Life Energy Motion

E-Mobility Solutions

DCBM 100 Series – DC Energy Meter

Operation Manual

16May2024 / Version 0

Life Energy Motion

TABLE OF CONTENTS

List of Figures

List of Tables

1 SAFETY RULES

1.1 Safety warning

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.

Terminal protection cover delivered with the product must be installed to obtain proper electrical protection. The data link cable used between the product's elements shall be the one delivered by LEM.

Please note:

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.

The meter must be installed inside an enclosure IP51 (indoor) or IP54 (outdoor).

LEM suggests following recommendations about EMC performance:

Shielded Ethernet cable must be used from the types: F/FTP or S/FTP.

Ethernet cable shield must be connected to a ground plane.

1.2 Important notice

- Time source to set product's time must be provided by the customer. Product must be time synchronized to operate.
- The 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 logbook entries is up to 204 000; product's operation stops if logbook is full.
- The product is designed with IP20 and is intended to be mounted in an enclosure with a suitable IP rating for the final application.

1.3 Symbols and conventions

The following symbols point out critical information. They can be found either in this document or on the product.


Instruction manual


Heat hazard


Warning


Electric hazard


Double insulation

The symbols below are intended to enhance the reader's experience by drawing attention to specific sections.


Important Note


Tip and advice

2 DOCUMENT INFORMATION

2.1 Document overview

This document pertains to the DCBM 100 product family, consisting of direct-connected energy meters designed for DC applications. Within this manual, you will find comprehensive information essential for correct usage. The content is structured according to the following topics:

- Product introduction.
- Functions, performances, and integration into EV charging applications.
- Communication interface description.

2.2 Document issue

Targeted Product:

DCBM100

Release Scope: Public

2.3 Company details

LEM International SA

Route du Nant-d'Avril

1217 Meyrin

Switzerland

2.4 Revision history

Version	Date	Changes
0	16 May 2024	First issue

2.5 Related documents

Name	Description
dcbm_100_datasheet	Product datasheet
DCBM 100 Installation Manual	Installation manual

2.6 Abbreviations

Abbrevation	Description
API	Application Programming Interface
CRC	Cyclic Redundancy Checksum
DC / AC	Direct current / Alternating current
DCBM	DC Billing Meter
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
DST	Daylight Saving Time
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
FW	Firmware
HTTP[S]	Hypertext Transfer Protocol [Secured]
ID	Identifier
IP	Internet Protocol / Ingress Protection Code
JSON	JavaScript Object Notation
LED	Light-emitting diode
LR / LNR	Legally relevant / Legally non-relevant
MSB & LSB	Most Significant Bit / Least Significant Bit
N/A	Not applicable
NTP	Network Time Protocol
OBIS	Object Identification System
OCMF	Open Charge Metering Format
OCPP	Open Charge Point Protocol
OVC	Overvoltage Category
REST	Representational state transfer
RMS	Root Mean Square
S.A.F.E.	Software Alliance For E-mobility
UTC	Coordinated Universal Time
V2G	Vehicle To Grid

3 PRODUCT PRESENTATION

3.1 General presentation

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 meets 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.

It performs energy measurement in compliance with legal metrology (as required by Eichrecht and Measuring Instrument Directive 2014/32/EU in Europe).

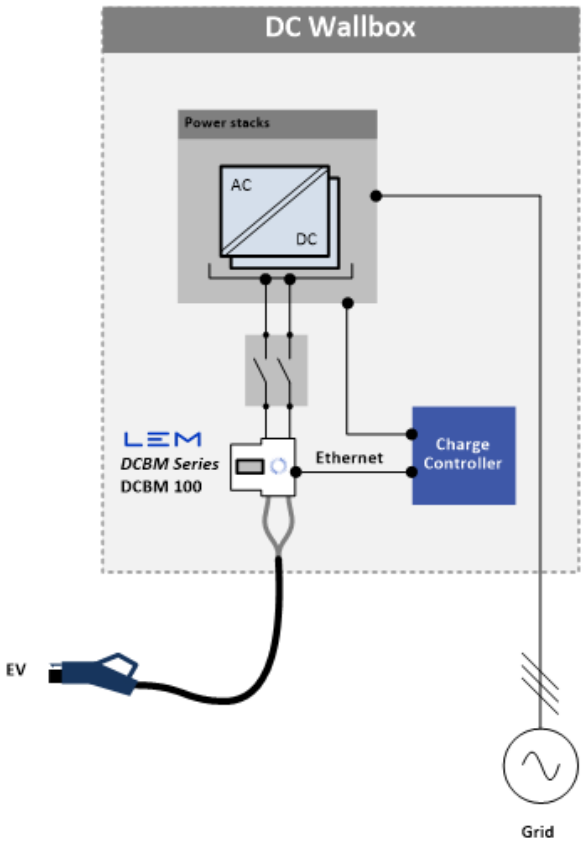


Figure 1 : DCBM100 in WallBox application

3.2 Main specifications

The DCBM100 series offers an operating range particularly suited for DC Wallbox charging Electric Vehicles:

- Charging Voltage range 150 … 1000 V DC
- Starting current 64 mA
- Minimum current 0,8 A
- Maximum current 80 A
- Energy registering Bidirectional
- Accuracy Class B
- Operating temperature -40°C … +80°C.
- Metrological LED available 10 000 imp. / kWh
- Auxiliary power supply +12 ... +24 V DC

3.3 Features overview

Picture	Features	Advantages
	✓ M4 screw mounting ✓ Aux. Power Supply connector ✓ 35mm² screw cages (DC power connectors) ✓ Ethernet communication with HTTP and RestApi ✓ Class B measurement range ✓ Charging cable loss compensation ✓ Transaction handling ✓ Signed data readouts in OCMF ✓ PublicKey QR Code for signature verification ✓ Integrated high contrast display	✓ OpenAPI for easy communication integration ✓ Flexible integration with cables ✓ OCMF readouts compliant with S.A.F.E ✓ Compliant for energy billing or parking time billing ✓ System monitoring

DCBM100 is communicating through Ethernet with HTTP REST APIs.

A full set of APIs Stoplight documentation is delivered for quick start-up and easy integration (see Communication interface).

4 DETAILED PRODUCT AND FUNCTIONS OVERVIEW

4.1 Product variants

The DCBM 100 product family offers multiple solutions for integration, choices can be made on:

- The current flow which is considered as regular counting direction.

Two types of references are available, matched with different counting direction:

Naming	Counting direction	References designation
Direct	I1 → I2	DCBM_Nxx_xx00_xxxx
Reverse	I2 → I1	DCBM_Nxx_xx10_xxxx

Table 1 : Counting direction references

The goal of this choice is to always have registers as follows:

- Energy coming from the electrical grid into the vehicle increments Import energy register.
- Energy coming from the vehicle back to the grid increments Export energy register.

4.2 Safety features

Reinforced insulation

- Reinforced insulation according to IEC 60664-1 is provided between SELV and HV.
- Rated insulation RMS voltage: 3.24kV

Thermal consideration

- The DCBM features temperature measurements on its shunt.
- Temperature can be read at any time using /livemeasureAPI

4.3 Metering and monitoring functions

tbd

5 COMMUNICATION INTERFACE

5.1 Introduction

DCBM100 series offers a set of communication API over Ethernet with a HTTP/REST protocol. The APIs are defined in two groups:

- **Legally Relevant**: energy metering values, handling of transaction, logbook, with data protected with signature using an asymmetric key mechanism.
- **Non-Legally Relevant**: management of product settings such as network settings, time, DC monitoring (current, voltage, temperature).

Table below summarizes the APIs and their functions, with default network settings (factory setting).

LR/NLR	URL	Method	Description
Legally Relevant (URL: http://192.168.1.22:81/LEM_DCBM/V1/LR)	/LiveMeasure	GET	Read a legally relevant measure. Synchronized data in LiveMeasure are refreshed every 100ms and shared with Display
	/Product/ID	GET	Read the product Type and Product ID. (Manufacturer, Model, Variant) and its identifiers (MAC, SN, SW LR Version, SW LR CRC)
	/Product/PublicKey	GET	Read public key used for signing OCMF Data
	/Transaction	POST	Start a new Transaction and returns the pagination counter (OCMF field [PG] referring to unique transaction identifier)
	/Transaction/Snap	GET	Read the on-going transaction status and data
	/Transaction/{PaginationCounter}	PUT/GET/DELETE	Stop on-going transaction using its PG / Read Transaction OCMF data Tuple / Acknowledge Transaction read-out
	/DisplayCasting	POST/PUT	Enable or Disable the CastDisplay feature / Getting the data of the DisplayCasting
	/Logbook	GET	Download LR logbook of Metrologic Events
	/Logbook/ReadByIndex/{Index}	GET	Read specified index in LR logbook of Metrologic Events

Non-Legally Relevant (URL: http://192.168.1.22:80/LEM_DCBM/V1/LR)	/Time/UTC	GET/PUT	Read Time Mode (Synchronization rule: Manual / NTP) Set Time Mode (Fix synchronization rule: Manual / NTP) Note: To apply any changes, you must restart DCBM
	/Time/Mode	GET/PUT	Read Time Mode (Manual / NTP) Set Time Mode (Manual / NTP) Note: To apply any changes, you must restart DCBM
	/Time/Local	GET/PUT	Read local time of DCBM100 Set local time parameters for DCBM100
	/TCP/IP	GET/PUT	Read DCBM100 ETH configuration (DHCP/StaticIP) Set a static IP address or activate DHCP mode
	/Monitoring	GET	Read a legally non-relevant measure, refreshed every 100ms. - Product Status - Electrical measurands with full depth resolution (V, I, T°) - Pagination's transaction in local Storage - Event count in logbook

Table 2 : DCBM100 API list

5.2 Default factory settings

i By default, factory settings are set as follows:

- In initial configuration the IP address: 192.168.1.22
- LR port: 80, NLR port: 81
- Local Time is not activated
- TCP/IP Configuration Mode = « StaticIP »
- Time/Mode Configuration = « Manual »

5.3 Software version table

Software version table and corresponding CRC are listed in the following table. This information is particularly relevant in certification processes for EV chargers.

Software Version	SW LR CRC
2.5.0.1	F024A42A

5.4 Communication protocol principles

In this document, request and response headers are described for all types of REST requests supported by the DCBM. Those headers specify how to properly configure a client to ensure functional communication.

The DCBM supports the following methods of RESTful API

- POST: publish a data
- GET: obtain a data
- PUT: place a data
- DELETE: delete a data

In this document the IP address and port are set to the default value (set in production):

URL: http://192.168.1.22:80/

When describing in section below a REST API header, the following formalism is used:

<COMMAND> <PATH> HTTP/1.1

With

<COMMAND> = REST command (ex: GET)

<PATH> = path to add to the URI (ex: /LEM_DCBM/V1/LR/Logbook)

Remarks: All fields size in this document are given in bytes, without counting ending '\0' NULL characters needed for storing a string in C language.

HTTP request and response are implemented using socket and TCP connection sequence. This sequence is defined with a SYN/SYN-ACK then exchange HTTP Request/Response and always end with a FIN/FIN-ACK to comply with TCP connection flow standard.

Example of TCP socket standard connection flow:

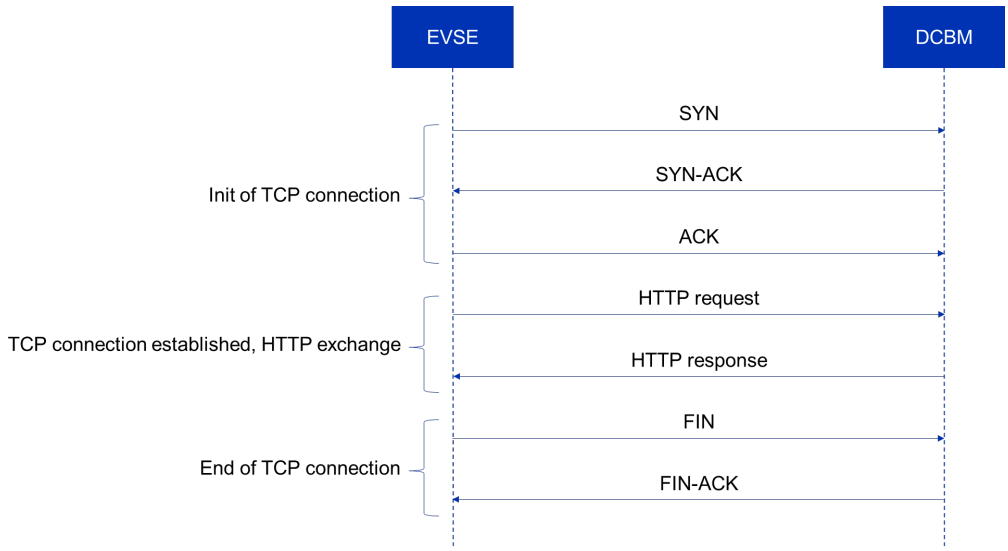


Figure 2 : TCP socket standard connection

5.4.1 Request header

5.4.1.1 Header formatting

The following request headers shall be formatted as follows:

```
POST /v1/legal HTTP/1.1
Host: <DCBM IP>
Content-Type: application/json
Content-Length: strlen(<BODY>)

<BODY>
```

With <BODY> = message sent to the DCBM

Close the line above with "\r\n" (named "CRLF", or carriage return and line feed)

Extra CRLF needed before the BODY

5.4.1.2 GET request

```
GET <PATH> HTTP/1.1
Host: <DCBM IP>
```

5.4.1.3 PUT request

```
PUT <PATH> HTTP/1.1
Host: <DCBM IP>
Content-Type: application/json
Content-Length: <SIZE>

<BODY>
```

with <SIZE> = strlen(<BODY>)

5.4.1.4 POST Request

POST <PATH> HTTP/1.1
Host: <DCBM IP>
Content-Type: application/json
Content-Length: <SIZE>

<BODY>

with <SIZE> = strlen(<BODY>)

5.4.2 Response header

5.4.2.1 Header formating

The following response headers are formatted as follows:

HTTP/1.1 <ERROR_CODE> <STATUS>
Connection: close

With:

<ERROR_CODE> = response code sent by the DCBM.

<STATUS> = HTTP status (example : OK / Forbidden / ...)

HTTP/1.1 Transfer encoding in chunked block is supported, with max size of blocks = 0x100 = 256 bytes

5.4.2.2 Success case

HTTP/1.1 200 OK

Connection: close

Content-Type: application/json

Transfer-Encoding: chunked

5.4.2.3 Failing case

HTTP/1.1 400 Bad Request

Connection: close

5.4.2.4 Possible HTTP status codes

Below are the implemented HTTP error codes, used in responses.

Code number	Meaning	PUT	POST	GET	DELETE
200	OK Success Setting read OK. Product Id available Public Key available Transaction successfully started. Transaction on-going values available Logbook available for download Logbook index available for read. Display casted. UTC time offset set with success Local Time settings processed successfully	used	used	used	used
201	Created	used			
400	Bad parameters Bad Request Wrong pagination counter provided. Bad Request, Sync or Check are NOK. Bad Request: bad offset parameters	used	used	used	
404	Logbook event index not found. No transaction on-going Transaction not found			used	used
500	Internal Server Error Shall never occur. Transaction found but corrupted / no readout possible error occured during write parameters processing RTC in error with given Time offset Setting received but processed with an internal error Display casted with delay Transaction ongoing but data corrupted	used	used	used	
503	Logbook not available for download (transaction on-going or upgrade on-going) DisplayCast Not available with current settings	used	used	used	used

	Service Unavailable Transaction ongoing but stop service not available Delete service not available Cannot start transaction, service not available.				

Table 3 :The implemented HTTP error codes

5.4.2.5 Chunked transfer

Typical HTTP chunked response is with max block size of 256 bytes, with length indicated at beginning of the data:

HTTP chunked response

100
<BODY_CHUNK>
100
<BODY_CHUNK>
...

The last block is identified with:

<REMAINING_LENGTH_IN_HEXADECIMAL_FORMAT>
<LAST_BODY_CHUNK>
0

Length before chunked body responses are expressed in hexadecimal format, without the "0x" prefix

The table below summarizes the maximum byte size for storing all the fields (worst cases). Add +1 if it is stored as a string to terminate with \0 character.

REST interface	Paths	Example values (byte)
RestApiLR	LiveMeasure	229
	Product/ID	253
	Product/PublicKey	268
	Transaction	82
	Transaction/{PaginationCounter}	1.1k
	Transaction/Snap	429
	DisplayCasting	77
	Logbook	162k
	Logbook/ReadByIndex/{Index}	134
RestApiNLR	TCP/IP	139
	Time/UTC	105
	Time/local	317
	Time/Mode	165
	Monitoring	249

Table 4 : example of value of the paths in the REST interface

5.5 Legally Relevant APIs - Detailed description

5.5.1 /LiveMeasure

5.5.1.1 Overview and example

This API gives access to synchronized data, refreshed every 100ms. It contains:

- Product Status
- Electrical measurands with certified precision
- Head and Tail Pagination's transaction in local Storage
- Event count in logbook

GET: http://192.168.1.22:80/LEM_DCBM/V1/LR/**LiveMeasure**


```
{
  "Status": 0,
  "T": "2024-01-16T13:57:30,408Z",
  "Ei": 3.495,
  "Ee": 1.348,
  "I": 0,
  "Ta": 21.7,
  "Tb": 21.7,
  "U": 0.2,
  "P": 0,
  "PGHead": 65,
  "PGTail": 16,
  "Ev#": 2398
}
```

5.5.1.2 Fields Description

5.5.1.2.1 Status

Product status is number.

BIT	VALUE	MEANING IF SET	MEANING IF RESET
0	1	startup not achieved	startup ended in success (SystemManager reached nominal mode)
1	2	NvramManager not operational	NvramManager operational
2	4	Sampler not operational	Sampler operational
3	8	Display not operational	Display operational
4	16	Ethernet PHY link cut	Ethernet PHY link connected
5	32	SignalProcessing produces an output in error status	SignalProcessing output is OK
6	64	TimeManager not synchronized	TimeManager synchronized
7	128	TimeManager time drift detected	TimeManager time reliable
8	256	TcpLRServer busy or bored: - LR API endpoint busy > 500ms - Logbook download > 300s - 40 minutes without LR activity and PHY link cut	TcpLRServer running
9	512	Transaction Metering on-going	Idle Transaction Metering
10	1024	LR Parameters in RAM are corrupted	LR Parameters in RAM OK
11	2048	Transaction BillBook slot is full - transaction logging depth is filled - oldest transaction data (with smallest pagination counter) is not acknowledged	Transaction Billbook slot is not full
12	4096	Production mode active	Product state in Nominal mode sequence
13	8192	LR Parameters in ROM are corrupted	LR Parameters in ROM are OK
14	16384	CastDisplay feature is activated	CastDisplay feature is off
15	32768	CastDisplay is in read TimeOut error	CastDisplay is OK
16	65536	Over-temperature operating condition	Temperature operating condition OK
17	131072	Reverse Voltage operating condition	Voltage in Operating condition
18	262144	Production Media open	Production Media removed
19	524288	Logbook is Full	Logbook is not full
20	1048576	event logging lifeproof test	Logbook commissionned

21	2097152	Logbook is in downloading state	Logbook is idle
22	4194304	Firmware corrupted	Firmware authenticated
32	4294967296	TcpNLRServer busy or bored: - NLR API endpoint busy > 500ms - 8 hours without NLR activity	TcpNLRServer running

Table 5 : status of the product (status metro)

Value is comprised between, Min = 0 and max = 4 294 967 295

5.5.1.2.2 UTC

Name	Type	Description
T	String	ISO8601, millisecond resolution, UTC

Example: 2024-01-01T00:01:02,691Z

5.5.1.2.3 Metering values

Name	Type	Description	Format	Min	Max
Ei	number	Import energy, kWh, resolution 1 Wh	float	0	-
Ee	number	Export energy, kWh, resolution 1 Wh	float	0	-
I	number	Current, A, resolution 0.1 A	float	-115	115
Ta	number	Temperature a, °C, resolution 0.1 °C	float	-150	150
Tb	number	Temperature b, °C, resolution 0.1 °C	float	-150	150
U	number	Voltage, V, resolution 0.1V Negative voltage is forced to 0	float	0	1150
P	number	Power, kW, resolution 1 W	float	0	132,25

5.5.1.2.4 Head and Tail Pagination value in local Storage

Values of the pagination counter of the newest and oldest transactions in the local memory of the meter.

Name	Type	Description	Format	Min	Max
PGHead	number	PG counter of the newest transaction in local storage	integer	0	4294967295
PGTail	number	PG counter of the oldest transaction in local storage	integer	0	4294967295

5.5.1.2.5 Event count in logbook

Name	Type	Description	Format	Min	Max
Ev#	number	Event count in logbook	integer	0	204000

5.5.2 /Product/ID

5.5.2.1 Overview and example

This API gives access to:

- Type: Manufacturer, Model and Variant
- Identification: MAC address, Serial number, Firmware version and Firmware CRC

GET: http://192.168.1.22:80/LEM_DCBM/V1/LR/**Product/ID**


```
{
  "Type": {
    "Manufacturer": "LEM",
    "Model": "DCBM",
    "Variant": "N0M_0800_0000"
  },
  "ID": {
    "MAC": "02:75:1D:E6:27:05",
    "SN": "123312NQ081308A",
    "SW LR Version": "2.5.0.1",
    "SW LR CRC": "F024A42A"
  }
}
```


5.5.2.2 Fields Description:

5.5.2.2.1 TYPE

To define the object of type of the DCBM100, we have:

Name	Type	Description	MinLength	MaxLength
Manufacturer	string	LEM	1	3
Model	string	DCBM	1	4
Variant	string	DCBM model: example N0M_0800_0000	1	16

5.5.2.2.2 Identification

Name	Type	Description	MinLength	MaxLength
MAC	string	MAC address	17	17
SN	string	Serial number, example: SN0123456789LEM	1	15
SW LR Version	string	Firmware version, example: 2.5.0.1	1	-
SW LR CRC	string	Firmware CRC	1	-

5.5.3 /Product/PublicKey

5.5.3.1 Overview and example

Get secp256-r1 public key used for signing OCMF Data Tuple.

GET: http://192.168.1.22:80/LEM_DCBM/V1/LR/**Product/PublicKey**


```
{
  "publicKey": "3059301306072A8648CE3D020106082A8648CE3D030107034200049E03DAF5CD3B
DF196A176ACD33A554B3C7C350F2BCD90187AA3EE6B4F95A28DD33F0D20F74F2E9F1BE78F60B0433FC
4758087E9D33A00478448160B45DC6452B"
}
```


5.5.3.2 Fields Description

Name	Type	Description	MinLength	MaxLength
publicKey	string	Public key in OCMF format	178	182

5.5.4 /Transaction

5.5.4.1 Overview and example

This method starts a new transaction and returns the pagination counter (OCMF field [PG] referring to unique transaction identifier) in JSON format.

POST: http://192.168.1.22:80/LEM_DCBM/V1/LR/**Transaction**

```
{
  "IT": 1,
  "ID": "customer_id",
  "CI": "client_identifyer_data_extra_info",
  "UF": "import",
  "UI": 0,
  "UD": "user_designation",
  "UU": "reserved_field_for_user",
  "UV": "software_version",
  "TT": "tariff_identifyer",
  "UZ": "location_identifyer",
  "SC": 63
}
```

RESPONSE :

```
{
  "PG": "T66"
}
```

5.5.4.2 Fields Description:

5.5.4.2.1 Request Body

Values are verified before initiating a new transaction and are then propagated "as is" into OCMF format.

Name	Type	Description	Min / Min Length	Max / Max Length
IT	integer	Customer identification method	0	255
ID	string	Customer ID	0	40
CI	string	CI field in returned OCMF	0	40
UF	string	Energy direction: “import” “export”	-	-
UI	integer	Cable identification used to choose mOhm resistance used in Power Loss compensation	0	7
UD	string	OCMF field refering to user designation	0	20
UU	string	Reserved field for user	0	40
UV	string	User software version	0	20
TT	string	User tariffication, example: “0,57 €/kWh”	0	20
UZ	string	User transaction display info	0	20
SC	integer	Bitfield enabling optional screen (page 2, 3, 4, ...) UI: enable by default, could not be disable - 1, enable CI page - 2, enable UT page - 4, enable UZ page - 8, enable UD page - 16,enable UV page - 32,enable UU page	0	63

IT is Customer identification method, integer from 0 to 255.

Values with a text definition:

0 NONE
1 DENIED
2 UNDEFINED
10 ISO14443
11 ISO15693
20 EMAID
21 EVCCID
30 EVCOID

50 CARD_TXN_NR
61 CENTRAL_1
62 CENTRAL_2
70 LOCAL
71 LOCAL_1 Lokal
72 LOCAL_2
80 PHONE_NUMBER
90 KEY_CODE

Full [0;255] array is supported for avoiding update if a minor OCMF update brings a new text definition (like in OCMF 1.0.1 revision)

To start a transaction, all fields are needed, and order shall be observed.

the transaction is rejected if one of these errors is met:

- a Transaction is already on-going.
- a logbook download is on-going.
- NVRAM transaction memory slot is full.
- a Metrologic risk / error is currently detected.

5.5.4.2.2 Response Body

PG is pagination counter value, from T1 to T4294967295, string higher than 2 characters. Example: T1254

The DCBM can store up to 50 transactions maximum, if you have already 50 transactions you must DELETE the oldest transaction to be able to start transaction again.

For the transaction start to be accepted, the DCBM time shall be synchronized. If the DCBM time is out-of-sync, the transaction start will be rejected.

5.5.5 /Transaction/Snap

5.5.5.1 Overview and example

Read on-going transaction status and transaction data registers.

GET : `http://192.168.1.22:80/LEM_DCBM/V1/LR/Transaction/Snap`


```
{
  "TX": "C",
  "PG": "T68",
  "IT": "1",
  "ID": "customer_id",
  "UI": "0",
  "UR": "0",
  "TM": "2024-01-23T12:13:00,003+0100 R",
  "startT": "2024-01-23T12:12:00,103+0100 R",
  "deltaT": "000h00m59,900s",
  "deltaEi": "0.000",
  "EiLoss": "0.000",
  "deltaEe": "0.000",
  "EeLoss": "0.000",
  "Status": "512",
  "TransactionStatus": "512",
  "I": "-0.0",
  "Ta": "25.5",
  "Tb": "25.6",
  "U": "0.2",
  "P": "0.000"
}
```

5.5.5.2 Fields description

Here is the body of the snap transaction:

Name	Type	Description	Min / Min Length	Max / Max Length
TX	string	-	1	1
PG	string	Pagination counter, example “T1458”	2	11
IT	integer	Identification Type (customer type ID), integer and the allowed values are: 0, 1, 2, 10, 11, 20, 21, 30, 50, 61, 62, 70, 72, 80, 90.	0	90
ID	string	Customer ID	0	40
UI	integer	Cable identification used to chose Cable Data for Power Loss compensation through cable	0	8
UR	string	Cable Resistance Value	0	7
TM	string	UTC time	1	-
startT	string	Start time	1	-
deltaT	string	Time since start in ms	1	16
deltaEi	string	Imported energy since start (in kWh, Wh precision)	1	-
EiLoss	string	Imported energy loss (in kWh, Wh precision)	1	-
deltaEe	string	Exported energy since start (in kWh, Wh precision)	1	-
EeLoss	string	Exported energy loss (in kWh, Wh precision)	1	-
Status	integer	System status	0	4096
TransactionStatus	integer	Status flag seen during Transaction	0	4096
I	string	Current measurement	1	-
Ta	string	Temperature Ta	1	-
Tb	string	Temperature Tb	1	-
U	string	Voltage	1	-

P	string	Power	1	-

Status detailed information is given below:

BIT	VALUE	MEANING IF SET	MEANING IF RESET
0	1	startup not achieved	startup ended in success (SystemManager reached nominal mode)
1	2	NvramManager not operational	NvramManager operational
2	4	Sampler not operational	Sampler operational
3	8	Display not operational	Display operational
4	16	Ethernet PHY link cut	Ethernet PHY link connected
5	32	SignalProcessing produces an output in error status	SignalProcessing output is OK
6	64	TimeManager not synchronized	TimeManager synchronized
7	128	TimeManager time drift detected	TimeManager time reliable
8	256	TcpLRServer busy or bored: - LR API endpoint busy > 500ms - Logbook download > 300s - 40 minutes without LR activity and PHY link cut	TcpLRServer running
9	512	Transaction Metering on-going	Idle Transaction Metering
10	1024	LR Parameters in RAM are corrupted	LR Parameters in RAM OK
11	2048	Transaction BillBook slot is full: - transaction logging depth is filled - oldest transaction data (with smallest pagination counter) is not acknowledged	Transaction Billbook slot is not full
12	4096	Production mode active	Product state in Nominal mode sequence
13	8192	LR Parameters in ROM are corrupted	LR Parameters in ROM are OK
14	16384	CastDisplay feature is activated	CastDisplay feature is off
15	32768	CastDisplay is in read TimeOut error	CastDisplay is OK
16	65536	Over-temperature operating condition	Temperature operating condition OK
17	131072	Reverse Voltage operating condition	Voltage in Operating condition
18	262144	Production Media open	Production Media removed
19	524288	Logbook is Full	Logbook is not full
20	1048576	event logging lifeproof test	Logbook commissionned
21	2097152	Logbook is in downloading state	Logbook is idle
22	4194304	Firmware corrupted	Firmware authenticated

Table 6 : Transaction status

5.5.6 /Transaction/{PaginationCounter}

5.5.6.1 Overview and example

GET: http://192.168.1.22:80/LEM_DCBM/V1/LR/**Transaction/{PaginationCounter}**

Read Transaction Ocmf data tuple identified by PaginationCounter parameter.

Provide the state of transaction in TX field:

At start:

- [Start(B)] transaction start correctly
- [Abort(A)] in case transaction stop is never stored in NvRam

At stop:

- [Stop(E)] if transaction has been finished correctly
- [PowerFailure(P)] if transaction has been interrupted by a power off

The transaction read is rejected if one of these errors is met:

- *a Transaction is already on-going.*
- *an upgrade is on-going.*
- *a logbook download is on-going.*

Provide the state of transaction in TX field:
Example: PaginationCounter*: 66

Response:


```
OCMF|{"FV":"1.0","GI":"LEM_DCBM_N0M_0800_0000","GS":"123312NQ081308A","PG":"T66","
MS":"123312NQ081308A","IS":true,"IT":"1","ID":"customer_id","CT":"EVSEID","CI":"cl
ient_identifyer_data_extra_info","UF":"import","US":"512","UD":"user_designation",
"UU":"reserved_field_for_user","UV":"software_version","TT":"tariff_identifyer","U
Z":"location_identifyer","UC":{"UN":"0 mOhm","UI":0,"UR":0},"RD":[{"TM":"2024-01-
22T15:29:22,309+0100 R","TX":"B","RV":3.495,"RI":"1-
b:1.8.0","RU":"kWh","EF":"","ST":"G"},{"TM":"2024-01-22T15:29:22,309+0100
R","TX":"B","RV":1.348,"RI":"1-b:2.8.0","RU":"kWh","EF":"","ST":"G"},{"TM":"2024-
01-22T16:06:44,808+0100 R","TX":"E","RV":3.495,"RI":"1-
b:1.8.0","RU":"kWh","EF":"","ST":"G"},{"TM":"2024-01-22T16:06:44,808+0100
R","TX":"E","RV":1.348,"RI":"1-
b:2.8.0","RU":"kWh","EF":"","ST":"G"}]}|{"SA":"ECDSA-secp256r1-SHA256",
"SD":"3044022079D6B78DB36C99EF8F47074B3004F3BFC7786F90EC07A07E5849B9B6309A85E50220
4C4E6B449A0AA2E36095EE012444B6CD96B46F37B736FAF9076819A7E55010CF"}
```


5.5.6.2 Fields Description

Request:

PaginationCounter is unique identification number of transaction.

Response:

Transaction found, provide OCMF data. OCMF is provided using following format (elements are separated by pipe character '|'):

- header: fixed value "OCMF",
- body: OCMF data in JSon format (see OCMF body example),
- tail: signature to assert data integrity in JSon format (see OCMF signature example)

Name	Type	Description	Min / Min Length	Max / Max Length
FV	string	OCMF Format Version	1	-
GI	string	Signature-generating component	1	-
GS	string	Serial number	1	15
PG	string	Pagination counter, example “T1458”	2	11
MS	string	Serial number (redundant)	1	15
IS	string	Charging operator identified customer	0	1
IT	string	Customer identification method (provided at start)	-	-
ID	string	Customer ID (provided at start)	1	40
CT	string	Charging point identification type	0	EVSEID
CI	string	Charging point identification (provided at start)	-	-
UF	string	Energy direction (provided at start)	import	export
US	string	Product status	1	-
UD	string	User designation (provided at start)	0	20
UU	string	User Unknown (provided at start)	1	64
UV	string	User SW Version (provided at start)	-	20

TT	string	User tariffication (provided at start)	-	20
UZ	string	User transaction display info (provided at start)	-	20
UC	string	object	-	-
UN	string	Cable name	0	10
UI	integer	Cable identification used to chose Cable Data for Power Loss compensation through cable	0	7
UR	integer	Cable Resistance Value	0	7
RD	array		0	4
TM	string	UTC time	1	-
TX	string	Transaction context	-	A, B, E and P
RV	string	Energy value read	00000000.000	99999999.999
RI	string	Obis code	1-b:1.8.0	1-b:2.8.0
RU	string	Energy Unit	0	kWh
EF	string	Error flags	0	-
ST	string	Encoding of OCMF errors based on Status on LR events during a transaction. Representation by a value (8 bits unsigned interger) is authorized	0	-
SA	string	fixed value indicating the signature algorithm used and set according to OCMF specification	-	"ECDSA-secp256r1-SHA256"

PUT: http://192.168.1.22:80/LEM_DCBM/V1/LR/**Transaction/{PaginationCounter}**

Stop transaction. PaginationCounter (provided as parameter) should match ongoing transaction. Return the OCMF data in JSon format if succesful.

The minimal transaction time specified by LEM is 60 seconds.

5.5.6.3 Overview

Provide the state of transaction in TX field :
Example: PaginationCounter*: 67

Response:


```
OCMF|{"FV":"1.0","GI":"LEM_DCBM_N0M_0800_0000","GS":"123312NQ081308A","PG":"T67","
MS":"123312NQ081308A","IS":true,"IT":"1","ID":"customer_id","CT":"EVSEID","CI":"cl
ient_identifyer_data_extra_info","UF":"import","US":"512","UD":"user_designation",
"UU":"reserved_field_for_user","UV":"software_version","TT":"tariff_identifyer","U
Z":"location_identifyer","UC":{"UN":"0 mOhm","UI":0,"UR":0},"RD":[{"TM":"2024-01-
22T17:57:27,307+0100 R","TX":"B","RV":3.495,"RI":"1-
b:1.8.0","RU":"kWh","EF":"","ST":"G"},{"TM":"2024-01-22T17:57:27,307+0100
R","TX":"B","RV":1.348,"RI":"1-b:2.8.0","RU":"kWh","EF":"","ST":"G"},{"TM":"2024-
01-22T17:57:37,007+0100 R","TX":"E","RV":3.495,"RI":"1-
b:1.8.0","RU":"kWh","EF":"","ST":"G"},{"TM":"2024-01-22T17:57:37,007+0100
R","TX":"E","RV":1.348,"RI":"1-
b:2.8.0","RU":"kWh","EF":"","ST":"G"}]}|{"SA":"ECDSA-secp256r1-SHA256",
"SD":"3044022067366ECD56FEB4EC6FFBC46AB229C571E8EDB38A1B0E584C26469CC00F8BAD860220
7DC92045AF91949E6F674FB1524883D78E0BBA74BF84C6731A4440637C48C655"}
```


5.5.6.4 Fields Description

Request:

PaginationCounter is unique identification number of transaction.

Response:

Transaction found and stopped. Provide OCMF data. OCMF is provided using following format (elements are separated by pipe character '|') :

- header : fixed value "OCMF",
- body : OCMF data in JSon format (see OCMF body example),
- tail : signature to assert data integrity in JSon format (see OCMF signature example)

DELETE: http://192.168.1.22:80/LEM_DCBM/V1/LR/**Transaction/{PaginationCounter}**

Acknowledge transaction read-out.
When transaction book is full (transaction status full), it allows to overwrite local transaction storage.
Max transaction storage is 50 transactions.

5.5.7 /DisplayCasting

POST : http://192.168.1.22:80/LEM_DCBM/V1/LR/DisplayCasting

To enable/disable the CastDisplay feature.

5.5.7.1 overview

Request:

```
{
  "Key": 0
}
```

5.5.7.2 Fields description

Name	Type	Description	Min	Max
Key	integer	Control key used to enable and disable the CastDisplay feature. If the CastDisplay is enabled only the right Control key set at start-up will disable the feature.	0	4294967295

PUT: http://192.168.1.22:80/LEM_DCBM/V1/LR/DisplayCasting

Send a token of Display Synchronization then the encrypted security word for getting the data of the DisplayCasting

5.5.7.3 Overview

Request:

```
{

  "Token": 0,

  "Hash": 0

}
```

Response:

```
{
  "Token": "0",
  "L1": "Energy imp:",
  "L2": "3.495 kWh",
  "L3": "Energy exp:",
  "L4": "1.348 kWh"
}
```

5.5.7.4 Fields description

Request:

Name	Type	Description	Min	Max
Token	integer	value must be chosen arbitrarily; it must be the same value while acknowledging the CastDisplay	0	4294967295
Hash	integer	value used to acknowledge the display data received	0	4294967295

Response:

Name	Type	Description	Min	Max
Token	string	value must be chosen arbitrarily; it must be the same value while acknowledging the CastDisplay	1	4294967295
L1	string	Energy import	1	4294967295
L2	string	Value of Energy import	1	-
L3	string	Energy Export	1	-
L4	string	Value of Energy Export	1	-

5.5.8 /Logbook

GET : http://192.168.1.22:80/LEM_DCBM/V1/LR/Logbook

To download LR logbook of metrologic Events.

Read-only, contains the metrological events during the lifetime of the DCBM.

5.5.8.1 Overview:

The JSON object is as follows.


```
{
  "Events": [
    {
      "Time": " 2024-01-23T13:55:25,841Z",
      "EvID": "9",
      "StatusMetro": " 49424"
    }
  ],
  "Signature":"0xE7EA8A94FEFC992152753FF42A426F80C2B7ED78BBA8D6E278AF9BA2F028F5494
29D5731E21EDBD1047A213AF5646311E07B89557020DFD7F3D080E933970C66"
}
```


5.5.8.2 Fields description

The "logbook" field is a JSON array of events.

All fields are provided as strings.

When the logbook is full, the DCBM ceases to operate (FF error, event: " Logbook is Full *"). **The DCBM shall be changed.***

! *The logbook can contain up to **204000** events.*

Time is UTC timestamp of the event, in ISO8601 extended datetime format.

! *The timestamp of the logbook is expressed in UTC time ("Z" suffix) and does not depend on local time.*

EvID is string (see the paragraph below)

StatusMetro is string, it is one of the following list.

Some of the statuses are linked to a fatal error, preventing new transactions permanently. Some are blocking, preventing new transactions temporarily.

"statusMetro" field is a copy of the status bit at the time of the event. The status name is displayed when the corresponding status bits are set. (see table 5)

Signature is Signature of the logbook in octet string format, with ASN1 DER encoding, using ECDSA secp256r1 and SHA256 methods.

! *The 40 minutes used Network loss corresponds to 36 events per day if problem is triggered at max occurence.*

36 events per day corresponds to the event logging filling rate for reaching logbook full depth in 15 years.

Energy Reset is only available in test mode in DCBM-100 V1.

5.5.9 /Logbook/ReadByIndex/{Index}

GET: `http://192.168.1.22:80/LEM_DCBM/V1/LR/Logbook/ReadByIndex/ {Index}`

Read specified index in LR logbook of Metrologic Events

5.5.9.1 overview

The JSON object is as follows.

```
{
  "Time": "2023-12-15T13:13:49,880Z",
  "EvID": "9",
  "StatusMetro": "272"
}
```

5.5.9.2 Fields description

When Logbook index available for read:

Time have date code = year <<16 + mounth <<8 + day.

EvID is string, it is one of following list.

EVENT ID	MEANING
0	Initial NVRAM commissionning event
1	POR and nominal mode startup synch achieved
2	NVRAM failure
3	Sensore failure
4	Display Failure
5	Display Recovery
6	Time Synchronisation Loss
7	Time Synchronisation Recovery
8	Time Drift
9	Network connection Loss
10	Network connection Recovery
11	CastDisplay Activate
12	CastDisplay Desactivate
13	Logbook life proof

Table 7 : Meaning of EVENT ID

StatusMetro see the paraph 5.2.8.2.

5.6 Non-Legally Relevant APIs - Detailed description

5.6.1 /TCP/IP

GET : http://192.168.1.22:81/LEM_DCBM/V1/NLR/TCP/IP

Read TCP/IP configuration

5.6.1.1 Overview :


```
{
  "Mode": "StaticIP",
  "IP": "192.168.1.22",
  "Port_LR": 80,
  "Port_NLR": 81
}
```


5.6.1.2 Fields description

Name	Type	Description	Min	Max
Mode	string	IP mode (static or DHCP),	-	-
IP	string	IP address taken by DCBM in IP mode	1	192.168.1.22
Port_LR	number	Legally relevant port,(value by default: 80)	1	65535
Port_NLR	number	Non legally relevant port, (value by default: 81)	1	65535

PUT: http://192.168.1.22:81/LEM_DCBM/V1/NLR/TCP/IP

Write TCP/IP configuration</br>

Need restart after any change.

5.6.1.3 Overview

Request:

```
{
  "Mode": "StaticIP",
  "IP": "192.168.1.22",
  "Port_LR": 80,
  "Port_NLR": 81
}
```

5.6.1.4 Fields Description

Request:

Mode is one of following list.

VALUE	DESCRIPTION
StaticIP	Static IP addressing
DHCP	DHCP addressing

Table 8 : Mode of the DCBM

Both values need DCBM restart to apply.

Name	Type	Description	Min	Max
IP	string	IP address taken by DCBM in IP mode	1	192.168.1.22
Port_LR	number	Legally relevant port,(value by default: 80)	1	65535
Port_NLR	number	Non legally relevant port, (value by default: 81)	1	65535

5.6.2 /TIME/UTC

GET : http://192.168.1.22:81/LEM_DCBM/V1/NLR/Time/UTC

Read Date and Time in ISO8601 UTC format: "yyyy-mm-ddThh:mm:ss,mmsZ"

5.6.2.1 Fields description

Time: date and time from DCBM, string.

Example: 2024-01-24T14:14:26,551Z

PUT : http://192.168.1.22:81/LEM_DCBM/V1/NLR/TIME/UTC

Set Date and time in ISO8601 UTC format: "yyyy-mm-ddThh:mm:ssZ"
Year must be between 2021 & 2100

5.6.2.2 Overview:


```
{
  "Time": "2024-01-24T14:14:00Z"
}
```


5.6.3 /Time/Local

GET : http://192.168.1.22:81/LEM_DCBM/V1/NLR/**Time/Local**

Read Time in local format and inner related parameters.

5.6.3.1 Overview


```
{
  "Local": "2024-01-24T20:07:13,346+0100",
  "TZ": "+01:00",
  "DST": {
    "Activated": "true",
    "Offset": "60",
    "Start": {
      "Month": "march",
      "Day": "sunday",
      "Hour": "02:00",
      "Order": "last"
    },
    "End": {
      "Month": "october",
      "Day": "sunday",
      "Hour": "03:00",
      "Order": "last"
    }
  }
}
```

5.6.3.2 Fields Description

Name	Type	Description	Min	Max	Example
Local	string	local time expressed in UTC format	-	-	"[yyyy]-[mm]-[dd]T[hh]:[mm]:[ss],[ms][s][hh][mm]", "2021-11-21T12:41:01,000+1030"
TZ	string	time zone	-	-	"sHH:mm", "+00:30", "-4:45", "+09:50", "-12:00", "+14:00"
DST	Object	-	-	-	-
Actived	string	-	TRUE	FALSE	
Offset	integer	offset to be applied when DST is active expressed in minutes	-	60	-
Start	Object	-	-	-	-
Month	string	Allowed values are January, February, march, April, may, June, July, august, September, October, November, December.	-	-	-
Day	string	Allowed values are: Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday.	-	-	-
Hour		hour in 24h Local time format.	-	-	"HH:mm", "00:00", "4:50", "23:59"
Order	string	Day position in the month	-	-	allowed values: first, second, third, fourth, last.
End	Object	-	-	-	-
Month	string	Allowed values are January, February, march, April, may, June, July, august, September, October, November, December.	-	-	-
Day	string	Allowed values are: Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday.	-	-	-
Hour		hour in 24h Local time format.	-	-	"HH:mm", "00:00", "4:50", "23:59"
Order	string	Day position in the month	-	-	allowed values: first, second, third, fourth, last.

PUT : http://192.168.1.22:81/LEM_DCBM/V1/NLR/**Time/Local**

Write local Time parameters

5.6.3.3 Overview


```
{
  "TZ": "+01:00",
  "DST": {
    "Activated": "true",
    "Offset": 60,
    "Start": {
      "Month": "march",
      "Day": "sunday",
      "Hour": "02:00",
      "Order": "last"
    },
    "End": {
      "Month": "october",
      "Day": "sunday",
      "Hour": "03:00",
      "Order": "last"
    }
  }
}
```


5.6.3.4 Fields description

Request:

This API parametrize the local time. DST refers to the specific daylight saving time. TZ is the local timezone from -12h to +14h.

DST time is expressed in LOCAL time format.

Date identification for DST fields work as follow:

Month : "january"

Day : "monday"

Hour : "11:30"

Order : "first"

This means first monday of january at 11:30am.

In 2022 it refers to Monday 03/01/2022.

In 2023 it refers to Monday 02/01/2022.

See paragraph 7.3.2

5.6.4 /Time/Mode

GET: http://192.168.1.22:81/LEM_DCBM/V1/NLR/Time/Mode

Read Time Mode:

- Synchronisation rule (Manual / NTP)
- NTP Time source information

5.6.4.1 Overview

```
{
  "Time_Source": "Manual",
  "Manual_IP": "192.168.1.20",
  "Ntp_IP": "192.168.1.20",
  "Ntp_Port": 50123
}
```

5.6.4.2 Fields description

Name	Type	Description	Min	Max	Example
Time_source	-	select time source: time sent by user (Manual) or time synchronized by a NTP server (NTP).	-	-	Allowed values: Manual or NTP. Default value: Manual.
Manual_IP	string	manual time source IP (optional). DCBM could ping this IP for informational network diagnostic.	-	-	Default value: 192.168.1.20
Ntp_IP	string	NTP server IP			Default value: 192.168.1.20
Ntp_Port	number	NTP server port	0	65535	Default value: 50123

! *The NTP client shall get a new Time reference and update the DCBM Time offset accordingly if no transaction is on-going:*

each 10s if time synchronization is KO.

each 1 hour if if the synchronization is OK.

The NTP client shall skip Time reference update if a transaction is on-going.

PUT: http://192.168.1.22:81/LEM_DCBM/V1/NLR/Time/Mode

Write Time Mode:

- Fix synchronization rule (Manual / NTP)
- Give Time source TCP information
- Manual_IP: Manual Time Source IP (optionnal). DCBM could ping this IP for informational network diagnostic.

5.6.4.3 Overview

```
{
  "Time_Source": "Manual",
```

```
  "Manual_IP": "192.168.1.20",
  "Ntp_IP": "192.168.1.20",
  "Ntp_Port": 50123
}
```


5.6.4.4 Fields description

This change requires a restart each time we write time mode.

5.6.5 /Monitoring

GET: http://192.168.1.22:81/LEM_DCBM/V1/NLR/Monitoring

Synchronized data monitoring, refreshed every 100ms. It contains:

- Product Status
- Electrical measurands with full depth resolution
- Head and Tail Pagination's transaction in local Storage
- Event count in logbook

5.6.5.1 overview


```
{
  "Status": 0,
  "T": "2024-01-24T22:43:53,493Z",
  "Ei": 3.495640062,
  "Ee": 1.348941061,
  "I": 0,
  "Ta": 25.794,
  "Tb": 25.805,
  "U": 0.235,
  "P": 0,
  "PGHead": 68,
  "PGTail": 19,
  "Ev#": 9560
}
```

5.6.5.2 Fields description

Status of the DCBM: see paraph 6.1.2

Name	Type	Description	Min	Max	Example
T	string	ISO8601 millisecond resolution			
Ei	number(float)	Import energy	0		resolution e-6 Wh
Ee	number(float)	Export energy	0		resolution e-6 Wh
I	number(float)	current, A	-115	115	resolution 0.001 A
Ta	number(float)	temperature a, °C	-150	150	resolution 0.001 °C
Tb	number(float)	temperature b, °C	-150	150	resolution 0.001 °C
U	number(float)	Voltage, V, resolution 0.001V. Negative voltage is forced to 0	0	1150	
P	number(float)	Power, kW, resolution 1W	0	132.5	
PGHead	integer	PG counter of the newest transaction in BillBook.	0		
PGTail	integer	PG counter of the oldest transaction in BillBook	0		
Ev	integer	Event count in logbook	0		(see paraph 5.2.9.2)

6 DISPLAY

6.1 Display states

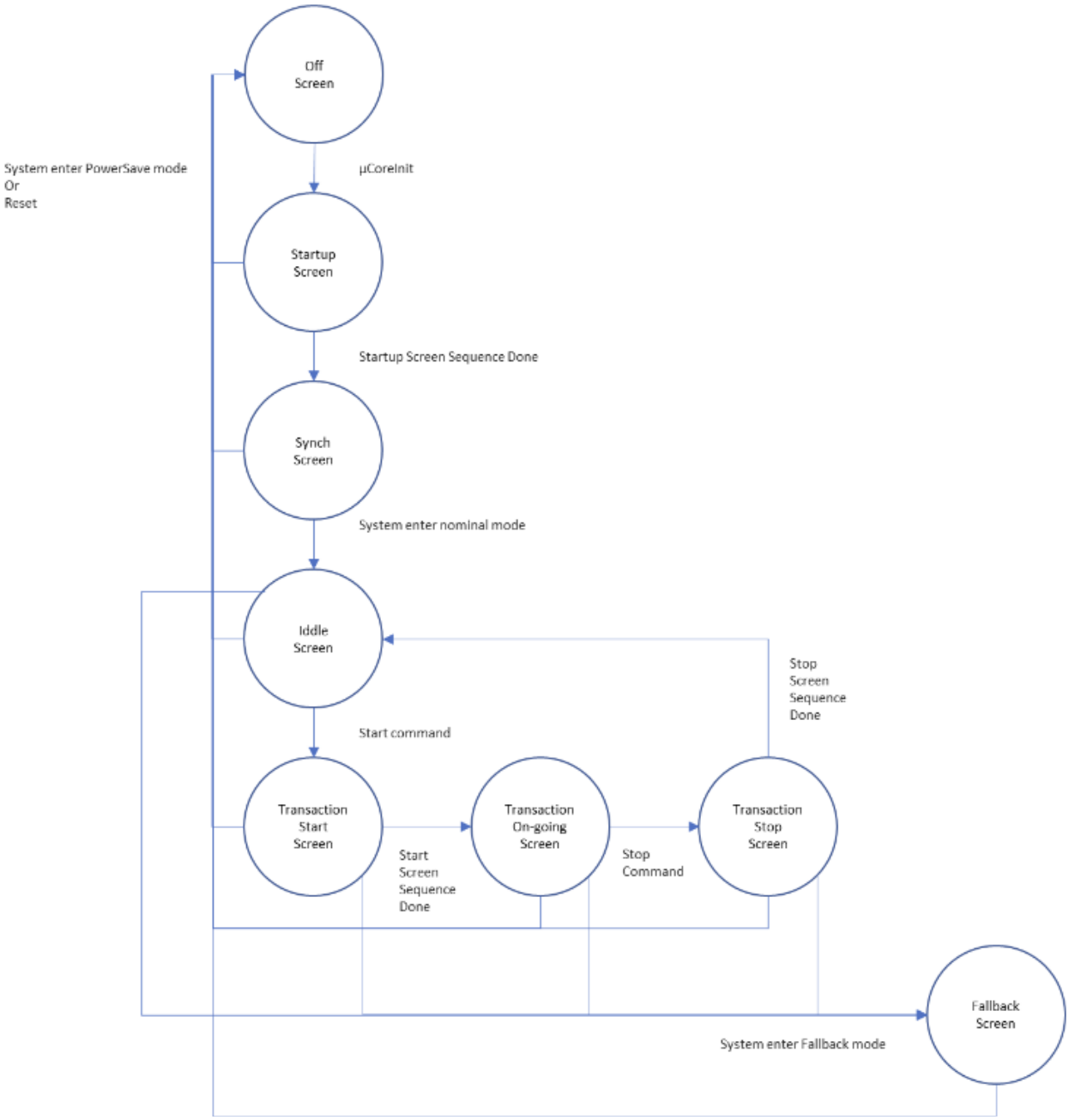


Figure 3 : General display concepts

The display of the DCBM primarily aims at displaying data relevant to certified billing. Screens are sequenced accordingly. The display also provides data which can be useful for installation and maintenance.

The screens are sequenced according to the adjacent block-diagram. Those states are described individually in below sections.

6.1.1 Startup screen:

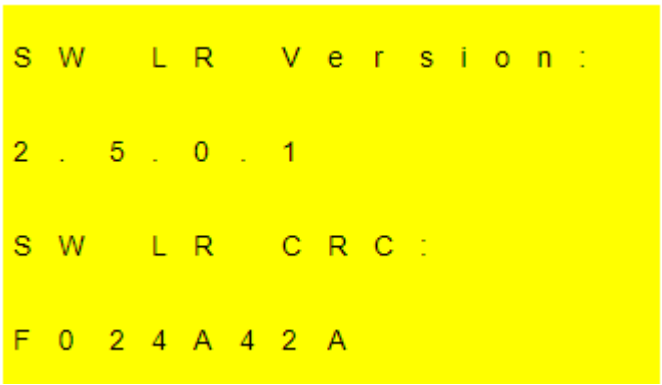
Juste after Offmode:

On powering up the DCBM, the following screens will be displayed successively. In particular, the following data allow metrological validation :

1/5

Startup display sequence for 2s each one:

2/5

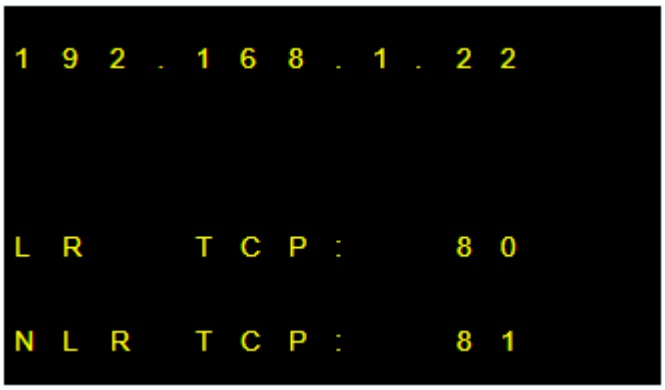


3/5

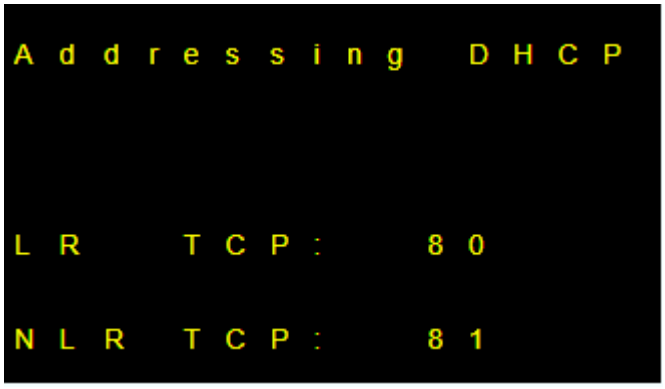
6.1.2 Synch screen

Synchronization display sequence for 5s each one:

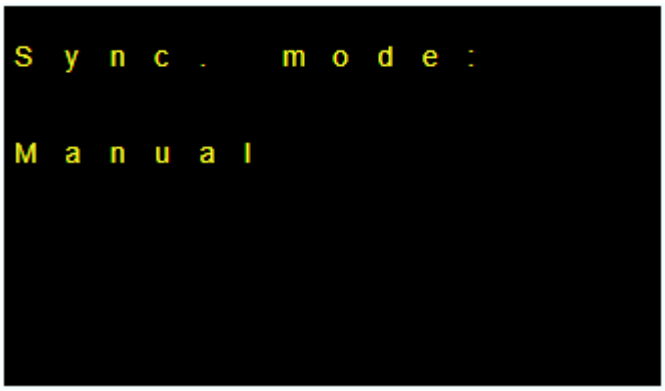
4/5



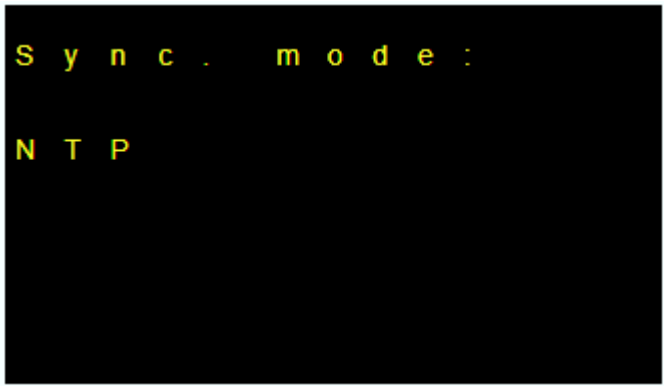
If DHCP addressing is not defined yet:



5/5



If synchronization mode is NTP:



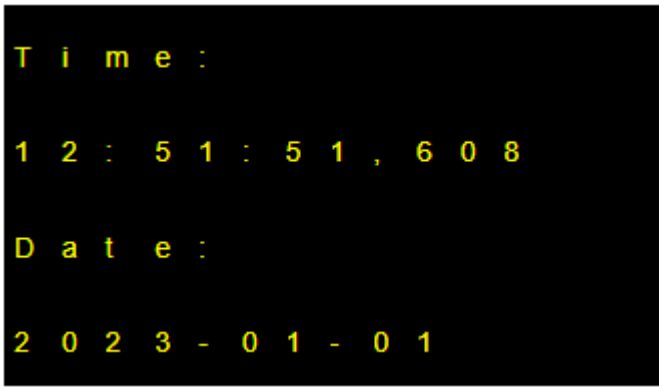
Screen index	Solution
1/5	Company logo
2/5	Identifiers of the versions test ON
3/5	Identifiers of the versions test OFF
4/5	Static IP address with NTP server
5/5	Screen clock mode

Table 9 : Screen Index

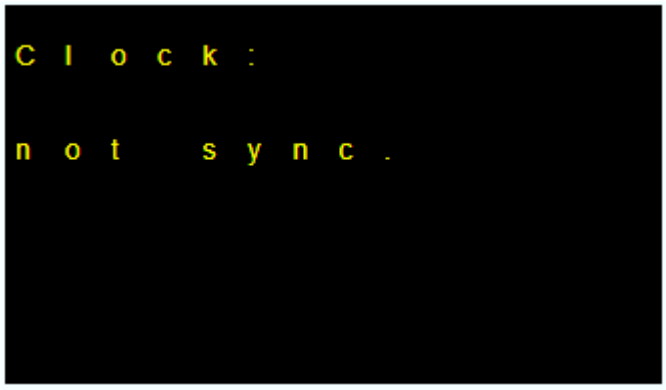
6.1.3 Idle screen

Idle display screen clock in a roll -over sequence over idle mode following screen for 5s:

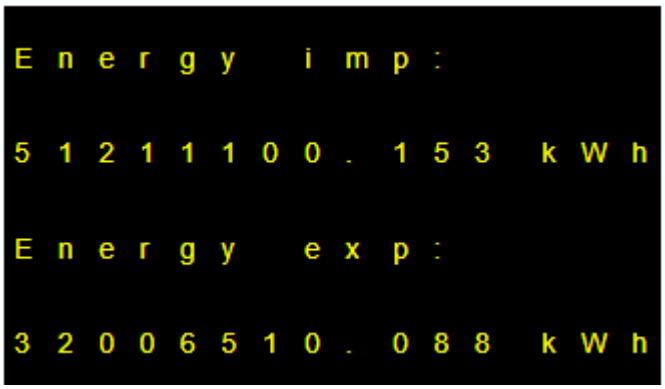
If synchronization is good:



If synchronization has been lost:



Idle display screen absolute energy registers in a roll-over sequence over idle mode following screen for 5s:



The idle screen is the central screen, following the boot sequence, the transaction screens.

The data provided in the Idle screen are the following:

- Total import and export energy registers
- Current local date and time

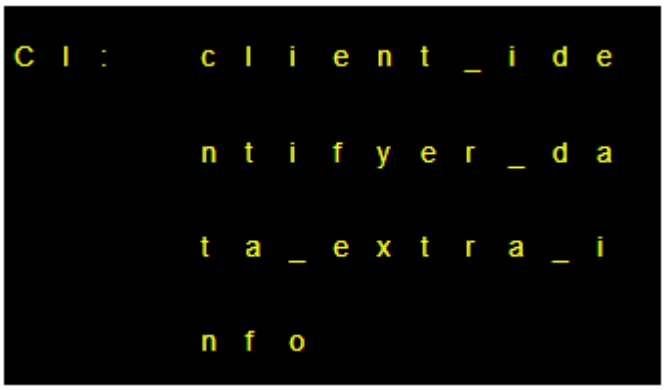
6.1.4 Transaction start screen:

A transaction must be triggered. Sequences of screens are triggered by the beginning and end of the transaction, which are illustrated below.

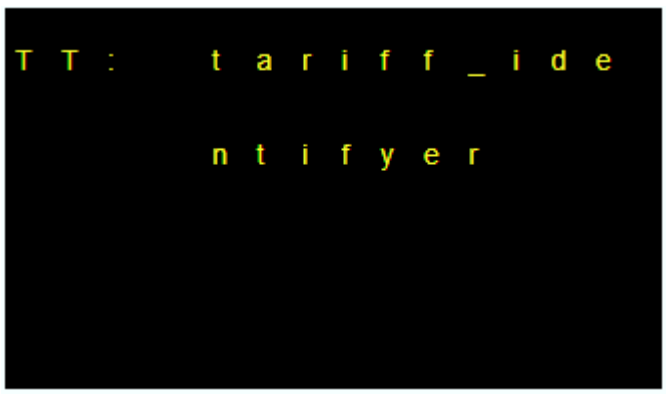
The display at Transaction Start following screen for 5s each one:

1/7

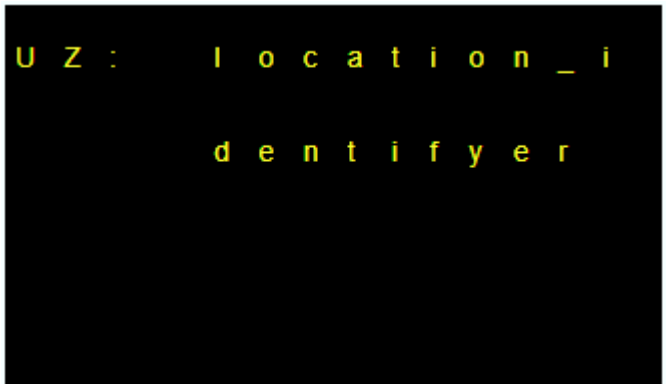
2/7



3/7



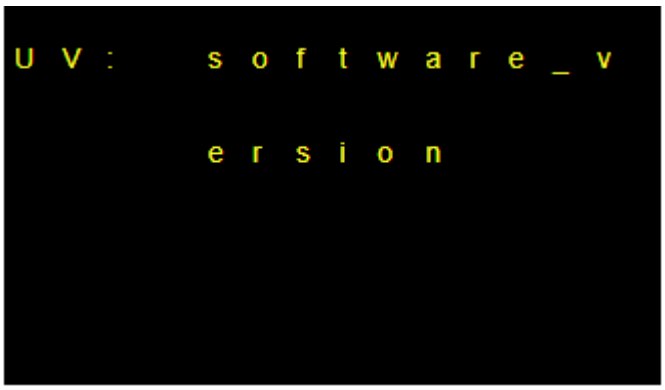
4/7


U Z : l o c a t i o n _ i
d e n t i f y e r

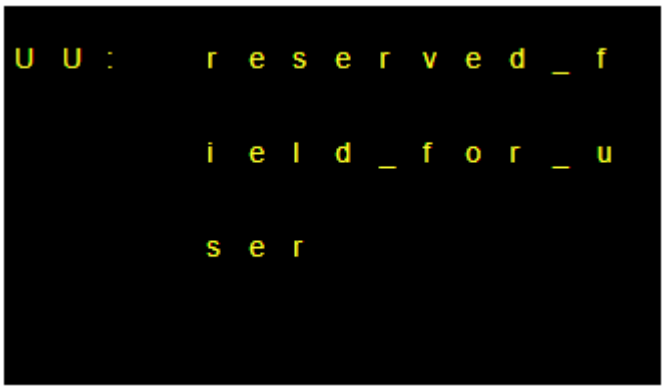
5/7


U D : u s e r _ d e s i g
n a t i o n

6/7


U V : s o f t w a r e _ v
e r s i o n

7/7

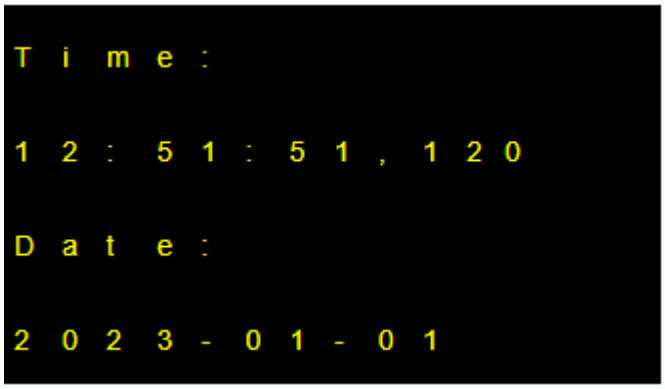


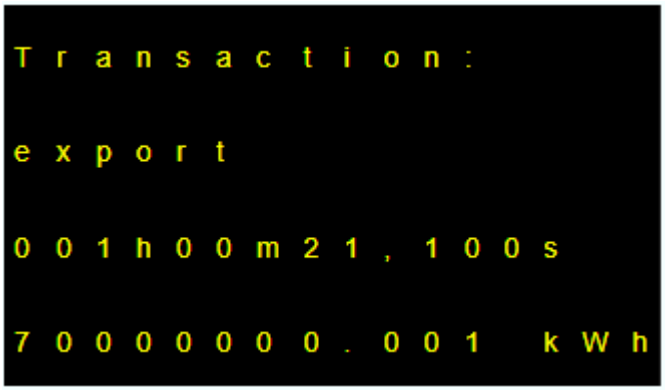
Screen index for SC = 63	Data on rolling pane
1/7	the CableID parameter of transaction start command
2/7	the OCMF EVSEID parameter of transaction start command
3/7	the Custom Tarif parameter of transaction start command
4/7	the Custom Location parameter of transaction start command
5/7	the Custom User designation
6/7	the Software version
7/7	the Custom field reserved for the user

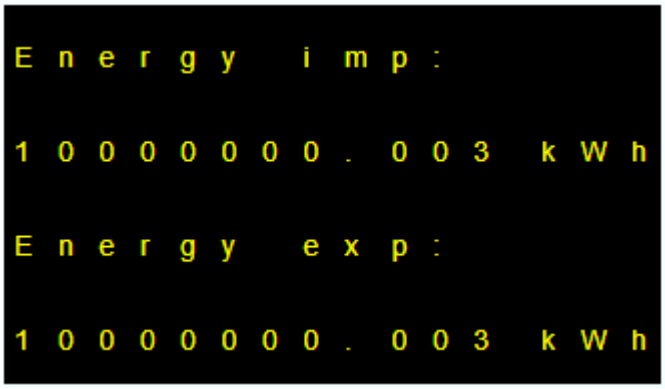
Table 10 : Data on rolling pane

6.1.5 Transaction on-going screen

The display is in a roll-over sequence over transaction on-going mode following screen for 5s each one:

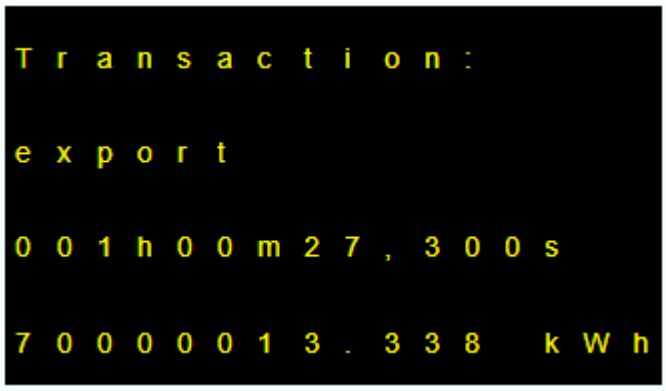






6.1.6 Transaction stop screen:

The display at transaction stop command following screen for 30s:



Transaction Start and Stop commands are not rejected if Display sequences are not completed.

If Start and Stop commands are flooded, the timing of scheduled start and stop sequences are kept and the content displayed will be updated with the on-going transaction's data without prolongating former transaction data display.

6.1.7 Fallback screen:

The display under Fallback error state following screen indefinitely:

The status display is the metrological status.
8192 value is an example, it will be based on general status available in monitoring API.

The only data displayed on the error screen is the following:

- The current error code (see "6.1.2 products status")

7 TROUBLESHOOTING

You face issue when using Stoplight?

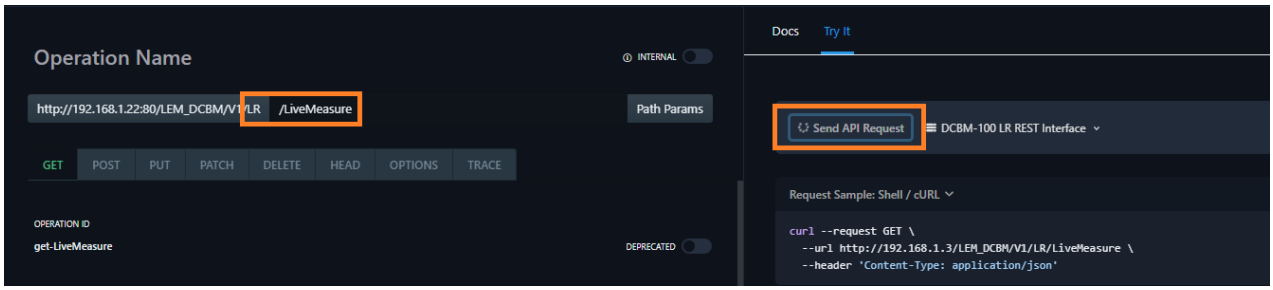
Please check following helping notes:

- I sent a LiveMeasure command, but I do not have any response.
- I only measure 0 values.
- I cannot send a successful Start transaction command

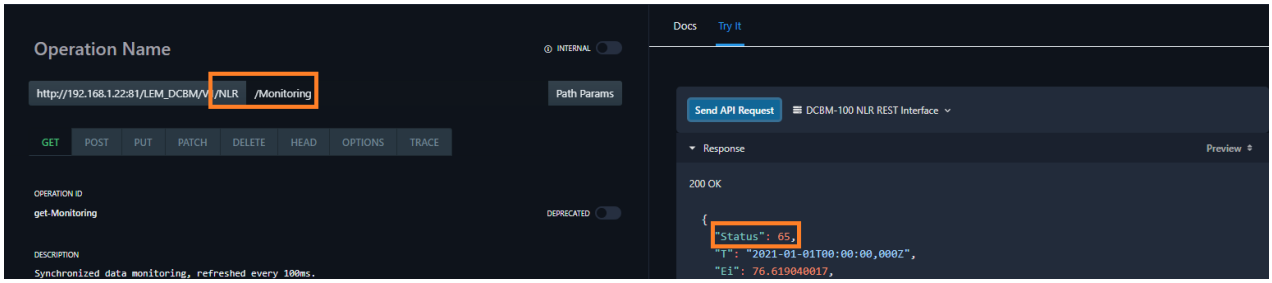
7.1 I sent a LiveMeasure command, but I do not have any response

LiveMeasure is part of the LR APIs, the LR interface is only available once the DCBM is synchronized after Power-on (Status pass from 65 to 0).

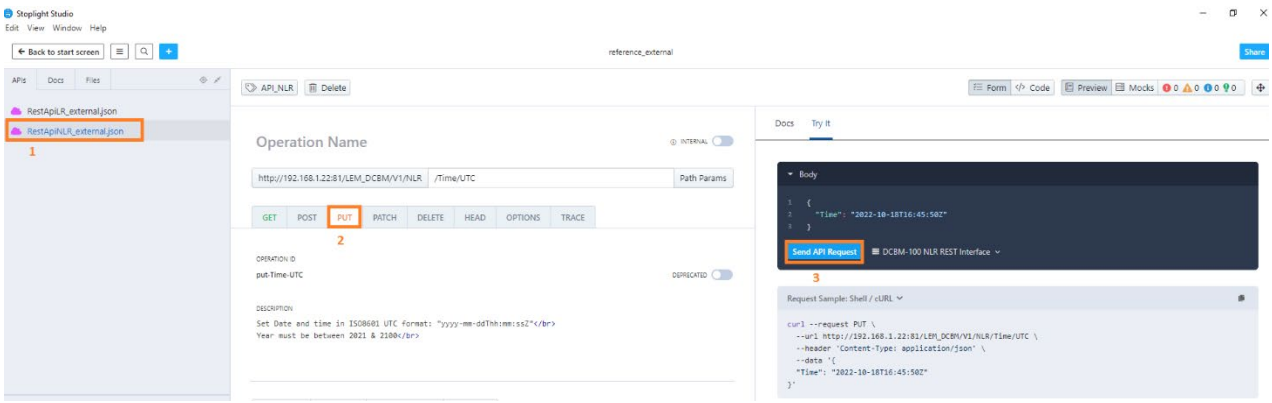
So, if you see that Stoplight is not responding (see image below), it means that the DCBM is not in Not synchronized (NLR Monitoring requests will indicate Status = 65)



Monitoring Status:



Solution: Please send time (see image below) and try again.



7.2 I only measure 0 values

If the current, voltage, temperature and power values are at 0 (see image below), this means that the DCBM is not synchronized after Power-on.

The Monitoring Status confirms this (Status = 65 means: startup not achieved and TimeManager not synchronized).

Solution: Please send time and try again.

7.3 I cannot send a successful Start transaction command

The start transaction can be rejected (http response = 503) for several reasons, for example:

- DCBM not synchronized (status = 64)
- A Transaction is already on-going (Status = 512)
- A logbook download is on-going (Status = 2097152)
- NVRAM transaction memory slot is full (Status = 2048)
- An error is currently detected (Status != 0)

So, please ensure that the DCBM is in nominal condition (Status = 0) and then try to start a transaction again.

Note: **The DCBM synchronization is valid for 48h**, so remember to synchronize periodically the DCBM; you can also set automatic synchronization via the NTP service.

7.4 Start transaction without error:

Here are the steps to start a transaction, but before that, it's crucial to:

- Perform a set the time either by utilizing the API: /NLR/Time/UTC or through an NTP server (if DCBM is configured in NTP Mode).
- Check via the NLR/**Monitoring** API that the **DCBM Status is 0**, which means no errors have been detected.

Then, to start a transaction, we use the API "post /LR/Transaction" method with a set of parameters, all of which are mandatory to start a transaction. Below is the list of parameters, their associated types, and ranges:

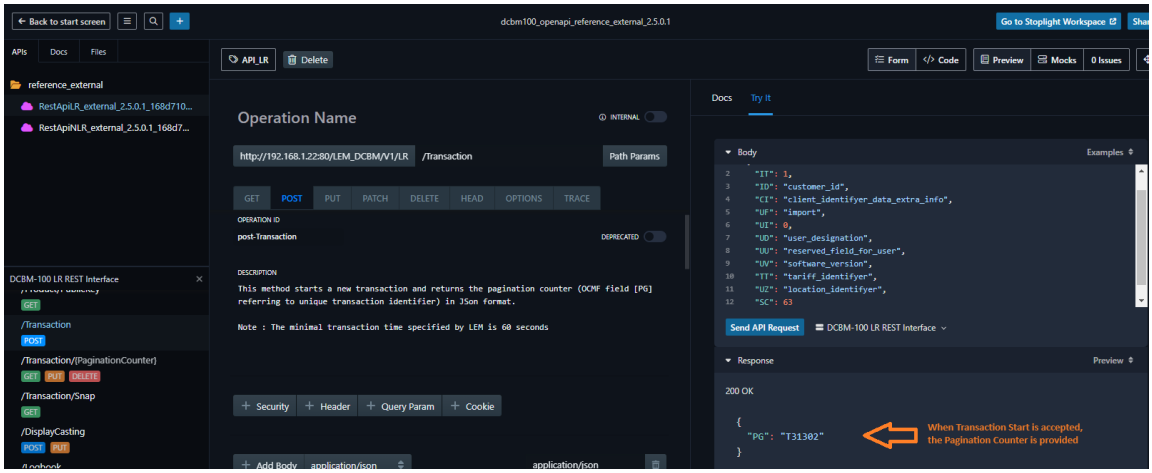
Name	Type	Description	Min / Min Length	Max / Max Length	Display on the screen (according to SC parameter)
IT	integer	Customer identification method	0	255	No
ID	string	Customer ID	0	40	No
CI	string	CI field in returned OCMF	0	40	Yes
UF	string	Energy direction: “import” “export”	-	-	NO
UI	integer	Cable identification used to choose mOhm resistance used in Power Loss compensation	0	7	Yes
UD	string	OCMF field refering to user designation	0	20	Yes
UU	string	Reserved field for user	0	40	Yes
UV	string	User software version	0	20	Yes
TT	string	User tariffication, example: “0,57 €/kWh”	0	20	Yes
UZ	string	User transaction display info	0	20	Yes
SC	integer	Bitfield enabling optional screen (page 2, 3, 4, ...) UI: enable by default, could not be disable - 1, enable CI page - 2, enable UT page - 4, enable UZ page - 8, enable UD page - 16,enable UV page - 32,enable UU page	0	63	NO

Table 11 : Transaction parameters

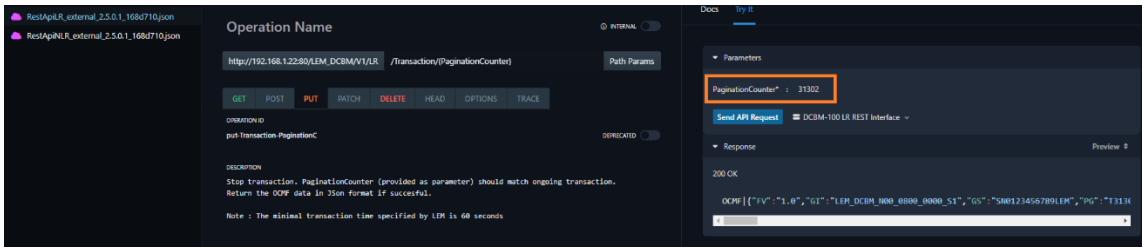
7.5 Start a transaction using stoplight:

Below is an example of starting a transaction using **Stoplight** (equivalent to Insomnia for DCBM400) and **Curl**:

1. Start Transaction using Stoplight:



To stop a transaction, utilize the PG value that is returned when the transaction start response **without "T".** Please refer to the image below for further guidance:



2. **Start Transaction using curl :**

curl -X POST http://192.168.1.22/LEM_DCBM/V1/LR/Transaction --header "Content-Type: application/json" --data "{ """IT""": 1, """ID""": "customer_id", """CI""": """client_identifyer_data_extra_info""", """UF""": "import", """UI""": 0, """UD""": "user_designation", """UU""": "reserved_field_for_user", """UV""": "software_version", """TT""": "tariff_identifyer", """UZ""": "location_identifyer", """SC""": 63 }"

Result:

Reminder: If you are using curl on Windows, here are some helpful tips:

- Single quotte è Seems to be an windows issue. Do not use the ' (single quote) character. Instead, use " (double-quote) character for enclosing the string
- **Double quotes in JSON must be escaped with the backslash "\" or “” on Windows computers**

In JSON, data is written in form of key-value pairs. The **keys are written in double quotes** and values are written according to their data types.

JSON example

```
{
        "id" : 10,
        "name" : "Lokesh",
        "role" : ["admin", "author"]
}
```

JSON Keys must be Valid Strings

According to JSON.org, a *string* is a sequence of zero or more Unicode characters, wrapped in double quotes, using backslash escapes. **Any valid string can be used as a JSON key**.

These keys must be enclosed in the double-quotes ("). This means if the key name contains any double quote in it, then it must be escaped.

```
{"Some \"random\" string" : "value"}
```

The following characters are invalid when used in a JSON key:

- " (double quote) – It must be escaped.
- \ (backslash) – It must be used to escape certain characters.
- All control characters like \n, \t

8 APPENDIX

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