Circuit Monitoring Systems (CMS)
User Manual CMS-770 System

Date: 01.01.2015
Safety instructions

Warning
Non-compliance with these instructions can lead to fatal injuries or material damage. The device may only be installed by a qualified person. If it is apparent that the components or devices are not in proper condition, these must be replaced. Only use original components and accessories. The device must not come into contact with liquids.

Cleaning
Use a dry cloth.

Disposal
Defective devices must be disposed of as special waste at the appropriate collection points set up for this purpose. National or regional regulations on the disposal of special waste must be followed.

Meaning of symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚠️</td>
<td>Warning – can result in death or serious personal injury</td>
</tr>
<tr>
<td>🔄</td>
<td>Non-safety related, but useful and important information</td>
</tr>
<tr>
<td>CE</td>
<td>CE conformity mark</td>
</tr>
<tr>
<td>🛠️</td>
<td>Torque</td>
</tr>
<tr>
<td>🌐</td>
<td>Observe the accompanying documents</td>
</tr>
<tr>
<td>☑️</td>
<td>Disposal</td>
</tr>
</tbody>
</table>

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**Intended use**

The CMS-770 control unit “ABB Energy Monitor” is a three-phase meter which also enables up to eight individual circuits to be recorded.

The ABB Energy Monitor can be integrated into a network using the following options:
- a) wired into an existing LAN
- b) using WLAN in an existing WLAN

Visualization is done via PC, laptop, tablet, or smartphone (web or app-based display of the current and extrapolated power consumption/statistics and budget planning). Remote access via the internet is also possible.

The device is intended exclusively for sub-metering. This is not a billing-related electric house meter (eHZ) and therefore it may not be used for billing purposes.

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**System overview**

![System overview diagram]

- **CMS-770**: 3-phase measurement
- **LAN/WLAN**: LAN/WLAN (web server) 1 x 8 sensors
- **CMS bus**: 4-wire flat cable
- **Visualization**: PC-Browser
  - Apple/Android Apps
- **Electricity meter of the energy provider**
Scope of supply

Control Unit CMS-770

- CMS-Bus
- SMA-socket for WLAN-Antenna
- RS45-socket for LAN connection
- Terminals L1, L2, L3, N
  - Wire gauge 10 – 25 mm²
  - Voltage 230 VAC (50 Hz)
- Reset button
- LEDs (description p. 29)

Sensor

- Opening for the electrical conductor
- CMS-Bus
- Push button
- LED

LED status
- On: Sensor online and in measurement mode
- Flashing slowly: Sensor is not connected
### Mounting

<table>
<thead>
<tr>
<th>Mounting</th>
<th>pro M compact &amp; SMISSLINE</th>
<th>DIN-Rail</th>
<th>Cable tie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor type</td>
<td>for all ABB MCBs, RCDs, RCBOs with twin terminals</td>
<td>universal use</td>
<td>universal use</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Flat cable CMS-800 (2m)</th>
<th>Flat cable CMS-801 (3m)</th>
<th>Connector set CMS-820</th>
<th>WLAN Antenna CMS-870</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor 18mm CMS-102xx (20A)</td>
<td>CMS-102PS</td>
<td>CMS-102DR</td>
<td>CMS-102CA</td>
<td>35 x connector housing 35 x connector</td>
</tr>
</tbody>
</table>
Installation and wiring

Connecting the Energy Monitor

1. The CMS-770 can be mounted on all 35 mm DIN-rails (DIN50022)
2. The device can be installed for single or three phase use
3. When available, connect the LAN cable of the home network

Mounting on DIN rail

1a

Mounting of pro M compact- and SMISSLINE-sensors

1. Sensors fit to all ABB installation devices with twin terminals.
2. The cable should not exert force on the sensor, otherwise measuring errors are possible.

1

2

3

Unscrew the terminal of the installation device.

Plug in the metal pin of the sensor into rear terminal connection.

Put the cable through the opening of the sensor into the installed device. The cable has to be insulated within the sensor. Then tighten the screw.

Mounting of DIN-rail sensors

1. Sensors can be mounted on all 35 mm DIN-rails (DIN50022)
2. The cable should not exert force on the sensor, otherwise measurement errors are possible.

1

2

Snap the sensor into the DIN-rail.

Put the cable through the opening of the sensor into the installed device. Fix the cable with a cable tie if needed.
Mounting of cable tie sensors

1. The cable should not exert force on the sensor, otherwise measurement errors are possible.

Put the cable through the opening of the sensor into the installed device. Fix the cable with a cable tie.

Cabling the sensors

- Use the connectors only once
- Connect up to 8 sensors to the CMS-Bus interface
- Do not exceed a maximum line length of 2.5 m
- The cable should not exert force on the sensor, otherwise measurement errors are possible
- Observe a min. distance of 5.5 mm to bare components

1. Mark the desired placement of the connector with a pen.
2. Press the flat cable into the cable duct of the connector housing.
3. Insert the connector into the connector housing at the position of the mark.
4. Press the connector and the connector together housing with parallel pliers. Repeat the process at all the other mark.
5. Plug the connectors into the Energy Monitor and the sensors.
6. Plug the connectors into the sensors with the longer side to the left.
Setup

Network connection
The following sections build on each other to show the steps that need to be performed in order to set up the ABB Energy Monitor.

The energy monitor can be used in two operating modes:
mode A: LAN Bridge (factory setting)
mode B: Wi-Fi Bridge
If you have connected a LAN cable, you can start to configure the device using the "CMS-770 Finder" software tool (for an explanation, see the next page).
If you would like to access the device using Wi-Fi (mode B), you must still connect the LAN cable directly to your PC beforehand to activate the Wi-Fi mode B after the device is configured.

LAN connection (mode A)
The ABB Energy Monitor is connected using an RJ45 cable (see device connection/connection diagrams) to the router (network). The device receives an IP address which is automatically assigned via DHCP.

Wi-Fi connection (mode B)
The ABB Energy Monitor in as-delivered condition transmits its own SSID and therefore automatically establishes its own Wi-Fi network. The network is called "ABB Energy Monitor" and the Wi-Fi password is "abb770pw".
Finding the IP address of the respective ABB Energy Monitor
The ABB Energy Monitor is set up using a web interface. To access this interface, the device must be integrated into your network using DHCP. The device's IP address must be identified for this purpose. The software tool "CMS-770 Finder" is used to do this. This tool is either a part of the ABB Energy Monitor app or a stand-alone tool for PC, laptop, or tablet. Alternatively, the IP address can be found using the connected router, which shows the connected devices.

Finding the IP address using the CMS-770 Finder
The "CMS-770 Finder" software tool can be used to find the IP address of the device using the LAN/Wi-Fi connection. This tool can be downloaded from the ABB website: (http://www.abb.com/product/seitp329/33ca4850f6cbbff3c1257a2a0048ae77.aspx?productLanguage=us&country=DE). This software is Java-based and requires Java to be installed in advance. This software can be downloaded from http://www.java.com/de/download/. Use at least version 7 or later, update 45 (build 1.7.0 45-b18). This version has been tested.

Note
The ABB Energy Monitor uses the UDP ports in 1900, 5350, 5351 and 5353. Therefore, with some firewalls, the ports must be opened to allow the software tool to function correctly.

After starting the software tool, all devices with their own IP address are displayed automatically.

Finding the IP address using the "ABB Energy Monitor App"
The "CMS-770 Finder" software tool can be used to find the IP address of the device using the LAN/Wi-Fi connection. This tool is part of the ABB Energy Monitor app. The app can be downloaded from the App Store.

Note
The app is available for Android and iOS (Apple) operating systems.

After starting the app, all devices with their own IP address are displayed automatically.

Finding the IP address from the router
You can read in the manual of the respective manufacturer about how to find the IP address of connected devices. Then enter the IP address in the browser and connect to the device.
Setup wizard

The web interface includes a setup wizard which guides you through the individual steps.

Note
The web interface is designed for use on browser-based devices. These include PCs, laptops, and tablets.

The web interface is optimized for a resolution of 1024 × 768 px (W × H).

The following minimum versions of the current web browsers are supported:

<table>
<thead>
<tr>
<th>Browser</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Internet Explorer</td>
<td>8</td>
</tr>
<tr>
<td>Mozilla Firefox</td>
<td>17</td>
</tr>
<tr>
<td>Google Chrome</td>
<td>21</td>
</tr>
<tr>
<td>Apple Safari</td>
<td>6</td>
</tr>
</tbody>
</table>

In addition, setup is possible using a standard tablet browser.

1. Start screen (Login)

Here you can specify whether a future LOGIN should use a password or not. The password can be freely chosen by the user.

Note
Please note that, if no password has been assigned, everyone in your network has access to your configuration and measurement data. Therefore, we strongly recommend assigning a password with at least 8 characters.
2. Basic setup

Note
It is recommended that you complete points 1–4 and then press "Save settings".

1. Set the date and time.

2. Set the tariff (EUR, CHF).
3. Define your budget and cycle.

4. Teach-in sensors (install sensors: see installation & assembly).
**Procedure for teaching-in the sensors**

1. Press the lower part of the button for the corresponding sensor. The blue LED lights up when detection is successful.

**Note**
- All sensors flash blue when in an untaught-in state
- There may be a time hysteresis of about 2 seconds between pressing the button and detection of the sensor in the setup wizard.
- It is recommended to use a pen for pressing the button.

2. Name the sensor individually (max. 15 characters).

A maximum of 8 sensors can be taught in successively in this way.
3. Then it is possible to group the sensors, e.g. divided into floors or 3-phase consumers (such as a stove or water heater).

![Image of sensor grouping interface]

A group name can be assigned and sensor membership can be defined (see red marks).

4. Finally, ensure that you save your settings.

5. It is also possible to create multiple groups. A sensor can belong to only one group. The selection list is updated accordingly.

6. After the sensors have been taught in, you must press "Save settings"

![Image of sensor settings interface]

7. Basic setup is now complete.
3. Extended settings
More advanced settings can still be made. To do this, press "extended settings".

1. Set the IP address from DHCP to static and define the address range. It is also possible to set the host name.
2. Set the timeserver if the device has internet access.

3. Make the Wi-Fi settings. The device can be used in two operating modes:
   mode A: LAN Bridge
   mode B: Wi-Fi Bridge
About mode A: Further down in the window, the name and password of the Wi-Fi energy monitor access points can be changed.
About mode B: If integration into your own Wi-Fi network is to be carried out, then the correct Wi-Fi network and the corresponding password can be set here. Please press "Save settings" after entering the password.

**Note**

In this mode, the RJ45 port on the ABB Energy Monitor can also be used to integrate other network devices using a LAN cable.

**Safety instructions**

If the ABB Energy Monitor is integrated into a home network as described above, an attacker who is on the same network can force the device to reboot through message flooding. To avoid this, the home network should meet a high Wi-Fi security standard (min. WPA 2). If you would like to access your configuration and measurement data on the web server, it is recommended that you do this using a cable that is directly connected to the ABB Energy Monitor. Otherwise, consumption and other customer data could be accessible to third parties, as the connection type used (HTTP) is unencrypted.
4. Completing setup
Setup is complete. Press "Finish" to restart the device.

It takes approx. 1–2 minutes for the device to restart. The homepage opens automatically afterwards. The device is now ready for use.
Operating the web interface or app

Home area

Once the setup is complete, the device will start on the homepage.

On the homepage you can see your current consumption or current supply (depending on the installation). In addition, the following menu items can now be called up using the navigation bar:

1. Home
2. Statistics
   - Total
   - Individual circuits
3. Current values
   - Total
   - Individual circuits
4. Your budget
5. Energy stopwatch
   - Current measurement
   - Saved measurement
6. Settings
Proceed in the same way as you did in the setup wizard when setting the tariff, your budget, network, and Wi-Fi settings. In addition, some expert settings, such as backup, firmware update, reset, and data export, are possible.

**Settings -> Data Export**

Export: Manually or automatically  
Format: CSV file or graphic PDF format  
Target: To send it as email or as a "push" to an FTP server. In a manual export, it is also possible to save to your hard drive.
Resolution of the metering information: 15 minutes, 1 hour, 1 day, 1 week

The metering information (circuits) can be selected individually.

Email or FTP server settings must be made during an automatic export. Otherwise, no export can be done.
Settings -> Backup

It is possible to create a backup as well as to import saved data (see red mark).
Settings -> Firmware Update

**FIRMWARE UPDATE**

- **Firmware file**
  - Firmware version currently installed: 1.34
  - Here you can manually update your firmware.

1. Before updating the firmware, please create a backup file of your Box.
   - [Download](#)

2. From a local directory, select the firmware file you want to transfer to the ABB Energy Monitor.
   - Firmware file: [Browse]

3. Start the firmware update by clicking the button below.
   - [Install](#)

---

**Note**

You must first go through point 1 (download backup) before the update file can be selected.

Settings -> Reset

**RESET**

- **Reset**
  - Select this button to reset the device:
    - [Reset](#)

- Select this button to reset the configuration of the device:
  - [Reset configuration](#)

- Click on this button to restore the factory settings.
  - Please note: This erases all consumption and configuration data.
    - [Restore factory settings](#)
Settings -> Device Settings

It is possible to change the language, the date, and the time as well as the LOGIN password.

Settings -> Sensor Settings

Subsequent processing of the sensors is possible (add sensor, change the group, customize the phase or the name). It is also possible to delete sensors. Moreover, a sensor can also be replaced. In this case, the old metering information of the previous sensor is retained.
A measurement correction factor can be entered (in %) in this menu as well.

Note
This correction factor should only be adjusted if deviations in the measurement accuracy have become conspicuous. The background of such a measurement deviation is usually a modified CosPhi under highly inductive or capacitive loads in the system.

**Reset button**

There is a recessed button for restarting the device or for resetting it to a defined as-delivered condition. Pressing the button for longer than 6 seconds resets the device to the factory settings.

Pressing the button for between 3 to less than 6 seconds or longer triggers a hard reset. Caution: Data may be lost in the process!

**LEDs**

For the position of the LEDs, see setting up the device.

### LED sensor – sensor readiness

<table>
<thead>
<tr>
<th>Display</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No sensor connected</td>
</tr>
<tr>
<td>Green on</td>
<td>Sensors online and in the measurement mode</td>
</tr>
<tr>
<td>Green flashing quickly</td>
<td>Transition from measurement to teach-in mode</td>
</tr>
<tr>
<td>Green flashing slowly</td>
<td>Teach-in mode active</td>
</tr>
<tr>
<td>Red on</td>
<td>Sensors are missing or defective</td>
</tr>
<tr>
<td>Red flashing quickly</td>
<td>Tripping of overcurrent protection for sensors</td>
</tr>
</tbody>
</table>

### LED network – network connection

<table>
<thead>
<tr>
<th>Display</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Is not connected</td>
</tr>
<tr>
<td>Green on</td>
<td>LAN is connected</td>
</tr>
<tr>
<td>Green flashing</td>
<td>Network traffic</td>
</tr>
</tbody>
</table>

### LED status – readiness for operation

<table>
<thead>
<tr>
<th>Display</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Device turned off</td>
</tr>
<tr>
<td>Orange</td>
<td>U-booting active (briefly)</td>
</tr>
<tr>
<td>Green flashing slowly</td>
<td>Booting routine</td>
</tr>
<tr>
<td>Green flashing quickly</td>
<td>Firmware update in progress</td>
</tr>
<tr>
<td>Green</td>
<td>Device ready</td>
</tr>
</tbody>
</table>
## Technical specifications

### Sensors 18mm

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>CMS-102xx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range</td>
<td>[A] 20</td>
</tr>
<tr>
<td>Measurement values</td>
<td>TRMS, AC 50/60 Hz, DC</td>
</tr>
<tr>
<td>Crest factor of distorted wave forms</td>
<td>≤ 6</td>
</tr>
<tr>
<td>AC Accuracy</td>
<td>≤ ± 0.5 %</td>
</tr>
<tr>
<td>AC Temperature coefficient</td>
<td>≤ ± 0.036 %</td>
</tr>
<tr>
<td>DC Accuracy (TA = +25 °C)*</td>
<td>≤ ± 1.7 %</td>
</tr>
<tr>
<td>DC Temperature coefficient*</td>
<td>≤ ± 0.084 %</td>
</tr>
<tr>
<td>Resolution</td>
<td>[A] 0.01</td>
</tr>
<tr>
<td>Sampling rate internal</td>
<td>[Hz] 5000</td>
</tr>
<tr>
<td>Settling time (±1 %)</td>
<td>[sec] typ. 0.25</td>
</tr>
<tr>
<td>Cable feed through</td>
<td>[mm] 10</td>
</tr>
<tr>
<td>Insulation voltage</td>
<td>[V] 690 VAC/1500 VDC</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>[°C] –25 ... +70</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>[°C] –40 ... +85</td>
</tr>
<tr>
<td>Standards</td>
<td>DIN EN 61010-1</td>
</tr>
</tbody>
</table>

### Overall dimensions

- **CMS-100PS series** | [mm] 17.4 x 41.0 x 26.5
- **CMS-100DR series** | [mm] 17.4 x 51.5 x 43.2
- **CMS-100CA series** | [mm] 17.4 x 41.0 x 29.0

* of full range

### Control Unit CMS-770

| Operating voltage | [VAC] 230 (± 10 %) |
| Frequency | [Hz] 50 (± 5 %) |
| Power consumption | [VA] voltage path < 0.01 (pro Phase) current path < 2 (pro Phase) |
| Voltage measurement | [VAC] 230/400 |
| Current measurement | [A] 63 |
| Data refresh time | ≤ 0.25 sec for up to 8 sensors |
| LAN | [Mbit/s] 100 |
| WLAN | [Mbit/s] 150 (802.11 n) |
| Cable cross section | [mm²] 1.0 .. 25.0 |
| Mounting | DIN-rail 35 mm DIN50022 |
| Safety class | IP2X |
| Operating temperature | [°C] –25 .. 45 |
| Storage temperature | [°C] –25 .. 70 |
| Dimensions | [mm] 70.0 x 85.0 x 54.8 4 DIN modules |
| Accuracy: | |
| Voltage | ± 1 % |
| Current | ± (1 % + 20 mA) |
| Active power | ± (1 % + 5 W) |
| Apparent power | ± (1 % + 7.5 VA) |
| Reactive power | ± (1 % + 7.5 var) |
| Power factor | ± 0.1 % |
Dimension drawings

Sensor series CMS-10XPS

Sensor series CMS-10XDR

Sensor series CMS-10XCA
Due to possible changes in design and materials, the properties and dimensions contained in this catalogue should only be viewed as binding upon confirmation from ABB.

www.abb.de/stotz-kontakt