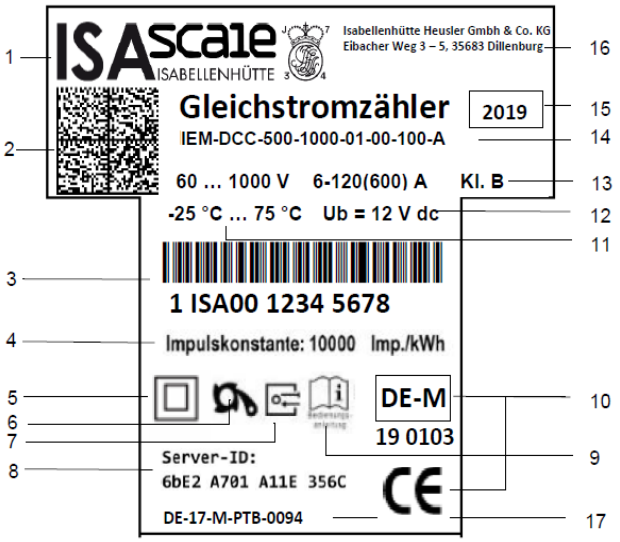


Parameter	Value	Unit
max. width of the cable lug	19	mm
recommended cable cross-section	150	mm²
max. permissible diameter and cross-section	22.5	mm

The permissible maximum temperature of the wires is to be kept to no more than 60°C. Corresponding measures are to be taken on the connection side to maintain this working temperature.

When using cable lugs as a connection method, the breaking points in the upper housing must be removed using pliers.

3.4. Rating plate



Item	Description
1	Logo IsaScale
2	Data matrix code
3	Meter number, bar code 128, code set B as per EN799
4	LED pulse constant
5	Protection class II
6	Return stop
7	Bidirectional communication
8	Server ID
9	Observe the operating instructions
10	CE sign
11	Temperature range
12	Supply voltage of the meter
13	Voltage, current, precision class
14	Type designation ► from SAP classification
15	Year of manufacture ► current year!
16	Manufacturer's address
17	Identification number of the type-examination certificate

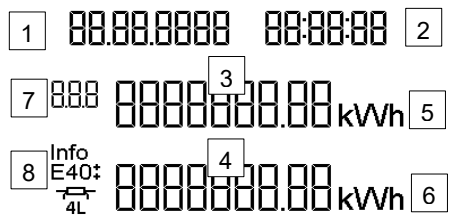
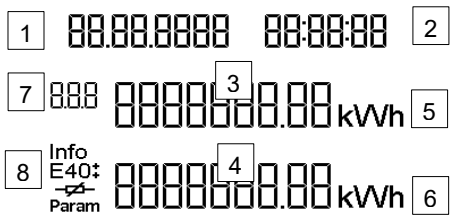
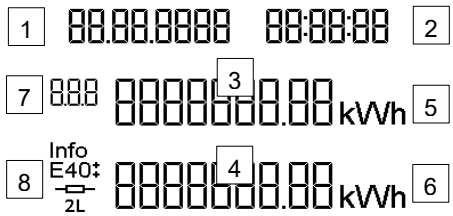
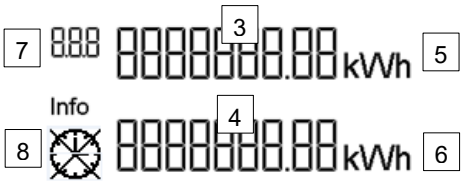
Content of the data matrix code (example)	
ID	Identifier of the meter number
1ISA0012345678	Meter number (max. 14 characters)
@	Separator
DT	Identifier of the device type
IEM-DCC-500-1000-01-100-A	Item number
@	Separator
SI	Identifier of the server ID
09014841471000O5B2C8	Server ID
@	Separator
PK	Identifier of the public key
9B8EBEC16D88817E1FEA 7E09CE54AF89148DCE0A A014F8667C28B878F4FC 503596A8662F5FAE79F0 4094EA4760FC9C5A	Public key
@	Separator
D	Identifier of the date of print of the rating plate
2016-07-22	Print date of the rating plate YYYY-MM-DD (10 characters)

Example:
ID1ISA0012345678@DTIEM-DCC-500-1000-01-100-A
@SI09014841471000O5B2C8@PK9B8EBEC16D88817E1FEA7E09CE54AF89148DC
E0AA014F8667C28B878F4FC503596A8662F5FAE79F04094EA4760FC9C5A@D2016
-07-22

4. Displayn

4.1. Operating mode displays

1	Display of current date	5	Unit (kWh) for partial consumption
2	Display of current time	6	Unit (kWh) for absolute energy consumption
3	Display of total consumption	7	Additional information on Pos.3 [OBIS code]
4	Display of transaction energy volume	8	Info line/measurement mode in use

Operating mode	Layout of display data
Normal display **4-wire mode** - The device is in EDL40++ mode - Detected measurement method: **4-wire measurement** - Wire resistance is determined using 4-wire measurement and corrects the energy value	
Normal display **2-wire mode (compensated)** - The device is in EDL40++ mode - Detected measurement method: 2-wire measurement - Wire resistance is calculated using cable parameters	
Normal display **2-wire mode (non-compensated)** - The device is in EDL40++ mode - Detected measurement method: 2-wire measurement - Wire resistance is disregarded	
Restart mode **(time not synchronized)** **EDL 40 not set**	

4.2. Fault displays

The IEM-DCC-500 distinguishes between two fault cases that are shown on the display in accordance with their gravity. Here, general faults are shown with “F” and fatal faults with “FF”. It is also possible to use the status word to assess the fault condition. The following table provides information about faults, their causes, and the behavior of the IEM-DCC-500 in fault situations.

Fault	Description	Condition	Behavior
Faulty connection of U1 or U2	- U1 > U3 or U2 > U3 *(tolerance is preset at the factory; is tested only in 4-wire mode)* - Tolerance (default): 10 V The fault is triggered when U1 > (U3 + 10 V) *ODER* U2 > (U3 + 10 V)	**Reset condition**	- The fault is displayed only for as long as the fault is unresolved - Fault display is automatically reset as soon as the fault is resolved
		Display	F
		Entry in calibration log	Entry is created
		Status report SML	Fault status is activated
		Behavior of active reference	Transaction is ended
Faulty connection of U1 or U2 **Unsuitable charging cable used (e.g. overheated)**	- Power losses are unreasonably high (tolerance is preset at the factory; is tested only in *4-wire mode*) - Tolerance for the overall voltage drop in supply and return lines (default): 10 V	**Reset condition**	- The fault is displayed only for as long as the fault is unresolved - Fault display is automatically reset as soon as the fault is resolved
		Display	F
		Entry in calibration log	Entry is created
		Status report SML	Fault status is activated
		Behavior of active reference	Transaction is ended
Factory settings are inappropriate	-Change in meter mode required but not permitted or invalid parameters for the compensated 2-wire mode (if this is in use).	**Reset condition**	- Fault display is permanent. **The meter must be replaced.**
		Display	FF
		Entry in calibration log	Entry is created
		Status report SML	Fault status is activated
		Behavior of active reference	Transaction is ended
Malfunction in the integrated controller	-The controller has detected a malfunction, e.g.: The content of the program memory has changed (CRC), or the RTC is faulty.	**Reset condition**	- Fault display is permanent. **The meter must be replaced.**
		Display	FF
		Entry in calibration log	The entry is created if possible despite changes in the program memory
		Status report SML	Fault status is activated
		Behavior of active reference	Transaction is ended
Fault	**Description**	**Condition**	**Behavior**

Malfunction in the integrated data storage device	- Logging cannot be initiated, factory settings unreadable, target configuration for the sensor mode unreadable	**Reset condition**	- Fault display is permanent. **The meter must be replaced**.
		Display	FF
		Entry in calibration log	The entry is created if writing is possible
		Status report SML	Fault status is activated
		Behavior of active	Transaction is ended
Malfunction in the integrated cryptography module	- The cryptography module is needed but is not responding at all or not correctly.	**Reset condition**	- Fault display is permanent. **The meter must be replaced.**
		Display	FF
		Entry in calibration log	Entry is created
		Status report SML	Fault status is activated
		Behavior of active reference	Transaction is ended
Malfunction in the integrated current/voltage sensor	- The integrated sensor module reports faults, is behaving defectively or has a changed configuration.	**Reset condition**	- Fault display is permanent. **The meter must be replaced.**
		Display	FF
		Entry in calibration log	Entry is created
		Status report SML	Fault status is activated
		Behavior of active reference	Transaction is ended