SCHLEIFENBAUER
LIVING FOR THE POWER TO DELIVER

V2.42 Schleifenbauer PDU
User manual

Index

LAY OUT 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	**Installation manual**	Prepare PDU for use: ● safety issues ● mounting the PDU ● cabling the PDU
Part II	**User manual**	Operator and user part: ● operating/read out via the PDU-display ● operating/read out via the webinterface ● problem solving
Part III	**Administrator manual**	Admin part: ● configure via the webinterface ● set up via the webinterface ● problem solving

WHAT'S NEW

● This manual has a new design and is now divided in an Installation, User and Admin manual
● Also new are the "How to.." sections. You can see this as quick problem solving parts, but only use them after reading the "Safety warnings" and "Expert personnel" sections in part I of this manual
● Described how to configure SNMPv3

HOW TO? ....TAKING A SHORTCUT

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.

> Please read the "Safety Warnings" and "Expert Personnel" sections first !

INTRODUCTION

POWER DISTRIBUTION MEETS INTELLIGENCE

The Schleifenbauer Intelligent Power Distribution Unit (PDU) is designed to distribute the power. And Schleifenbauer data bus makes it possible to read and manage many PDUs with a single IP address! This PDU adds an Ethernet port to this functionality, so that alongside the advantages of a data bus, 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 data bus. There are several possibilities:

- (embedded) web interface
- Modbus/TCP
- SNMP (Simple Network Management Protocol)
- SPAPI (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

MEASUREMENTS

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

Measurement	Unit	Remark
Energy	(kWh)	total & sub-total
Voltage	(V)	with voltage dip registration
Current	(A)	with peak value registration
Power factor	(%)	
Apparent power	(VA)	
Real power	(W)	
Temperature	(°C)	with optional sensor
Relative humidity	(%)	with optional sensor
NO/NC contact	0 or 1	

PART I - INSTALLATION

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 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 tested according to the NEN 3140 standard. Test reports of individual PDUs 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 GreenCart (rolling trolley) or are packaged 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. Please contact Schleifenbauer Products BV to arrange return of your empty GreenCart. 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 4 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.
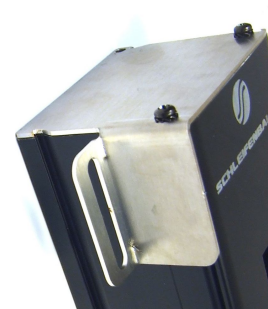
How to mount a PDU without tools?

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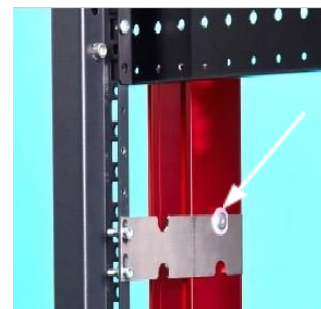
How to achieve maximum mounting flexibility? ...mounting with profile clamps

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.
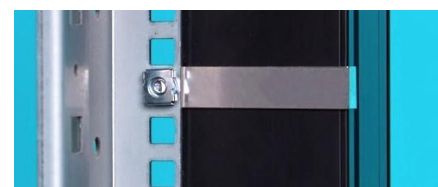
CABLING THE PDU: ETHERNET, DATA BUS AND SENSORS

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 data bus.
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 data bus?

The serial data bus in the Schleifenbauer PDU uses CAT5 or (preferable) patch cables.
Each PDU features **two** RJ45 connectors, with which you can make a closed loop.

- Connect the RJ45/patch cable to the connector labelled data bus. *(Remark: both data bus connectors are identical but it is preferable to connect "data bus OUT" on the left data bus connector)*
- Connect the other end of the patch cable to the nearest PDU that is already connected to the data bus

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 a dry switch contact

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?

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.

NO / NC dry contact

PIN 1 (white)
PIN 2 (black)
PIN 3 (red)
PIN 4 (green)
PIN 5 (yellow)
PIN 6 (blue)

RJ12 6P6C
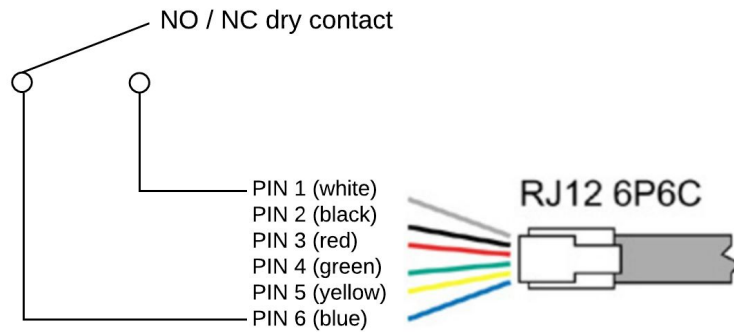
Note that on a PDU only 1 NO/NC contact can be connected.

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

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. 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.

> See the section "Power distribution meets intelligence"

LIFE-SUPPORTING POLICY

The Schleifenbauer PDU has been designed and built for use in data centers. The Intelligent PDU 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 OPERATING THE PDU

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 not have a display.

10/100 Ethernet [1]
Access point from LAN to PDU
Default is autonegotiate, link speed and duplex mode can be selected

Reset
Sunken reset button to perform hard reboot.
Please use a paperclip.
Note: this does NOT interrupt the power distribution and does NOT erease settings/measurement vallues!

Sensor
RJ12 connector for: Schleifenbauer
Temperature/humidity sensor OR dry contact

Scroll buttons
You can use these buttons to:
(a) scroll through the several displays
(b)to return to first display (push both buttons and let loose
(c) to reset alarms [2]

Link
Orange LED lights up when network communication is established

Power
When connected to a power source, the green LED dims every 2 seconds to indicate that the controller is operating correctly. When flashing, requests/actions are send by Ethernet to the PDU.

Data bus
Two RJ45 connectors for databus wiring

LCD display
Presenting the measurement values and settings of the PDU

Pulse LED
This LED pulses at a speed of 3200 pulses per kWh

[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

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

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
- the screen of the PDU will start blinking.

After the temperature has dropped, 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!

How to check load balance, 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). There is nearly no load, only on L3 there is a small 0,1A.

"DS" gives the status of the connected NO/NC contact: 0= open, 1 = closed
"Te" shows the temperature in degrees Celsius and "RH" the relative humidity in %.

How to get back to the first display?

| Actions: | ● No alerts (= no blinking display) => shortly press both the scroll buttons. You will see the first screen in the display. |
| | ● If there are alerts, first clear these (see: "*How to stop blinking display? … local alert reset*") then shortly press both the scroll buttons |

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.

Example: outlet page

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

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?

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]
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?

When the PDU is equipped with a Residual Current Sensor (RCS), measurements of the residual current are shown in the sensors pages (see previous chapter: "*How to read measurements of optional sensors and what options are possible?*").

Residual Current Monitoring vs 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 datacentre when residual currents are metered at many points. It makes sense to have one or more RC-sensors inside each PDU. The search of an RC-fault can thus be limited to a single PDU or segment of that PDU.

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

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

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

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

Information screen about how the PDU is connected to the network:

- 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

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

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

- Mode = hybrid, data bus , bridge, colocation, …

See the chapter "Schleifenbauer data bus: what is it?" in this manual for explanations of the term hybrid, bridge, ….

Through which protocol and over which port the connection is provided for this interface as well as the status, such as off:

- HTTP
- API
- Modbus
- SNMP

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?

In the "About" display you can find the installed firmware version of the device. In this example it is FW02.33.

> It is important that the most recent firmware version is running on the devices. This to ensure good working of the device and data bus. Firmware and service tools can be found on "downloads" page of the Schleifenbauer website
>
> **Software & firmware**
>
> Click here for software & firmware.

How to check for traceability information ?

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

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

⚠ There are three window sizes: S for smartphones, M for tablets and L for monitor screens.
Size of the shown screen is automatically set to the device you are working on.

⚠ Using the web interface means using capacity of the data bus 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 data bus.

How to enlarge a pane in L sized screens?
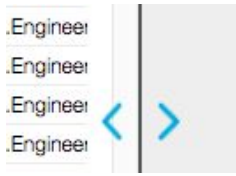
There are two possibilities:

- Using the pane separator: the thin line between < and > sign:

- Using   or

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

Shown is an example of a 3 phase PDU: therefore, you see 3 loads in the "Load" section.

System status		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?
		NOTE: When enabled "Auto reset alert", alerts will be automatically cleared after the chosen time without active alert conditions.

Device status code	The code shows the status of the device in terms of errors:	
	0 OK	Device status is OK.
	1 Alert flagged of	One or more alerts have been flagged. Please check the other alert fields to see the cause the alert. It can be one of the following sources:
		o temperature alert
		o input current alert
		o output current alert
		o input voltage alert
		o output current drop alert
		o input current drop alert
		o sensor change alert
	2 Setting(s) initialized	Some settings have been reset to default values. This may occur after a factory reset or a firmware upgrade.
	4 Power-on reset	The device booted after a power loss. It can be one of the following reasons:
		o because of inserting the PDU power plug (mostly intentional. It can be unintentional if someone removed the power plug accidentally)
		o because of a power outage (unintentional),
		o because of a defect in the internal power supply.
	8 External reset	The device has been reset by pressing the reset button on the unit.
	16 Watchdog timer	The device rebooted due to an internal error.
	32 Brownout detected	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.
	64 Controller error	A hardware error has been detected.
	128 Slave reset	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 current alert[1]	Input current alert raises for inputs, which exceed the user's maximum current setting for that input. In case multiple inputs are in alert state, the highest input will be indicated as number of the phase. '0' is the indication of everything's all right.
Output Current Alert[1]	Output current alert raises for outlets, which exceed the user's maximum current setting for that outlet. In case multiple outlets are in alert state, the highest outlet will be indicated as number of outlet. '0' is the indication of everything's all right.
Input Voltage Alert[1]	Input voltage alert raises in case the voltage on an input drops below normal operating range, even if the drop is very short. In case multiple inputs are in alert state, the highest input will be indicated as number of the phase. '0' is the indication of everything's all right.
Output Current Drop Alert[1]	Output current drop alert raises due to a sudden current drop for an outlet. In case multiple outlets are in alert state, the highest output will be indicated. '0' is the indication of everything's all right.
Input Current Drop Alert[1]	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. '0' is the indication of everything's all right.
Sensor Change Alert[1]	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. '0' is the indication of everything's all right.

(1)   For the alert setting please check System Tab > Settings section > Sensor Change Alert.

Load	Load Example: ext.name 8.54A ▮▮▮▯▯ alert at 12.00A max 16A	Shows the name, load and alert threshold of each input.
name	Default, the name has 8 characters. With the "extended name"-option enabled, you can make use of 18 characters ➢ *See also chapter: System tab > Settings*	
8.54A ▮▮▮▯▯	In a graphical bar the load is presented. As long as the load is under the "alert threshold" the bar will be green	

17.06A ▮▮▮▮▮	However, when the load passes the alert threshold, the bar will turn red. In the meantime 2 things will happen:
	 1) an alert occurs in the "System status" block
	         ➢ *See also chapter: Web Interface > Dashboard tab > System status*
	 2) at the same time the display of the PDU will blink
	         ➢ *See also chapter: Operating the PDU > Alerts: blinking display*	

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

SENSORS – TAB

name	Default, the name has 8 characters. With the "extended name"-option enabled, you can make use of 18 characters ➢ *See also chapter: System tab > Settings*
type	Shows the type of sensor. This is auto detect ➢ *See also chapter: Operating the PDU > description of display screens > Sensor page(s)*
value	Shows the actual sensor value

INPUTS – TAB

#	name	kWh total	subtotal		power (VA)	power (W)	PF	current	peak current	voltage	min voltage	alert current
1	L1	0	0.000	⚠ reset	0	0	100.00	0.00	0.03	229.20	222.35	14.00
2	L2	29	0.044	⚠ reset	0	0	100.00	0.00	0.00	229.48	222.64	14.00
3	L3	4	3.313	⚠ reset	0	0	100.00	0.00	0.00	229.25	222.43	14.00

#	This indicates the number of input phases. In this example, you see 3 lines because a 3 phase PDU is shown. A single phase PDU will show only 1 line
name	Default, the name has 8 characters. With the "extended name"-option enabled, you can make use of 18 characters. If 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

#	name	kWh total	subtotal		power (VA)	power (W)	PF	current	peak current	voltage	alert current	delay	power cycle time	state	
1		0	0	⚠ reset	0	0	100.00	0.00	0.00	229.51	14.00	9	5	on	⚠ unlock
2	L1; test plug	0	0	⚠ reset	0	0	100.00	0.00	0.00	229.48	14.00	0	20	on	⚠ unlock
3		1	1	⚠ reset	0	0	100.00	0.00	0.00	229.36	14.00	0	20	on	⚠ unlock
4	2kW elec. heater	0	0	⚠ reset	2040	2030	99.52	8.82	9.03	231.18	14.00	0	20	on	⚠ unlock
5		0	0	⚠ reset	0	0	100.00	0.00	8.83	231.13	14.00	0	20	on	⚠ unlock

#	This tab gives an overview of the configuration of the PDU. In this example, there are 18 outlets in total of which 18 are both switchable and metered. *The example shows only the first 5 lines, in reality the screen shows 18 lines because 18 outlets!*
name	Default, the name has 8 characters. With the "extended name"-option enabled, you can make use of 18 characters. If 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 outlet *Note: not available on Classic PDU (= without Ethernet port) or DPM27*
power [W]	Real power per outlet *Note: not available on Classic PDU (= without Ethernet port) or DPM27*
PF	Power factor per outlet [%] = 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 outlet
alert current	Field in which the maximum current [A] is configured for this outlet, what the actual current is allowed to reach. Crossing this limit will lead to an alert ➢ *See also chapter: System tab > Reset & Settings*

delay	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.
power cycle time	Configurable downtime when an outlet is power cycled. Which means that after the command to power cycle (shut outlet of and start again) is given, the outlet will be switched on again after the configured downtime has passed. ➢ *See "Unlock" at the end of this table*
state	The state of the outlet. There are several possibilities: current state **on** on **off** off **son** scheduled to switch on **sof** scheduled to switch off **pc** power cycling ➢ *See "Unlock" at the end of this table*
unlock	After the "unlock" sign is clicked, a confirmation is needed to change the state of the outlet. There are 2 possibilities: switch off power cycle ● Switch off ● Power cycle *(See "power cycle time" in this table)* 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. 20 **pc** power cycling

SYSTEM – TAB

Identification 🔒 Locked

firmware version and build	240 - 161208PL837
SPDM version	240
sales order number	2015-33693
product ID	SSCHMB1106-001
serial number	SVNL00040585
hardware address	36176-6129-0
unit address	40585
device name	PDU Blauw A
device location	Demorack
vanity tag	Schleifenbauer

Configuration 🔒 Locked

number of phases	1
number of outlets	18
number of switchable outlets	18
number of metered outlets	18
maximum load (A)	16
number of sensors	3

Reset 🔒 Locked

ℹ Restart CPU will not affect any outlet state!

restart CPU	⚠ restart CPU
reset alerts	⚠ reset alerts
reset peaks and dips	⚠ reset peaks and dips
local alert reset allowed	yes
auto reset alert (s)	5

Settings 🔒 Locked

display backlight timeout	10 seconds
display orientation	horizontal, display at left side
peak duration (ms)	1000
current drop detection	always off
fixed outlet delay (ms)	150
outlet powerup mode	same state as at power down, but delayed by individual out
outlet unlock override	enabled
maximum temperature (°C)	50
sensor change alert	disabled
extended name support	enabled

On the next pages the different sections of this tab are described.
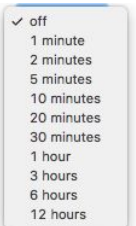
Identification	Identification	Identification and allocation information of the device
	firmware version and build 240 - 161208PL837	
	SPDM version 240	
	sales order number 2015-33693	
	product ID SSCHVIB1106-001	
	serial number SVNL00040585	
	hardware address 36176-6129-0	
	unit address 40585	
	device name PDU Blauw A	
	device location Demorack	
	vanity tag Schleifenbauer	

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 MAC-address of the device controller
unit address	Address of the device on the data bus. Number can be between 1 and 65535. (When using Modbus, number can be between 1 and 247)
device name	Configurable device name, which has a maximum of 16 characters *Note: this field is not connected with the "extended name support" and always max 16 characters*
device location	Configurable location name, which has a maximum of 16 characters *Note: this field is not connected with the "extended name support" and always max 16 characters*
vanity tag	Configurable vanity tag, which has maximal 20 characters *Note: this field is not connected with the "extended name support" and always max 20 characters*

Configuration	Configuration	Configuration information of the device
	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
number of sensors	Shows the total number of sensors detected *Note: this is autoconfig so after sensors are added or taken out, the system recognizes this and change the information*

Reset	Reset	Restart controller and resetting alerts (manually / automatically)
	Restart CPU will not affect any outlet state! restart CPU ⚠ restart CPU reset alerts ⚠ reset alerts reset peaks and dips ⚠ reset peaks and dips local alert reset allowed yes ⇕ auto reset alert (s) 5	

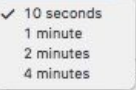|	
restart CPU	This is a reboot of the controller of the PDU. After restarting all alerts and peak registrations will be erased. Be assured: **power distribution will NOT BE INTERRUPTED during this restart**!
reset alerts	Clears all the alerts on the device. Of course resetting alerts does not mean that 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)	In this drop-down menu, you can select how much time it will take to automatically clear alerts after the alert condition disappeared. Be sure that alerts are registered by your management software.	✓ off 1 minute 2 minutes 5 minutes 10 minutes 20 minutes 30 minutes 1 hour 3 hours 6 hours 12 hours

Settings	Settings 🔒 Locke display backlight timeout — 10 seconds display orientation — horizontal, display at left side peak duration (ms) — 1000 current drop detection — always off fixed outlet delay (ms) — 150 outlet powerup mode — same state as at power down, but delayed by individual ou outlet unlock override — enabled maximum temperature (°C) — 50 sensor change alert — disabled extended name support — enabled
display backlight timeout	Setting for switching off display backlight after certain set time: ✓ 10 seconds 1 minute 2 minutes 4 minutes
display orientation	Setting for the orientation of the LCD display. It can be set as: no display vertical, display on top vertical, upside down ✓ horizontal, display at left side horizontal, display at right side
peak duration [msec]	Configurable time in milliseconds that a current overload can occur before an alert is given. *Note: do not make this time too short because otherwise alerts keep on raising!*

current drop detection	In this drop-down menu, you can select what kind of current drops must be detected. 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. For example: ● 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
fixed outlet delay [msec]	Setting for delay time between 2 switch actions in milliseconds. Default value is 100 milliseconds and values below 100 milliseconds are not accepted.
outlet power up mode	Shows the behavior of the outlets when a PDU is powered. It can be set as: ● off: at power up, all the outlets are kept in the off state. ● same state as power down: At power up, all the outlets are set to their last known state by respecting the fixed outlet delay. ● same state as power down, but delayed by the individual outlet delay: At power up, all the outlets are set to their last known state, but delayed by the individual outlet delay.
outlet unlock override	Setting for overriding the outlet unlock registers. When this setting is enabled outlets can be switched or power cycled without unlocking them first. *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.* *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.*
maximum temperature [°C]	Shows the value of the upper limit that the maximum temperature is allowed to reach in degrees Celsius. An alert will be raised if the temperature of any connected temperature sensor exceeds the set value. It can be disabled by setting it to '0'.
sensor change alert	Informs about the change in sensors such as new sensor, disconnected sensor or broken sensor for this device.
extended name support	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. ● 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 simultaneous and independent of each other. ● when the device is configured in bridge mode, all connected devices should support the extended name feature to work properly.

INTERFACES – TAB

Network Status

network state	bound to static IP
IP address	192.168.9.221
subnet mask	255.255.255.0
gateway	192.168.9.254
hostname	Schleifenbauer_SVNL00028910

Network Configuration 🔒 Locked

DHCP & Static IP Settings

DHCP	disabled ⬍
DHCP fallback to static IP	enabled, will fallback to static IP on failure ⬍
DHCP fallback delay (s)	60
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
hostname	Schleifenbauer_SVNL00028910

Access Control 🔒 Locked

ℹ️ 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

ℹ️ 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	84.105.79.102	
allowed IP range 1	0.0.0.0	/ 0
allowed IP range 2	0.0.0.0	/ 0
allowed IP range 3	0.0.0.0	/ 0

Behavior

ℹ️ 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

ℹ️ In colocation mode, firmware upgrades over Ethernet are blocked.

device mode	hybrid ⬍

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

www.schleifenbauer.eu

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	Describe the WebAPI custom authentication and resource requests
SPDM 2.xx (Schleifenbauer Products Data Model)	List of all registers and their settings. These must be used when the API's
SPBUS_protocol	Provide 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.

How to change SNMPv3 settings?

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.

How to use the 'connected devices' section in the web interface?

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.
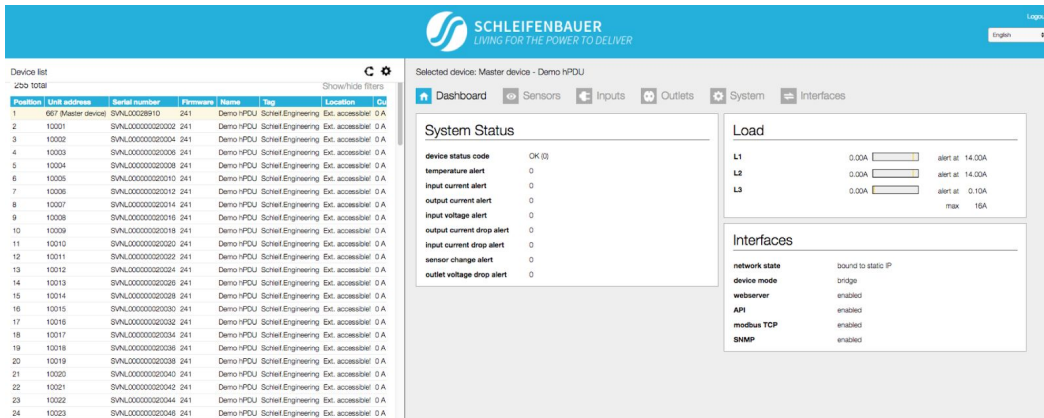
How about login profiles, usernames and passwords?

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 data bus 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.

How to change factory passwords?

<div style="border: 1px solid red">

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

</div>

User management	In tab "Interfaces", block "User management" passwords can be changed.
User management form: username / action super role — super — cancel username — super * An empty username will disable the account ☑ change password new password repeat password ☐ change snmpv3 settings	There are five login profiles: 1. Viewer = viewing only 2. User = Viewer + resetting alerts and switching outlets 3. Power = User + resetting subtotals 4. Admin = all administrator rights And the "factory profile": 5. Super. Please keep in mind that 'super' user profile should never be used since it allows changing the configuration of PDU.

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 ▼]

<div style="border: 1px solid red">

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

</div>

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:

<div align="center">

192.168.1.220

(subnet mask: 255.255.255.0)

</div>

How to configure the IP settings manually?

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

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.

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 data bus 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 data bus 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 data bus 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 the FW Updater Tool

In the Firmware Updater Tool-manual you will find all necessary actions to up- or downgrade
For updating the firmware you need a tool which can be found on our website on the download page. On this page a manual is available

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Actions: In the updater manual is exactly described what to do when upgrading the firmware. In summary:
- first download and upgrade this Gateway firmware (when used in the data bus); in this firmware an updater tool is integrated
- download the zip file of the Firmware Updater tool
- download the required firmware
    - Classic PDU: SPFW-01..- series
    - PDU: SPFW-02.. -series
- unzip the updater tool
- run the updater tool; via this updater tool the firmware will be downloaded to all devices in the ring.

The PDU firmware updater tool is available for Windows, Mac OS and Linux.
The Gateway firmware is available for Windows en Mac OS

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.

Schleifenbauer data bus: what is it?

Schleifenbauer webinterface

BRIDGED DEVICES

> BRIDGE mode < > HYBRID mode < > HYBRID mode < > HYBRID mode <
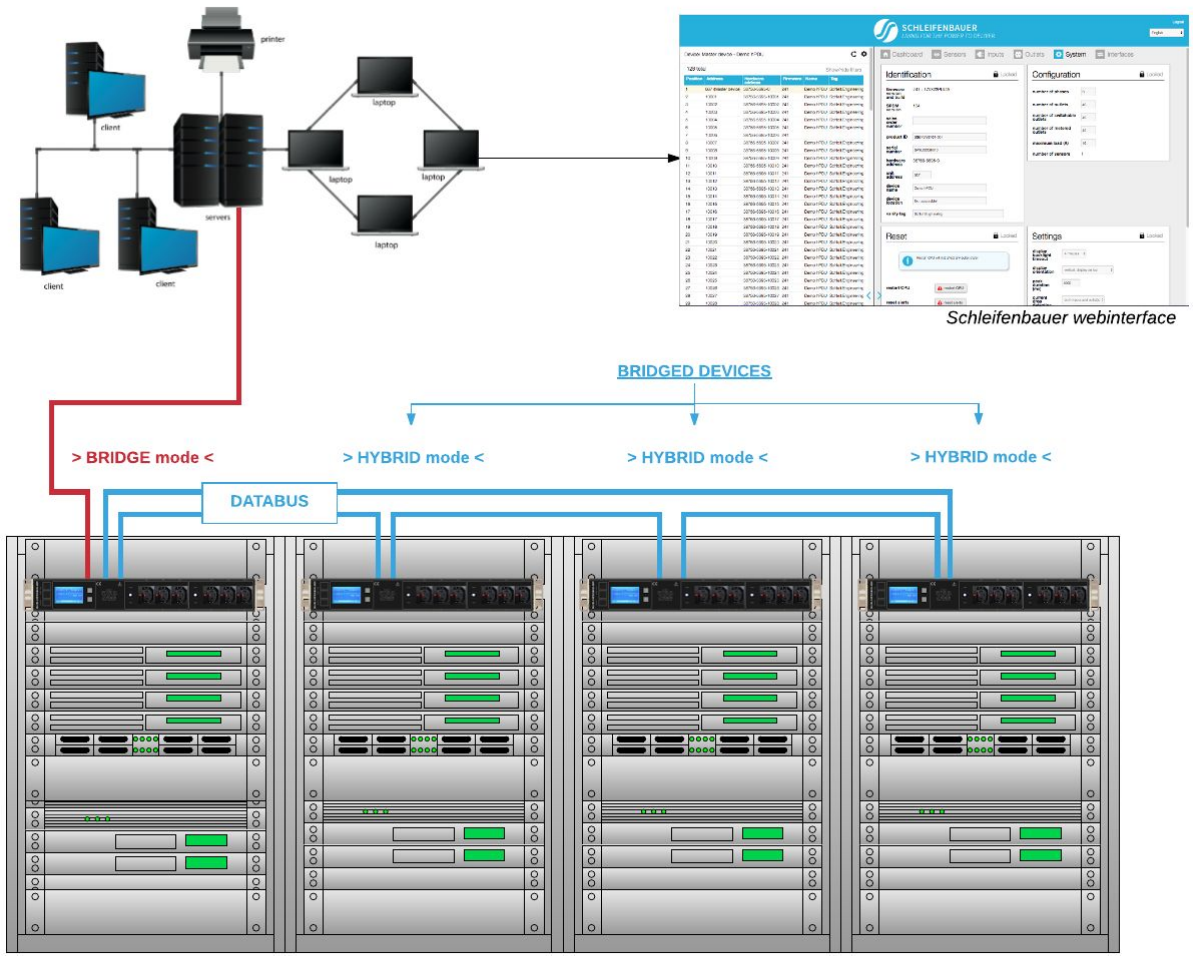
DATABUS

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 data bus via the web interface, MODBUS and SNMP.

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

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

Advantages of the data bus:
- 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 data bus
- 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 data bus" on the PDU

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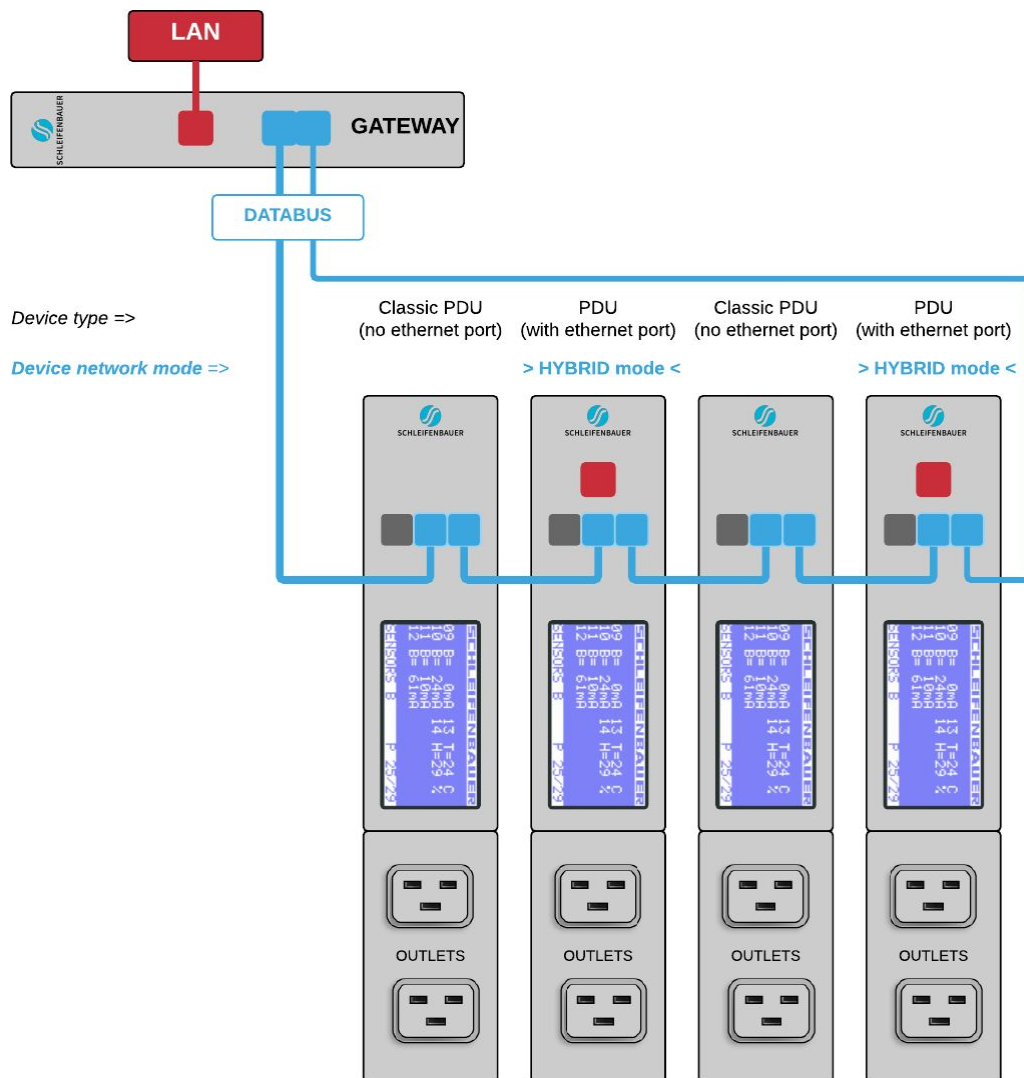
In the figure above you see a small data bus-ring with four PDUs connected to the Schleifenbauer Gateway. The Classic PDU has NO ethernet port, so a (Schleifenbauer) Gateway is needed in order to get PDUs connected to your LAN.

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

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

> Data bus 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 data bus to LAN without a Gateway? …using a PDU
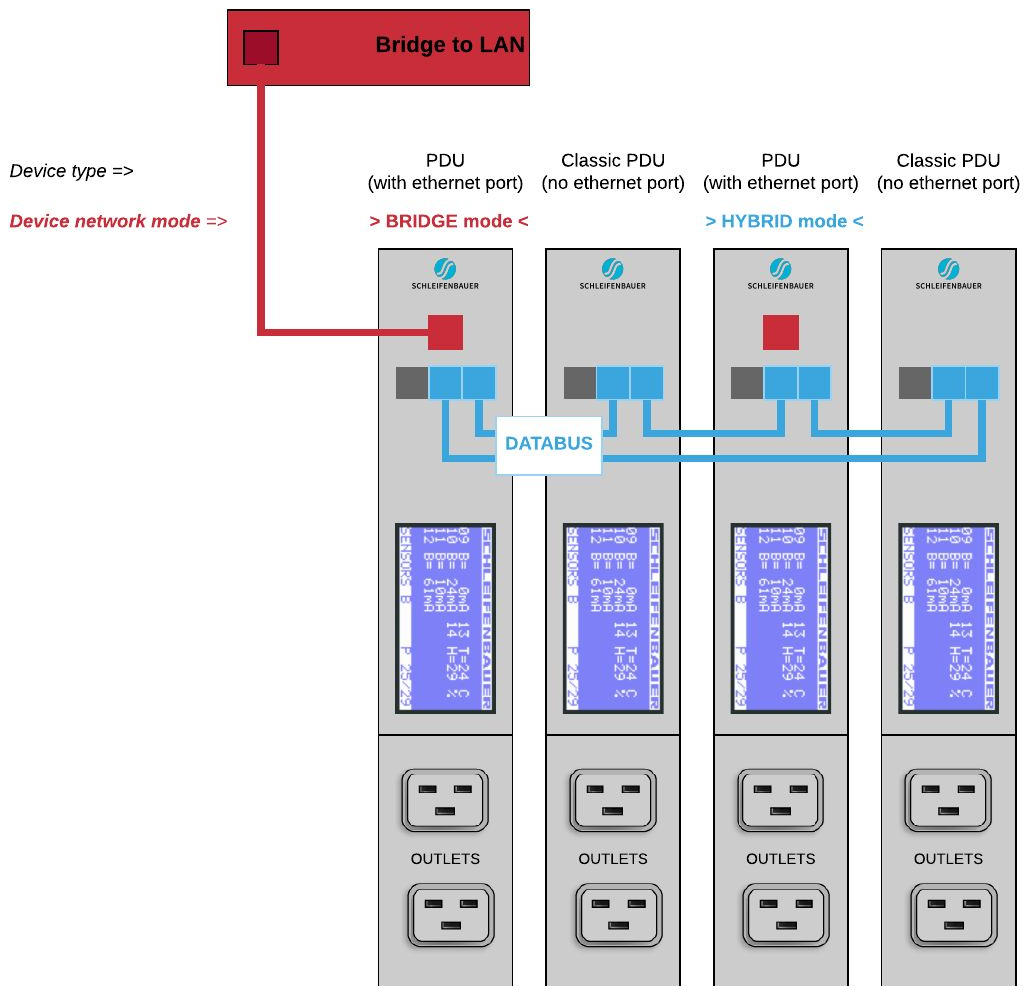
In the figure you see a small data bus-ring with only four devices connected to a LAN: a Classic PDU and PDU with ethernet port. The device connected to the LAN must have an ethernet port and be in "BRIDGE" mode. All other devices should be in "Hybrid" mode. The BRIDGED device takes over the function 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 data bus-ring. But, the more devices you place in the data bus-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 data bus ring. So it is best to connect the last device in

the data bus to the device which is in BRIDGE-mode. In a closed data bus ring you can reach all connected devices via IN and OUT data bus 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 can not be used

> Data bus 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

MAINTENANCE & TROUBLESHOOTING

The PDU is equipped with advanced electronics for running the software. Under exceptional circumstances, a fault may arise in the software. In most cases, resetting the software will resolve the fault:

How to perform a "Software reset"?

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.

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% NC
Level of pollution	2
Environment	Indoors IP20
Installation category	II
Protective rating	II
Conditions of use	Continuous

Voltage: single-phase 230 V; three-phase 230/400 V
Frequency: 50 Hz.
Permitted load: see product information on your PDU
Accuracy: EN 50470-1/3 class B
        EN 62053-21: class 1, ± 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/en

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.