

SHDSL.bis
Up to 60Mbps
E1 / Nx64 /Ethernet

FlexDSL Orion3



Features

- Up to 15Mbps Data Transmission per Copper Pair
- SHDSL and SHDSL.bis, TC-PAM16/32
- Additional TC-PAM4/8/64/128 Available
- 1, 2 or 4 Copper Pairs Support
- 2 or 4 Port Ethernet Switch (10/100BaseT)
- SFP connector for mixed Copper and Fiber applications
- QoS, VLAN and RSTP Support
- E1 (G.703/704, Balanced/Unbalanced)
- Nx64 (V.35, V.36, X.21, V.28) and RS-232/485
- Multi-Service Operation
- Point-to-Point and Point-to-Multipoint Operation
- Console Port, Telnet, Web, SNMP Management
- 24/48VDC Powered, Low Power Consumption
- Included Primary Protection
- Robust DIN-Rail Metal Enclosure

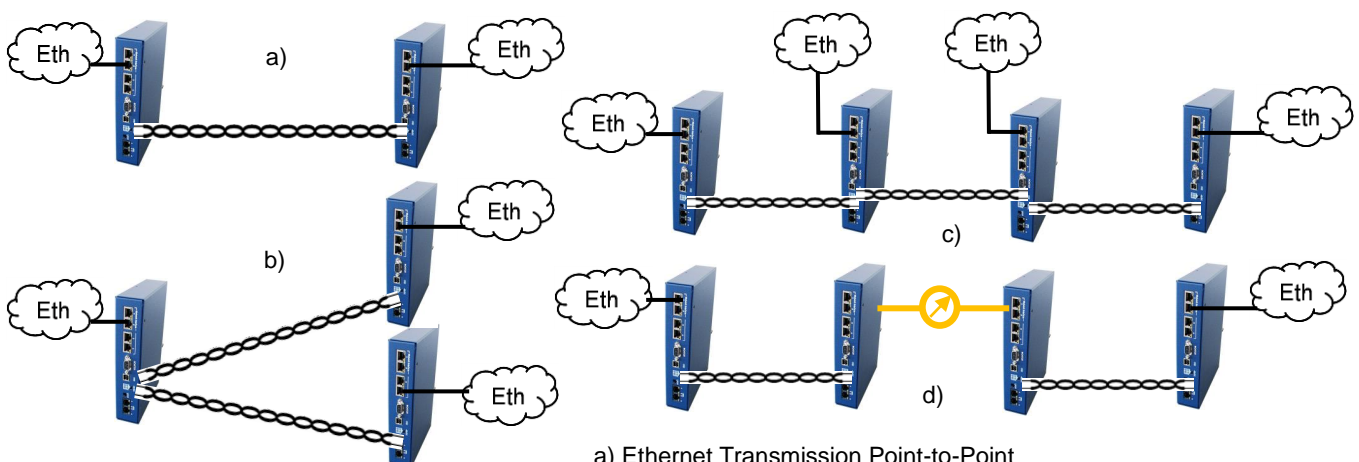
The FlexDSL Orion3 product family offers a broad range of products, which are based on the latest SHDSL.bis standards (ITU-T G.991.2 & ETS TS 101 524) The FlexDSL Orion3 supports TC-PAM16/32 and the new TC-PAM4/8/64/128 line coding.

The FlexDSL Orion3 allows symmetrical data and voice transmission at speeds up to 15.2Mbps over a single pair of copper. In addition, the FlexDSL Orion3 supports DSL channel bonding for up to 4 copper pairs in order to achieve speeds to 60.8Mbps. The SFP module (available on selected models) allows Ethernet data transmission over mixed Copper and Fiber media.

FlexDSL Orion3 SHDSL.bis Extended modems can provide up to 2 E1 interfaces, which support framed and unframed services (G.703/G.704). An integrated 2 or 4 port Ethernet layer 2 managed Switch with VLAN support (10/100BaseT) ensures connectivity to IP services. Beside of E1 and Ethernet the additional Nx64 interfaces can be configured as V.35, V.36, X.21, V.28, or RS232/RS485 interface (cable selectable).

Like all FlexDSL Orion products, the Orion3 SHDSL.bis modems family is based on industrial components, have extended temperature range, advanced surge protection and produced in Switzerland.

Possible Applications



- a) Ethernet Transmission Point-to-Point
b) Ethernet Transmission Point-to-Multipoint
c) Ethernet Add/Drop over a Long Copper Line
d) Ethernet Transmission over Copper and Fiber

Quick Installation Guide

Enter an Orion3 Device

You can use the Monitor (Local Craft Terminal, RS-232) interface with Hyper Terminal (or any equal program) or you can address the device with Telnet through the Ethernet interface.

Monitor (LCT, RS-232 or USB) Interface:

- Configure the COM port: Bits per second:9600, Data bits: 8, Parity: None, Stop bits: 1, Flow control: None
- Press <ENTER>.

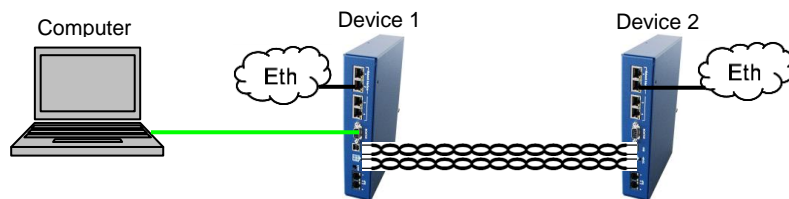
Telnet through Ethernet Interface:

- Type in command line <Telnet 192.168.0.235> and press <ENTER>. This is the default Ethernet Address for Orion3 devices.

After a successful entering the main menu of the device will be displayed.

Configure an Orion3 Device

A first installation example with the most important commands and points to care about is shown below. We just like to have an Ethernet transmission between the two devices over 2 SHDSL copper pairs with a speed of 11.4Mbit/s. The pairs should aggregate (bundle) the data traffic and in case of any SHDSL pair failure, the remaining pairs should continue to work.



Enter in device 1 with the Monitor (LCT, RS-232 or USB) or Telnet interface.

Type following commands	Description
3 <↵>	Go to Configuration Management (CM)
<DEFAULT EVERYTHING> <↵>	Set everything to default configuration
<MASTER ON 1> <↵>	Configure SHDSL 1 as MASTER
<MASTER ON 2> <↵>	Configure SHDSL 2 as MASTER
<PAYLOAD WAN 1> <↵>	Configure Ethernet over SHDSL 1
<PAYLOAD WAN 2> <↵>	Configure Ethernet over SHDSL 2
<NET> <↵>	Go to NET menu
<SETIP 10.0.2.200> <↵>	Set the IP-address of the device
<NETMASK 255.0.0.0> <↵>	Set the subnet mask
<GATEWAY 10.0.0.101> <↵>	Set the default gateway
<M> <↵>	Go to Configuration Management (CM)
<M> <↵>	Go to Main Menu
2 <↵>	Go to Fault and maintenance management (FMM)
<APPLY ALL> <↵>	Apply all configurations (written in the running config.)
<CONFIRM> <↵>	Confirm all configurations (written in the startup config.)

In Menu Configuration Management (CM) you can type <CONFIG> to see the following picture:

```
CO_CM>CONFIG
```

```
-----
Running Line Configuration
-----
```

```
xDSL          DSL1          DSL2
Mode          : Master (HTU-C) Master (HTU-C)
Extended rates: OFF          OFF
Line coding   : PAM32        PAM32
Baserate     : 89            89
Annex        : B             B
Payload      : WAN           WAN
Clock source  : Int           Int
GS compatible : OFF
NM threshold  : OFF
LA threshold  : OFF
-----
```

```
CO_CM>
```


Enter in device 2 with the Monitor (LCT, RS-232 or USB) or Telnet interface.

Type following commands	Description
3 <↵>	Go to Configuration Management (CM)
<DEFAULT EVERYTHING> <↵>	Set everything to default configuration
<MASTER OFF 1> <↵>	Configure SHDSL 1 as SLAVE
<MASTER OFF 2> <↵>	Configure SHDSL 2 as SLAVE
<PAYLOAD WAN 1> <↵>	Configure Ethernet over SHDSL 1
<PAYLOAD WAN 2> <↵>	Configure Ethernet over SHDSL 2
<NET> <↵>	Go to NET menu
<SETIP 10.0.2.201> <↵>	Set the IP-address of the device
<NETMASK 255.0.0.0> <↵>	Set the subnet mask
<GATEWAY 10.0.0.101> <↵>	Set the default gateway
<M> <↵>	Go to Configuration Management (CM)
<M> <↵>	Go to Main Menu
2 <↵>	Go to Fault and maintenance management (FMM)
<APPLY ALL> <↵>	Apply all configurations (written in the running config.)
<CONFIRM> <↵>	Confirm all configurations (written in the startup config.)

In Menu Configuration Management (CM) you can type <CONFIG> to see the following picture:

```
CP_CM>CONFIG
-----
Running Line Configuration
-----
xDSL          DSL1          DSL2
Mode          : Slave (HTU-R)  Slave (HTU-R)
Extended rates: OFF          OFF
Line coding   : PAM32        PAM32
Baserate     : 89           89
Annex        : B            B
Payload      : WAN          WAN
Clock source  : Int         Int
GS compatible: OFF
NM threshold  : OFF
LA threshold  : OFF
-----
CP_CM>
```

The idea is the following: the default settings help any device to be in an initial state, then the MASTER/SLAVE mode is enabled on the modem, then the transmit data is configured, then the network settings are configured (IP address, default subnet mask and default gateway) and finally, these settings are applied and then are written in the EEPROM.



ATTENTION
 DON'T FORGET TO WRITE THE CONFIGURATION IN THE STARTUP CONFIGURATION WITH THE FOLLOWING COMMANDS:

2 <↵>	Go to Fault and maintenance management (FMM)
<APPLY ALL> <↵>	Apply all configurations (written in the running config.)
<CONFIRM> <↵>	Confirm all configurations (written in the startup config.)

Connector Description

SHDSL Technical Specification

Specification	ITU-T G.991.2 G.shdsl and G.shdsl.bis
Line Code	TC-PAM16/32, Extended: TC-PAM4/8/64/128
Impedance	135Ω
Transmit Power	13.5 (Annex A) or 14.5 (Annex B) dBm @ 135Ω
Number of Pairs	2 or 4
Bit Rate	192 to 5704kbit/s, Extended: 128 to 15232kbit/s
Overvoltage Protection	ITU-T Rec. K.20/K.21
Connector Type	RJ-45 Female, 8 pin

Specification	ITU-T G.991.2 G.shdsl and G.shdsl.bis
Line Code	TC-PAM16/32, Extended: TC-PAM4/8/64/128
Impedance	135Ω
Transmit Power	13.5 (Annex A) or 14.5 (Annex B) dBm @ 135Ω
Number of Pairs	4
Bit Rate	192 to 5704kbit/s, Extended: 128 to 15232kbit/s
Overvoltage Protection	ITU-T Rec. K.20/K.21
Connector Type	Phoenix Mini Combicom MCD 1,5/4-G1F-3,81 Female, 8 pin
Matching Type for Cable	FK-MCP 1,5/ 4-STF-3,81 For AWG 16-28 Area 0.14–1.5 mm ² or Diameter 0.42-1.4 mm

SHDSL Connector Specification

Pin No	Description
1	NC (not used)
2	NC (not used)
3	SHDSL interface B *
4	SHDSL interface A
5	SHDSL interface A
6	SHDSL interface B *
7	NC (not used)
8	NC (not used)
* only used in V84	
1	SHDSL interface B (2)
2	SHDSL interface B (2)
3	SHDSL interface D (4)
4	SHDSL interface D (4)
5	SHDSL interface A (1)
6	SHDSL interface A (1)
7	SHDSL interface C (2)
8	SHDSL interface C (2)
only used in V84I, V84IS	



Ethernet Technical Specification

Standard:	IEEE-802.3, VLAN/QoS IEEE-802.1q/p
Number of Interfaces	2/4
Data Rate	10/100BaseT, Full/Half Duplex
Protocols	Data, Telnet, SNMP, WEB
Signal Level	Ethernet
MDI/MDI-X auto crossover	Supported
Auto Negotiation	Supported
Connector Type	RJ45 Female, 8 pin,

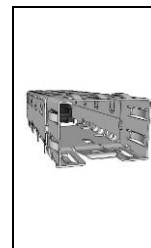
Ethernet Connector Specification

Pin No	Description
1	Tx+ (transmit data)
2	Tx- (transmit data)
3	Rx+ (receive data)
4	NC (not used)
5	NC (not used)
6	Rx- (receive data)
7	NC (not used)
8	NC (not used)

100Base-FX Ethernet (V84S, V84IS)

Standard:	IEEE-802.3, VLAN/QoS IEEE-802.1q/p
Data Rate	100BaseT, Full/Half Duplex
Signal Level	Ethernet
Connector Type	Type –SFP Tyco 1658391-1, only V84S Type –SFP Amphenol UE78-B1126 only V84IS
Recommended 155Mbps SFP Transceiver (Fast Ethernet, OC-3, STM-1):	LS38-A3S-TC-N XGSF-03-1503-80

SFP Connector



E1 (G.703) Technical Specification

Specification	ETS 300 166, ITU-T Rec. G.703, G.704
Number of Interfaces	2
Line Code	HDB3
Impedance	either 120Ω or 75Ω
Jitter	ITU-T Rec. G.823, ETSI TS 101 135
Bit Rate	2048kbit/s ± 50 ppm
ESD Protection	8kV (Air discharge)
Connector Type	RJ45 Female, 8 pin

E1 (G.703) Connector Specification

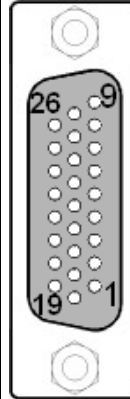
Pin No	Description
1	E1 Input → CH1/2 Wire A
2	E1 Input → CH1/2 Wire B
3	NC (not used)
4	E1 Output → CH1/2 Wire A
5	E1 Output → CH1/2 Wire B
6	NC (not used)
7	NC (not used)
8	NC (not used)

Nx64 Interface

Specification	V.35/V.36/X.21/V.28
Data Rate	1..128x64kbps (synchronous) for V.35/V.36/X.21 1..3x64kbps (synchronous) for V.28
Connector Type	DB26 high density female
Cable Connector Type	V.35 ISO2593 (34 Pin MRAC) V.36 ISO4902 (37 Pin Dsub) X.21 ISO4903 (15 Pin Dsub)
ESD Protection	8kV (Air discharge)

DB-26H Connector Specification

Pin No	V.35/36/28	X.21
1	Mode Sel 2	
2	Mode Sel 1	
3	Mode Sel 0	
4	DTE/DCE	
5	LLoopback	
6	TXD(A)	Ta
14	TXD(B)	Tb
19	RXD(A)	Ra
10	RXD(B)	Rb
24	RTS(A)	Ca
15	RTS(B)	Cb
26	CTS(A)	Ia
17	CTS(B)	Ib
18	DSR(A)	
9	DSR(B)	
16	DTR(A)	
25	DTR(B)	
8	DCD(A)	
7	DCD(B)	
22	TTC(A)	Xa
13	TTC(B)	Xb
21	TXC(A)	
12	TXC(B)	
20	RXC(A)	Sa
11	RXC(B)	Sb
23	SGND (Ground)	

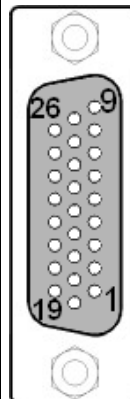


4x RS-232(V24) Interface

Specification	RS-232/485
Data Rate	1200..256000 bps (asynchronous)
Format RS-232/RS-485	Bits: 5... 8 Stop bits: 1/1.5/2 Parity: odd/even/odd/mark/space
Connector Type	DB26 high density female
ESD Protection	8kV (Air discharge)

DB-26H Connector Specification

Pin No	4x RS-232
1	TXD-1
2	RTS-1
3	TXD-2
4	RTS-2
6	RXD-1
7	CTS-1
8	RXD-2
9	CTS-2
11	PGND (Protection Ground)
12	PGND (Protection Ground)
13	PGND (Protection Ground)
14	SGND (Ground)
15	CC (Cable Connected)
19	TXD-3
20	RTS-3
21	TXD-4
22	RTS-4
23	RXD-3
24	CTS-3
25	RXD-4
26	CTS-4
27	PGND (Protection Ground)
28	PGND (Protection Ground)



RS-232(V24)/RS-485 Interface

Specification	RS-232/485
Data Rate	1200..256000 bps (asynchronous)
Format RS-232/RS-485	Bits: 5... 8 Stop bits: 1/1.5/2 Parity: odd/even/odd/mark/space
Connector Type	DB26 high density female
Cable Connector Type	RS-232 EIA/TIA-574 ISO2110 (9 Pin or 25 Pin Dsub)
ESD Protection	8kV (Air discharge)

DB-26H Connector Specification

Pin No	RS-232	RS-485
1	DTR	
2	DSR	
3	CTS	
6	DCD	
7	RXD	TXD+
8	RTS	
9	TXD	RXD+
11	PGND (Protection Ground)	
12	PGND (Protection Ground)	
13	PGND (Protection Ground)	
14	SGND (Ground)	
15	CC (Cable Connected)	
16		TXD-
18		RXD-

Monitor/Local Craft Terminal Technical Specification

Specification	EIA-232 / V.28
Data Rate	9600 baud, asynchronous
Protocol	8 bit, no parity, 1 stop bit , no flowcontrol no linefeed with carriage return
Signal Level	V.28
Alarm Output Spec	Load Driver
Max. Switching Voltage	60VDC
Max. Switching Current	150mA
Connector Type	DB9 Female

Monitor/LCT Connector Specification

Pin No	Description
1	Urgent Alarm Output
2	TXD (Transmit Data)
3	RXD (Receive Data)
4	NC (not used)
5	SGND (Ground)
6	NC (not used)
7	NC (not used)
8	NC (not used)
9	Not Urgent Alarm Output

Monitor/Local Craft Terminal Technical Specification

Specification	USB V2.0 full and low speed
Data Rate	12Mbit/s
Protocol	Master/Slave, Uses the USB communication device class (CDC) drivers to take advantage of the installed PC RS-232 software to talk over the USB
Connector Type	USB Type B Female connector

Monitor/LCT Connector Specification

Pin No	Description
1	+5V
2	Data +
3	Data -
4	SGND

Power Supply Technical Specification

Specification	ETSI ETS 300 132-2
Voltage	38-230VDC local power, remote power
Voltage (-24V models)	18-230VDC local power, no remote power
Voltage (V84S3 model)	18-300VDC local power, no remote power
Power Consumption	Typically 4/6 Watts if 2/4 DSL pairs
Connector Type	Molex Mini-Fit 39-01-2040

Power Supply Connector Specification

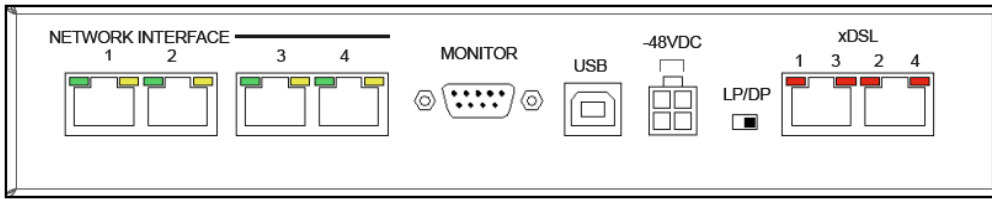
Pin No	Description
1	Negative power terminal 1
2	Protection ground
3	Negative power terminal 2
4	Positive power terminal
All units except V841, V84IS	

Specification	ETSI ETS 300 132-2
Voltage (-24V models)	18-230VDC local power, no remote power
Power Consumption	Typically 6 Watts if 4 DSL pairs
Connector Type	Phoenix Mini Combicom MC 1,5/3-GF-3,5 Female, 3 pin
Matching Type for Cable	FK-MCP 1,5/ 3-STF-3,5 For AWG 16-28 Area 0.14–1.5 mm ² or Diameter 0.42-1.4 mm

Pin No	Description
1	Negative power terminal 1
2	Protection ground
3	Positive power terminal
only used in V841, V84IS	



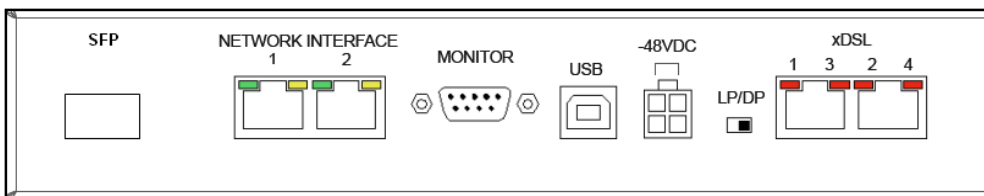
Panel Description



Connector	LED	RED	GREEN	AMBER	OFF
xDSL 1 (DSL No 1)	Left	DSL not working	DSL normal operation		
xDSL 1 (DSL No 3, only V84)	Right	DSL not working	DSL normal operation		
xDSL 2 (DSL No 2)	Left	DSL not working	DSL normal operation		
xDSL 2 (DSL No 4, only V84)	Right	DSL not working	DSL normal operation		
G.703 1 or G.703 2 (NI 3 V81)	Left		E1 normal operation		Failure / no E1 Signal
G.703 1 or G.703 2 (NI 3 V81)	Right			E1 Alarm	E1 normal operation
Ethernet (NI 1/2 V83, 1..4 on V84)	Left		Blinking = Data		Connection not active
Ethernet (NI 1/2 V83, 1..4 on V84)	Right			100 Mbit/s data rate	10 Mbit/s data rate

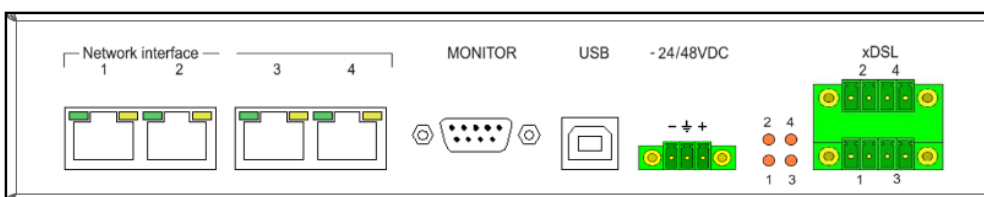
* NI means NETWORK INTERFACE

Panel Description V84S (Version with SFP interface)



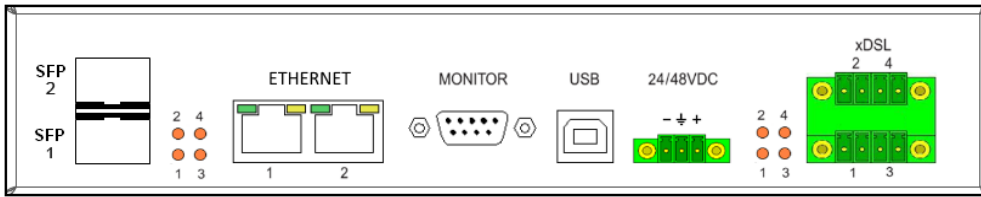
Connector	LED	RED	GREEN	AMBER	OFF
xDSL 1 (DSL No 1)	Left	DSL not working	DSL normal operation		
xDSL 1 (DSL No 3)	Right	DSL not working	DSL normal operation		
xDSL 2 (DSL No 2)	Left	DSL not working	DSL normal operation		
xDSL 2 (DSL No 4)	Right	DSL not working	DSL normal operation		
Ethernet (NI 1/2)	Left		Blinking = Data		Connection not active
Ethernet (NI 1/2)	Right			100 Mbit/s data rate	10 Mbit/s data rate
SFP	n/a				

Panel Description V84I (Special Industrial Version)



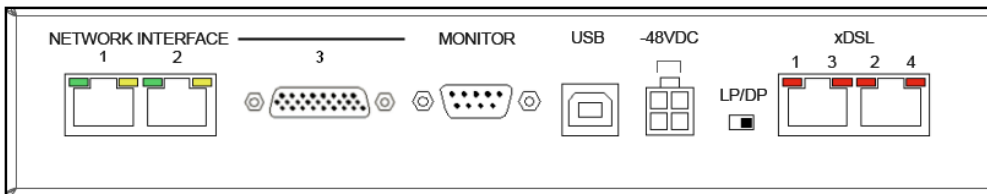
Connector	LED	RED	GREEN	AMBER	OFF
xDSL 1 (DSL No 1)	1	DSL not working	DSL normal operation		
xDSL 1 (DSL No 3)	3	DSL not working	DSL normal operation		
xDSL 2 (DSL No 2)	2	DSL not working	DSL normal operation		
xDSL 2 (DSL No 4)	4	DSL not working	DSL normal operation		
Ethernet (1..4)	Left		Blinking = Data		Connection not active
Ethernet (1..4)	Right			100 Mbit/s data rate	10 Mbit/s data rate

Panel Description V84IS (Special Industrial Version with SFP interfaces)



Connector	LED	RED	GREEN	AMBER	OFF
xDSL 1 (DSL No 1)	1	DSL not working	DSL normal operation		
xDSL 1 (DSL No 3)	3	DSL not working	DSL normal operation		
xDSL 2 (DSL No 2)	2	DSL not working	DSL normal operation		
xDSL 2 (DSL No 4)	4	DSL not working	DSL normal operation		
Ethernet (1/2)	Left		Blinking = Data		Connection not active
Ethernet (1/2)	Right			100 Mbit/s data rate	10 Mbit/s data rate
SFP 1	1		Blinking = Data		Connection not active
SFP 1	3			100 Mbit/s data rate	
SFP 2	2		Blinking = Data		Connection not active
SFP 2	4			100 Mbit/s data rate	

Panel Description (Version with Serial Interface)



Connector	LED	RED	GREEN	AMBER	OFF
xDSL 1 (DSL No 1)	1	DSL not working	DSL normal operation		
xDSL 1 (DSL No 3)	n/a				
xDSL 2 (DSL No 2)	2	DSL not working	DSL normal operation		
xDSL 2 (DSL No 4)	n/a				
Ethernet (1..2)	Left		Blinking = Data		Connection not active
Ethernet (1..2)	Right			100 Mbit/s data rate	10 Mbit/s data rate
Serial (3)	n/a				

Environment, EMC and Safety

Storage: ETS 300 019-1-1 Class 1.2 (-40°C ... +70°C) Extended Temperature
 Transportation: ETS 300 019-1-2 Class 2.3 (-40°C ... +70°C)
 Operation: ETS 300 019-1-3 Class 3.2 (-25°C ... +70°C) Extended Temperature

When inside outdoor rack:
 ETS 300 019-1-3 Class 3.3/3.4 partly over -25°C ... +80°C

Dimension: 216(W)x165(D)x43(H) mm

Weight < 1.0kg in Metal DIN-Rail Enclosure

Standards: EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013
 EN 300 386 V1.6.1:2012 EN 61000-4-3:2006/A1:2008/A2:2010
 EN 50121-4:2006/AC:2008 EN 61000-4-4:2012
 EN 55022:2010/AC:2011 EN 61000-4-5:2014
 EN 55024:2010 EN 61000-4-6:2014
 EN 61000-4-2:2009 EN 61000-4-11:2004

Available Models

Ordering Code	Interfaces	Power Supply	Attention!
FG-PAM-RAIL2N-2E1B/2Eth, V81	2xDSL 2xE1 2xETH	38-230VDC	
FG-PAM-RAIL2N-2E1B/2Eth-24V, V81	2xDSL 2xE1 2xETH	18-230VDC	
FG-PAM-RAIL2N-2Eth, V83	2xDSL 2xETH	38-230VDC	G.703 connector has no function (NI 3/4)
FG-PAM-RAIL2N-2Eth-24V, V83	2xDSL 2xETH	18-230VDC	G.703 connector has no function (NI 3/4)
FG-PAM-RAIL4N-4Eth, V84	4xDSL 4xETH	38-230VDC	xDSL connector has 2 DSL interfaces
FG-PAM-RAIL4N-4Eth-24V, V84	4xDSL 4xETH	18-230VDC	xDSL connector has 2 DSL interfaces
FG-PAM-RAIL4N-4Eth-24V, V84I	4xDSL 4xETH	18-230VDC	
FG-PAM-RAIL4N-3Eth,V84S	4xDSL 2xETH+1SFP	38-230VDC	xDSL connector has 2 DSL interfaces
FG-PAM-RAIL4N-3Eth-24V,V84S	4xDSL 2xETH+1SFP	18-230VDC	xDSL connector has 2 DSL interfaces
FG-PAM-RAIL4N-3Eth-24V,V84S3	4xDSL 2xETH+1SFP	18-300VDC	xDSL connector has 2 DSL interfaces
FG-PAM-RAIL2N-4Eth-24V, V84IS	2xDSL 2xETH+2SFP	18-230VDC	
FG-PAM-RAIL4N-4Eth-24V, V84IS	4xDSL 2xETH+2SFP	18-230VDC	
FG-PAM-RAIL2N-V24/2Eth-24V, V88	2xDSL 2xETH 1xV24	18-230VDC	
FG-PAM-RAIL2N-485/2Eth-24V, V88	2xDSL 2xETH 1xRS-485	18-230VDC	
FG-PAM-RAIL2N-N64/2Eth-24V, V88	2xDSL 2xETH 1xN64	18-230VDC	