NEOXPacketRaven Hybrid Singlemode/Multimode 1G Fiber TAPs

with Data Diode Function

QUICK USER GUIDE

SecurITy made in Germany

Trust Seal www.teletrust.de/itsmig

CRITIS APPROVED

IEC62443 APPROVED

Hybrid Fiber Network TAPs with media conversion and signal regeneration are decoupling elements for passive, secure and reliable tapping of network data in optical networks. These TAPs are looped into the fibre-optic line to be monitored and route out the entire data traffic while maintaining data integrity, without interruption and without packet loss.

Using conventional SPAN ports, also known as mirror ports, on the other hand, can distort the result, as this copying process works in store-and-forward mode and, for example, discards FCS/CRC faulty packets on OSI layer 2 instead of providing these Ethernet frames to the security or monitoring tool.

Our Network TAPs do not have a MAC or IP address, but work entirely on OSI Layer 1 and cannot be traced in the network without special and expensive measuring equipment. Hackers and attackers therefore have no chance. As the integrity of the outgoing data remains unaltered due to this tapping method, our Network TAPs are increasingly used in the areas of network forensics, security and monitoring.

Furthermore, our hybrid 1000Base Fiber TAPs behave passively on the network side, which means that there is no interruption of network traffic in the event of a TAP power supply failure. In order to ensure the highest possible reliability on the monitoring side, our hybrid Fiber TAPs have redundant power supplies, but can also be additionally operated or fused with 12-48V DC voltage.

Additionally, our TAPs work like a Data Diode and the monitoring ports are physically isolated from the network ports, which prevents access to the network via the monitoring ports on the hardware side for security reasons. Therefore, our hybrid Fiber TAPs guarantee a reliable network analysis or security investigation without compromise.

These models in the PacketRaven Network TAPs product family were designed as portable TAPs, but can also be installed in a 19" mounting frame in data centers using a mounting kit or on a DIN rail using a DIN rail clip.

Our active hybrid FIber TAPs support a network speed of 1000Mbps (1000Base-SX, 1000Base-LX and 1000Base-ZX).

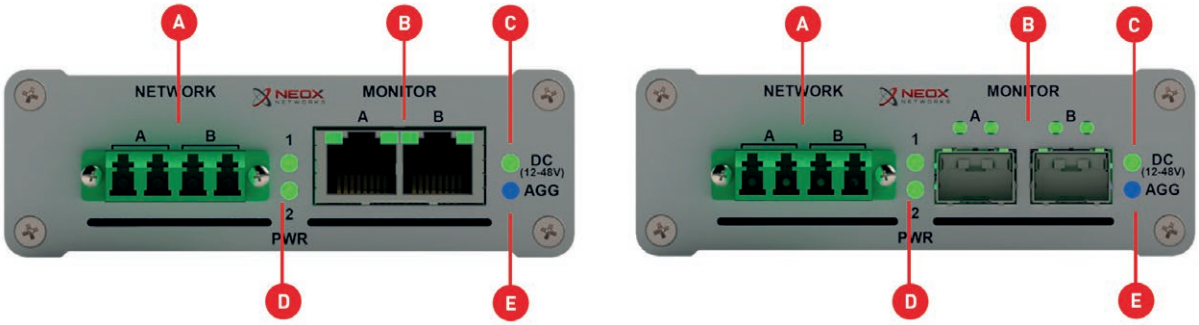
With PacketRaven Fiber TAPs you get permanent network access without risk and provide e.g. your monitoring tools with 100% reliable network data - without introducing a single point of failure.

- Full Network Transparency
- No impairment of Data Traffic
- 100% Network Data
- Invisible for Attackers
- No Network Access via Monitoring Port
- Flexible to Use
- Plug-n-Play
- Failure Protection on Power Loss
- Redundant Power Supply
- Various Split Ratios
- Fast and Precise
- Support Jumbo Frames
- Made in Germany

1. More Highlights

- Plug-n-Play, no complex configuration necessary
- Secure, rock-solid FPGA-based design
- Support for up to 16k jumbo frames
- Mirrors 100% of traffic including FCS/CRC errored packets that may be dropped by SPANs discarded
- Various mounting options available
- Can be powered by redundant AC/DC power supplies (5V)
- Designed, assembled, certified and tested in Germany

2. Front View - Connections and LEDs



(A) LC Network ports A & B

(B) RJ45/SFP Monitoring ports A & B and Status LEDs *(see section 2.1)*

(C) 12-48V DC power LED *(see section 3.)*
If power is supplied via the 12-48V DC connection, this LED lights up.

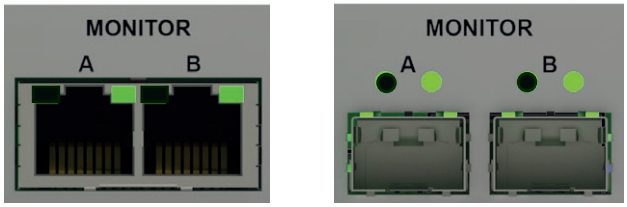
(D) 2 power LEDs for AC/DC 5V *(see section 3.)*
It is possible to connect up to 2 power supply units to ensure power supply redundancy.

(E) Aggregation-Modus LED *(see section 6.1)*
If the Aggregation mode is activated instead of the standard Breakout mode, this LED lights up.

2.1 Front View - Meaning of the Port LEDs

The right-hand port LED lights up if there is a functioning 1G connection.

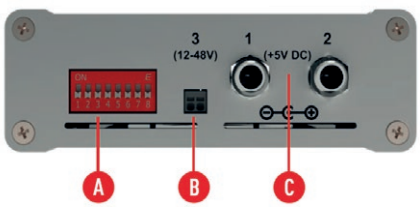
If network data is also being transmitted, the right-hand port LED starts flashing.



3. Back View

(A) DIP switch for setting the TAP mode *(see section 6.)*

(B) Connection for 12-48V DC voltage.
The polarity at the DC connection is irrelevant, since the TAP automatically detects the live wire and supplies the power supply to the TAP in the required form!



(C) Redundant connections for AC/DC power supplies (5V)
For reasons of compatibility and EMC protection, our TAPS may only be operated with the supplied power supplies certified together with the TAP. If the TAP is nevertheless operated with power supplies other than those supplied, any warranty claim granted for the TAP will be voided!

4. Mounting options

TAPs with rack mount frame bracket or DIN rail clip can of course also be used in mobile applications!

1. Mobile Use

Portable models - these models have no special mounting options and are primarily designed for mobile use.

PacketRaven Network TAP for mobile use

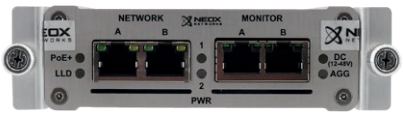
Handy & portable

2. Server Rack Mounting

To install our portable TAPs in a server rack, you need our server rack mounting frame with item number PRP-1U3-V2, as well as a rackmount frame mounting kit (item number PRP-1U3-CLIP) for the TAP.
The server rack mounting frame PRP-1U3-V2 provides space for up to 3 portable PacketRaven Network TAPs. Both components are available as accessories.

After removing the rackmount kit brackets of the TAP, if any, **DO NOT screw** the screws **without brackets** into the enclosure, otherwise sensitive parts could be damaged!

Server rack mounting frame PRP-1U3-V2
for up to 3 PacketRaven portable Network TAPs



TAP with rack mounting kit for
server rack mounting frame PRP-1U3-V2

3. DIN Rail Mounting

As a further alternative, we also offer a top-hat rail clip for our TAPs for mounting on a TS35/7.5 DIN top-hat rail. This clip can be rotated by 180° so that the connections of the TAP can be aligned according to the respective requirements. This DIN rail clip, available as an accessory, has the item number PRP-DIN-CLIP.

After removing the DIN rails clip, if any, **DO NOT screw** the screws into the TAP housing **without the clip**, otherwise sensitive parts could be damaged!

TS35/7.5 DIN rail

Network TAP
with DIN rail clip

5. Advanced functions of Hardened TAPs

Preconfigured

Our Network TAPs with RJ45 monitoring output work like a data diode and thus physically isolate the monitoring ports from the network ports. This ensures that, for security reasons, access to the network via the monitoring ports is prevented on the hardware side.

Secure Boot

PacketRaven Network TAPs are therefore already in the standard version among the network components through which an attack vector is excluded.

For high-security areas according to IEC 62443 and critical infrastructures (CRITIS), however, even this is sometimes not sufficient, which is why NEOX Networks now also offers a specially hardened version of its TAPs.

Security Seal

If desired, these TAPs can be delivered pre-configured and then do not allow any subsequent configuration changes.
In addition, they are secured against unwanted or unnoticed opening by special screws and security seals.

Safety Screws

And to round it all off, these TAPs also have a specially secured and encrypted firmware. Secureboot checks each time the TAP is started whether the firmware to be executed has a valid signature and an authorised public key. If this is not the case, the TAP cannot be put into operation.

6. Split Ratios / Light Extraction

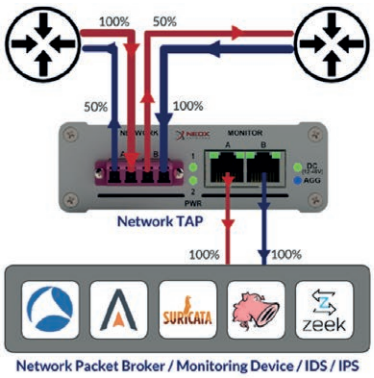
In order to tap data from an optical network connection, it is necessary to decouple or split a part of the available light signal.

The split ratio is the ratio of the amount of light that is still available for the fiber optic network connection in relation to the amount of light that is diverted or split off to the monitoring ports of the (passive) fiber optic Network TAPs.

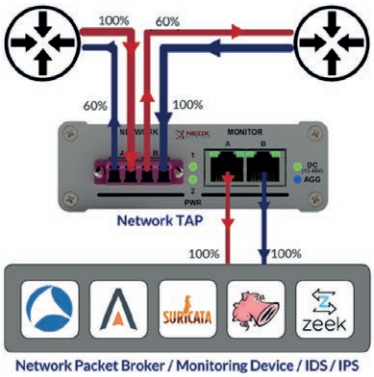
A split ratio of e.g. 70/30 means that 70% of the light is still available for the network connection and 30% is split off for the monitoring ports.

However, as these TAPs have a copper or SFP-based monitoring output, 100% signal strength is available by means of OEO conversion - i.e. conversion of the optical signal into an electrical signal - in contrast to fiber-based monitoring ports.

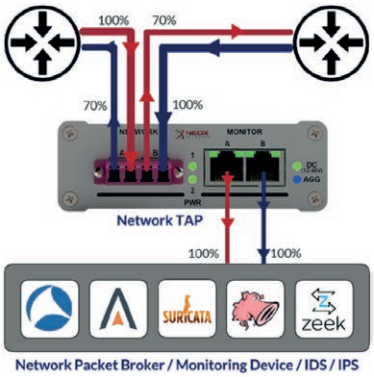
Fiber TAP 50/50 Split Ratio



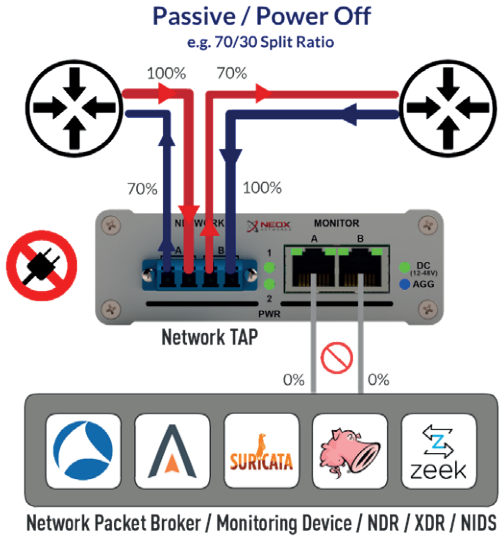
Fiber TAP 60/40 Split Ratio



Fiber TAP 70/30 Split Ratio



7. Data Diode Function



Data diodes ensure unidirectional communication and ensure that data traffic can only flow in one direction.

Unidirectional network devices are typically used to ensure information security or the protection of critical digital systems, such as industrial control systems or production networks from cyber attacks.

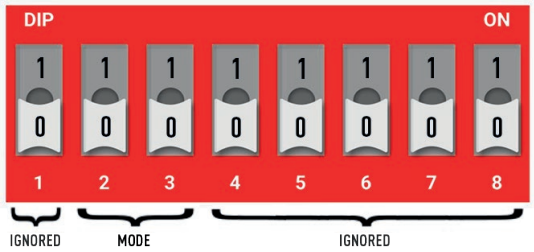
Our TAPs work like a diode and do not allow access to the network via the monitoring ports for security reasons.

By adding this further layer of security, it is therefore not possible to compromise the network connection and the productive network.

8. Individually configured available

Due to the FPGA chipset on which our active TAPs are based, it is possible to programme these models according to customer-specific requirements.
For example, TAPs with fixed operating mode and/or fixed speed, time stamping of outgoing packets, and much more.

9. DIP Switch Configuration



As shown in the figure on the left, the second and third switches are used to select the operating mode.

The switches numbered 1, 4, 5, 6, 7 and 8 are ignored and left for future use.

The desired configuration should be set before plugging in the network cable.

If an invalid configuration has been selected, all LEDs on the unit light up and the relay switches are not activated. In this case, switch off the unit and check the DIP switches.

When changing the configuration by means of DIP switches, it is always necessary to perform a restart by disconnecting the power supply so that the new settings are activated!

In case of a restart, however, there is no interruption of the network traffic!

9.1 Operating Mode Configuration

Please note that no matter which operating mode you set, the link speed of the RJ45 monitoring port will always be negotiated with 1000Base-T. In the case of a TAP with SFP monitoring port the link speed is negotiated with 1000Base-T, 1000Base-SX, 1000Base-LX or 1000Base-ZX, depending on the transceiver type.

When selecting the operating mode ***(switches 2 & 3)***, the configuration is as follows:

• **Aggregation**: In this mode, the data streams are bundled and output aggregated on both of the monitoring ports. This allows you to evaluate the network data of a full duplex line simultaneously with a single network interface on your analyzer. Due to the aggregation in hardware (FPGA), faulty packet sequences during recording are a thing of the past in this mode.

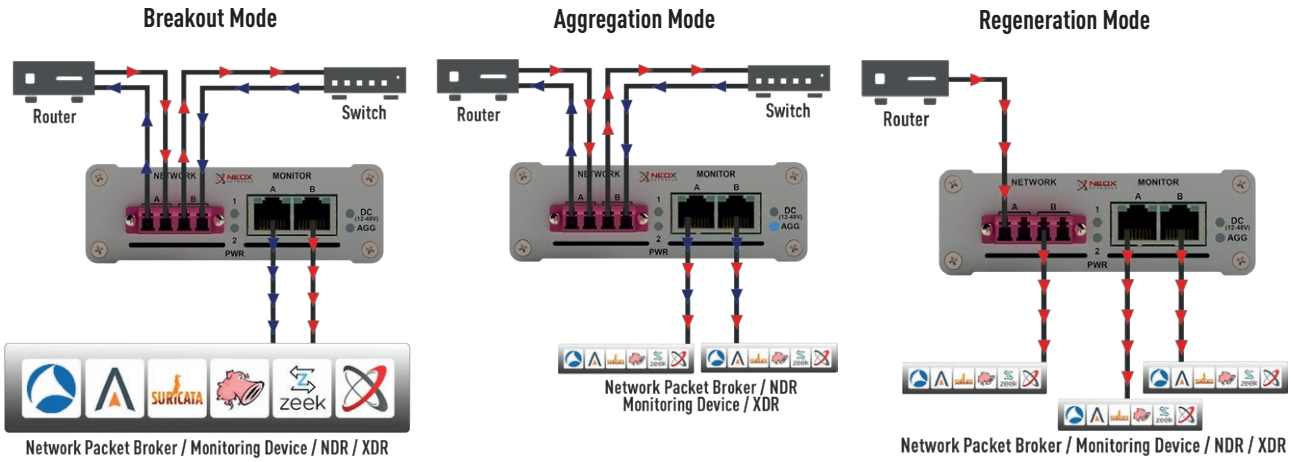
Switch value 01

• **Breakout**: Each Ethernet packet transmitted via the network line is mirrored separately in this mode while maintaining data integrity in the TAP. The send and receive directions are output separately on the two monitoring ports so that the network traffic can be analysed per data direction in this case. Another great advantage of the Breakout mode is the visibility of the network traffic even with a fully loaded network connection.
In this mode, the set network speed is transferred to the monitoring ports.

Switch value 00

• **Regeneration**: Regeneration is used to capture 100% full duplex traffic that can be sent to multiple monitoring devices (up to 3 in this case) for analysis of your network.
In this mode, the network speed settings are synchronised as in Breakout mode and the setting on the DIP switch is applied to all ports.

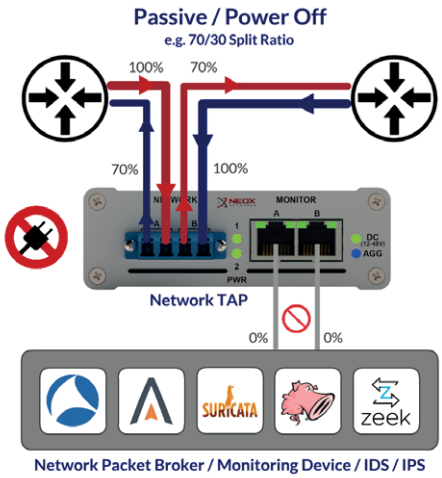
Switch value 10



9.2 Passive / Power Off Mode

If the power supply fails, the active network connection is not interrupted.

Only the devices connected to the monitoring port are no longer supplied with data.



10. Connection reliability in case of power loss

With all our active Hybrid Network TAPs it is guaranteed that a loss of the TAP power supply will not lead to a failure of the active network line.

Only the devices connected to the monitoring port may no longer be supplied with data.

11. Technical Specifications

NETWORK TAP	
Dimensions:	10.60 cm x 3.50 cm x 16.40 cm
Weight:	460g
Consumption:	max. 3 Watt at 5V/0.6A
Storage Temperature:	-40° to 70°C
Operating Temperature:	0° to 40°C
Relative humidity in operation:	20% to 80%, non-condensing
Certifications:	CE, FCC, RoHS, WEEE, EN 55032 KL. A/B, EN 55035, EN 61000-3-2, EN 61000-3-3, EN 61000-6-2 EN 50121-4:2016*, EN 50129*

** Hardened TAPs*

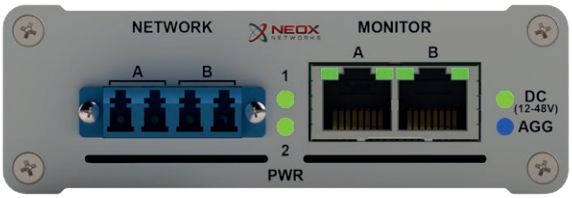
POWER SUPPLIES **	
Input Voltage:	110V-240V AC 50-60Hz
Output Voltage:	5V DC
Output Current:	2A
Power:	max. 10 Watt
Power Plug:	with interchangeable plug head
5V Cable	with ferrite ring
5V Plug	- Screwable hollow plug - 5.5 mm outer diameter - 2.1 mm inner diameter

*** Optional power supply units available for connection via C13-C14 cable (s. Accessories)*

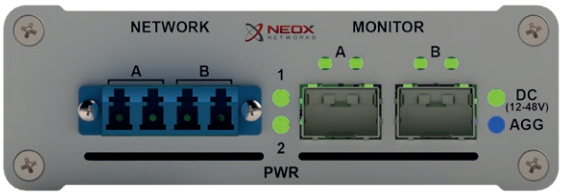
ATTENUATION VALUES				WAVELENGTH
SPLIT RATIO (OTHERS ON REQUEST)	50:50	60:40	70:30	
Singlemode OS1, OS2	3.4 dB / 3.4 dB	2.5 dB / 4.5 dB	1.7 dB / 5.8 dB	1310nm/1550 nm
Multimode OM3, OM4, OM5	3.8 dB / 3.8 dB	2.8 dB / 4.8 dB	2.2 dB / 6.1 dB	850nm

12. Models - Network TAPs

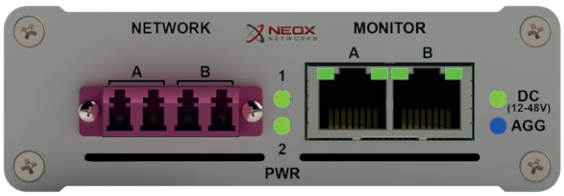
If you need a TAP with DIN rail mounting clip, please additionally order the mounting clip **PRP-DIN-CLIP**!
If you need a TAP with rackmount frame front panel, please order the **PRP-1U3-CLIP** front panel additionally!
(see „Mounting Options")!



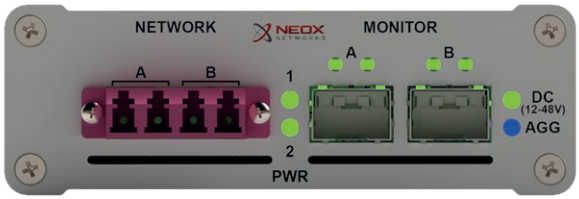
PRP-OS2-SLC-x / PRP-OS2-SLZC-x



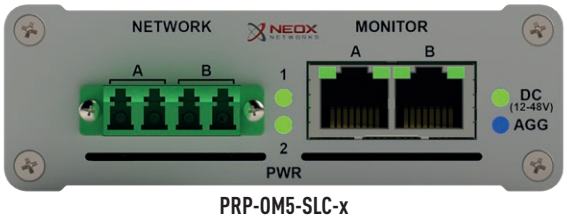
PRP-OS2-SLS-x / PRP-OS2-SLZS-x



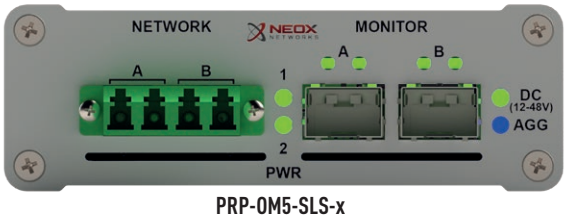
PRP-OM4-SLC-x



PRP-OM4-SLS-x



PRP-OM5-SLC-x



PRP-OM5-SLS-x

STANDARD SINGLEMODE MODELS							
All TAPs for fiber type OS2 are also OS1 compatible!							
ITEM NO.	STANDARD	NETWORK	FIBER TYPE	WAVE-LENGTH	INTERFACES NETWORK / MONITORING		OPERATING MODES
PRP-OS2-SLC-*	1000Base-LX	1G	OS2	1310 nm	LC Singlemode	RJ45	Aggregation, Breakout, Regeneration
PRP-OS2-SLS-*	1000Base-LX	1G	OS2	1310 nm	LC Singlemode	SFP	Aggregation, Breakout, Regeneration
PRP-OS2-SLZC-*	1000Base-ZX	1G	OS2	1550 nm	LC Singlemode	RJ45	Aggregation, Breakout, Regeneration
PRP-OS2-SLZS-*	1000Base-ZX	1G	OS2	1550 nm	LC Singlemode	SFP	Aggregation, Breakout, Regeneration

** respective split ratio - e.g. „**70**" for a split ratio of 70:30, „**60**" for 60:40, and „**50**" for 50:50*

// NEOX**PacketRaven**

HARDENED SINGLEMODE MODELS

All TAPs for fiber type OS2 are also OS1 compatible!

ITEM NO.	STANDARD	NET-WORK	FIBER TYPE	WAVE-LENGTH	INTERFACES NETWORK / MONITORING		OPERATING MODES
PRP-OS2-SLC-*-**1GA**-S	1000Base-LX	1G	OS2	1310 nm	LC Singlemode	RJ45	Aggregation, Breakout, Regeneration
PRP-OS2-SLC-*-**1GAO**-S	1000Base-LX	1G	OS2	1310 nm	LC Singlemode	RJ45	Aggregation
PRP-OS2-SLC-*-**1GBO**-S	1000Base-LX	1G	OS2	1310 nm	LC Singlemode	RJ45	Breakout
PRP-OS2-SLZC-*-**1GA**-S	1000Base-ZX	1G	OS2	1550 nm	LC Singlemode	RJ45	Aggregation, Breakout, Regeneration
PRP-OS2-SLZC-*-**1GAO**-S	1000Base-ZX	1G	OS2	1550 nm	LC Singlemode	RJ45	Aggregation
PRP-OS2-SLZC-*-**1GBO**-S	1000Base-ZX	1G	OS2	1550 nm	LC Singlemode	RJ45	Breakout

** respective split ratio - e.g. „**70**" for a split ratio of 70:30, „**60**" for 60:40, and „**50**" for 50:50*

STANDARD MULTIMODE MODELS

All TAPs for fiber type OM4 are also OM3 compatible! All TAPs for fiber type OM5 are also OM4 and OM3 compatible!

ITEM NO.	STANDARD	NET-WORK	FIBER TYPE	WAVE-LENGTH	INTERFACES NETWORK / MONITORING		OPERATING MODES
PRP-OM4-SLC-*	1000Base-SX	1G	OM4	850 nm	LC Multimode	RJ45	Aggregation, Breakout, Regeneration
PRP-OM4-SLS-*	1000Base-SX	1G	OM4	850 nm	LC Multimode	SFP	Aggregation, Breakout, Regeneration
PRP-OM5-SLC-*	1000Base-SX	1G	OM5	850 nm – 950 nm	LC Multimode	RJ45	Aggregation, Breakout, Regeneration
PRP-OM5-SLS-*	1000Base-SX	1G	OM5	850 nm – 950 nm	LC Multimode	SFP	Aggregation, Breakout, Regeneration

** respective split ratio - e.g. „**70**" for a split ratio of 70:30, „**60**" for 60:40, and „**50**" for 50:50*

HARDENED MULTIMODE MODELS

All TAPs for fiber type OM4 are also OM3 compatible! All TAPs for fiber type OM5 are also OM4 and OM3 compatible!

ITEM NO.	STANDARD	NET-WORK	FIBER TYPE	WAVE-LENGTH	INTERFACES NETWORK / MONIT.		OPERATING MODES
PRP-OM4-SLC-*-**1GA**-S	1000Base-SX	1G	OM4	850 nm	LC Multimode	RJ45	Aggregation, Breakout, Regeneration
PRP-OM4-SLC-*-**1GAO**-S	1000Base-SX	1G	OM4	850 nm	LC Multimode	RJ45	Aggregation
PRP-OM4-SLC-*-**1GBO**-S	1000Base-SX	1G	OM4	850 nm	LC Multimode	RJ45	Breakout
PRP-OM5-SLC-*-**1GA**-S	1000Base-SX	1G	OM5	850 nm – 950 nm	LC Multimode	RJ45	Aggregation, Breakout, Regeneration
PRP-OM5-SLC-*-**1GAO**-S	1000Base-SX	1G	OM5	850 nm – 950 nm	LC Multimode	RJ45	Aggregation
PRP-OM5-SLC-*-**1GBO**-S	1000Base-SX	1G	OM5	850 nm – 950 nm	LC Multimode	RJ45	Breakout

** respective split ratio - e.g. „**70**" for a split ratio of 70:30, „**60**" for 60:40, and „**50**" for 50:50*

13. Accessories

INSTALLATION & MOUNTING	
ITEM NO.	**DESCRIPTION**
PRP-1U3-V2	Server rack mounting frame for 3 portable TAPs
PRP-1U3-BP-V2	Blank plate for mounting frame PRP-1U3-V2
PRP-1U3-CLIP	TAP rackmount frame bracket for server rack monuting frame PRP-1U3-V2
PRP-DIN-CLIP	TAP DIN rail mounting clip

PRP-DIN-CLIP

PRP-1U3-CLIP

PRP-1U3-V2 PRP-1U3-BP-V2

POWER SUPPLIES & ACCESSORIES	
ITEM NO.	**DESCRIPTION**
PRP-PS-INT	PSU with EU, UK, and US plug head
PRP-PS-*-A	Plug head *EU, *UK or *US
PRP-PS-EU	Power supply unit with EU plug (head)
PRP-PS-UK	Power supply unit with UK plug (head)
PRP-PS-US	Power supply unit with US plug (head)
PRP-PS-C14-25W	Power supply unit with C14 socket - connected to PSU via C13-C14 cable

PRP-PS-INT

PRP-PS-C14-25W

ITEM NO.	SFP TRANSCEIVER
NX-SFP-TX-1G	10/100/1000Base-T SFP transceiver, supports connection lengths of up to 100 m
NX-SFP-FX-100M	100Base-FX SFP transceiver, Multimode, 1310nm, supports connection lengths of up to 2 km
NX-SFP-SX-1G	1000Base-SX SFP transceiver, Multimode, 850nm, supports connection lengths of up to 550 m
NX-SFP-LX10-1G	1000Base-LX SFP transceiver, Singlemode, 1310nm, supports connection lengths of up to 10 km
NX-SFP-LX20-1G	1000Base-LX SFP transceiver, Singlemode, 1310nm, supports connection lengths of up to 20 km
NX-SFP-LX40-1G	1000Base-LX SFP transceiver, Singlemode, 1310nm, supports connection lengths of up to 40 km
NX-SFP-ZX80-1G	1000Base-ZX SFP transceiver, Singlemode, 1550nm, supports connection lengths of up to 80 km
NX-SFP-ZX120-1G	1000Base-ZX SFP transceiver, Singlemode, 1550nm, supports connection lengths of up to 120 km
NX-SFP-ZX160-1G	1000Base-ZX SFP transceiver, Singlemode, 1550nm, supports connection lengths of up to 160 km

NEOX NETWORKS GmbH
Monzastr. 4 · 63225 Langen · Germany
+49 6103 / 37 215 910 · solutions@neox-networks.com · www.neox-networks.com

// NEOX**PacketSolutions**

NEOX NETWORKS
NEXT GENERATION NETWORK VISIBILITY

PACKETRAVEN

Modular, Portable and Virtual NETWORK TAPS for up to 400G

PACKETFALCON

Portable & Compact NETWORK FORENSICS Appliances

PACKETGRIZZLY

Modular & Scalable NETWORK FORENSICS Solution

PACKETLION

High-End NETWORK PACKET BROKER for up to 400G

PACKETTIGER

Cost Efficient Next-Gen NETWORK PACKET BROKER
as Appliance or Virtual

PACKETWOLF

Advanced PACKET PROCESSING up to 400Gbps

NEOX NETWORKS
NEXT GENERATION NETWORK VISIBILITY

NEOX NETWORKS GmbH
Monzastr. 4 · 63225 Langen · Germany
+49 6103 / 37 215 910 · solutions@neox-networks.com · www.neox-networks.com