

Technische Dokumentation / Operating Instructions

PEPPER (Professional Enhanced Power Performance Email Reporter)



Legal references and imprint

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2. Edition 2008

Editorial date 5/2008

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1.

2. Security advice

The device was produced to the state-of-the-art and to the approved safety-related rules. However, in case of operating errors or misapplication you may run the risk of:

- body and life of the user or a third person
- the device and other material assets of the operator
- efficient work with the device

The operating instructions must be kept permanently at the installation place of the device. Complementary to that, general rules for accident prevention and environmental protection as well as local ones have to be followed.

2.1. Conventional application

PEPPER is a universal system of monitoring for photo-voltaic constructions. Other electrical constructions must not be connected. Follow the technical data and connecting conditions. Information about that is listed in this documentation. If correct, also the following instructions have to be applied:

- terms of the power supply company concerning the network supply
- advice of the solar modulus and inverter manufacturer

PEPPER is exclusively constructed for the use in electric distribution boxes. Please mind during installation and use to install all devices out of range of children.

Any other application is not according to regulations and not appropriate. The manufacturer is not liable for any damage caused here from.

2.2. Installation by an expert

All persons who are involved in the initiation, machine care and maintenance are obliged:

- to be qualified adequately,
- to have knowledge about the handling of electric installations and
- to read and follow this operating instructions completely.

The information about installation in the present operating instructions is exclusively for qualified staff.

Under no circumstances, try to repair devices on our own. Electric shock can be lethal.

There is a risk for:

- body and life of the user or a third person
- the device and other material assets of the operator
- efficient work with the device

- ! Only use the device if all protective equipment is fully functional.
- ! Never expose the device to the effect of weather. It is exclusively constructed for indoor use.
- ! Avoid exposure to heat, magnetic fields, batches, buffets, moisture or temperature jumps.
- ! Do not try to alter the device.
- ! Do not induct foreign substance into the device.
- ! Do not use the device in case of water infiltration.
- ! Under no circumstances, use the device if it is abnormally hot or causes uncommon noises.

3. Scope of delivery



Abb. 1: PEPPER

PEPPER was designed by the SPYCE-Team and is exactly tailored to the requirements of SPYCE. The logger is measuring electric output by electricity meter, hourly. This data are transferred via internet to the SPYCE-Server, daily. There is no risk of data loss in case of blackout as PEPPER owns an intelligent data recording. PEPPER is able to eliminate interferences independently.

3.1. Description of device



Abb. 2: PEPPER accesses

3.1.1. S0 interface

Only pulse exits (Pulsausgänge) of power meters corresponding to S0 Standard (DIN Norm 43864) can be identified and counted by PEPPER.

The plus (+) terminal of the counter has to be connected to the plus (+) access of PEPPER.

The minus (-) terminal of the counter has to be connected to the minus (-) access of PEPPER.

! Due to the installed reverse voltage protection the circuit does not work in case of inverted accesses!

3.1.2. Net access

The access of a 230V AC power source (home net) via screw terminals (Schraubklemme) supplies PEPPER with electricity. The correct access of phase (ph) and the zero-conductor has to be attended!

The data of PEPPER are saved in case of a blackout (see chapter 3).

3.1.3. Internet access

The access to LAN is realized by a RJ45 jack, which accords to a standard network cable jack.

3.1.4. Top hat rail

The PEPPER box corresponds to a standard box of 23 mm width, which can be snapped in place on the DIN top hat rail.

3.2. Display of state

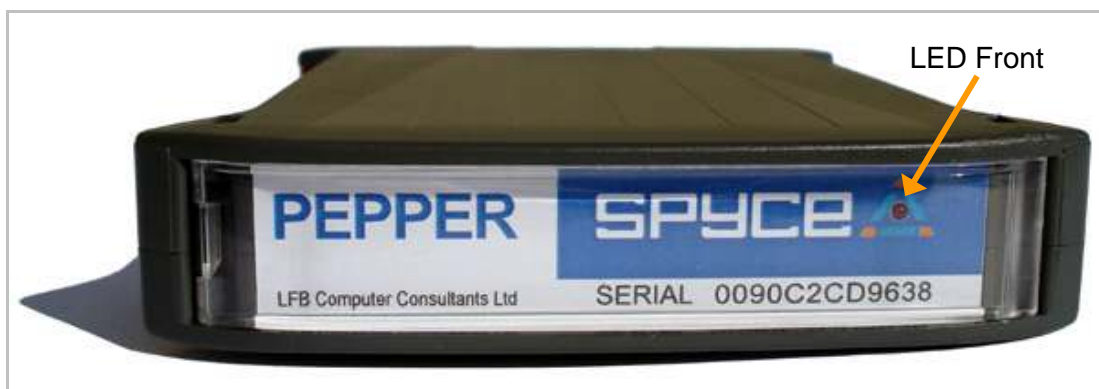


Abb. 3: LED Front

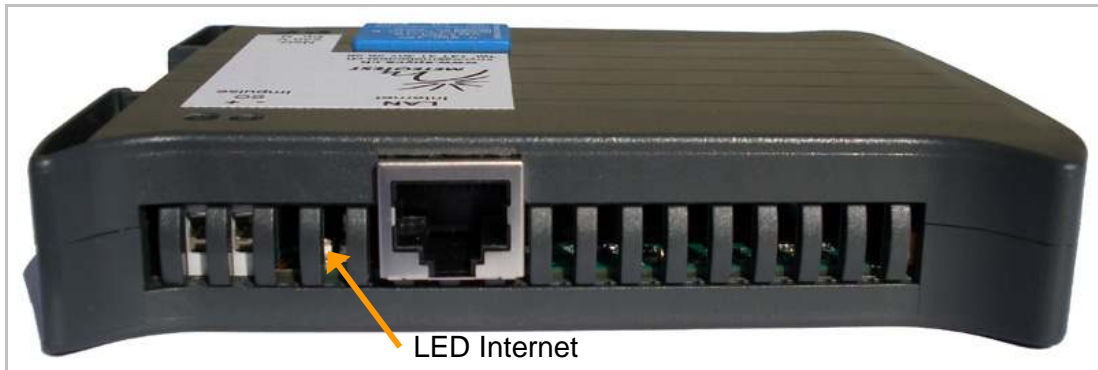


Abb. 4: LED internet

3.2.1. LED control panel-operation

The LED in the control panel shows the operation state of PEPPER (fig. 3).

3.2.2. LED internet

2 LEDs are located on the interior printed board between the S0 access and the RJ45 plug. They signalise the condition of the network connection (fig. 4).

4. Operation

4.1. Setting-up operation

As soon as PEPPER is provided with electricity it starts to work independently. Therefore all other accesses have to be made previously.

1. Access of the LAN connection (internet)
2. Access of the S0 Signal cable to the S0 terminals

! Due to the installed reverse voltage protection the circuit does not work in case of inverted accesses!

3. Access of electric power supply = setting-up operation!

! Please note date of setting-up operation! (see chapter 3.2.1)

The internet LED flashes green respectively orange in case of activity (see chapter Fehler! Verweisquelle konnte nicht gefunden werden.)

4.1.1. Initial tasks

Before PEPPER can switch to normal mode the following processes are activated. They are executed step by step and are mandatory for the ensuing step.

- PEPPER is searching for a DHCP server until it gets assigned an IP address.
- Via a FTP connection PEPPER is taking the actual configuration file of the SPYCE server.
- The time information is taken of a NTP server. Without those it can not allocate any data to a time.

The initial steps are happening automatically and after a few seconds PEPPER can start with the normal operating: the LED front is starting to blink in time with the S0 signal.

4.2. Normal operating

While operating, PEPPER is recording the production data independently and is sending an e-mail to the SPYCE Server, daily. There is a flashing of the front LED in time with the S0 signal which is externally visible.

In a multi tasking procedure PEPPER is executing the following tasks, quasi simultaneous:

1. Control of time for „synchronisation and configuration“
2. Control of time for „data backup at midnight“
3. Control of time for „e-mail forwarding“
4. Connection control to Ethernet

4.2.1. Synchronisation and configuration

Once daily (every 24h), starting from the time of setting-up operation, PEPPER is connecting to the FTP server and is taking the actual configuration file. Afterwards, the time is synchronised with the NTP server.

4.2.2. Data backup at midnight

At midnight PEPPER is saving the data of the last 24 hours to the flash memory and is setting the oldest dataset free to overwrite.

4.2.3. E-mail forwarding

Daily, corresponding to the time in the configuration file, PEPPER is generating an e-mail with the production data and is mailing it to the SPYCE server.

4.2.4. Ethernet

PEPPER is checking the Ethernet connection periodically. In case of a problem PEPPER is trying to rebuild the connection.

4.3. Blackout

During normal operating PEPPER writes down the data of the present day into the RAM memory. In case of a blackout PEPPER is able to transfer this data immediately into the Flash memory before the voltage drops out completely. After the blackout PEPPER is restarting the initial tasks and continues the recording.

5. Error analysis

5.1. Display

To identify different states of the logger an the network connection, flashing iodes (Leuchtioden)(LED) are applied.

5.1.1. State of network (*internet LED*)

2 LEDs are located on the internal print board between the S0 access and the RJ45 plug. They signalise the state of the network connection corresponding to the following table:

LED	Status
-	No connection
green	Link / connection ok
orange	activity

5.1.2. State of logger (*front LED*)

During normal operating of the Logger the red LED is flashing on the front board in time with the S0 impulses. During the starting phase error states are also signalised with the red LED which then, corresponding to the following table, is blinking 0.2 s followed by a break of 2 s. The display is repeated 10 times.

<i>Impulses</i>	<i>Failures</i>	<i>Failures</i>
2	Network Interface is not initialised	fatal
3	Configuration file is not charged, is using old data	alert
4	No time synchronisation by the NTP server. RTC is running free.	alert

5.2. Failure operation

5.2.1. Initial tasks and synchronisation

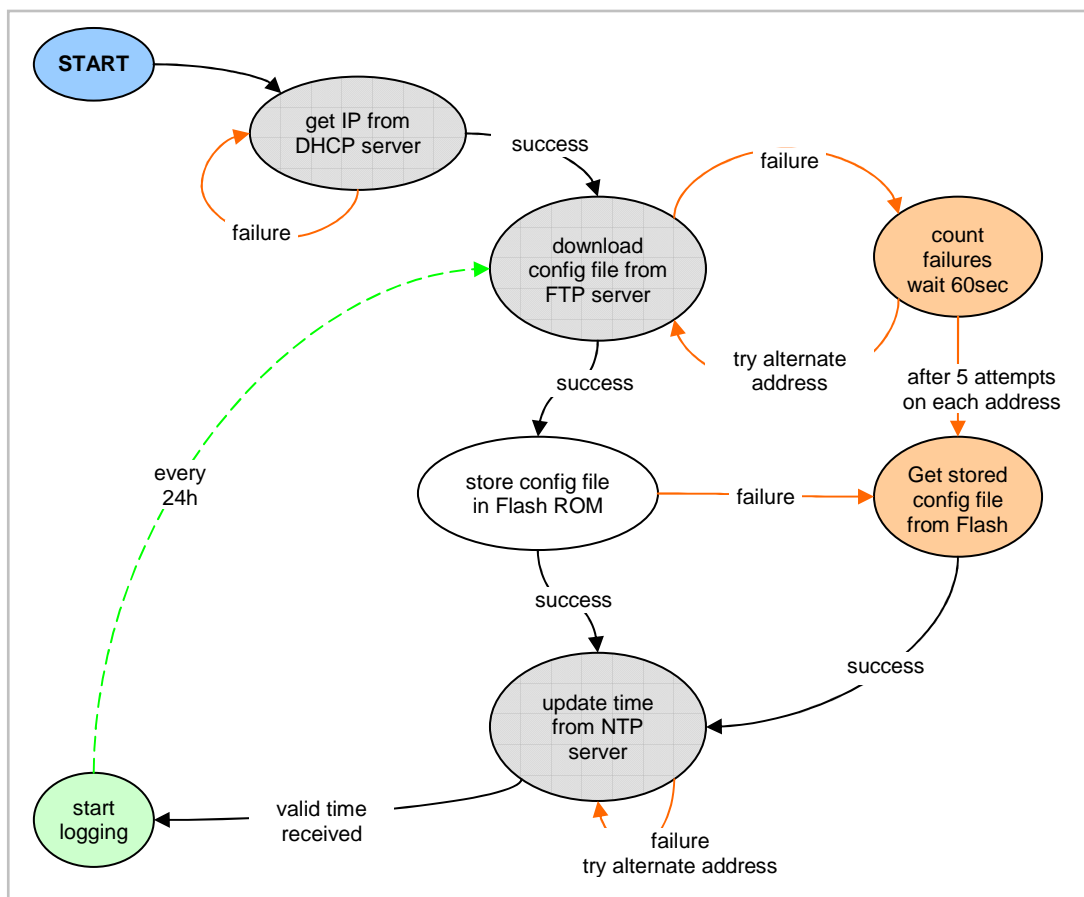


Abb. 5: Failure operating ,initial tasks and synchronisation

5.2.2. Normal operating

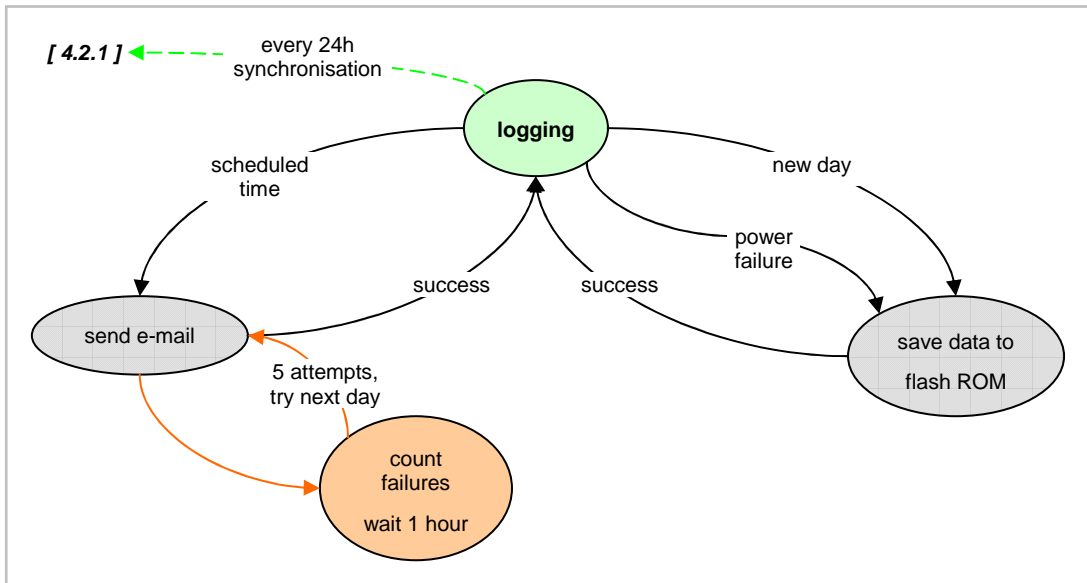


Abb. 6: Failure operating during normal operating

6. Technical data

The used kernel modulus possesses the following properties.

- Flash Memory 256K
- Static RAM 128K
- Clock Frequency 29.4 MHz
- Power Supply 3.15 - 3.45V DC @ 145 mA
- Power Consumption 0.5 W
- Connectivity 10Base-T Ethernet port

6.1. Network technical specification

PEPPER is mailing the data via Ethernet. Normally, it is not necessary to do some security adaptations. In a standard configuration with an ADSL router PEPPER is working in most cases flawless without making configuration modifications.

Persons in charge for the network have to meet the following requirements for a smooth operating of PEPPER:

- DHCP in the local net
- Port 25 (SMTP) from PEPPER to the internet
- Port 21 (FTP) from PEPPER to the internet
- Port 123 (NTP) from PEPPER to the internet

6.1.1. Annotation

In the local net a DHCP Server must be available. A manual IP configuration is not possible. The MAC address is imprinted on the device (fig. 1).

The data forwarding is running via SMTP (**Port 25**). The logger sends daily an e-mail via SMTP server to Meteotest.

PEPPER is checking daily if there exists a new configuration file which is located on a FTP Server. The logger must be able to build a FTP connection (**Port 21**) outwards.

To keep a correct time on the data logger permanently, it is synchronising periodically with a time server (NTP) on the internet (**Port 123**).