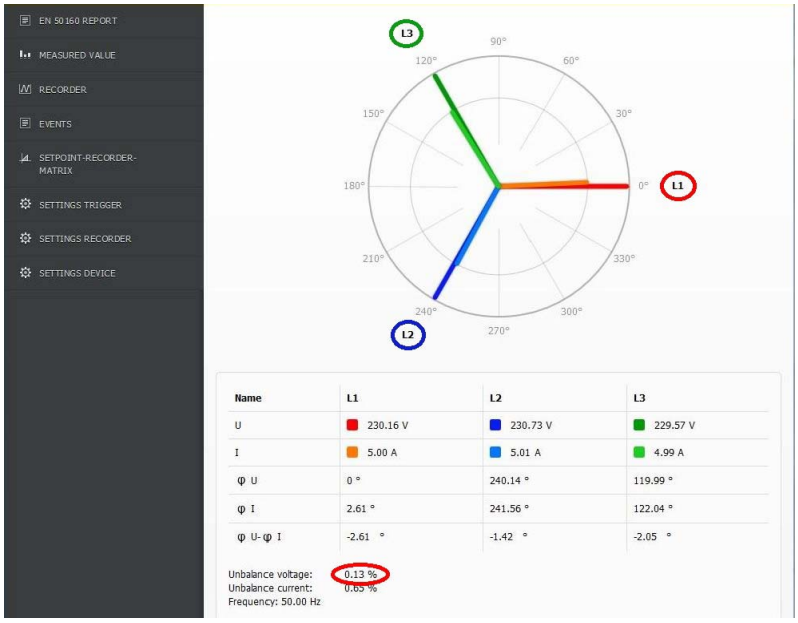
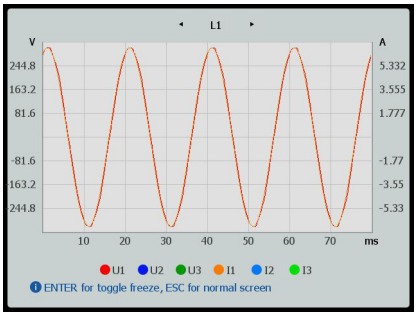
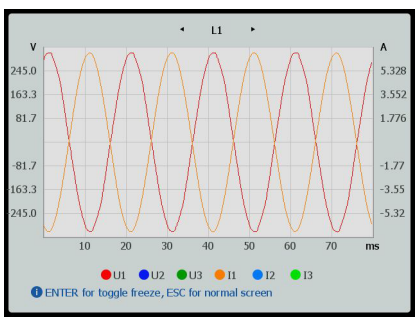
# PEM735 measuring case checklist

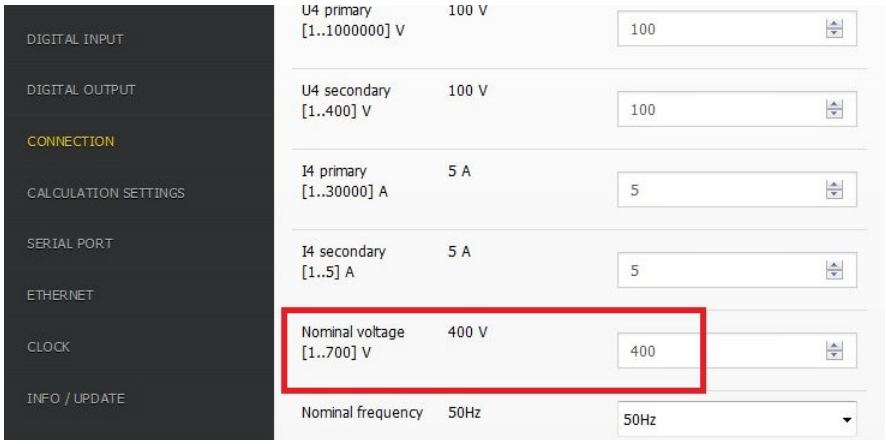
## 1. Preparing the measuring task

### Connecting the case

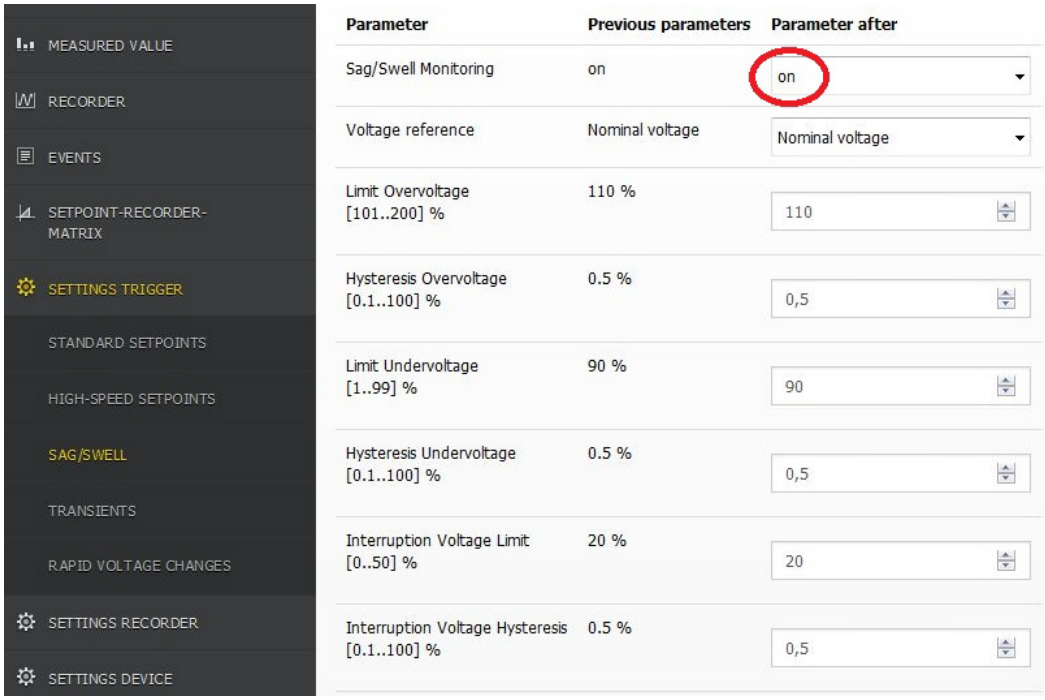
| Task | Done? |
|---|---|
| **The case is switched off**. | ❑ |
| The **jumper wires** for all current sensors are placed correctly | ❑ |
| **Connections that are not in use are short-circuited** | ❑ |
| All current sensors have **first** been connected **to the case** and then to the load | ❑ |
| The measuring ranges of the Rogowski repeaters are set as expected | ❑ |
| Compensation setting checked on repeater. For included Rogowskis: 600 mm | ❑ |
| **Voltage measuring taps** connected according to measuring case manual:<br><br>Connect the measuring voltage cables to the corresponding socket L1…3/N/PE at the side of the case. To connect the secured side of the measuring voltage cable you have the following options:<br>– Crocodile clips (PE always, for other cables optional)<br>– Safety crocodile clips for use with push-wire terminals<br>– Magnetic test probes to enable the screws to make contact with the circuit breaker | ❑ |
| The **digital inputs/outputs** are wired if required | ❑ |
| Switch on the case | ❑ |
| If required: Make network settings for/via WLAN or LAN (router and PEM735 display) | ❑ |

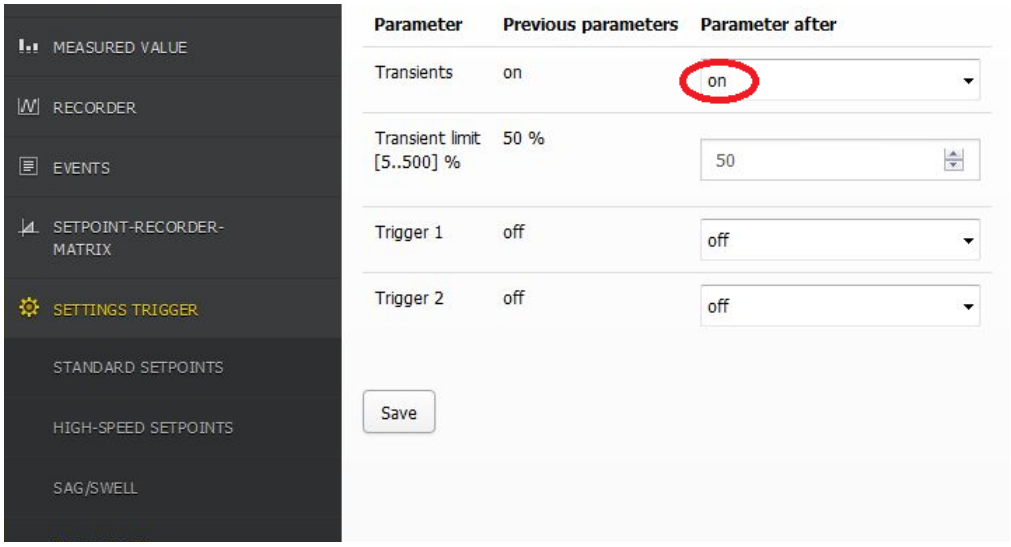
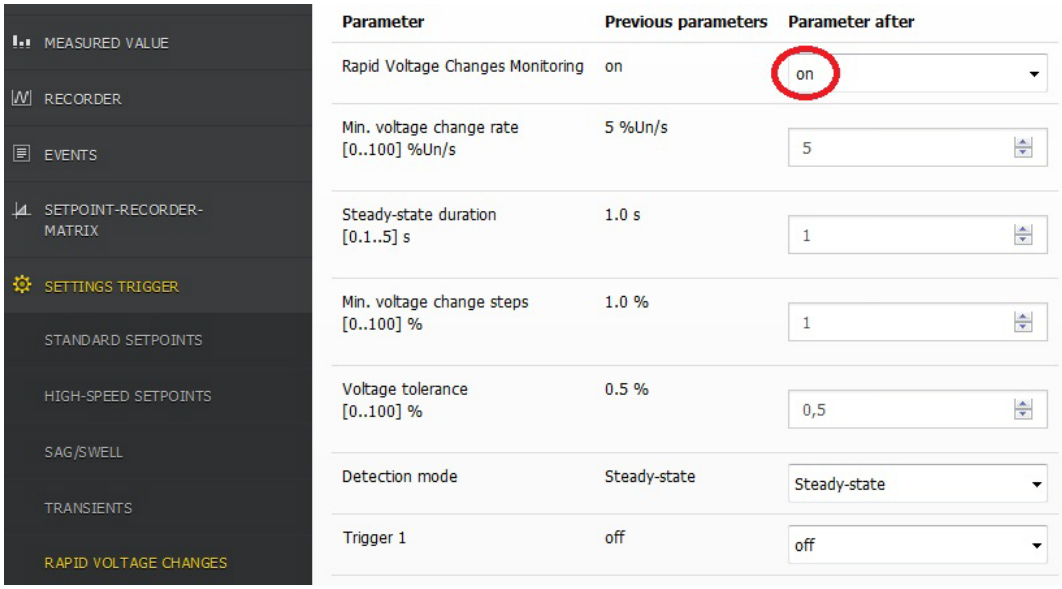
## PEM735 basic settings (web server "Settings device")

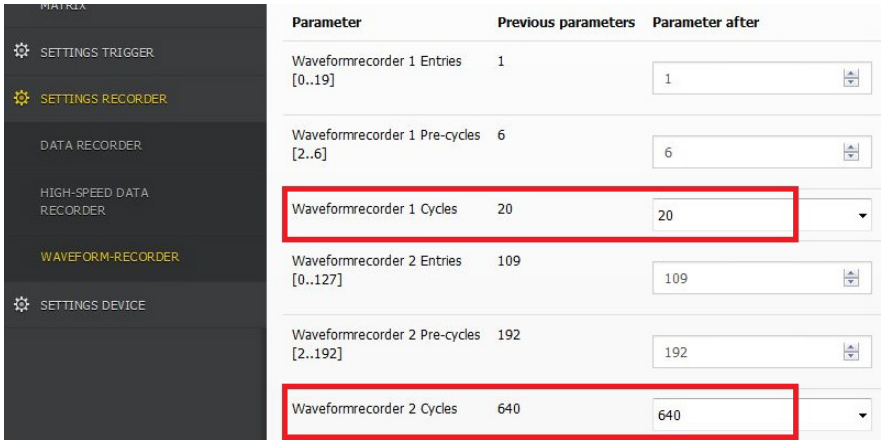
| Task | Done? |
|---|---|
| Star or delta set correctly | ☐ |
| Clockwise rotating field tested by means of voltage unbalance (phasor diagram; an anti-clockwise rotating field has a very high voltage unbalance)<br>  | ☐ |
| PTs and CTs for phases L1, L2 and L3 set correctly according to measuring case manual:<br>Rogowski and C112: secondary 1 A<br>C148: secondary 5 A | ☐ |
| PTs and CTs for U4 and I4 set correctly according to measuring case manual | ☐ |
| Correct **polarity for the current transformers**: Test on display via menu "Waveform".<br>  <br>Example phase L1:<br>Current and voltage are in phase:<br>Energy is absorbed (**energy import**).<br><br>If cos φ is not equal to 1, the figure may deviate slightly (additional slight phase displacement) | ☐ |
|  <br>Example phase L1:<br>Current and voltage are out of phase:<br>Energy is released (**energy export**)<br><br>**PEM735 operates in the load meter arrow system.**<br><br>If cos φ is not equal to 1, the figure may deviate slightly (additional slight phase displacement) | ☐ |

| Task | Done? |
|---|---|
| Plausibility check measuring range of the Rogowski transformers (with current measuring clamp) | ☐ |
| **Nominal system voltage** (as phase-to-phase voltage) set correctly   | ☐ |
| **Nominal frequency** set correctly | ☐ |
| Calculation of **power factor** set according to IEC | ☐ |
| Vectorial calculation of the **apparent power** set | ☐ |
| Calculation of **distortion factor** set as % of the fundamental component | ☐ |
| Calculation of **harmonics** set as subgroup | ☐ |
| Max. **harmonics order** for calculation of THD, TEHD, TOHD = **40** set | ☐ |
| **Flicker mode** set correctly (usually 230 V) | ☐ |
| Frequencies for the **mains signalling transmission voltages** set, in case they are recorded | ☐ |
| **Start day** for the EN 50160 report interval set (usually to the next weekday) | ☐ |
| **Time** and **time zone** set correctly | ☐ |

## Settings for recorders/setpoints

| Task | Done? |
|---|---|
| **SAG/SWELL**: Monitoring of undervoltage/overvoltage set to "On"<br>  <br> | ☐ |
| The **reference voltage** is set to "Nominal voltage" | |
| The response value **overvoltage** is not higher than 110 % | ☐ |
| The response value **undervoltage** is not lower than 90 % | ☐ |
| The trigger is set to a (high-speed )**data recorder** that contains all relevant measuring quantities for sags/swells or failures.<br>This recorder is configured as "Triggered by = digital setpoint“ | ☐ |

| Task | Done? |
|---|---|
| **Transients**: Monitoring of transients set to "On"<br>  | ☐ |
| Both triggers are set to different waveform recorders | ☐ |
| **Rapid voltage changes**: Monitoring set to "On"<br>  | ☐ |
| Trigger is configured as required, e.g. standard or high-speed recorder | ☐ |
| Depending on measuring task: Additional (high-speed) setpoints have been defined independently. | ☐ |

| Task | Done? |
|---|---|
| **Data recorder 1 and 2**<br>– Triggered by timer<br>– Overwriting: No<br>– Data points: 65535<br>– Interval: 15<br>– Delay: 0<br>Parameters: All currents, voltages, power, frequency, power factors (split between both recorders) | ☐ |
| **Data recorder 3**<br>As data recorder 1, but<br>– Interval: 900 (= 15 minutes)<br>Parameters: All requirements parameters, all PST, maybe also energies | ☐ |
| Additional data recorders at your own discretion, depending on what data are to be recorded when triggering the various setpoints | ☐ |
| **Waveform recorder 1** 20 cycles per recording<br>**Waveform recorder 2** 640 cycles per recording<br>  | ☐ |
| Test **setpoint recorder matrix**: Each trigger is assigned to a recorder/relay, configuration errors are not signalled | ☐ |
| All **delete functions** available at "Settings device" have been carried out | ☐ |
| An adequate number of **photos** have been taken during assembly for documentation purposes | ☐ |

_____ _____

**Date** **Signature**

# 2. Follow-up of a measuring task

## Device backup

| Task | Done? |
|---|---|
| All used **standard and high-speed recorders**, including those configured as a timer, are called one after another<br>**These are not included in the setpoint recorder matrix!**<br><br>*Click on "All" on each recorder when it is called the first time.*<br>*Afterwards, save the data locally as a *.csv file by clicking on "Export".* | ❑ |
| All **waveform recorder** recordings are called one after another and saved via a screenshot<br><br>*Buttons <Ctrl> + <Alt> + <Print Screen>, paste clipboard content to a word document or similar.*<br>*(The relevant parts can be zoomed in)* | ❑ |
| Export **SOE log** as a *.csv file at "Events" | ❑ |
| Export **PQ log** as a *.csv file at "Events" | ❑ |
| Indicate all listed **EN 50160 reports** one after another (Print preview) and save them as PDF using a PDF creator or print them out using a printer | ❑ |

## Processing the data recorders

If there is a data recorder timestamp included in Excel, e.g. in cell "A2" as "Unix Time * 1000" (also incl. ms), **the actual date + time** can be calculated in an additional column using the following formula:

"**=A2/86400000+25569+GMT/24**",

Number format = user-defined = "TT.MM.JJJJ hh:mm:ss,000" (high-speed recorder)
"TT.MM.JJJJ hh:mm:ss" (standard recorder).

***The timestamp of the data recorders does not take into account any time zone (GMT)!***
*GMT = 1 (wintertime Germany)*
*GMT = 2 (summer time Germany)*

_____ _____

**Date** **Signature**

## 3. Resetting the case

| Task | Done? |
|---|---|
| Network settings (for router and PEM735, IP address, subnet mask, gateway for each) set to the settings printed on the inside of the case | ❑ |
| For the router:<br>– Encryption off<br>– WLAN on<br>– Router is access point | ❑ |
| All delete functions available at "Settings device" have been carried out | ❑ |
| All setpoints and high-speed setpoints (except SAG/SWELL, transients and rapid voltage changes) are disconnected | ❑ |
| All recorders and high-speed recorders are disconnected (also the ones with timer function, which are not included in the setpoint recorder matrix) | ❑ |

_____ _____

**Date** **Signature**

Alle Rechte vorbehalten.
Nachdruck und Vervielfältigung
nur mit Genehmigung des Herausgebers.
Änderungen vorbehalten!
© Bender GmbH & Co. KG

BENDER
The Power in Electrical Safety©
BENDER Group

All rights reserved.
Reprinting and duplicating
only with permission of the publisher.
Subject to change!
© Bender GmbH & Co. KG

Bender GmbH & Co. KG
Londorfer Str. 65 • 35305 Grünberg • Germany
Postfach 1161 • 35301 Grünberg • Germany

Tel.: +49 6401 807-0
Fax: +49 6401 807-259

E-Mail: info@bender.de
Web: http://www.bender.de