



SCHLEIFENBAUER

LIVING FOR THE POWER TO DELIVER

V2.52 Schleifenbauer PDU

User manual



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LAYOUT OF THIS MANUAL

This manual is split in three sections. You can focus on the section that fulfills your need when installing, operating and/or managing the PDU.

The “How to....” section is meant to guide you directly to a solution for a problem you are faced with. It is not necessary to read the complete manual.

Part I	<u>Installation manual</u>	Prepare PDU for use: <ul style="list-style-type: none">• safety issues• mounting the PDU• cabling the PDU
Part II	<u>User manual</u>	Operator and user part: <ul style="list-style-type: none">• operating/read out via the PDU-display• operating/read out via the web interface• problem solving
Part III	<u>Administrator manual</u>	Admin part: <ul style="list-style-type: none">• configure via the web interface• set up via the web interface• problem solving
Part IV	<u>Problem Solving</u>	In this chapter you can find the frequently asked questions (FAQs)

WHAT'S NEW

- Firmware upgrade via USB port
- Near zero cross switching of outlet relays
- Support for 54 metered and/or switched outlets
- Voltage drop alert is now based on the input line voltage rather than a fixed value for 120 and 230 Volt operation.

INTRODUCTION

POWER DISTRIBUTION MEETS INTELLIGENCE

The Schleifenbauer Intelligent Power Distribution Unit (PDU) is designed to distribute power for many years and without problems. It is equipped with a Schleifenbauer databus which makes it possible to read and manage many PDUs with a single IP address. An ethernet port was added to the individual PDUs so that alongside the advantages of a databus, a whole range of new options has become available.

Schleifenbauer PDUs bring together or merges the interests between IT and infrastructures, making it a real bridge builder.

The PDU may contain:

- metered outlets
- switched outlets
- metered and switched outlets
- passive outlets

Monitoring capabilities will be described in detail within this manual in coming sections.

INTERFACES

In the Admin part of this manual you will find information about the “Interfaces” with which we mean the technology to communicate via your LAN with the Schleifenbauer databus. There are several possibilities:

- (embedded) web interface
- Modbus/TCP
- SNMP (Simple Network Management Protocol)
- (SP)API (Schleifenbauer Products Application Programming Interface)

ACCESSORIES

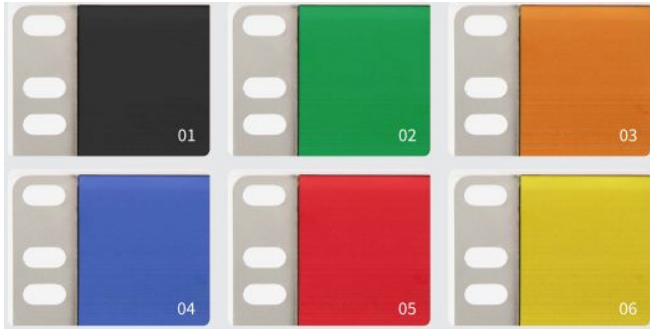
The following accessories can be purchased from Schleifenbauer, additionally. Please check the [Installation Section](#) for more details regarding mounting brackets.

- C14/C20 plugs if C13/C19 outputs are used
- Different types of attachment brackets
 - o 19” rack mounting brackets
 - o Tabletop mounting brackets
 - o Mounting plates for sunken installation
 - o Profile clamps
 - o Toolless Mounts
- Customer Specific solutions related tools

Please check www.schleifenbauer.eu for further details regarding the accessories.

COLORED HOUSING

Standard the housing color of the Schleifenbauer PDUs is black. It is also possible to anodizing the housing in 5 other colors.



- 01. black
- 02. green
- 03. orange
- 04. blue
- 05. red
- 06. Yellow

Not shown but available is “natural”

*Note: **actual colors may vary!***

MEASUREMENTS

Measurements of the input and the outlet level can be found below:

Measurement	Unit	Remark
Energy	(kWh)	total & subtotal
Voltage	(V)	with voltage dip registration
Current	(A)	with peak value registration and drop detection.
Power factor	(%)	
Apparent power	(VA)	
Real power	(W)	
Temperature	(°C)	with optional sensor
Relative humidity	(%)	with optional sensor
NO/NC contact	0-2	devices equipped with a USB-port can operate two NO/NC contacts (see chapter “How to connect a NO/NC contact)

PART I - INSTALLATION OF HARDWARE

Please use the information in this chapter to inspect, install and connect the Schleifenbauer Intelligent PDU and all optional mentioned accessories.



The PDU must be installed in a restricted access location

Socket-outlet must be installed near the equipment

Socket-outlet must be easily accessible

Installation by expert personnel only

After installation: default passwords / RC4 keys **MUST** be changed (see: [Part III - Administrator manual](#))

SAFETY WARNINGS

This manual contains important safety instructions that should be followed during installation and operation of the PDU. Please read this manual carefully since there may be serious or fatal personal injury and damage to the equipment if the safety instructions, warnings and directions are not followed. Please save this document for future use.

EXPERT PERSONNEL

Installation, maintenance and inspection of the Schleifenbauer Intelligent PDU must be carried out by adequately trained persons according to NEN EN 50110-1, with full observance of the specifications of NEN EN 50110-1 and NEN 3140.

TECHNICAL INSTALLATION REQUIREMENTS

Before installing and putting the system into operation, check whether the characteristics of the electrical system to which connection is to be made correspond to the product specifications.

- The Schleifenbauer Intelligent PDU has been designed for connection to electrical systems that comply with IEC 60364 or in the Netherlands, NEN 1010.
- The voltage, maximum permitted current and the number of phases must be correct. This information is displayed on the front side of the PDU.
- The maximum permitted power must be taken into account with regard to the maximum length and the diameter of the connecting lead.
- The values and characteristics of the in-series protective devices must match the PDU and the protective elements included in it.
- The environmental factors must correspond to the product specifications.

VISUAL INSPECTION

After opening the cardboard box and removing the packaging material, the PDU should be checked visually. The PDU should not be put into operation if damage is detected such that safe and proper operation cannot be guaranteed. In such cases, please contact Schleifenbauer Products BV.

Note that, in the case of PDUs that are equipped with an over voltage protection, the overvoltage protection and the respective overcurrent protection (if applicable) must be inspected on a regular basis.

TESTING

Each Schleifenbauer PDU is individually tested according to the NEN 3140 standard. Test reports are available on request.



For measurement of insulation resistance, the measuring voltage used must be lower than or equal to the voltage according to the product specification.

CLEANING

The PDU may only be cleaned by wiping off the outside with a clean dry cloth.

CONTENTS OF THE PACKAGE

The Schleifenbauer Intelligent PDUs are shipped in a cardboard box. Where applicable, dispose the packaging material in a responsible manner, in accordance with local regulations. All of the materials used for packaging can be recycled. Immediately after receipt, check whether you have received all of the goods.

The following items are delivered for each PDU:

- fixing materials: these can be attached to the PDU (19" or table-mounting brackets), or are delivered separately if they have been ordered separately;
- the installation manual (1 per shipment);

Please note that the PDU User Manual can be found online at <http://schleifenbauer.eu>

ADDITIONALLY NEEDED TOOLS

The following tools are needed to install the PDUs:

- cage-nuts with bolts and washers
- suitable screwdriver.

MOUNTING THE PDU IN CABINETS

How to mount a PDU horizontally (19 inch)?

Each 19" rack bracket of a PDU has holes for horizontal mounting in 19" racks. The holes are positioned so that an appropriate fixing hole is always available for a PDU with a profile height of 1.5 U. Using one or two of the 4 holes allows mounting without wasting space.



How to mount a PDU vertically (= 0U)?

In the case of a PDU for vertical mounting, the connection lead is fed through a hole in the upper, bottom or front face. There are 4 options for horizontal mounting:

How to install on a flat surface?...table top mount

Gives the profile possibility to be mounted to a flat surface (tabletop). This arrangement is used for:

- vertical mounting to the bracing beams in the 19" cabinet
- fixing to a mounting plate
- mounting between the 19" uprights: the profile attaches to the front of the uprights

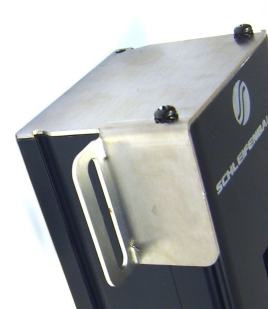
The holes on the brackets are located as far as possible to the outside so that it can also fit and tighten the bolts if a swivel gland has been placed on the short side.



How to prevent hot spots in a cabinet? ...sunken installation

When power leads might block the flow of hot exhaust air, especially in case of a 600mm wide cabinet, it is necessary to create flow space. This can be done by using the "sunken installation brackets". Because of the shape of the bracket, it is possible to 'partially sink' the profile into the cabinet and save space.

These mounting plates can be used for many different cabinets.

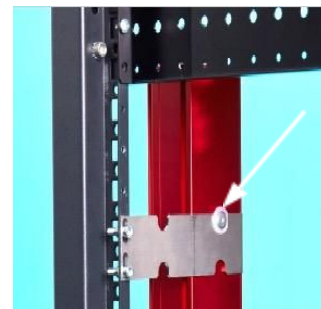


How to mount a PDU without tools?

Toolless mounting is created by making attachment points on the rear of the PDU housing. There is a wide range of cabinet brackets available, all in which you can hang the PDU without using tools.

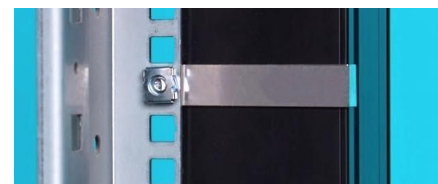
Toolless Mounting can be done as single PDU or double PDUs (see photo).

Mounting brackets can be custom made by Schleifenbauer.



How to achieve maximum mounting flexibility? ...mounting with profile clamps

The clamps, made of spring steel, can be installed in the position of your choice. The clamp fits around the PDU profile and is secured with a fastening screw. Best is to use one clamp for every 50 cm of profile length.



CABLING THE PDU: ETHERNET, DATABUS AND SENSORS

How to connect the PDU to LAN?

10/100 Mbps LAN Ethernet port

Connecting the PDU to a Local Area Network (LAN) provides communication through an Ethernet network, if the PDU is connected exclusively, or simultaneously with the databus.

The RJ45 connector for the network cable must be plugged into the Ethernet port:

- Connect the RJ45 Ethernet cable to the Ethernet port on the PDU and to the Ethernet connector on the LAN device; when connected, the orange LED – marked “lnk” - will blink



How to connect a databus?

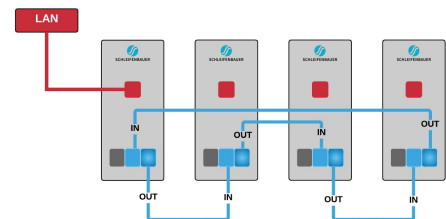
There are three black communication ports. One is marked as sensorport, the other two as databus ports (in and out).

The left databus port is the “incoming” databus port. The right databus port is “outgoing”. This is a MUST HAVE for devices in bridge mode. For devices in hybrid mode it is a NICE TO HAVE.

The serial databus in the Schleifenbauer PDU uses CAT5 patch cables.



The terms IN and OUT are arguable. Data will be send and received by both ports but to close the databus ring, it is recommended to follow the connection diagram. See it as the best way to daisy chain PDUs.



How to connect sensors to a PDU?

The PDU has a RJ12 connector sensor port for connecting a digital temperature sensor, a combined sensor for temperature/humidity or one or multiple dry switch contacts.

Plug and play

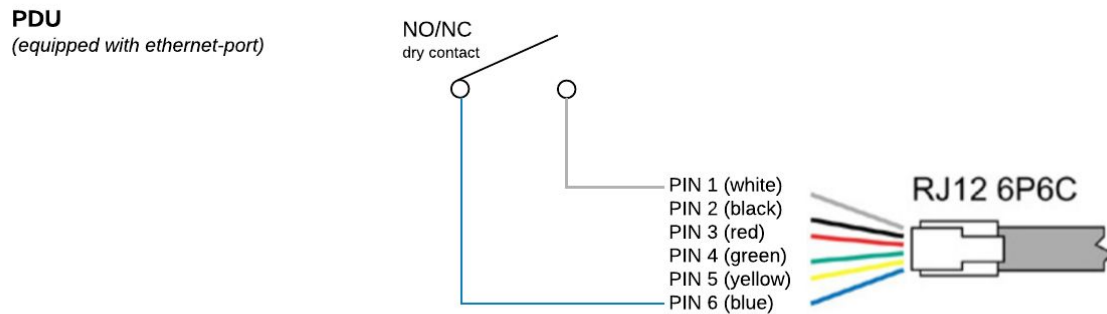
The PDU registers which sensor is connected and automatically adapts the menu in the display to the sensor(s) that it has detected.



Use Schleifenbauer sensors only

How to connect a NO/NC contact on Classic PDU and ethernet PDU?

The sensor port makes use of the RJ12 6P6C standard (= 6 position, 6 conductor). To connect a NO/NC contact on the PDU sensor port, you have to make use of pin 1 and pin 6 ; as shown in the figure below.



Note that on a PDU only 1 NO/NC contact can be connected.

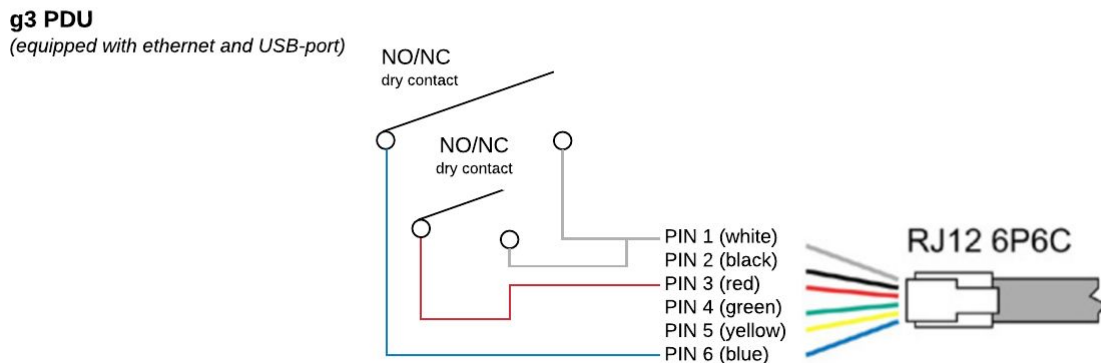


Status of the contact will be displayed. It is not possible to send a command.

Classic PDUs (= without ethernet port) do not support a NO/NC contact

How to connect NO/NC contact on a g3 PDU?

3rd generation PDUs and DPM's are equipped with a USB-port and are able to operate two NO/NC dry switch contacts:



PART II - USER MANUAL

How to maintain a PDU?

Internal maintenance is not an option

A Schleifenbauer Intelligent PDU **may not be opened by unauthorized persons**. In the event of malfunction or faults in the PDU, please refer to the warranty conditions. Schleifenbauer Products BV will not accept warranty claims if the PDU has been opened or alterations have been made.

- ⇒ Please pay attention to the operation conditions before installation and operation of the Schleifenbauer PDU.
- ⇒ The Schleifenbauer PDU has to be protected according to the valid installation guidelines.
The rated value of the in-series protective device may not exceed the maximum value indicated on the product.
- ⇒ The Schleifenbauer PDU may not be used in: a humid environment, a seriously contaminated environment or outdoors.
- ⇒ The manufacturer's warranty on the Schleifenbauer PDU becomes invalid when the QC sticker on the side of the profile is broken.
- ⇒ Before turning on the PDU for the first time, make sure that it has been allowed to acclimatize to the ambient temperature for at least 24 hours. Major temperature fluctuations can lead to the formation of condensation in the PDU if this guideline is not followed.
- ⇒ Please keep in mind that maximum allowed temperature for a metal enclosure is 70 °C for installation in a normal location and 90 °C for installation in a restricted access location.

How to be sure the status of switchable outlets will not change during firmware upgrade or restarting of the controller?

There are no extra safety precautions necessary! Because power distribution and the control over measuring and switching is separated. This means that while updating or restarting the (controller of the) PDUs, power distribution is not interrupted.

LIFE-SUPPORTING POLICY

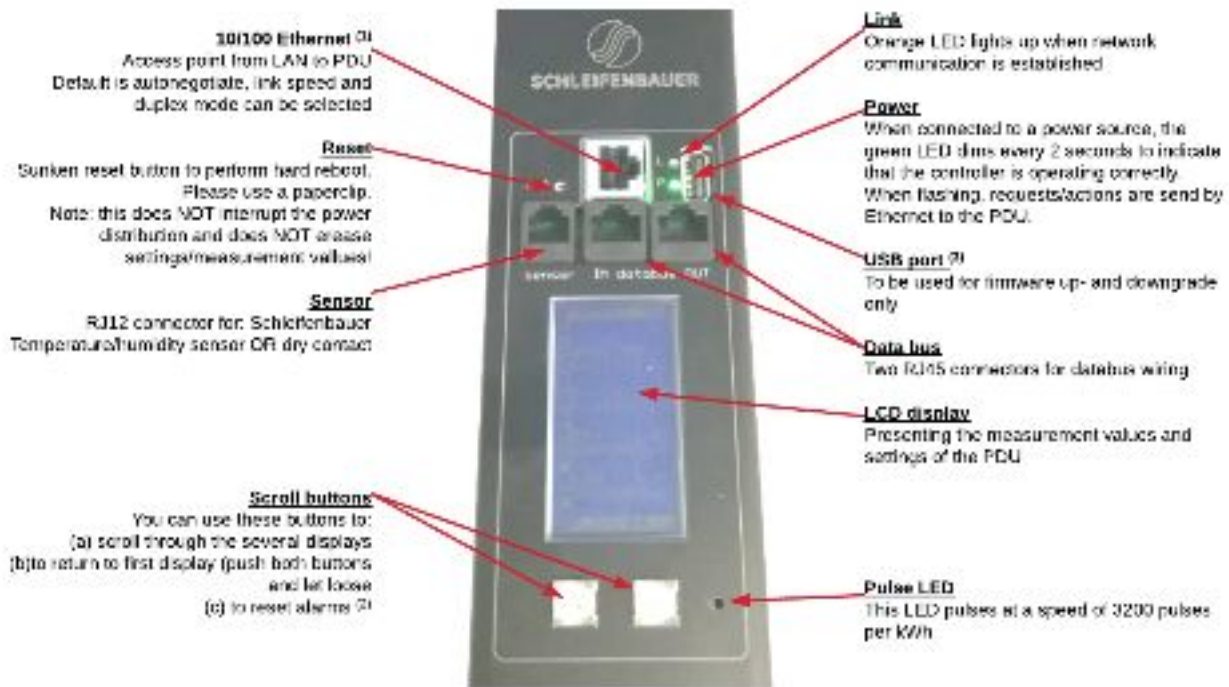
The Schleifenbauer PDU has been designed for use in data centers where equipment has to meet very high demands especially regarding to reliability.

The Intelligent PDU however may not be applied in surroundings where a malfunction in the PDU can have consequences for life support systems.

Life support systems include any devices designated as “critical” by the U.S. FDA. Such systems are found not only in medical environments such as hospitals, but also on offshore platforms, in petrochemical plants, in air traffic control centers, etc.

PART IIA - LOCALLY MONITORING: DEVICE DISPLAY

The intelligent PDU features a display with scroll buttons, LEDs and some ports for connecting accessories. Please keep in mind that PDUs may differ in configuration and may or may not not have a display.



- (1) PDUs **without** an Ethernet port are called Classic PDUs. Firmware for Classic PDUs are in the FW1xxx - range
- (2) This option is called “Local alert reset” and must be activated via the interfaces
- (3) USB-port on g3 (generation 3) only ; to be used for firmware up- and downgrade (from FW2.52 and further)

How to change settings locally via PDU display?

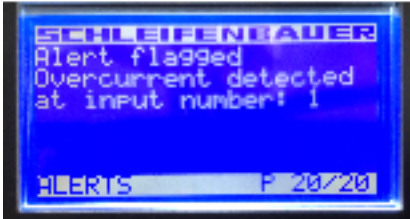
Changing settings locally via the PDU itself is **not** possible! You have to use one of the interfaces.



See the [Administrator part](#) of this manual how to changes the settings

How to stop a blinking display? ... local alert reset

Since FW2.50 alerts are represented on both display and web interface. For example:



The displayed text shows directly what kind of an alert has occurred.

Why do alerts occur?

Alerts are signal flags after an event occurred. For example, if you measure temperature and the environmental conditions exceeded a configured level - threshold - the PDU will generate an alert. This resolves in:

- SNMP trap (optional)
- The screen of the PDU will start blinking.
- The screen of the PDU will jump to the Alert page which provides information on what happened.

After the temperature has come down again, the event is cleared but the alert still exists. The display will blink until you “reset” (=clear) the alert.

The LCD display only flashes when an alert is active.

- Actions:
- press any button to stop blinking for a short period: blinking will stop so you can read the display
 - resetting the alert can be done by pressing both scroll buttons simultaneously; when cleared the display will stop blinking (Note: this possibility must be activated on your device; see Admin part of this manual)



Remember: you can reset the alert but by doing so, you do not resolve the cause of the alert!
If the alert condition is still present the alert will fire again.

How to check the load balance, the temperature / humidity or the status of the NO/NC contact?



In the picture you see 3 phases (L1, 2 and 3). The actual information is given in amperes but also graphically displayed. The higher the load, the more the bar is filled.

The graphical bar is related to the maximum PDU rating (in the picture it is 32A). In this picture, there is nearly no load, only on L3 there is a small 0.1A.

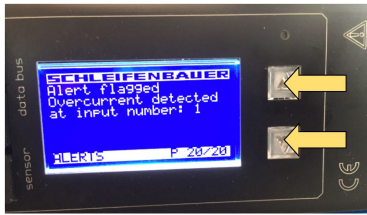
DS = status of NO/NC contact [0 = open; 1 = closed]

Te = temperature [degrees C] *

RH = relative humidity [%] *

*only visible when the corresponding sensor has been connected.

How to get back to the first page?



No alerts (= no blinking display) => shortly press both the scroll buttons (see yellow arrows).

You will see the first screen in the display.

If there are alerts, first clear these by pressing both scroll buttons (see: "[How to stop blinking display? ... local alert reset](#)") then press both the scroll buttons to jump to the first page

How to check an outlet status locally?



Note: every row on the display shows the state of 9 outlets. So the first ends with outlet 9, the second row starts with outlet 10

In the "outlets" display you can see how many outlets the PDU has and what their individual state is.

An overview of the possible states:

- 0 = off
- 1 = on
- s = scheduled to go off
- S = scheduled to go ON
- p = power cycling

How to check input and/or outlet measurements?



Example: input page

Note: "Input x" shows the name of the Input. This information can be configured from the Web Interface, Inputs tab or from the other interfaces.

With the scroll buttons you can scroll through the pages. The total amount of pages varies and depends on the configuration of the PDU. For example: the more outlets the higher the total amount of pages.

In the upper example you see that page 4 of 29 is displayed.

In the lower left corner of the displayed page, you see the subject of the shown information. In this example: input measurements of L2.

So, when you search for outlets, you need to scroll through the pages until you reach the "outlet" sections. See lower example



Example: outlet page

Displayed information can be:

- I = current [A]
- P = power [W]
- U = voltage [V]
- Pf = power factor [%] (= real power ÷ apparent power)
- Et = energy total [kW]
- Es = subtotal energy [kW]

How to read measurements of optional sensors and what options are possible?

Option 1: load page

Sensors are displayed on the "Load" screen whenever there are less than 3 sensors in use. When adding more sensors, one or more pages are added to the LCD screen to show the sensors readout as shown in the images below:



DS = status of NO/NC contact [0 = open; 1 = closed]

Te = temperature [degrees C]

RH = relative humidity [%]

Option 2: sensor pages

The sensor measurements are displayed in the following format:

< channel number > < sensor type > = < value >

The sensor type is indicated by a letter. The letters are abbreviations for the sensor type as follows:



Example: sensor page 1 of 2



Example: sensor page 2 of 2

Analog:

T = temperature [°C]

H = humidity [%]

R = residual current [mA]

See "How to read branch residual current measurements"

A = AC residual current [mA]

D = DC residual current [mA]

B = Branch residual current [mA]

Digital:

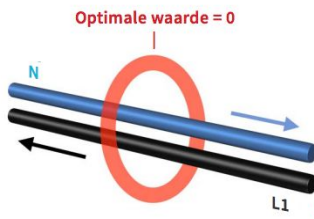
I = dry switch contact

S = error status

Y = activity

For all optional sensors see www.schleifenbauer.eu

How to read Branch Residual Current measurements?



$L1 + L2 + L3 + N > 0 \text{ mA}$ THERE MIGHT BE FAULT IN YOUR SYSTEM !

When the PDU is equipped with a Residual Current Sensor (RCS), measurements of the residual current are shown in the sensors pages.

(See “Example: sensor pages x of 2” in the previous chapter “Option 2: sensor pages”).

In parts of Europe, electrical installations must incorporate devices designed to protect people and prevent fires: the residual current device, or RCD. A RCD disconnects the circuit if the total for the incoming and outgoing currents in the monitored phases and their neutral conductor exceed a threshold, for example : $L1 + L2 + L3 + N > 30 \text{ mA}$

Data center practice: Residual Current Monitoring in relation to Residual Current Devices

Many devices inside a datacenter operate a switching power supply. These power supplies usually leak a bit of energy to the protective earth, so even without failing hardware some residual current will occur.

In order to discriminate a single dangerous fault from a sum of harmless smaller faults, one needs to set up a network of RC-sensors and monitor permanently. RC-monitoring can take place in many forms. The Schleifenbauer RC-sensor offers Class B metering, thus enabling our customers to set-up an RC-monitoring system that prevents dangerous situations inside the datacenter.

Where to measure residual current?

When monitoring residual current at a single location it is not possible to determine whether the measured value is a sum of many small currents or a single larger (dangerous) one. For that reason it contributes to the safety of the personnel inside a data center when residual currents are metered at several points.

How to find the PDUs unit address, tag, name or location?



You will find all customer specific information about the PDU in the “Custom” display.

- Adr = address of this unit on the databus
- Tag = vanity tag
- Nme = device name
- Loc = location of the device

How to check the way the PDU is connected to the LAN?

```
SCHLEIFENBAUER
Lnk:100M Full-duplex
St :IPv6 configured
IP :192.168.9.161
NM :255.255.255.0
GW :192.168.9.254
MAC:D0-22-12-B0-7A-FC
IPv4 LINK P 17/21
```

```
SCHLEIFENBAUER
#1:FE80::D222:12FF:FE
B0:7AFC
#2:CAFE::D222:12FF:FE
B0:7AFC
#3:::
IPv6 LINK P 18/21
```

You will find all information related to the PDUs network connection in the IPv4 Link and IPv6 Link pages.:

IPv4Link:

- Lnk = current Ethernet link status of the device
- St = IP status:
 - DHCP: Acquiring/Bound, Static, Static fallback
 - '-' when there is no link
- IP = IP address of the device
- NM = subnet mask of the device
- GW = IP address of the Gateway or Router
- MAC = MAC address of the device

The IPv6 link will show up to 3 IPv6 addresses. The first one will be your link-local address which will always start with FE80:: the second and third will be your LAN and WAN address respectively.

How can I check in which mode and with what protocol the PDU is running?

```
SCHLEIFENBAUER
Mode :Bridge
HTTP :TCP/80
API :TCP/7783
Modbus:TCP/502
SNMP :UDP/161 v2+v3
IPMode:IPv4+IPv6
IP INTERFACES P 19/21
```

In the “IP Interfaces” display you can find information about the device mode in which the PDU is working:

- Mode = hybrid, databus, bridge, colocation, ...



See the chapter “[Schleifenbauer databus: what is it?](#)” in this manual for explanations of the term hybrid, bridge,

In the display you can read the status, which protocol and port number is shown for:

- HTTP
- API
- Modbus
- SNMP
- IPMode (IPv4, IPv6 or both)



When there is active communication with the PDU, the interface which is running will turn white. In this example “HTTP”.

How to check the installed firmware version?



```
SCHLEIFENBAUER
Ver: 02.50-18082115C01
ID : 02431-06521-00000
SN : SUNL00056484
Prt: ESENVIB1103-002
Ord: 2017-35140
Ph : 1 0:12 S:12 M:12
H8001 P 20/21
```

In the “About” display you can find the installed firmware version of the device. In this example it is FW02.50.



It is important that the most recent firmware version is running on the devices. This to ensure good working of the device and databus. Firmware and service tools can be found on “downloads” page of the Schleifenbauer website

How to check for traceability information ?



```
SCHLEIFENBAUER
Ver: 02.50-18082115C01
ID : 02431-06521-00000
SN : SUNL00056484
Prt: ESENVIB1103-002
Ord: 2017-35140
Ph : 1 0:12 S:12 M:12
H8001 P 20/21
```

In the “About” display you can find information regarding serial number, product information and Schleifenbauer order number.

- ID = unique hardware address of this device’s controller
- SN = serial number (also found on the PDU housing)
- Prt = product identification (also found on the PDU housing)
- Ord = order number for internal Schleifenbauer uses
- Ph = number of phases of this device
- O = total number of outlets on this device
- S = number of switchable outlets on this device.
- M = number of metered outlets on this device

PART IIB - REMOTE OPERATING AND MONITORING: WEB INTERFACE

INTRODUCTION



Connected devices
(ONLY IN BRIDGE MODE)

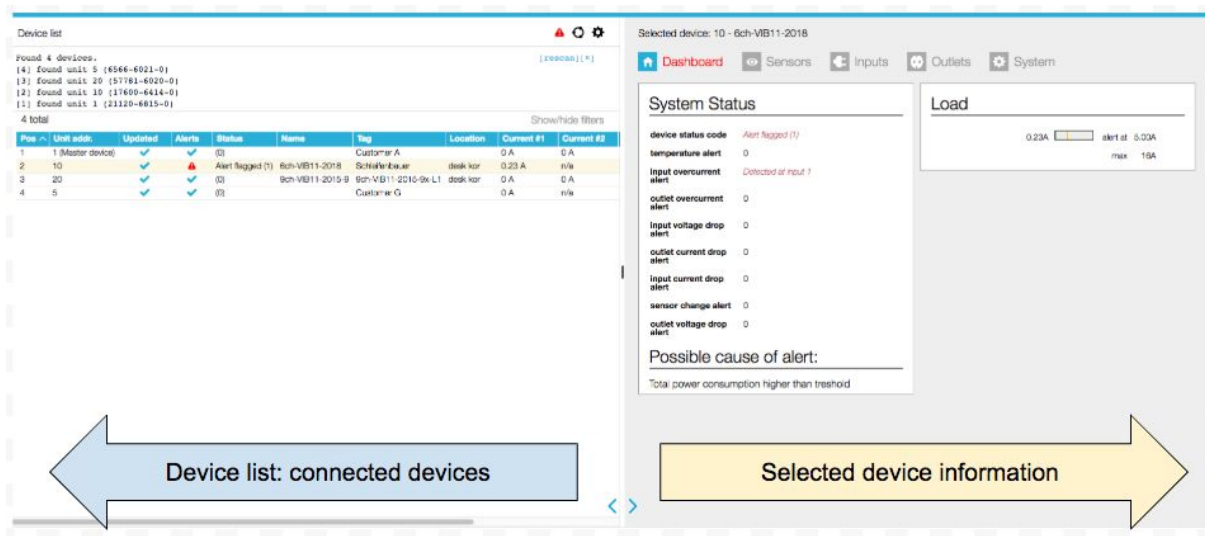
In the left pane (part of the screen) a list of connected devices in the databus is shown. Also the databus management functions can be found in this section such as:

- Scan databus
- Initialise zero addresses to sequence
- Reset all alerts



Device information

After selecting a connected device, you see measurements/information and get access to the remote operating functions, in the right pane.



Using the web interface means using capacity of the databus and slowing down the performance of other interfaces. Therefore it is NOT advisable to open too many web interfaces in order to prevent “hammering” the databus.



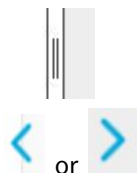
Classic PDUs don't have a device type register. That is why some things do not work using SNMP:

- input subtotal reset per phase, not working -> try multiple times, reset is often delayed.
- outlet reboot, not working
- Power (W) and Power (VA), invalid value (0.0)

How to enlarge a pane in L sized screens?

There are two possibilities:

- using the pane separator:
- using the < or > signs :



How to select English or German language?



The login screen makes it also possible to select English or German as language

Note: in this manual, only the English screens will be shown.

How to change and save settings in the web interface?

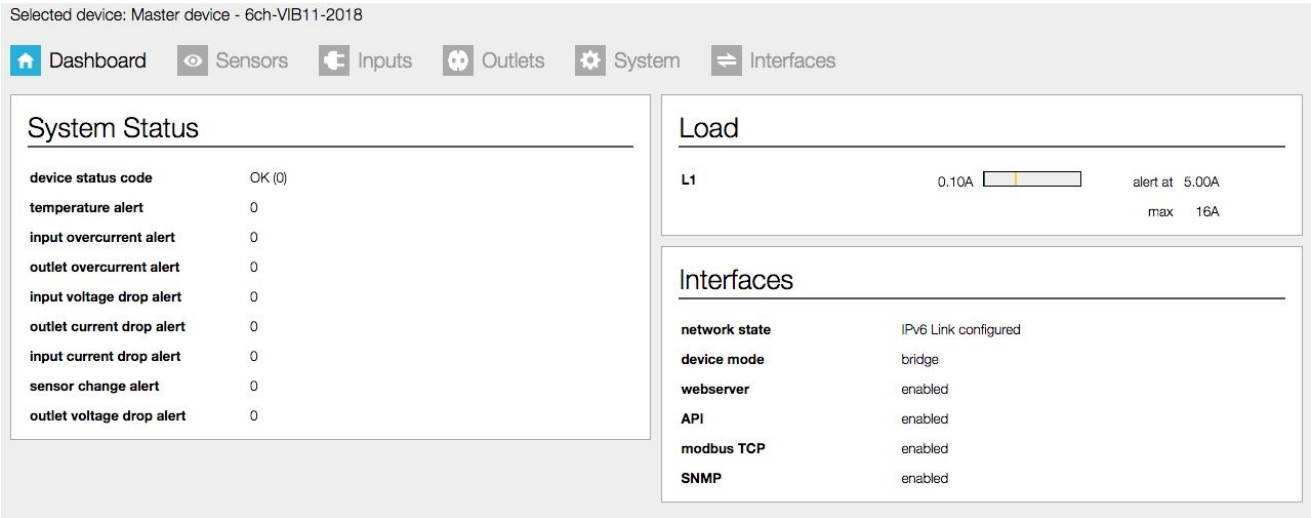


The web interface is protected against accidentally changing settings. Related to your profile, you might have permission to change information: see the “Permission model”.

To open protected cells, you first have to click the “Locked” sign and the status will change to “Editable”.

When ready, click “Editable” or click the “Save changes” icon if shown, and the sign will turn into “Locked”.

DASHBOARD – TAB



System status

DashboardSensors

System Status

device status code	Alert flagged (1)
temperature alert	0
input overcurrent alert	Detected at input 1
outlet overcurrent alert	Detected at outlet 9
input voltage drop	0

!

The number following after “drops” and “overcurrent” show the OUTLET NUMBER of the last alert. In this example there is an “outlet overcurrent” at outlet number 9

When enabled “Auto reset alert”, alerts will be automatically cleared after the chosen time without active alert conditions.

When an alert occurs, the tab name “Dashboard” turns red (see example on the left)













The name “Dashboard” also turns red when switching devices in the device list.




Possible cause of alert:

Total power consumption higher than threshold

This section gives you a quick view of the actual status of the PDU: are there any alerts? And if yes, what kind of alerts, and what caused them?

Looking for the reason why an alert occurred?
In the <System Status> box the PDU gives you a possible cause of the alert.

Device status code	The code shows the status of the device in terms of errors:													
	0 OK 1 Alert flagged 2 Setting(s) initialized 4 Power-on reset 8 External reset 16 Watchdog timer 32 Brownout detected 64 Controller error 128 Slave reset	Device status is OK. One or more alerts have been flagged. Please check the other alert fields to see the cause of the alert. It can be one of the following sources: <ul style="list-style-type: none">◆ temperature alert◆ input current alert◆ output current alert◆ input voltage alert◆ output current drop alert◆ input current drop alert◆ sensor change alert Some settings have been reset to default values. This may occur after a factory reset or a firmware upgrade. The device booted after a power loss. It can be one of the following reasons: <ul style="list-style-type: none">• because of inserting the PDU power plug (mostly intentional. It can be unintentional if someone removed the power plug accidentally)• because of a power outage (unintentional),• because of a defect in the internal power supply. The device has been reset by pressing the reset button on the unit. The device rebooted due to an internal error. Device rebooted because a voltage drop has been detected. This may indicate a defect in the internal power supply or a dip in external power supply. A hardware error has been detected. A communication issue has been detected with an outlet slave module.												
temperature alert ⁽¹⁾	Temperature alert raises for temperatures, which exceed the user's maximum temperature setting. '0' is the indication of everything's all right.													
input overcurrent alert ⁽¹⁾	Input current alert raises for inputs/lines/phases, which exceed the user's maximum current setting for that input. In case multiple inputs are in alert state, only the alert which appeared first is shown.  0 = OK , "Detected at input 1" => there is/was an input/line/phase current alert at phase/line 1													
	There still is an input overcurrent: <u>Load</u> <table><tr><td>L1</td><td>8.00A</td><td></td><td>alert at 5.00A</td></tr><tr><td>L2</td><td>0.00A</td><td></td><td>alert at 5.00A</td></tr><tr><td>L3</td><td>0.00A</td><td></td><td>alert at 5.00A</td></tr></table> <p style="text-align: right;">max 32A</p> In the example above there still is an overcurrent on input L1 => RED bar	L1	8.00A		alert at 5.00A	L2	0.00A		alert at 5.00A	L3	0.00A		alert at 5.00A	The threshold of an input can be changed at the tab < Input >. The threshold itself is visualised in the horizontal bar (vertical yellow line). When exceeding the threshold, the color of the bar will turn red (see example on the left) When the overcurrent is solved, the red bar turns green. Meaning there is an input current; in the example below it is 4.12A  4.12A alert at 5.00A
L1	8.00A		alert at 5.00A											
L2	0.00A		alert at 5.00A											
L3	0.00A		alert at 5.00A											
outlet overcurrent alert ⁽¹⁾	Outlet OVER CURRENT alert raises for outlet number ..n.. In case multiple outlets are in alert state, the highest outlet will be indicated  0 = OK , "Detected at outlet 9" means that there was a current drop at outlet "9"													
input voltage drop	This alert raises in case the voltage on an input/line/phase drops below normal operating range,													

alert ⁽¹⁾	<p>even if the drop is very short (30ms).</p> <p>In case multiple inputs are in alert state, only the alert which appeared first is shown.</p> <p> 0 = OK, "3" means that there was an input/line/phase voltage alert at phase 3</p>
outlet current drop alert ⁽¹⁾	<p>Outlet drop alert raised for outlet number ..n..</p> <p>In case multiple outlets are in alert state, the highest outlet will be indicated.</p> <p> 0 = OK, "22" means that there was a current drop at outlet "22"</p>
input current drop alert ⁽¹⁾	<p>Input current drop alert raises due to a sudden current drop for an input. In case multiple inputs are in alert state, the highest input will be indicated.</p> <p>'0' is the indication of everything's all right.</p>
sensor change alert ⁽¹⁾	<p>Sensor change alert raises when a sensor type has been changed. If multiple sensor types have been changed the lowest sensor channel will be shown.</p> <p>'0' is the indication of everything's all right.</p>
outlet voltage drop alert ⁽¹⁾	<p>Outlet voltage drop alert raises for outlet number ..n..</p> <p>In case multiple outlets are in alert state, the highest outlet will be indicated.</p> <p>The threshold is hard coded on 118V.</p> <p> 0 = OK, "22" means that there was a current drop at outlet "22"</p>

- (1) Only the first alert is flagged
- Input overcurrent thresholds can be changed at the < Inputs > tab
- Outlet overcurrent thresholds can be changed at the < Outlets > tab
- General alert setting can be changed at the < System > tab

<div><div>Load</div><div><div>Total1-9</div><div>4.52A</div><div><div></div></div><div>alert at 14.00A</div></div><div><div>Out123</div><div>0.66A</div><div><div></div></div><div>alert at 5.00A</div></div><div><div>Out456</div><div>4.17A</div><div><div></div></div><div>alert at 14.00A</div><div>max 16A</div></div></div> <div><p>Shows the name, load and alert threshold of each input.</p><div><div><div></div></div><div>The way loads are visualised depend on the configuration of your PDU See tab < Input > when you want to change the name of an input.</div></div></div>	
<div><div>Load</div><div><div>Total1-9</div><div>Out123</div><div>Out456</div></div></div>	<p>By default, the name field has an 8 character limit. With the “extended name”-option enabled, you can make use of 18 characters</p> <p>➤ See also chapter: System tab > Settings</p>
<div><div>8.54A</div><div><div></div></div></div>	<p>In a graphical bar the load is presented. As long as the load is under the “alert threshold” the bar will be green</p>
<div><div>0.00A</div><div><div></div></div><div><div> alert at 10.00A</div><div>max 16A</div></div></div>	<p>The alert threshold is visualised as a yellow, vertical line.</p> <p>➤ See also chapter: System tab > Settings</p>
<div><div>17.06A</div><div><div></div></div></div>	<p>However, when the load passes the alert threshold, the bar will turn red. In the meantime 2 things will happen:</p> <div><div>1) an alert occurs in the “System status” block</div><div>➤ See also chapter: Web Interface > Dashboard tab > System status</div><div>2) at the same time the display of the PDU will blink</div><div>➤ See also chapter: Operating the PDU > Alerts: blinking display</div></div>

Interfaces

network state

IPv6 Link configured

device mode

bridge

webserver

enabled

API

enabled

modbus TCP

enabled

SNMP

enabled

Data shown is read-only and gives an overview of the statuses of the interfaces.

!

This block is only shown for devices in BRIDGE mode

SENSORS – TAB

Selected device: Master device -

Dashboard

Sensors

Inputs

Outlets

System


Interfaces

Sensors

4 total

Locked

#	name	type	value
1		dry switch contact	0
2		dry switch contact	0
3		temperature	26.71 °C
4		humidity	35.38 %

name	By default, the name field has an 8 character limit. With the “extended name”-option enabled, you can make use of 18 characters. <div>➤ See also chapter: System tab > Settings</div>
type	Shows the type of sensor. This is auto detected <div>➤ See also chapter: Operating the PDU > description of display screens > Sensor page(s)</div> <div> G3 devices - equipped with an USB port - can handle two dry switch contacts (see example above)</div>
value	Shows the actual sensor value

INPUTS – TAB

Selected device: Master device -

[Dashboard](#)
[Sensors](#)
[Inputs](#)
[Outlets](#)
[System](#)
[Interfaces](#)

Inputs 3 total

Locked

#	name	kWh total	subtotal	power (VA)	power (W)	PF	current	peak current	voltage	min voltage	overcurrent alert at
1	L1	0	0.082	0	0	100.00	0.00	8.05	229.11	223.52	5.00
2	L2	1	0.080	0	0	100.00	0.00	8.07	228.79	223.21	5.00
3	L3	14	0.018	0	0	100.00	0.00	8.02	228.99	223.17	5.00

#	This indicates the number of input phases. In this example, a 3 phase PDU is shown therefore we have 3 inputs. A single phase PDU will show only 1 input.
name	By default, the name field has an 8 character limit. With the “extended name”-option enabled, you can make use of 18 characters. Whether you are allowed to change the names, depends on your role according to the “permission model” ➤ See also chapter: “web interface > permission model” & “System tab > Settings”
kWh total	Total amount of energy per line: value cannot be reset during the lifetime of the devices!
subtotal / reset	Total amount of energy per line since the last reset. Resetting after “unlocking” and clicking the “reset” button
power [VA]	Apparent power per line
power [W]	Real power per line
PF	Power factor per line [%] = real power [W] / apparent power [VA]
current	Actual current [A] per line
peak current	Highest current per line since the last “reset peaks and dips” ➤ See also chapter: System tab > Reset
voltage	Actual voltage [V] per line
min voltage	Lowest measured voltage (dip) [V] since the last “reset peaks and dips” ➤ See also chapter: System tab > Reset
alert current	Field in which the maximum current [A] is configured for this line, what the actual current is allowed to reach. Crossing this limit will lead to an alert ➤ See also chapter: System tab > Reset & Settings

OUTLETS – TAB

Selected device: Master device -

[Dashboard](#)
[Sensors](#)
[Inputs](#)
[Outlets](#)
[System](#)
[Interfaces](#)

Outlets 48 total 54 switchable 54 metered

Locked

#	name	kWh total	subtotal	power (VA)	power (W)	PF	current	peak current	voltage	overcurrent alert at	individual delay	power cycle time	state	
1		0 0	reset	0	0	100.00	0.00	0.00	229.22	14.00	0	5	on	unlock
2		0 0	reset	0	0	100.00	0.00	0.00	228.76	14.00	0	5	on	unlock
3		0 0	reset	0	0	100.00	0.00	0.00	228.67	14.00	0	5	on	unlock
4		0 0	reset	0	0	100.00	0.00	0.00	228.49	14.00	0	5	on	unlock

#	<p>This tab gives an overview of the configuration of the PDU.</p> <p>In this example, there are 54 outlets in total of which 54 are both switchable and metered.</p> <p><i>The example shows only the first 5 lines, in reality the screen shows 54 lines, one for each outlet!</i></p>
name	<p>By default, the name field has an 8 character limit. With the “extended name”-option enabled, you can make use of 18 characters. Whether you are allowed to change the names, depends on your role according to the “permission model”</p> <p>➤ See also chapter: “web interface > permission model” & “System tab > Settings”</p>
kWh total	Total amount of energy per line: value cannot be reset during the lifetime of the devices!
subtotal / reset	Total amount of energy per line since the last reset. Resetting after “unlocking” and clicking the “reset” button
power [VA]	<p>Apparent power per outlet</p> <p><i>Note: not available on Classic PDU (= without Ethernet port) or DPM27</i></p>
power [W]	<p>Real power per outlet</p> <p><i>Note: not available on Classic PDU (= without Ethernet port) or DPM27</i></p>
PF	Power factor per outlet [%] = real power [W] / apparent power [VA]
current	Actual current [A] per line
peak current	<p>Highest current per line since the last “reset peaks and dips”</p> <p>➤ See also chapter: System tab > Reset</p>
voltage	Actual voltage [V] per outlet

alert current	<p>Field in which the maximum current [A] that the actual current is allowed to reach is configured for this outlet. Crossing this limit will lead to an alert</p> <p>➤ See also chapter: System tab > Reset & Settings</p>
delay	<p>This functionality makes it possible to switch outlets in a row during startup (if configured). So, one-by-one and not all at once. You can configure the time of switching in seconds.</p>
power cycle time	<p>Configurable downtime when an outlet is power cycled. Which means that after the command to power cycle (shut outlet off and start again) is given, the outlet will be switched on again after the configured downtime has passed.</p> <p>➤ See “Unlock” at the end of this table</p>
state	<p>Shows the configured OR actual outlet state. There are several possibilities:</p> <div data-bbox="375 689 687 898"> <p>current state</p> <ul style="list-style-type: none"> on on off off son scheduled to switch on sof scheduled to switch off pc power cycling </div> <p>➤ See “Unlock” at the end of this table</p> <div data-bbox="359 1012 418 1064"> </div> <p><i>Devices built up to and including January 2018: the displayed outlet state is the user configured state.</i></p> <p><i>For devices built from February 2018 on: the displayed outlet state is the ACTUAL state because of the implementation of new hardware which measures the actual state of the outlet. Depending the “power up/down outlet behaviour” you can see changes in the overview.</i></p>
unlock	<p>After the “unlock” sign is clicked, a confirmation is needed to change the state of the outlet. There are 2 possibilities:</p> <div data-bbox="387 1406 729 1471"> </div> <ul style="list-style-type: none"> • Switch off • Power cycle (See “power cycle time” in this table) <p>After you have made a choice, the state of the outlet is changing (See “state” in this table) While the given command is running, a status bar shows the progression of the action.</p> <div data-bbox="375 1711 729 1758"> </div>

SYSTEM – TAB

DashboardSensorsInputsOutletsSystemInterfaces

Identification

unit address1Set Address

firmware version and build251 - 180926154532

SPDM version250

sales order number2018-35600

product IDSDPEVM1302-001

serial numberSVNL00061921

hardware address21120-6815-0

device name

device location

vanity tagCustomer A

Reset

Restart CPU will not affect any outlet state!

restart CPUrestart CPU

reset alertsreset alerts

reset peaks and dipsreset peaks and dips

local alert reset allowedyes

auto reset alertoff

Configuration

number of phases3

number of outlets48

number of switchable outlets54

number of metered outlets54

maximum load (A)32

number of sensors4

Settings

display backlight timeout1 minute

display orientationhorizontal, display at left side

peak duration (ms)1000

current drop detectionalways off

system-wide outlet delay (ms)150

power up/down outlet behavioruse system-wide outlet delay

outlet unlock overridedisabled

maximum temperature (°C)50

sensor change alertrefresh

On the next pages the different sections of this tab are described.

Identification

Identification

Locked

unit address

1

Set Address

firmware version and build

251 - 180926154532

SPDM version

250

sales order number

2018-35500

product ID

SOPEVM1302-001

serial number

SVNL00081921

hardware address

21120-6815-0

device name

device location

vanity tag

Customer A

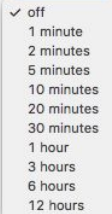
Identification and allocation information of the device


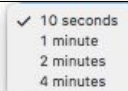
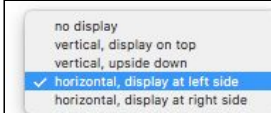
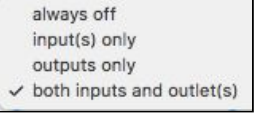
unit address	Address of the device on the databus. Number can be between 1 and 65535. (When using Modbus, number can be between 1 and 247)
firmware version	Actual firmware version on the device ➤ Please check the website for the latest version: www.schleifenbauer.eu
SPDM version	The actual version of the Schleifenbauer Products Data Model
sales order number	Reference of initial Schleifenbauer sales order number
product ID	Product identification tag of the device
serial number	Unique, sequential production number
hardware address	Unique identification of the device controller
device name	Configurable device name, which has a maximum of 16 characters <i>Note: this field is not connected with the "extended name support" and is always max 16 characters</i>
device location	Configurable location name, which has a maximum of 16 characters <i>Note: this field is not connected with the "extended name support" and is always max 16 characters</i>
vanity tag	Configurable vanity tag, which has a maximum of 20 characters <i>Note: this field is not connected with the "extended name support" and is always max 20 characters</i>


<div>Configuration</div> <div> <div>Configuration</div> <table> <tr><td>number of phases</td><td>3</td></tr> <tr><td>number of outlets</td><td>45</td></tr> <tr><td>number of switchable outlets</td><td>45</td></tr> <tr><td>number of metered outlets</td><td>45</td></tr> <tr><td>maximum load (A)</td><td>16</td></tr> <tr><td>number of sensors</td><td>1</td></tr> </table> </div> <div>Configuration information of the device</div>		number of phases	3	number of outlets	45	number of switchable outlets	45	number of metered outlets	45	maximum load (A)	16	number of sensors	1
number of phases	3												
number of outlets	45												
number of switchable outlets	45												
number of metered outlets	45												
maximum load (A)	16												
number of sensors	1												
number of phases	Number of input phases/lines												
number of outlets	Total number of outlets												
number of switchable outlets	Total number of switchable outlets												
number of metered outlets	Total number of metered outlets												
maximum load [A]	Maximum current of the loads (per phase or line)												
number of sensors	Shows the total number of sensors detected <i>Note: this is autoconfig so after sensors are added or taken out, the system recognizes this and changes the information</i>												


<div>Reset</div> <div> <div>Reset</div> <div> <div>Restart CPU will not affect any outlet state!</div> <div> <div>restart CPU</div> <div>restart CPU</div> </div> <div> <div>reset alerts</div> <div>reset alerts</div> </div> <div> <div>reset peaks and dips</div> <div>reset peaks and dips</div> </div> <div> <div>local alert reset allowed</div> <div>yes</div> </div> <div> <div>auto reset alert (s)</div> <div>5</div> </div> </div> </div> <div>Restart controller and resetting alerts (manually / automatically)</div>	
restart CPU	This is a reboot of the controller of the PDU. After restarting all alerts and peak registrations will be erased. Be assured: power distribution will NOT BE INTERRUPTED during this restart!
reset alerts	Clears all the alerts on the device. Of course resetting alerts does not mean that the reason of the alert is taken away. So, an alert can occur directly after resetting.
Reset peaks and dips	Clears all the registered peaks and dips on the device.
Local alert reset allowed	Provides possibility to clear alerts while standing next to the PDU by pressing both "Page up" and "Page down" buttons at the same time



Auto reset alert (s)	<p>In this drop-down menu, you can select how much time it will take to automatically clear alerts after the alert condition disappeared.</p> <p>Be sure that alerts are registered by your management software.</p>	
----------------------	--	---

<div> <div>Settings</div> <div> <div>Settings</div> <div> <div>display backlight timeout</div> <div>4 minutes</div> </div> <div> <div>display orientation</div> <div>horizontal, display at left side</div> </div> <div> <div>peak duration (ms)</div> <div>120</div> </div> <div> <div>current drop detection</div> <div>both inputs and outlet(s)</div> </div> <div> <div>system-wide outlet delay (ms)</div> <div>150</div> </div> <div> <div>power up/down outlet behavior</div> <div>no switching on power up</div> </div> <div> <div>outlet unlock override</div> <div>enabled</div> </div> <div> <div>maximum temperature (°C)</div> <div>50</div> </div> <div> <div>sensor change alert</div> <div>enabled</div> </div> <div> <div>extended name support</div> <div>disabled</div> </div> </div> <div>  <p>For devices built from February 2018 and equipped with 6-channel outlet prints have a new feature</p> </div> </div>		
display backlight timeout	Setting for switching off display backlight after certain set time:	
display orientation	Setting for the orientation of the LCD display. It can be set as:	
peak duration [msec]	Configurable time in milliseconds that a current overload can occur before an alert is given. <i>Note: do not make this time too short because otherwise alerts keep on raising!</i>	
current drop detection	<p>In this drop-down menu, you can select what kind of current drops must be detected.</p> <p>Please note that current drop detection is working in the following way: When the actual current of a channel (can be input or metered outlet) is greater than 0.5A (500mA) and drops with more than 50% of its value, then an input/outlet current drop alert is raised.</p> <p>For example:</p> <ul style="list-style-type: none"> Actual current = 0.4A, drops to 0A -> no alert Actual current = 1A, drops to 0.6A -> no alert Actual current = 1A, drops to 0.4A -> alert is raised 	

system-wide outlet delay [msec]	Setting for delay time between 2 switch actions in milliseconds. The default value is 100 milliseconds and values below 100 milliseconds are not accepted.
power up/down outlet behaviour	<div data-bbox="491 309 1316 654" data-label="Diagram"> <p style="text-align: center;">FEBRUARY 2018</p> </div> <p>Auto shut down is standard/default on Schleifenbauer PDUs. This means that when power distribution to the PDU fails, all outlets will shutdown; which of course leads to shut down of connected servers and other equipment .</p> <p>The reason for the auto shut down is is to prevent peak currents damaging equipment when power loss is solved and power distribution restarts. As a customer you are able to set the power up mode of the outlets.</p> <p>Outlet behaviour can be set as:</p> <ul style="list-style-type: none"> <input type="checkbox"/> no switching on power up <ul style="list-style-type: none"> - at power up, all outlets are kept in the off state <input type="checkbox"/> use system-wide outlet delay <ul style="list-style-type: none"> - at power up, all the outlets are set to their last known state by respecting the fixed <u>system-wide</u> outlet delay <input type="checkbox"/> use individual outlet delay <ul style="list-style-type: none"> - at power up, all the outlets are set to their last known state, but delayed by the <u>individual</u> outlet delay plus fixed <u>system-wide</u> outlet delay <p> For PDU's built from February 2018 and equipped with 6-channel outlet prints, there is an extra option:</p> <ul style="list-style-type: none"> <input type="checkbox"/> no switching on power down <ul style="list-style-type: none"> - in this state outlets are not turned off by default on power loss. This option is only available for G3 (2018) hardware.
outlet unlock override	<p>Setting for overriding the outlet unlock registers. When this setting is enabled outlets can be switched or power cycled without unlocking them first.</p> <p><i>Note that this makes it easier for the user to switch outlets using SNMP, Modbus and API, but also makes it easier to switch the wrong outlet.</i></p> <p><i>Please keep in mind that this setting isn't valid for the web interface. To be able to make a change through web interface, the relevant part has to be unlocked first.</i></p>
maximum	Shows the value of the upper limit that the maximum temperature is allowed to reach in degrees

temperature [°C]	<p>Celsius. An alert will be raised if the temperature of any connected temperature sensor exceeds the set value.</p> <p>It can be disabled by setting it to '0'.</p>
sensor change alert	<p>Informs about the change in sensors such as new sensor, disconnected sensor or broken sensor for this device.</p>
extended name support	<p>A feature allowing the use of longer names for inputs, outlets and sensors when viewing the web interface or using SNMP when it is enabled. This setting also affects the names shown on the LCD display.</p> <ul style="list-style-type: none"> • limited to 18 characters • setting is valid for SNMP, the web interface and the LCD display • for API and Modbus, both the original and extended name registers can be used simultaneously and independently of each other. • when the device is configured in bridge mode, all connected devices should support the extended name feature to work properly. <p> <i>When using both Classic and ethernet PDUs in a databus, the extended name support may lead to conflicting situations.</i></p>

INTERFACES – TAB

DashboardSensorsInputsOutletsSystemInterfaces

Network Status

network state

IPv6 Link configured

IPv4 address

192.168.9.109

subnet mask

255.255.255.0

gateway

192.168.9.254

MAC address

D0:22:12:B0:7A:FD

hostname

Schleifenbauer_SVNLO0056485

IPv6 link-local address

FE80::D222:12FF:FEB0:7AFD

IPv6 address 1

CAFE::D222:12FF:FEB0:7AFD

IPv6 address 2

::

Access Control

Locked

i

Access control is specified in CIDR notation, IP and prefix bits. Any network client that doesn't match one of these rules will be rejected. These settings are shared for HTTP, SNMP, API, Modbus TCP

i

0.0.0.0 is replaced with device's active IP. It can be used to limit access to current LAN (0.0.0.0/24)
0.0.0.0/0 can be used to allow all IPs
0.0.0.0/32 can be used to disable a single entry

web client IP

192.168.9.128

allowed IPv4 range 1

192.168.9.128

/32

allowed IPv4 range 2

192.168.9.128

/32

allowed IPv4 range 3

192.168.9.128

/32

allowed IPv6 range 1

::

/0

allowed IPv6 range 2

::

/0

allowed IPv6 range 3

::

/0

Network Configuration

Locked

DHCP & Static IP Settings

Link Speed/Duplex Mode

Autonegotiate

DHCP

enabled

DHCP fallback to static IP

enabled, will fallback to static IP on failure

DHCP fallback delay (s)

10

IPv4 address

192.168.1.220

subnet mask

255.255.255.0

gateway address

192.168.1.1

primary DNS

0.0.0.0

secondary DNS

0.0.0.0

hostname

Schleifenbauer_SVNLO0

IP protocol select

IPv4/IPv6 dual-stack

IPv6 address 1

::

IPv6 address 2

::

IPv6 Autoconfigure

enabled

IPv6 fallback to static IP

enabled

Behavior

i

In colocation mode, some restrictions are applied on data bus access, depending on the variation:

- 'data bus management': data bus can not switch outlets
- 'data bus viewer': data bus can not write, except for identification and firmware upgrade

i

In colocation mode, firmware upgrades over Ethernet are blocked.

device mode

bridge

The sections of this screen are described in specific manuals. These can be downloaded from our website:

www.schleifenbauer.eu


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Schleifenbauer PDU

PART III - ADMINISTRATOR MANUAL

SPECIFIC MANUALS

The specific manuals can be found on our download page: <http://documentation.schleifenbauer.eu/Documentation/>

Subject	Purpose
WebAPI documentation	Describes the WebAPI custom authentication and resource requests
SPDM 2.xx (Schleifenbauer Products Data Model)	List of all registers and their settings.  <i>If you collect data for your DCIM, please use the latest SPDM. There may be changes in register addresses which might lead to “faulty” readings. For every new firmware release an updated data model is published.</i>
SPBUS_protocol	Provides a concrete and clear description for developers who intend to integrate the SPBUS (Schleifenbauer Products BUS) protocol into their (custom) software solutions.
SPAPI (Schleifenbauer Products application programming interface)	Describe a high-level API for SPBUS devices such that (1) users using the API understand how to use it and (2) developers of any API implementation understand the API's intentions, structure, and design such that they can easily implement, maintain, and extend it where necessary.
APIs tutorial “Getting started with SPBUS”	Guide a developer to one of the SPBUS device interfaces most fit for their purpose.
Modbus	Address scheme, testfile and example can be found on our website
SPST Manual	Manual for our service tool.

How to change SNMPv3 settings?

The screenshot shows the 'User management' web interface. It features a table with columns for 'role', 'username', and 'action'. The table lists five users: 'super' (role: super), 'admin' (role: admin), 'power' (role: power), 'user' (role: user), and 'viewer' (role: viewer). The 'viewer' row has an 'edit' button. Below the table is a form to edit a user. The form includes a 'username' field, a note '* An empty username will disable the account', checkboxes for 'change password' and 'change snmpv3 settings' (which is checked), a 'security level' dropdown set to 'NoAuthNoPriv', and fields for 'authentication protocol', 'authentication password', 'privacy protocol', and 'privacy password'. A 'Save user' button is at the bottom right.

role	username	action
super	super	
admin	admin	
power	power	
user	user	
viewer	viewer	edit

username:

* An empty username will disable the account

☐ change password

☒ change snmpv3 settings

security level:

authentication protocol:

authentication password:

privacy protocol:

privacy password:

[Save user](#)

SNMPv3 user settings can be configured in the web interface: tab "Interfaces", block "User management".

To change the settings of a specific user click the 'edit' button. Then check the 'change snmpv3 settings' checkbox to edit the snmpv3 settings. When finished, click the 'save user' button.



Classic PDU, so without ethernet connector and running on firmware 1.xx , don't have a device type register. That is why some things do not work using SNMP

Not working using SNMP on a Classic PDU

- input subtotal reset per phase
- outlet reboot
- Power (W) and Power (VA), invalid value (0.0)

How to use the ‘connected devices’ section in the web interface?

Only when the PDU is configured in Bridge mode the web interface will show a list of all devices connected to the bridge-PDU on the left pane (or below the blue header when using narrower displays).

Initially this list is empty but will be filled while the web interface is loading data from the bridge-PDU. A selected device is marked - yellow line - in the device list (left pane). You can switch to another device just by clicking the row in the device list. Information and settings about the currently selected device can be seen on the right pane.

The screenshot shows the Schleifenbauer web interface. The left pane, titled 'Device list', contains a table with 24 rows. The first row is highlighted in yellow. The right pane shows the 'System Status' and 'Load' sections for the selected device.

Pos	Unit address	Serial number	Firmware	Name	Tag	Location	OK
1	0	6567	Master device	6567	0	0	0
2	10001	SNAL000000020002	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
3	10002	SNAL000000020004	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
4	10003	SNAL000000020006	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
5	10004	SNAL000000020008	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
6	10005	SNAL000000020010	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
7	10006	SNAL000000020012	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
8	10007	SNAL000000020014	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
9	10008	SNAL000000020016	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
10	10009	SNAL000000020018	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
11	10010	SNAL000000020020	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
12	10011	SNAL000000020022	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
13	10012	SNAL000000020024	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
14	10013	SNAL000000020026	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
15	10014	SNAL000000020028	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
16	10015	SNAL000000020030	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
17	10016	SNAL000000020032	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
18	10017	SNAL000000020034	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
19	10018	SNAL000000020036	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
20	10019	SNAL000000020038	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
21	10020	SNAL000000020040	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
22	10021	SNAL000000020042	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
23	10022	SNAL000000020044	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A
24	10023	SNAL000000020046	241	Demo HPOU	Schleif-Engineering	Ext. accessible	0 A

Device list only appears when device the connected device is in “bridge” mode.

How to add new devices on an existing ring? How to solve duplicate devices?

The screenshot shows the Schleifenbauer web interface. The left pane, titled 'Device list', contains a table with 4 rows. The first row is highlighted in yellow. Below the table, there is a form to enter a new unit address for the device with hardware ID 6566-6021-0.

Pos	Unit addr.	Updated	Alerts	Status	Name
1	0 (Master device)				
2	10	✓	✓	(0)	6ch-VIB11-2018
3	20	✓	✓	(0)	9ch-VIB11-2015-9
4	0 (Master device)	✓	✓	(0)	

When new devices are added to a ring, the firmware might find several devices with unit address 0. This can cause problems so you CAN NOT ignore the warnings!

It is not possible to set all addresses in one move!

4 devices are found. Device [1] is the bridged device so it is best to set this unit address last. So start with [4] which is the device on the top.

- click < set address >
- a new screen will appear; you can check if the correct device is selected because
- fill in the new < unit address >
- Click < ok >

A “ write error” will occur which is correct: you just changed the unit address so it can not be reached at its old unit address. Please click <ok>

Device list
🔄 🔍

Found 4 devices. [rescan][x]

[4] found unit 30 (6566-6021-0)

[3] found unit 20 (57781-6020-0)

[2] found unit 10 (17600-6414-0)

[1] found unit 5 (21120-6815-0)

4 total
Show/hide filter

Pos ^	Unit addr.	Updated	Alerts	Status	Name
1	5	✓	✓	(0)	
2	10	✓	✓	(0)	6ch-VIB11-2018
3	20	✓	✓	(0)	9ch-VIB11-2015-9
4	30	✓	✓	(0)	

When you perform a < rescan > you see that all devices are correctly addressed.

How about login profiles, usernames and passwords?

The PDU user authentication model provides 5 different accounts which can be used to access the web interface and SNMPv3.

In the web interface the user accounts are in decreasing order of access rights: super, admin, power, user and viewer. It should be noted that super is only intended for use by Schleifenbauer personnel. The access rights of the different user accounts, together with databus and unauthenticated ethernet, are shown in the following table.

	data bus	super / admin	power	user	viewer	eth unauth.
unit address	x	x				x
name, tag, location	x	x				x
import names	x	x				x
outl. & sens. names	x	x	x	x		x
alert settings	x	x	x			x
reset subtotals	x	x	x			x
switching	x	x	x	x		x
reset alerts / restart	x	x	x	x		x
viewing	x	x	x	x	x	x
FW upgrade	x					x
scan (bridge mode)		x				x
change PDU mode		x				
interface settings		x	x			
IP address		x	x			

The default password for each profile initially equals the username of the profile. For example the default password for the 'admin' user profile is "admin".

Each user can change all lesser user passwords, in addition to their own password.

Please fill the 'User Name' and 'Password' fields accordingly and then click login or press enter.

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Schleifenbauer PDU

How to change factory passwords?



All user profile passwords **MUST** be changed at the first connection by the administrator !

<div><h3>User management</h3><table><thead><tr><th></th><th>username</th><th>action</th></tr></thead><tbody><tr><td>super role</td><td>super</td><td><button>cancel</button></td></tr><tr><td>username</td><td><input type="text" value="super"/></td><td></td></tr><tr><td></td><td colspan="2"><small>* An empty username will disable the account</small></td></tr><tr><td></td><td><input checked="" type="checkbox"/> change password</td><td></td></tr><tr><td>new password</td><td><input type="text"/></td><td></td></tr><tr><td>repeat password</td><td><input type="text"/></td><td></td></tr><tr><td></td><td><input type="checkbox"/> change snmpv3 settings</td><td></td></tr></tbody></table></div>		username	action	super role	super	<button>cancel</button>	username	<input type="text" value="super"/>			<small>* An empty username will disable the account</small>			<input checked="" type="checkbox"/> change password		new password	<input type="text"/>		repeat password	<input type="text"/>			<input type="checkbox"/> change snmpv3 settings		<p>In tab "Interfaces", block "User management" passwords can be changed.</p> <p>There are five login profiles:</p> <ol style="list-style-type: none">1. Viewer = viewing only2. User = Viewer + resetting alerts and switching outlets3. Power = User + resetting subtotals4. Admin = all administrator rights <p>And the "factory profile": Super</p>
	username	action																							
super role	super	<button>cancel</button>																							
username	<input type="text" value="super"/>																								
	<small>* An empty username will disable the account</small>																								
	<input checked="" type="checkbox"/> change password																								
new password	<input type="text"/>																								
repeat password	<input type="text"/>																								
	<input type="checkbox"/> change snmpv3 settings																								

How to change the Ethernet link settings?

By default the "ethernet link speed and duplex mode"-setting is set to **autonegotiation**. With this setting the link speed and duplex mode are automatically configured with the link partner (e.g. Network Switch).

You can also configure the link speed and duplex mode to a fixed setting. You can choose from the following options:

- Autonegotiation
- 10 Mbps Full Duplex
- 10 Mbps Half Duplex
- 100 Mbps Full Duplex
- 100 Mbps Half Duplex

Network Configuration

Editable

DHCP & Static IP Settings

Save Changes

Saving these settings will reset Access Control settings.
Settings will be effective after restart of CPU or replug of ethernet cable.

Link Speed/Duplex Mode

Autonegotiate



When changing this setting you must also configure the link partner correctly! Otherwise you will not be able to connect to the PDU remotely.

If this setting is changed in the wrong way and you are not able to connect, change the setting of the link partner to be able to access the PDU again. If this doesn't work you can try a factory reset.

NETWORK CONFIGURATIONS

DHCP and default address

In general, the Dynamic Host Configuration Protocol (DHCP) protocol can dynamically configure the:

- IP address
- subnet mask
- gateway address
- Domain Name System (DNS) servers

By default, the PDU is configured to get the IP address from DHCP automatically. If the PDU does not receive an IP address within a set time, it will proceed using the default address:

192.168.1.220
(subnet mask: 255.255.255.0)

How to configure the IP settings manually?

The IP settings can be manually configured by using the web interface:

The screenshot displays the Schleifenbauer web interface. The top navigation bar includes 'Dashboard', 'Sensors', 'Inputs', 'Outputs', 'System', and 'Interfaces'. The 'Interfaces' tab is selected. The main content area is divided into two panels. The left panel, titled 'Network Status', shows the following information: network state (bound to static IP), IP address (192.168.9.221), subnet mask (255.255.255.0), gateway (192.168.9.254), and hostname (Schleifenbauer_SVNL00028910). Below this is an 'Access Control' section, which is locked and contains a note about CIDR notation and a table of IP rules. The right panel, titled 'Network Configuration', contains 'DHCP & Static IP Settings'. It shows 'DHCP' as disabled, 'DHCP fallback to static IP' as enabled, and 'DHCP fallback delay (s)' as 60. Below these are fields for 'IP address' (192.168.9.221), 'subnet mask' (255.255.255.0), 'gateway address' (192.168.9.254), 'primary DNS' (192.168.9.254), 'secondary DNS' (0.0.0.0), and 'hostname' (Schleifenbauer_SVNL00).

- Actions:
- go to the <web interface> , tab < Interface > , block < Network Configuration >
 - disable DHCP
 - Fill in the “Static IP Settings”
 - Restart the CPU: go to tab < System > , block “Reset”



When using ‘DHCP fallback to static IP’, it is recommended to enter a unique IP address for each PDU. This approach prevents all of the PDUs from being assigned the same IP address in the event of a faulty DHCP server.

How to setup IPv6?

Since firmware version FW2.44, IPv6 support has been introduced in the Schleifenbauer PDU. This feature is disabled by default.

An IPv6 address¹ consists of 8 blocks of 4 hexadecimal digits² separated by columns (:). Consecutive blocks of zeroes can be substituted with a double column (::) and leading zeroes can be omitted. By default the static IP is ":::" which translates to 0000:0000:0000:0000:0000:0000:0000:0000.

IPv6 Autoconfigure (SLAAC)

By default the PDU will try to obtain its IPv6 address through a process called "stateless local address auto configuration" (SLAAC). This setting can be turned off in the web interface by setting "IPv6 Autoconfigure" to "disabled".

The PDU will try to find a router by sending router solicitation packets via ICMP6 using its link-local address. This means that a IPv6-enabled router must be available on the network and it must send ICMP6 router advertisement packets in order for the PDU to obtain a valid IP6 address.

When "IPv6 fallback to static IP" is set to enabled in the web interface, the PDU will use it's configured static addresses as fallback when a router cannot be found.

Static IP

To use static IPv6 addresses the PDU must either have it's "IPv6 Autoconfigure" setting disabled or "IPv6 fallback to static IP" enabled in the web interface.


These settings can be found under "≡ interfaces → network configuration".

To change the static IPv6 addresses, fill in a valid IPv6 into fields "IP6 address 1" and/or "IP6 address 2"; see next chapter

¹ https://en.wikipedia.org/wiki/IPv6_address

² <https://en.wikipedia.org/wiki/Hexadecimal>

How to configure IPv6?

<div><h3>Network Configuration</h3><hr/><h4>DHCP & Static IP Settings</h4><hr/><table><tr><td>Link Speed/Duplex Mode</td><td>Autonegotiate</td></tr><tr><td>DHCP</td><td>enabled</td></tr><tr><td>DHCP fallback to static IP</td><td>enabled, will fallback to static IP on failure</td></tr><tr><td>DHCP fallback delay (s)</td><td>10</td></tr><tr><td>IPv4 address</td><td>192.168.1.220</td></tr><tr><td>subnet mask</td><td>255.255.255.0</td></tr><tr><td>gateway address</td><td>192.168.1.1</td></tr><tr><td>primary DNS</td><td>0.0.0.0</td></tr><tr><td>secondary DNS</td><td>0.0.0.0</td></tr><tr><td>hostname</td><td>Schleifenbauer_SVNL001</td></tr><tr><td>IP protocol select</td><td>IPv4/IPv6 dual-stack</td></tr><tr><td>IPv6 address 1</td><td>::</td></tr><tr><td>IPv6 address 2</td><td>::</td></tr><tr><td>IPv6 Autoconfigure</td><td>enabled</td></tr><tr><td>IPv6 fallback to static IP</td><td>enabled</td></tr></table></div>	Link Speed/Duplex Mode	Autonegotiate	DHCP	enabled	DHCP fallback to static IP	enabled, will fallback to static IP on failure	DHCP fallback delay (s)	10	IPv4 address	192.168.1.220	subnet mask	255.255.255.0	gateway address	192.168.1.1	primary DNS	0.0.0.0	secondary DNS	0.0.0.0	hostname	Schleifenbauer_SVNL001	IP protocol select	IPv4/IPv6 dual-stack	IPv6 address 1	::	IPv6 address 2	::	IPv6 Autoconfigure	enabled	IPv6 fallback to static IP	enabled	<p>The IPv6 settings can be found in the PDUs web interface at the tab < Interfaces> block < Network Configuration >.</p> <p>The PDU will always generate a Link-local address which starts with "FE80::". This address is auto-generated and loses its scope at the first encountered network node.³</p> <p>The IPv6 addresses can be found on the web interface or on the "IPv6 Link" page on the PDU's built-in LCD screen as shown in the image here..</p> <p>To enable the user must login to the PDU using the ipv4 address presented on the display. After logging in onto the web page⁴ of the PDU, select the tab "≡ interfaces". Under network configuration there's a drop-down box called "IP Protocol select". By default this will be set to "IPv4 only".</p> <p>To enable IPv6 set this to either "IPv6 only" or "IPv4/IPv6 dual-stack".</p> <p>Note that selecting "IPv4 only" or "IPv6 only" requires one of the filtering ranges to be all zero (allow all addresses). This is to prevent users from locking themselves out. Naturally filtering can be configured afterwards when the user has connected to the bridged and/or hybrid PDU using the protocol previously specified.</p>
Link Speed/Duplex Mode	Autonegotiate																														
DHCP	enabled																														
DHCP fallback to static IP	enabled, will fallback to static IP on failure																														
DHCP fallback delay (s)	10																														
IPv4 address	192.168.1.220																														
subnet mask	255.255.255.0																														
gateway address	192.168.1.1																														
primary DNS	0.0.0.0																														
secondary DNS	0.0.0.0																														
hostname	Schleifenbauer_SVNL001																														
IP protocol select	IPv4/IPv6 dual-stack																														
IPv6 address 1	::																														
IPv6 address 2	::																														
IPv6 Autoconfigure	enabled																														
IPv6 fallback to static IP	enabled																														
	<p>Enabling IPv6 will also add an additional page on the PDUs display (see image). The current IP Mode is also displayed on the display; screen "IP INTERFACES".</p>																														

³ https://en.wikipedia.org/wiki/Link-local_address#IPv6

⁴ See part IIB - Remote operating and monitoring

How to set up IPv6 address filtering?

As with IPv4, IPv6 address filtering settings can be found at tab < Interfaces > block < Access control > from within the web interface.

The web interface shown in image 3 will allow you to specify 3 IP ranges which grant access, anything outside of these IP ranges will be blocked. If you wish to configure only a single range, you should fill in this range 3 times.



All "allowed IP6 range" fields must be filled in order for the filter(s) to have effect !

Setting any address with prefix "0" will allow any address to access the PDU web interface, SNMP, modbus etc.

Setting the address to ":::" (all zero's) and the prefix to a number between 0 and 128, will limit the allowed IP scope to the network the PDU is connected to. Filtering will then be disabled.

Example:

Setting a filter of A76F::D222:12FF:FEB0:F48/64 will allow any address starting with A76F:0000:0000:0000: (A76F::) but other addresses such as A76A::32D4:731B:F17B:6 will be blocked. for more detailed explanation see the wikipedia page on IPv6 subnetting.⁵

allowed IPv6 range 1	<input type="text" value="::"/> / <input type="text" value="0"/>	<i>IPv6 filtering ranges</i>
allowed IPv6 range 2	<input type="text" value="::"/> / <input type="text" value="0"/>	
allowed IPv6 range 3	<input type="text" value="::"/> / <input type="text" value="0"/>	
IPv6 link-local address	FE80::D222:12FF:FEB0:F48	<i>PDU's current IPv6 addresses.</i>
IPv6 address 1	AF::D222:12FF:FEB0:F48	
IPv6 address 2	::	

How to send SNMP Traps with IPv6?

The PDU allows you to set 2 SNMP trap destinations. traps are fired when an alert has been generated within the PDU.

These destinations can be found under "≡ interfaces → SNMP" in the PDU web interface. The "trap destination address" fields can be set to any destination including an IPv4 address (when IPv4 is enabled) and an IPv6 address.

trap destination address 1	<input type="text" value="AF::2"/>	<i>Using IPv6 traps</i>
trap destination address 2	<input type="text" value="AF::D256:B4A7"/>	

⁵ https://en.wikipedia.org/wiki/IPv6_subnetting_reference

How to stop the alert signaling? ...auto reset alert

From firmware 2.40 on it will be possible to select a duration time after which the alert will be cleared after the cause of the alert is not present anymore. It will be no longer necessary to clear the alert on the PDU or via an interface after the event which led to an alert is gone

But remember: an alert does not occur without a reason. So it is important that the alerts are recorded/logged in an management system.

FIRMWARE DOWNGRADE / UPGRADE

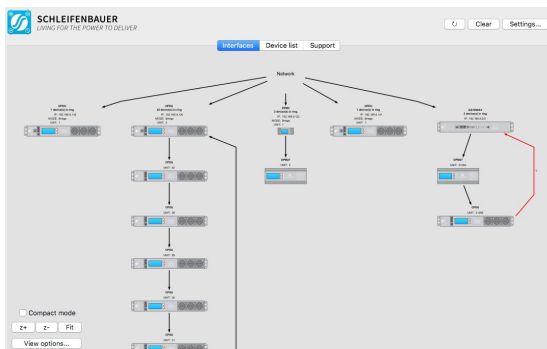
The development of the PDU firmware is an ongoing process. With every new release not only issues are fixed, but new features appear and the databus will be more stable and speed will be increased. Not installing the newest firmware means that you do not make use of the latest technology.

Because of the databus ring, upgrading of all attached devices can be done remotely! During the upgrade process the power distribution will not be interrupted. Our firmware, firmware tools and manual are cost free: both download and in use.





When a Schleifenbauer Gateway is in the databus you need to upgrade the Gateway firmware first. This firmware can be found on the documentation page of the Schleifenbauer website.

The latest firmware, manual and updater tool can be found on the downloads page of our website www.schleifenbauer.eu.

How to upgrade the firmware? ...using SPST



SPST stands for "Schleifenbauer Products Service Tool". This is a program which aims to aid customers in analyzing and maintaining their network of Schleifenbauer PDUs and DPM-energy meters. It does so by offering the following features:

-  You are able to "quick scan" the status of your databusses
-  You can up-/downgrade firmware very easy and simple
-  You can remotely mass configure your databus devices
-  You will decrease problem solving lead time

You can download SPST from www.schleifenbauer.eu where you also can find the SPST-manual. Please read the manual before you start using SPST and you will find out that this tool will make firmware updating and mass configuration a lot easier.

How to upgrade the firmware? ...using USB

All G3 products have an USB port near the LCD screen.

USB support is enabled by default so if it hasn't been explicitly disabled by the user, enabling it is unnecessary.

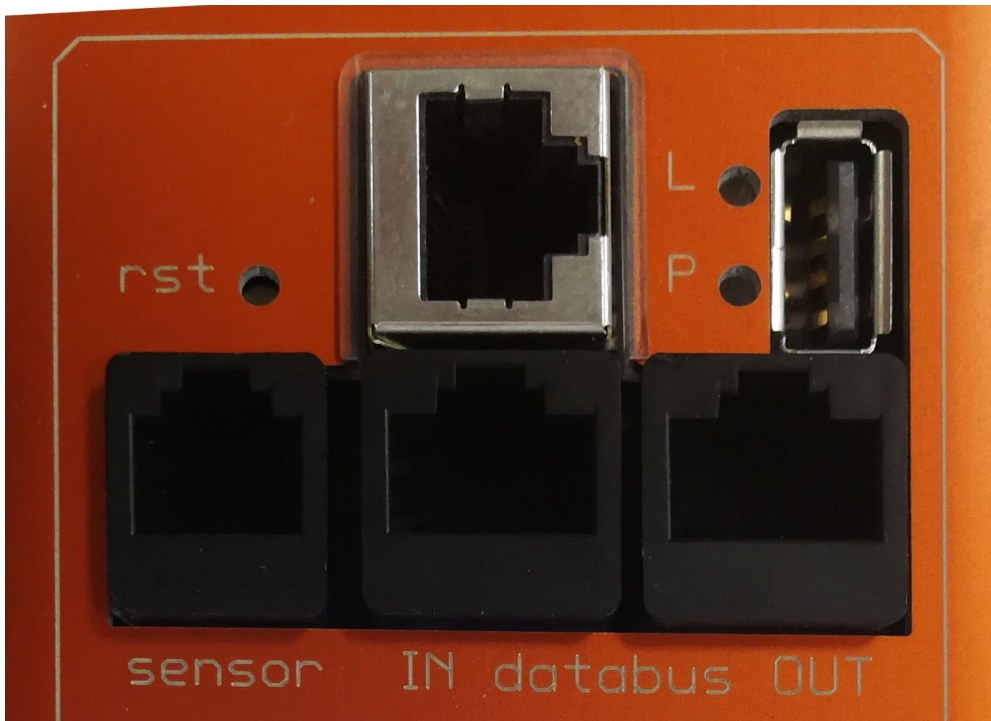
To start the update process make sure you have USB support enabled in the web interface. This can be found under <system> -> settings in the web interface. Alternatively you can write 1 to modbus register 220 (make sure modbus is set to read/write) or use SNMP.

Next download the latest firmware from <https://docs.schleifenbauer.eu/?dir=Firmware>.

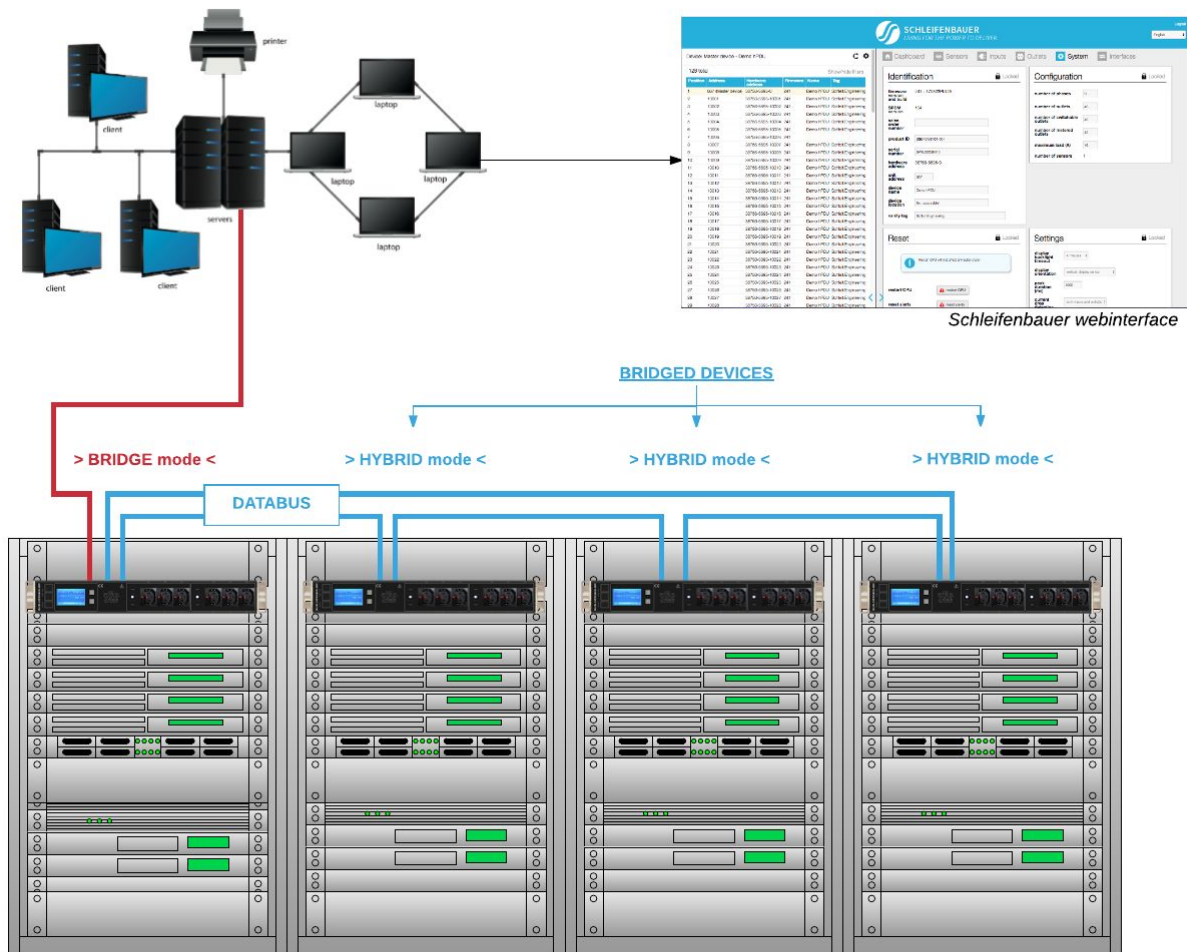
The firmware is provided as a single .zip archive.

Please extract the **entire contents** of this archive onto a **blank FAT32-Formatted USB pendrive**.

Then safely remove this pendrive from the PC and insert it into a PDU. The upgrade will start automatically.



SCHLEIFENBAUER DATABUS: WHAT IS IT?



The intelligence of Schleifenbauer PDUs (and DPM energy meters) makes it possible to read and manage devices remotely over IP. You can for example enter the databus via the web interface, MODBUS and SNMP.

There are all kinds of possibilities using the databus: whatever configuration you want to build, with the databus it is possible.

Databus and power distribution are two separate functions of the Schleifenbauer PDU. This means that all actions done via the databus do NOT interfere the distribution of power to the IT equipment in the racks.

Advantages of the databus:

- easy to build: just pick a PDU and connect it to your LAN, daisy chain the rest of the PDUs and you have made a databus
- remote updating of the firmware

Explanation of the figure:

- the PDU/DPM-energy meter that is connected to the LAN must be in “**BRIDGE**” mode; this is the MASTER device
- all “daisy chained” devices must be in “**HYBRID**” mode; these are the followers: the BRIDGED devices

How to prevent data losses because of cable cuts? ...ring redundancy

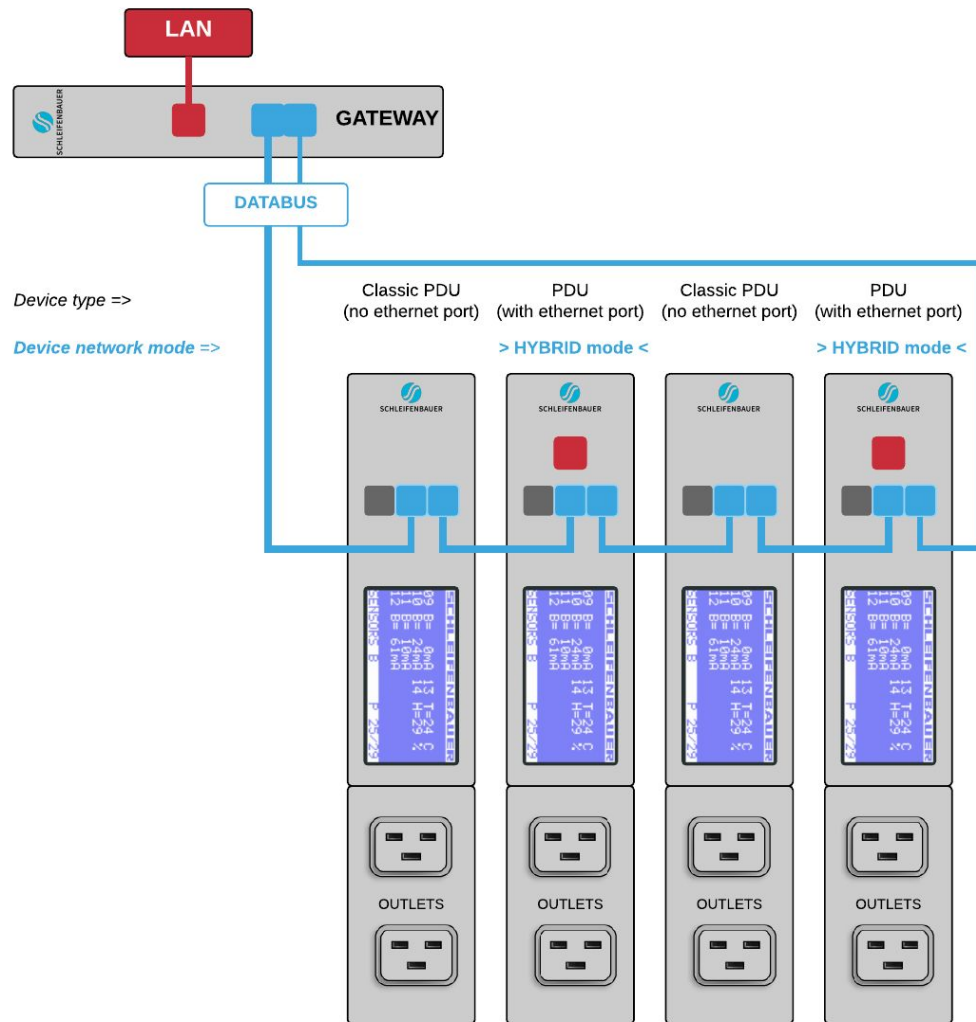
Normally the advantage of an IP solution per PDU is that a cable cut will not affect the other PDUs on the bus. This could happen in a normal daisy chained serial bus topology.

However, Schleifenbauer has made their bus redundant so that a single cable cut will not affect the readout or control of the PDUs; it will try and get access via the alternative route on the ring. A cable cut is detected by our firmware and an error message will be submitted to the database. The disadvantage of a serial bus topology is therefore covered in the Schleifenbauer system.



See Part I “How to connect a databus” on the PDU

How to make a databus using Schleifenbauer Gateway?



In the figure above you see a small databus-ring with four PDUs connected to the Schleifenbauer Gateway. The Classic PDU has NO ethernet port, so a (Schleifenbauer) Gateway is needed in order to get PDUs connected to your LAN.

The sequence of devices does not affect the performance of the Gateway or the databus. Though the more devices you place in the databus, the slower data transmission will be.

It is advised to close your databus-ring. To do so, you connect the last device in the databus also to the Gateway (blue lines in the figure). In a closed databus ring the Gateway can reach all connected devices via IN and OUT databus-ports (clockwise and anti-clockwise).

Advantage: with one IP-address you can collect data from a number of connected Schleifenbauer-devices (not only PDUs but also the Schleifenbauer DPM-range (=energy meters))

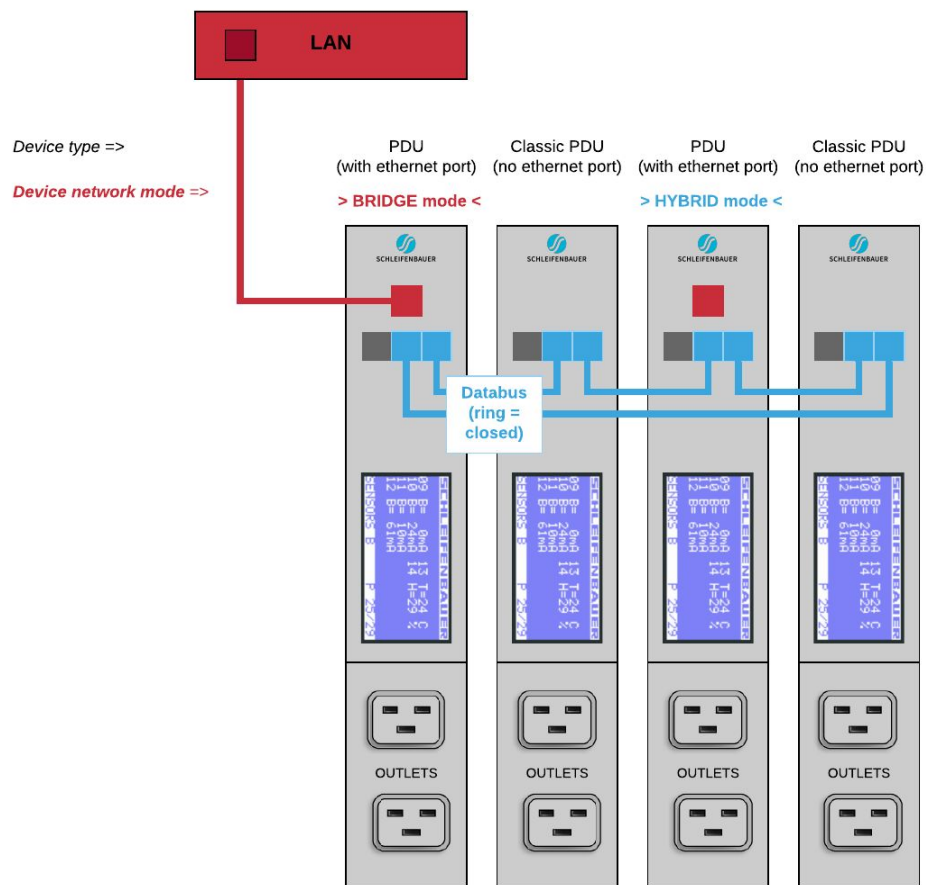
Disadvantage: Gateway uses 1U

Problem solving: when the Gateway fails, you can change to the next configuration: using the “bridge” mode



Databus communication is 0,2 seconds per query (e.g. input measures block). Therefore we advice to make rings with a maximum of 50 devices which means that querying each device once will last appr. 10 seconds

How to connect the databus to LAN without a Gateway? ...using a PDU!



In the figure you see a small databus-ring with only four devices connected to a LAN: a Classic PDU and PDU with ethernet port. The device connected to the LAN must have an ethernet port and be in "BRIDGE" mode. All other devices should be in "Hybrid" mode. The BRIDGED device takes over the function of the Schleifenbauer Gateway.

You can connect numerous of Schleifenbauer devices to the device which is in BRIDGE mode: PDUs and DPM3's (= 3 channel energy meter) as well as Classic PDUs and DPM27 (= 27 channel energy meter). The sequence of devices does not affect the performance of the databus-ring. But, the more devices you place in the databus-ring, the slower data transmission will be. The scheme shows that you can use different kind of Schleifenbauer devices in a ring which makes the system easily scalable to your needs. It is advised to close your databus ring. So it is best to connect the last device in the databus to the device which is in BRIDGE-mode. In a closed databus ring you can reach all connected devices

via IN and OUT databus ports (clockwise and anti-clockwise).

Advantages: (1) when only using devices with ethernet port: only the device in BRIDGE mode uses one IP-address. (2) you can select any device connected to your LAN as long as you place it in BRIDGE mode, (3) investment in a Schleifenbauer Gateway is not necessary, (4) the system is easily scalable

Disadvantage: MySQL and SMTP can not be used

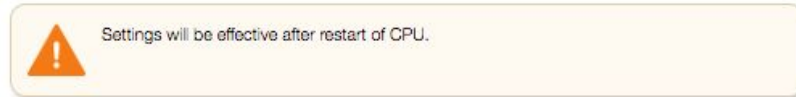


Databus communication is 0,2 seconds per query (e.g. input measures block). Therefore we advice to make rings with a maximum of 50 devices which means that querying each device once will last appr. 10 seconds

PART IV - PROBLEM SOLVING

How to perform a “Software reset”? And why?

When Interface-settings are changed the CPU has to be started. In the web interface a pop up will appear when needed:



Remotely

Software reset can be done via the web interface. It is important to understand that a software reset has no impact on power distribution of the PDU. So a reset can be performed at any time without having to interrupt the power supply and without losing the settings in the PDU.

Locally

The software can be reset using a paperclip or some other kind of thin and rigid rod to press the reset button. This button is mounted behind the hole labelled as 'rst' on the PDU which is next to the Ethernet connection port.

How to perform a “Factory reset”?

If the PDU can no longer be accessed via the LAN, for example, because settings have been changed, restoring IP access may be needed. The following procedure causes the PDU to adopt various default values, which allows it to be detected on the network again without losing any of the other settings in the PDU. However, the power supply must be interrupted in order to perform this restore procedure! The procedure is described in five steps:

1. Interrupt the power supply to the PDU.
2. Restore the power supply.
3. Wait for one second and afterwards press the reset button using a paper clip.
4. Wait for a further second and press the reset button again.
5. Wait for a further second and press the reset button again.

The PDU has now adopted the default values for the IP settings. The access control fields and the web server settings have also been returned to the standard values.

Please note that because the power is removed, outlets will also be out of power. Hence, during this process there won't be any measuring.

Please keep in mind that kWh totals will **NOT** be reset during this process.

How to reset peak current?.....and other dips or peaks

Example: you have set the “overcurrent alert at” on 5.00A in the <input > tab. At a certain moment you see an alert in the web interface dashboard. You check the Inputs-tab and see a peak current of 8.30A:

peak current	voltage	min voltage	overcurrent alert at
8.30	228.93	222.26	5.00

You can clear the alert as you already know locally or by the reset button in the <Reset> block in the System-tab but the peak current will not be cleared. You have to do this by clicking the <reset peaks and dips> button in the <Reset> block of the System-tab:

reset peaks and dips



RECYCLING

Schleifenbauer Products aims to be a socially responsible corporation. Therefore, it makes great effort to minimise the impact of our products to our planet during production as well as during operation. Packaging consists of recyclable materials and Schleifenbauer asks you to save them for later use or dispose them with applicable regulations.

PRODUCT SPECIFICATIONS

	OPERATING
Temperature	0° to 60° Celsius
Height	-30 to +2000 m
Relative humidity	10 to 90% non-condensing
Level of pollution	2
Environment	Indoors IP20
Class of equipment	Class I
Protective rating	II
Conditions of use	Continuous

Voltage:	single-phase 100-230 VAC; three-phase 230/400 VAC
Frequency:	50/60 Hz
Permitted load:	see product information on your PDU
Accuracy:	EN 50470-1/3 class B EN 62053-21: class 1, $\pm 1\%$
Wire colour code:	L1 = BROWN L2 = BLACK L3 = GREY N (neutral) = BLUE PE = YELLOW/GREEN

SERVICE AND SUPPORT

In case you have any questions regarding our products, please contact us from the following addresses:

T: +31 73 5230256
F: +31 73 5212383
E-mail: support@schleifenbauer.eu
Website: <http://schleifenbauer.eu/>

When an email is sent, a case is created automatically with a unique case number. The request will be investigated in detail and proper actions will be taken. Correspondence about the case will be done with the unique number as reference.

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