Hoymiles Micro Energy Storage MQTT Protocol Development Guide

Revision History

Version	Changes
V0.1	Initial release.
V0.2	Documentation formatting adjustments.
V0.3	Added TOU (time-of-use) schedule configuration, schedule acknowledgment, and schedule query functions; added the `tou_plan` option to EMS modes; added device heating status, grid-tied microinverter PV power, and off-grid port output power fields to the second-granularity data and the system real-time data; refined field definitions and descriptions of each topic.
V0.4	Extended supported device models to `MS-A2`, `HiBattery 1920 AC`, `HiBattery 4020 X`, and `HiBattery 4020 AC`; added output power setting, multi-phase output power setting, and device reboot functions; added total PV port power to the second-granularity data and PV string and battery pack details to the device real-time data.
V0.5	Optimized the `unique_id` identification to improve compatibility; power on/off control is now officially supported; output power setting, multi-phase output power setting, and reboot functions now support all device models; added off-grid port input/output energy to the system real-time data; refined value descriptions and definitions of some fields.

1. Basic Configuration Information (Published by Device)

Note: Published immediately after device connection for device discovery

Topic: `homeassistant/switch/<dev_id>/config`

Payload:

```
{
  "state_topic": "homeassistant/sensor/<dev_id>/device/state",
  "command_topic": "homeassistant/switch/<dev_id>/set",
  "json_attributes_topic": "homeassistant/sensor/<dev_id>/attributes",
  "unique_id": "<dev_id>_config",
  "device": {
    "identifiers": ["<id>"],
    "name": "<dev_id>",
    "manufacturer": "Hoymiles",
    "model": "MS-A2",
    "sw_version": "1.0.0"
  }
}
```

QoS: `1`

Retain: `true`

Note:
`model`: Device models supported by this protocol. Currently supported models: `MS-A2`, `HiBattery 1920 AC`, `HiBattery 4020 X`, `HiBattery 4020 AC`.

2. Basic Attribute Information (Published by Device)

Note: Published immediately after device connection for topic synchronization

Topic: `homeassistant/sensor/<dev_id>/attributes`

Payload:

```
{
  "supported_topics": {
    "quick_state": "homeassistant/sensor/<dev_id>/quick/state",
    "device_state": "homeassistant/sensor/<dev_id>/device/state",
    "system_state": "homeassistant/sensor/<dev_id>/system/state",
    "switch_ctrl": "homeassistant/switch/<dev_id>/set",
    "ems_mode": "homeassistant/select/<dev_id>/ems_mode/command",
    "power_ctrl": "homeassistant/number/<dev_id>/power_ctrl/set",
    "tou_day_plan": "homeassistant/sensor/<dev_id>/tou_day_plan/set",
    "tou_week_plan": "homeassistant/sensor/<dev_id>/tou_week_plan/set",
    "tou_get": "homeassistant/sensor/<dev_id>/tou_plan/get",
    "output_power": "homeassistant/number/<dev_id>/output_power/set",
    "phase_output_power": "homeassistant/number/<dev_id>/phase_output_power/set",
    "reboot": "homeassistant/button/<dev_id>/reboot/trigger"
  }
}
```

QoS: `1`

Retain: `true`

Note:
`supported_topics`: Lists all topics the device can publish and subscribe to
`quick_state`: Publish-only topic for fast updates of device and system operating status
`device_state`: Publish-only topic for periodic updates of device standalone status
`system_state`: Publish-only topic for periodic updates of overall system status
`switch_ctrl`: Subscribe-only topic for device power on/off control commands
`ems_mode`: Subscribe-only topic for EMS mode configuration commands
`power_ctrl`: Subscribe-only topic for power regulation commands
`tou_day_plan`: Subscribe-only topic for TOU daily schedule configuration
`tou_week_plan`: Subscribe-only topic for TOU weekly schedule configuration
`tou_get`: Subscribe-only topic for TOU schedule query requests
`output_power`: Subscribe-only topic for output power configuration

`phase_output_power`: Subscribe-only topic for multi-phase output power configuration
`reboot`: Subscribe-only topic for device reboot triggers

3. EMS Mode Configuration (Published by Device)

Note: Published immediately after device connection to declare power control rules. This topic is only available for master units and standalone units.

Topic: `homeassistant/select/<dev_id>/ems_mode/config`

Payload:

```
{
  "command_topic": "homeassistant/select/<dev_id>/ems_mode/command",
  "options": ["general", "mqtt_ctrl", "tou_plan"],
  "unique_id": "<dev_id>_ems_mode",
  "device": {
    "identifiers": ["<id>"],
    "name": "<dev_id>",
    "manufacturer": "Hoymiles",
    "model": "MS-A2"
  }
}
```

QoS: `1`

Retain: `true`

Note:
`options`: Defines available EMS operating modes:
`general`: Default mode. The device manages energy via its native internal logic.
`mqtt_ctrl`: Enables MQTT-based power regulation. Energy management can be performed via the `homeassistant/number/<dev_id>/power_ctrl/set` topic.
`tou_plan`: Enables TOU schedule-driven operation. TOU schedules can be delivered via `homeassistant/sensor/<dev_id>/tou_day_plan/set` and `homeassistant/sensor/<dev_id>/tou_week_plan/set`.

4. Power Regulation Configuration (Published by Device)

Note: Published immediately after device connection to declare power control rules. This topic is only available for master units and standalone units.

Topic: `homeassistant/number/<dev_id>/power_ctrl/config`

Payload:

```
{
  "name": null,
  "command_topic": "homeassistant/number/<dev_id>/power_ctrl/set",
  "device_class": "power",
  "unit_of_measurement": "W",
  "min": -1000,
  "max": 1000,
  "step": 0.1,
  "unique_id": "<dev_id>_power_ctrl",
  "device": {
    "identifiers": ["<id>"],
    "name": "<dev_id>",
    "manufacturer": "Hoymiles",
    "model": "MS-A2"
  }
}
```

QoS: `1`

Retain: `true`

5. State of Charge Display Configuration (Published by Device)

Note: Published immediately after device connection for battery SOC display setup

Topic: `homeassistant/sensor/<dev_id>/soc/config`

Payload:

```
{
  "name": "soc",
  "state_topic": "homeassistant/sensor/<dev_id>/quick/state",
  "value_template": "{{ value_json.soc }}",
  "device_class": "battery",
  "unit_of_measurement": "%",
  "unique_id": "<dev_id>_soc",
  "device": {
    "identifiers": ["<id>"],
    "name": "<dev_id>",
    "manufacturer": "Hoymiles",
    "model": "MS-A2"
  }
}
```

QoS: `1`

Retain: `true`

6. Battery Charge/Discharge Power Display Configuration (Published by Device)

Note: Published immediately after device connection for battery power display setup

Topic: `homeassistant/sensor/<dev_id>/bat_p/config`

Payload:

```
{
  "name": "bat_power",
  "state_topic": "homeassistant/sensor/<dev_id>/quick/state",
  "value_template": "{{ value_json.bat_p }}",
  "device_class": "power",
  "unit_of_measurement": "W",
  "unique_id": "<dev_id>_bat_p",
  "device": {
    "identifiers": ["<id>"],
    "name": "<dev_id>",
    "manufacturer": "Hoymiles",
    "model": "MS-A2"
  }
}
```

QoS: `1`

Retain: `true`

7. Output Power Configuration (Published by Device)

Note: Published immediately after device connection to declare output power limits. This topic is only available for master units and standalone units.

Topic: `homeassistant/number/<dev_id>/output_power/config`

Payload:

```
{
  "name": null,
  "command_topic": "homeassistant/number/<dev_id>/output_power/set",
  "device_class": "power",
  "unit_of_measurement": "W",
  "min": 100,
  "max": 2000,
  "step": 1,
  "unique_id": "<dev_id>_output_power",
  "device": {
    "identifiers": ["<id>"],
    "name": "<dev_id>",
    "manufacturer": "Hoymiles",
    "model": "MS-A2"
  }
}
```

QoS: `1`

Retain: `true`

8. Multi-Phase Output Power Configuration (Published by Device)

Note: Published immediately after device connection to declare multi-phase output power rules. This topic is only available for multi-phase master units.

Topic: `homeassistant/number/<dev_id>/phase_output_power/config`

Payload:

```
{
  "name": null,
  "command_topic": "homeassistant/number/<dev_id>/phase_output_power/set",
  "device_class": "power",
  "unit_of_measurement": "W",
  "min": 100,
  "max": 2000,
  "step": 1,
  "unique_id": "<dev_id>_phase_output_power",
  "device": {
    "identifiers": ["<id>"],
    "name": "<dev_id>",
    "manufacturer": "Hoymiles",
    "model": "MS-A2"
  }
}
```

QoS: `1`

Retain: `true`

9. Reboot Trigger Configuration (Published by Device)

Note: Published immediately after device connection to declare reboot trigger rules

Topic: `homeassistant/button/<dev_id>/reboot/config`

Payload:

```
{
  "name": null,
  "command_topic": "homeassistant/button/<dev_id>/reboot/trigger",
  "payload_press": "RESTART",
  "unique_id": "<dev_id>_reboot",
  "device": {
    "identifiers": ["<id>"],
    "name": "<dev_id>",
    "manufacturer": "Hoymiles",
    "model": "MS-A2"
  }
}
```

QoS: `1`

Retain: `true`

10. Power On/Off Control (Subscribed by Device)

Note: Device subscribes and responds

Topic: `homeassistant/switch/<dev_id>/set`

Payload: `ON`

QoS: `1`

Retain: `false`

Note:
Valid payload values: `ON`, `OFF`.

11. Reboot Command (Subscribed by Device)

Note: Device subscribes and executes reboot requests

Topic: `homeassistant/button/<dev_id>/reboot/trigger`

Payload: `RESTART`

QoS: `1`

Retain: `false`

12. EMS Mode Command (Subscribed by Device)

Note: Device subscribes and applies EMS mode changes. This topic is only available for master units and standalone units.

Topic: `homeassistant/select/<dev_id>/ems_mode/command`

Payload: `mqtt_ctrl`

QoS: `1`

Retain: `false`

Note:
Valid payload options are defined under the `options` field in the `homeassistant/select/<dev_id>/ems_mode/config` topic.

13. Power Regulation Command (Subscribed by Device)

Note: Device subscribes and applies power regulation values. This topic is only available for master units and standalone units.

Topic: `homeassistant/number/<dev_id>/power_ctrl/set`

Payload: `80.0`

QoS: `1`

Retain: `false`

Note:
This function only takes effect after setting EMS mode to `mqtt_ctrl` via `homeassistant/select/<dev_id>/ems_mode/command`.
Valid value range is defined by the `min` and `max` fields in `homeassistant/number/<dev_id>/power_ctrl/config`.
Messages must be published periodically at intervals no shorter than 1 minute; otherwise the device will automatically revert to self-consumption mode.

14. Output Power Setting Command (Subscribed by Device)

Note: Device subscribes and applies output power limits. This topic is only available for master units and standalone units.

Topic: `homeassistant/number/<dev_id>/output_power/set`

Payload: `800`

QoS: `1`

Retain: `false`

Note:
Valid value range is defined by the `min` and `max` fields in `homeassistant/number/<dev_id>/output_power/config`.

15. Multi-Phase Output Power Command (Subscribed by Device)

Note: Device subscribes and applies per-phase power limits. This topic is only available for multi-phase master units.

Topic: `homeassistant/number/<dev_id>/phase_output_power/set`

Payload:

```
{
  "phase_a": 800,
  "phase_b": 800,
  "phase_c": 800
}
```

QoS: `1`

Retain: `false`

Note:
Valid value range for `phase_a`, `phase_b`, `phase_c` is defined by the `min` and `max` fields in `homeassistant/number/<dev_id>/phase_output_power/config`.

16. TOU Daily Schedule Configuration (Subscribed by Device)

Note: Device subscribes and stores daily TOU schedules. This topic is only available for master units and standalone units.

Topic: `homeassistant/sensor/<dev_id>/tou_day_plan/set`

Payload:

```
{
  "day_idx": 1,
  "day_plan": [
    {
      "mode": 1,
      "ts": 0,
      "te": 5,
      "sh": 55,
      "sl": 10,
      "pc": 1000,
      "pd": 1000
    },
    {
      "mode": 4,
      "ts": 5,
      "te": 96,
      "sh": 55,
      "sl": 10,
      "pc": 1000,
      "pd": 1000
    }
  ]
}
```

QoS: `1`

Retain: `false`

Note:

This function only takes effect after setting EMS mode to `tou_plan` via `homeassistant/select/<dev_id>/ems_mode/command`.

Only one daily schedule can be sent per message; wait for the device to respond via `homeassistant/sensor/<dev_id>/tou_day_plan/ack` before sending the next schedule.

Daily schedules are distinguished by `day_idx`. TOU operation will not activate if only daily schedules are sent without a matching weekly schedule.

`day_idx`: Index of the daily schedule. Max 8 unique schedules (valid range: [1, 8])

`day_plan`: Detailed time-of-use rules; maximum 12 time intervals per day.

`mode`: Operating mode for the interval

- `1`: Force charge — ignores `sl` and `pd`
- `2`: PV-only charge — ignores `sl`, `pc`, `pd`
- `4`: Discharge — ignores `sh` and `pc`

`ts`: Start time of interval (unit: 15 minutes; range [0, 96]). Example: `0` = 00:00, `5` = 01:15, `96` = 24:00

`te`: End time of interval (unit: 15 minutes; range [0, 96])

`sh`: Upper SOC charging limit (unit: 1%; range [10, 100])

`sl`: Lower SOC discharge limit (unit: 1%; range [10, 100])

`pc`: Maximum charging power limit (unit: 1W; range [100, number of system units × unit capability])

`pd`: Maximum discharging power limit (unit: 1W; range [100, number of system units × unit capability])

17. TOU Daily Schedule Acknowledgment (Published by Device)

Topic: `homeassistant/sensor/<dev_id>/tou_day_plan/ack`

Payload:

```
{
  "status": 0,
  "err_msg": "success"
}
```

QoS: `1`

Retain: `false`

Note:

`status`: Result code for `homeassistant/sensor/<dev_id>/tou_day_plan/set`

- `0`: Configuration successful
- `1`: General configuration error
- `2`: More than 12 intervals defined
- `3`: Overlapping time intervals
- `4`: Invalid `mode` value
- `5`: Out-of-range `ts` / `te`
- `6`: Out-of-range `sh` / `sl`
- `7`: Out-of-range `pc` / `pd`
- `8`: Out-of-range `day_idx`
- `9`: Start time `ts` greater than end time `te`
- `10`: TOU mode not enabled

`err_msg`: Human-readable error description

18. TOU Weekly Schedule Configuration (Subscribed by Device)

Note: Device subscribes and maps daily schedules to weekdays. This topic is only available for master units and standalone units.

Topic: `homeassistant/sensor/<dev_id>/tou_week_plan/set`

Payload:

```
{
  "week_plan": [
    {
      "week": ["Mon", "Tue", "Wed"],
      "day_idx": 1
    },
    {
      "week": ["Thu", "Fri", "Sat", "Sun"],
      "day_idx": 2
    }
  ]
}
```

QoS: `1`

Retain: `false`

Note:
This function only takes effect after setting EMS mode to `tou_plan` via `homeassistant/select/<dev_id>/ems_mode/command`.
Time intervals undefined in daily schedules and days without assigned schedules run under default self-consumption logic. TOU scheduling activates only after a valid weekly schedule is uploaded.
`week`: List of weekdays mapped to the daily schedule (`Mon`=Monday, `Tue`=Tuesday, `Wed`=Wednesday, `Thu`=Thursday, `Fri`=Friday, `Sat`=Saturday, `Sun`=Sunday)
`day_idx`: Matching daily schedule index; corresponding daily schedule must be uploaded first with identical index via `homeassistant/sensor/<dev_id>/tou_day_plan/set`

19. TOU Weekly Schedule Acknowledgment (Published by Device)

Topic: `homeassistant/sensor/<dev_id>/tou_week_plan/ack`

Payload:

```
{
  "status": 0,
  "err_msg": "success"
}
```

QoS: `1`

Retain: `false`

Note:
`status`: Result code for `homeassistant/sensor/<dev_id>/tou_week_plan/set`
`0`: Configuration successful
`1`: General configuration error
`2`: Invalid weekday identifier in `week` array
`3`: Duplicate weekday assignment across rules

`4`: Out-of-range `day_idx`
`5`: Specified `day_idx` does not exist
`6`: TOU mode not enabled
`err_msg`: Human-readable error description

20. TOU Schedule Query Request (Subscribed by Device)

Note: Device subscribes and returns matching daily schedule. This topic is only available for master units and standalone units.

Topic: `homeassistant/sensor/<dev_id>/tou_plan/get`

Payload:

```
{
  "week": "Mon"
}
```

QoS: `1`

Retain: `false`

Note:
This function only takes effect after setting EMS mode to `tou_plan` via `homeassistant/select/<dev_id>/ems_mode/command`.
Only one weekday can be queried per request; wait for the device response on `homeassistant/sensor/<dev_id>/tou_plan/status` before sending another query.
`week`: Target weekday for schedule lookup (`Mon`=Monday, `Tue`=Tuesday, `Wed`=Wednesday, `Thu`=Thursday, `Fri`=Friday, `Sat`=Saturday, `Sun`=Sunday)

21. TOU Schedule Query Response (Published by Device)

Topic: `homeassistant/sensor/<dev_id>/tou_plan/status`

Payload:

```
{
  "week": "Mon",
  "day_idx": 1,
  "day_plan": [
    {
      "mode": 1,
      "ts": 0,
      "te": 5,
      "sh": 55,
      "sl": 10,
      "pc": 1000,
      "pd": 1000
    },
    {
      "mode": 4,
      "ts": 5,
      "te": 96,
      "sh": 55,
      "sl": 10,
      "pc": 1000,
      "pd": 1000
    }
  ],
  "status": 0,
  "err_msg": "success"
}
```


QoS: `1`

Retain: `false`

Note:

`week`: Weekday specified in the original `homeassistant/sensor/<dev_id>/tou_plan/get` request

`day_idx`: Index of daily schedule assigned to this weekday

`day_plan`: Full schedule rules for the queried day; parameters identical to `homeassistant/sensor/<dev_id>/tou_day_plan/set`

`status`: Query result code

- `0`: Query successful
- `1`: General error
- `2`: Invalid weekday identifier

If `status` ≠ `0`, the `week`, `day_idx`, and `day_plan` fields will be omitted from the payload.

22. Second-Granularity Real-Time Data (Published by Device)

Note: Published every 1 second; contains device-level and aggregated system metrics

Topic: `homeassistant/sensor/<dev_id>/quick/state`

Payload:

```
{
  "grid_on_p": 0.1,
  "grid_off_p": 0.1,
  "pv_p": 0.1,
  "bat_sts": "standby",
  "bat_p": 0.1,
  "soc": 0.01,
  "heat": true,
  "sys_pv_p": 0.1,
  "sys_plug_p": 0.1,
  "sys_bat_p": 0.1,
  "sys_grid_p": 0.1,
  "sys_load_p": 0.1,
  "sys_sp_p": 0.1,
  "sys_soc": 0.01,
  "sys_heat": true,
  "sys_pv2_p": 0.1,
  "sys_eps_p": 0.1
}
```


QoS: `0`

Retain: `false`

Note:

`grid_on_p`: Grid-tie port active power (resolution: 0.1W)

`grid_off_p`: Off-grid EPS port active power (resolution: 0.1W)

`pv_p`: Total PV input power of unit (resolution: 0.1W)

`bat_sts`: Battery operating state (`standby`=idle, `charge`=charging, `discharge`=discharging, `lock`=fault locked)

`bat_p`: Total battery power of unit (resolution: 0.1W)

`soc`: Unit battery state of charge (resolution: 0.01%)

`heat`: Battery heating status (`true`=heating active, `false`=heating inactive)

`sys_pv_p`: Off-grid microinverter PV power (resolution: 0.1W)

`sys_plug_p`: AC outlet power (resolution: 0.1W)

`sys_bat_p`: Aggregated system battery power (resolution: 0.1W)

`sys_grid_p`: Aggregated grid import/export power (resolution: 0.1W)

`sys_load_p`: Total system load consumption (resolution: 0.1W)

`sys_sp_p`: Smart socket total power (resolution: 0.1W)

`sys_soc`: Aggregated system battery SOC (resolution: 0.01%)

`sys_heat`: Global system heating status (`true`=heating active, `false`=heating inactive)

`sys_pv2_p`: Grid-tied microinverter PV power (resolution: 0.1W)

`sys_eps_p`: Total off-grid EPS output power (resolution: 0.1W)

23. Device Detailed Real-Time Data (Published by Device)

Note: Published every 5 minutes

Topic: `homeassistant/sensor/<dev_id>/device/state`

Payload:

```
{
  "grid": [
    {
      "type": "grid_on",
      "v": 0.1,
      "i": 0.01,
      "f": 0.01,
      "p": 0.1,
      "q": 0.1,
      "ein": 1,
      "eout": 1,
      "etin": 1,
      "etout": 1
    },
    {
      "type": "grid_off",
      "v": 0.1,
      "i": 0.01,
      "f": 0.01,
      "p": 0.1,
      "q": 0.1,
      "ein": 1,
      "eout": 1,
      "etin": 1,
      "etout": 1
    },
    {
      "type": "inv",
      "v": 0.1,
      "i": 0.01,
      "p": 0.1,
      "q": 0.1,
      "ein": 1,
      "eout": 1,
      "etin": 1,
      "etout": 1
    }
  ],
  "bat_sts": "standby",
  "bat_v": 0.01,
  "bat_i": 0.01,
  "bat_p": 0.1,
  "bat_temp": 0.1,
  "soc": 0.01,
  "rssi": -10,
  "pv_num": 4,
  "pvs": [
    {
      "id": 1,
      "p": 0.1
    },
    {
```

```
      "id": 2,
      "p": 0.1
    },
    {
      "id": 3,
      "p": 0.1
    },
    {
      "id": 4,
      "p": 0.1
    }
  ],
  "pack_num": 4,
  "packs": [
    {
      "id": 1,
      "soc": 0.01,
      "temp": 0.1,
      "heat": true
    },
    {
      "id": 2,
      "soc": 0.01,
      "temp": 0.1,
      "heat": true
    },
    {
      "id": 3,
      "soc": 0.01,
      "temp": 0.1,
      "heat": true
    },
    {
      "id": 4,
      "soc": 0.01,
      "temp": 0.1,
      "heat": true
    }
  ]
}
```


QoS: `1`

Retain: `false`

Note:

`type`: Port classification (`grid_on`=grid-tie, `grid_off`=off-grid EPS, `inv`=inverter internal bus)

`v`: Port voltage (resolution: 0.1V)

`i`: Port current (resolution: 0.01A)

`f`: AC frequency (resolution: 0.01Hz)

`p`: Port active power (resolution: 0.1W)

`q`: Port reactive power (resolution: 0.1VAR)
`ein`: Daily cumulative input energy (resolution: 1Wh)
`eout`: Daily cumulative output energy (resolution: 1Wh)
`etin`: Lifetime total input energy (resolution: 1Wh)
`etout`: Lifetime total output energy (resolution: 1Wh)
`bat_sts`: Unit battery state (`standby`=idle, `charge`=charging, `discharge`=discharging, `lock`=fault locked)
`bat_v`: Total battery pack voltage (resolution: 0.01V)
`bat_i`: Total battery pack current (resolution: 0.01A)
`bat_p`: Total battery pack power (resolution: 0.1W)
`bat_temp`: Battery pack temperature (resolution: 0.1°C)
`soc`: Unit overall SOC (resolution: 0.01%)
`rssi`: Wireless signal strength (resolution: 1dBm)
`pv_num`: Number of connected PV microinverters (max 4)
`pack_num`: Number of battery packs (variable, maximum 4)
`packs[].heat`: Battery pack heating status (`true`=heating active, `false`=heating inactive)

24. Aggregated System Real-Time Data (Published by Device)

Note: Published every 5 minutes. This topic is only available for master units and standalone units.

Topic: `homeassistant/sensor/<dev_id>/system/state`

Payload:

```
{
  "pv_p": 0.1,
  "pv2_p": 0.1,
  "plug_p": 0.1,
  "bat_p": 0.1,
  "grid_p": 0.1,
  "load_p": 0.1,
  "sp_p": 0.1,
  "eps_p": 0.1,
  "soc": 0.01,
  "pv_e": 1,
  "pv2_e": 1,
  "dchg_e": 1,
  "chg_e": 1,
  "plug_out_e": 1,
  "plug_in_e": 1,
  "eps_out_e": 1,
  "eps_in_e": 1,
  "ems_mode": "general"
}
```

QoS: `1`

Retain: `false`

Note:

`pv_p`: Off-grid microinverter total PV power (resolution: 0.1W)

`pv2_p`: Grid-tied microinverter total PV power (resolution: 0.1W)

`plug_p`: System AC outlet aggregate power (resolution: 0.1W)

`bat_p`: Aggregated system battery charge/discharge power (resolution: 0.1W)

`grid_p`: Aggregated grid import/export power (resolution: 0.1W)

`load_p`: Total system AC load power (resolution: 0.1W)

`sp_p`: All smart sockets combined power (resolution: 0.1W)

`eps_p`: Total off-grid EPS output power (resolution: 0.1W)

`soc`: Global system aggregated SOC (resolution: 0.01%)

`pv_e`: Daily energy generated by off-grid microinverters (resolution: 1Wh)

`pv2_e`: Daily energy generated by grid-tied microinverters (resolution: 1Wh)

`dchg_e`: Daily total battery discharge energy (resolution: 1Wh)

`chg_e`: Daily total battery charge energy (resolution: 1Wh)

`plug_out_e`: Daily total outlet export energy to grid (resolution: 1Wh)

`plug_in_e`: Daily total outlet import energy from grid (resolution: 1Wh)

`eps_out_e`: System off-grid port output energy (resolution: 1Wh)

`eps_in_e`: System off-grid port input energy (resolution: 1Wh)

`ems_mode`: Active energy management mode

- `general`: Native device autonomous power control
- `mqtt_ctrl`: External MQTT command power regulation
- `tou_plan`: Time-of-use schedule automatic operation