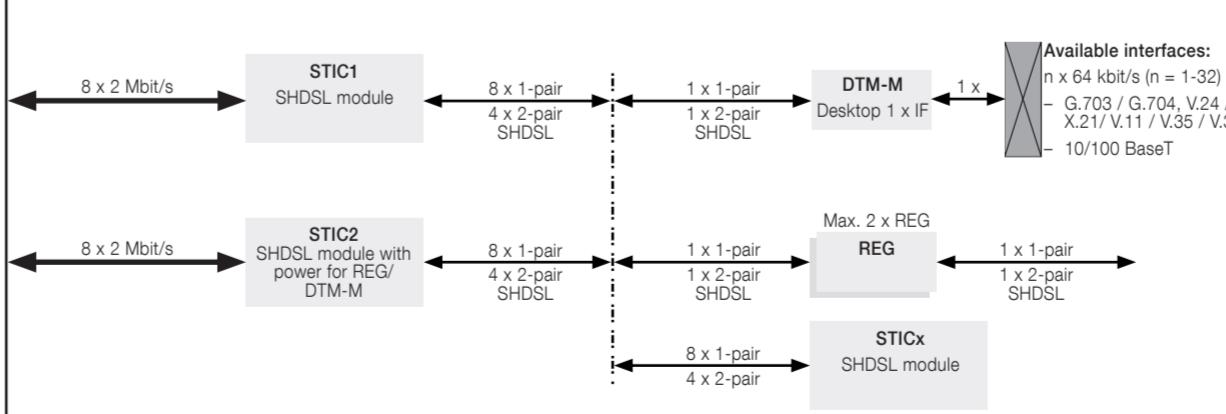
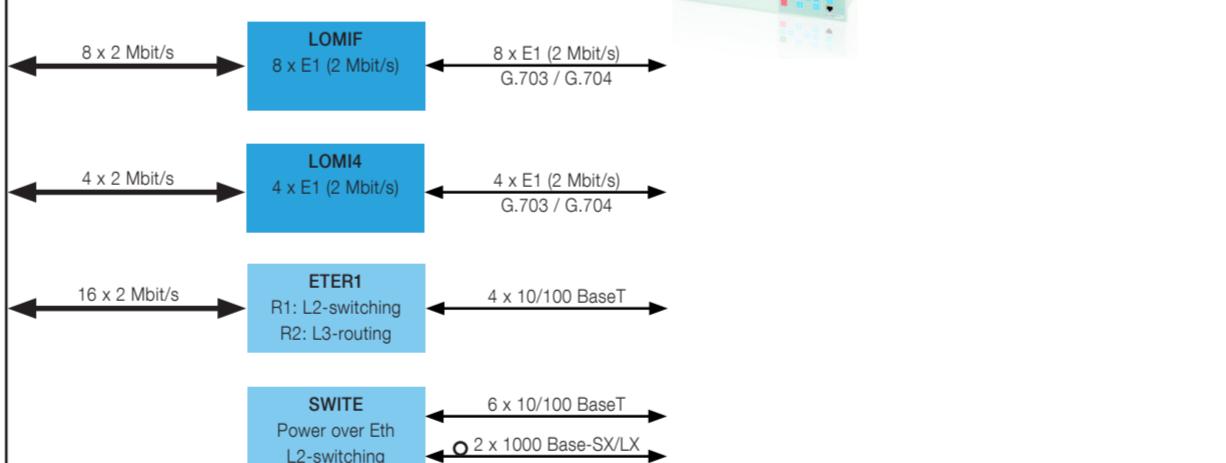
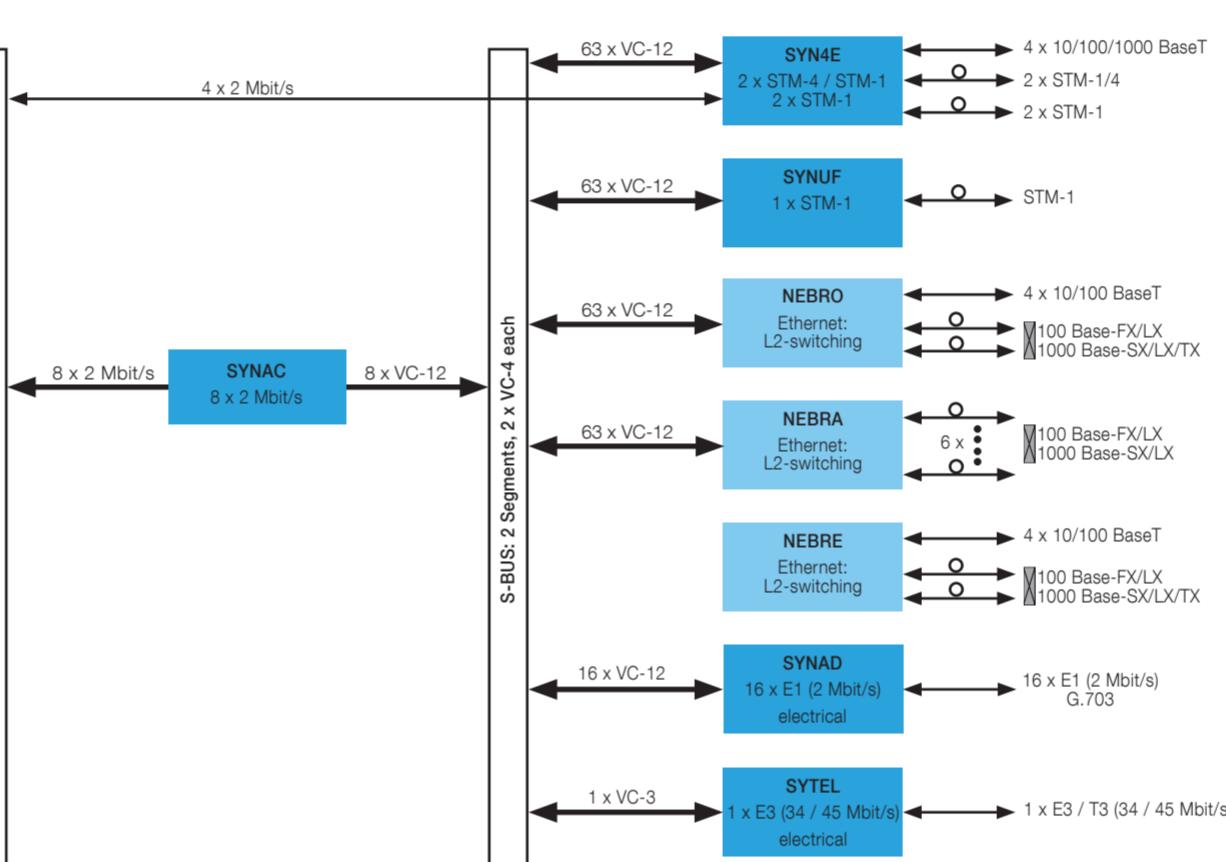
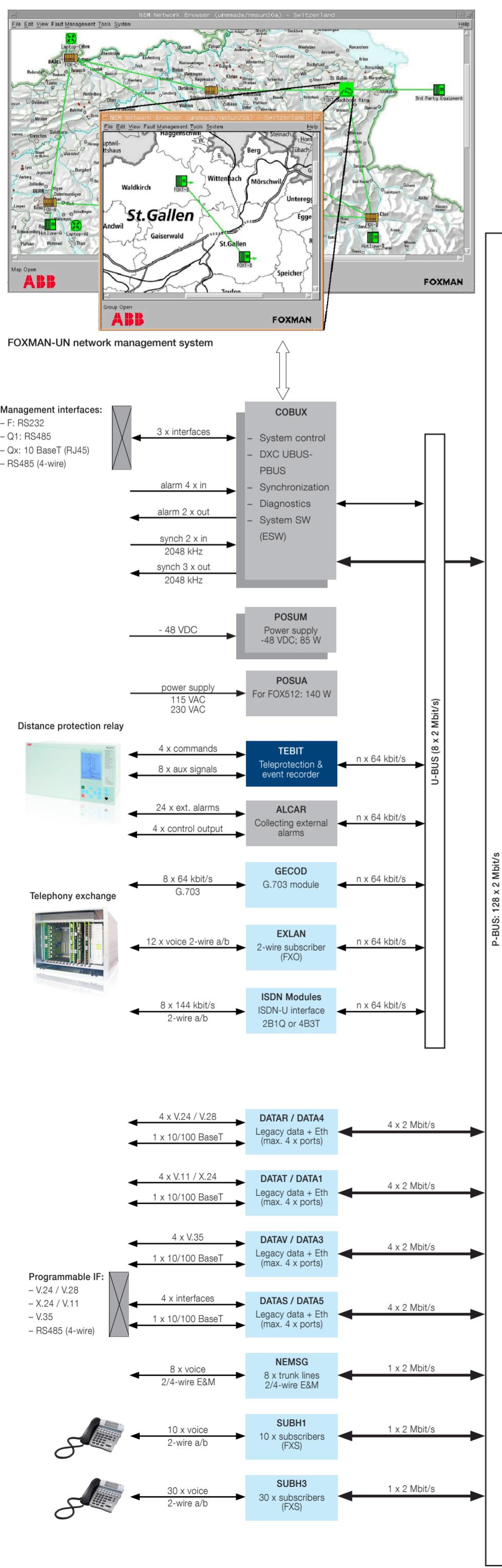


FOX512 & FOX515 Technical Data

PDH / SDH Multi-Service Multiplexer

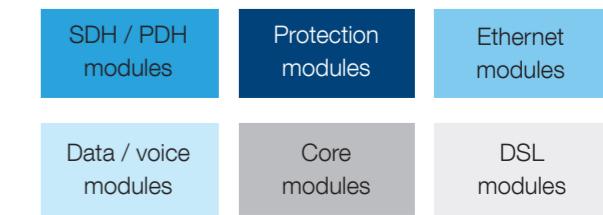


Type tests	witnessed by KEMA, Holland
Electromagnetic compatibility	
EMC	EN 300 386 V1.3.3 IEC 61 000-6-3 IEC TS 61 000-6-5 ANSI IEEE C37.1 ANSI IEEE C37.90.1 ANSI IEEE C37.90.2 ANSI IEEE C37.90.3
Emission	EN 55022
Immunity	EN 300 386 V1.3.2 IEC 61 000-4-3, EN 61 000-4-4 IEC 61 000-4-5, EN 61 000-4-5 IEC 61 000-4-6, EN 61 000-4-6
ESD	IEC 61 000-4-2, EN 61 000-4-2
Shock and vibration	IEC 60 721-3-3, class 3M1 IEC 60 721-3-2, class 2M1

Ambient conditions	
Storage (not for batteries BATMO)	ETS 300 019-1-1, class 1.2
Temperature range	- 40°C ... + 70°C
Humidity	Clima diagram class 1.2
Transport (not for batteries BATMO)	ETS 300 019-1-2, class 2.2
Temperature range	- 40°C ... + 70°C
Humidity	Clima diagram class 2.2
Operation	ETS 300 019-1-3, class 3.2
Temperature range	- 20°C ... + 55°C
without fan	- 20°C ... + 45°C
Startup temperature	- 20°C
Humidity	max 95%, non-condensing
	Clima diagram class 3.2

SFP overview	SYNUF	SYN4E	NEBRx	SWITE	OPTIF
STM-1 electrical	x	x			
S-1.1	x	x			
L-1.1	x	x			
L-1.2	x	x			
X-1.2	x	x			
CWDM	x	x			
S-4.1	x				
L-4.1	x				
L-4.2	x				
X-4.2	x				
100 BASE-SX					x
100 BASE-FX				x	x
100 BASE-LX			x		
1000 BASE-SX			x	x	
1000 BASE-LX			x	x	
1000 BASE-TX	x	x			

Main FOXMAN-UN network management system features
Full-featured management system for various ABB communication equipment including FOX515/512, FOX660 and legacy FOX-U
- Supervision of communication network
- Graphical network display with comprehensive fault management
- Alarm list
- Event list
- Configuration management
- Full configuration of network elements
- Backup of configurations
- Security management
- Performance management as per ITU-T G.826
- End to end trail handling



Technical data of FOX512 & FOX515

Main characteristics

Application	Utility-grade multi-service multiplexer for communication using optical and SHDSL networks
Communication technology	Supporting PDH, SDH, IP/Ethernet, EoS
Equipment protection	
hot standby	POSUM, COBUX
1+1 HW Protection	NEMSG, DATAx, ETER1 (VRRP)
Traffic protection	
1+1 path protection n x 64 kbit/s	TEBIT, OPTIF, NEMSG, DATAx, GECOD, SULIS
LTP (VC-12, VC-3)	SYNAC, SYNAD, SYTEL
SNCP (VC-12, VC-3, VC-4)	SYNAE, SYNUF
MSP (STM-1, STM-4)	PDH: 8 Mbit/s
Transmission bit rate	SDH: 622 Mbit/s (STM-4), 155 Mbit/s (STM-1)
SHDSL, net capacity	n x 64 kbit/s or 2 Mbit/s (n = 3 ... 32)
Power supply	48 VDC, 60 VDC
	115 VAC, 230 VAC; 50/60 Hz
Architecture	Modular design with bus connection on backplane for hot-pluggable modules
Bus structure	UBUS, PBUS, SBUS
Cross connect (DXC)	Non-blocking
PDH	40 x or 128 x 2 Mbit/s, granularity 64 kbit/s
SDH	VC-12, VC-3, VC-4
Standardization	
PDH / SDH	ITU-T G.702, G.703, G.704, G.706 G.707, G.7041, G.7042 G.711 - G.715, G.732, G.736, G.737 G.742, G.821, G.823, G.826
Optical parameters	G.692, G.694.1, G.694.2, G.957
Ethernet	IEEE 802.1D, 802.1Q, 802.1p 802.1w, 802.3af, 802.3at, 802.3z RFC 2328, RFC 2453
EMC	K.20
Safety	Q.920, Q.921, Q.922
	IEC 60950-1, EN 60950-1
Mechanical dimensions FOX515	IEC-60825
Shelf with front cover (WxHxD)	483 x 308 x 303 mm
Cable tray (WxHxD)	483 x 87 x 240 mm
Heat deflection shield (WxHxD)	483 x 88 x 237 mm, optional
Number of mechanical slots	21, incl. 1 (2) for COBUX
Mechanical dimensions FOX512	
Shelf with front cover (WxHxD)	483 x 177 x 283 mm
Number of mechanical slots	8, incl. 1 (2) for COBUX

Core modules

COBUX control unit	
Management interfaces	Qx-interface 10 BaseT (IEEE 802.3) Q1-interface RS485 F-interface V.24/28 (RS232) ECC-interfaces
Synch I/O	2048 kHz: 2 synch inputs, 3 synch outputs
Alarm I/O	4 alarm inputs, 2 alarm relay outputs
Features	Central processing unit, DCN IP routing / tunneling, diagnostics
Hardware protection	1+1 equipment protection, hot standby
POSM power supply	
Input voltage range	48 VDC, 60 VDC - 39.5 VDC ... - 75 VDC
Output voltage / power	- 5 VDC and + 5 VDC; totally 85 W max.
Hardware protection	1+1 or N+M protection, hot standby
Full load efficiency	typ. 80%
POSUA power supply	
Input voltage ranges	For FOX512 only: 115 VAC, 230 VAC (one per equipment)
Output voltage / power	115 VAC: 88 ... 132 VAC, 47 ... 63 Hz 230 VAC: 176 ... 264 VAC, 47 ... 63 Hz
Full load efficiency	- 5 VDC, + 5 VDC and 48 VDC / max 140 W
Number of slots	typ. 75%
ALCAR alarm interface	
Number of ports	24 alarm inputs 4 control outputs 4 serial interfaces RS232
Features	Alarm supervision on network management system
Number of modules	max 5 modules per FOX515
FANU5 fan unit	
Number of fans	10, temperature controlled
Operation	< 30°C: low speed / > 50°C: high speed
Installation	Above equipment, 1HU, no mechanical slot required
FANU2 fan unit	
Number of fans	for FOX512
Operation	2, temperature controlled
Installation	< 30°C: low speed / > 50°C: high speed
	Above equipment, no mechanical slot required

Aggregate modules

SDH aggregate modules	
SYN4E optical/electrical SDH	
Number of SDH ports	4 (2 x STM-1, 2 x STM-1/4 SFP-cage) SFPs available with optical LC/PC (STM-1/4) or electrical DIN 1.0/2.3 75 Ω (STM-1) connector
Number of Ethernet ports	4 x 10/100/1000 BaseT Ethernet ports RJ-45 connector
SDH features	18 x 18 VC-4 HO cross connect 36 x 36 VC-3 or 693 VC-12 LO cross connect Max. 3 x TU-3 or 63 x TU-12 termination to SBUS 4 x P12 termination to PBUS
Ethernet features	L1-Ethernet over SDH functionality Support of GFP / VCAT / LCAS
Traffic protection	SNCP / MSP for SDH traffic LCAS for Ethernet traffic
SYNUF optical/electrical SDH	
Number of SDH ports	1 x STM-1 SFP cage SFPs available with optical LC/PC (STM-1) or electrical DIN 1.0/2.3 75 Ω (STM-1) connector
SDH features	Max. 3 x TU-3 or 63 x TU-12 termination to SBUS

Tributary modules

SDH / PDH bus interconnection modules	
SYNAC SDH termination	
Number of ports	8 (no physical interface)
SDH / PDH features	8 x VC-12 SDH termination SBUS / PBUS interconnection
Traffic protection	LTP

PDH E1, E3/T3 modules

SYNAD E1 G.703

Number of electrical ports	16 x E1 to SBUS according to G.703
Bit rate	2048 kbit/s ± 50 ppm
Line impedance	75 Ω asymmetrical or 120 Ω symmetrical
Traffic protection	LTP
SYTEL E3/T3 G.703	
Number of electrical ports	1 x E3/T3 to SBUS according to G.703
Bit rate	DIN 47295 HF connector (series 1.6/5.6)
Line impedance	75 Ω asymmetrical
Traffic protection	LTP
LOM4 / LOMF E1 G.703	
Number of electrical ports	4 x E1 to PBUS (LOM4) acc. G.703/G.704 8 x E1 to PBUS (LOMf) acc. G.703/G.704
Bit rate	2048 kbit/s ± 50 ppm
Line impedance	75 Ω asymmetrical or 120 Ω symmetrical
Traffic protection	LTP
ISDN telephony modules	
SULIS	
Number of ports	8 x U-interface to UBUS (towards NT1 / ISDN terminal)
Transmission code	2B1Q, according ANSI T1.601/1992
Number of timeslots / subscriber	3 or 2.5
NT-1 remote power supply	96 V
EXLIC	
Number of ports	8 x U-interface to UBUS (towards ISDN exchange)
Transmission code	2B1Q, according ANSI T1.601/1992
Number of timeslots / subscriber	3 or 2.5
ISBUQ	
Number of ports	8 x U-interface to UBUS
Line code	2B1Q, according ANSI T1.601/1992
Power feeding of NT1	Supported
Interoperation with EXLIC	Not supported
Leased lines (ISBUQ-ISBUQ)	Not supported
ISBUT	
Number of ports	8 x U-interface to UBUS
Line code	4B3T
Power feeding of NT1	Supported
Leased lines (ISBUT-ISBUT)	Supported
Teleprotection modules	
OPTIF differential protection	
Number of protection ports	4 x differential protection ports to PBUS with SFP cages for: MM SFP 850 nm, LC/PC SM SFP 1310 nm, LC/PC
Protection port bitrate	Line-rate 2400 kbit/s IEEE C37.94 payload 63 - 768 kbit/s (1 - 12 time slots)
Protection features	Standardized IEEE C37.94 connection to protection relays Proprietary SFC-protocol connection to ABB protection relays
Traffic protection	1+1 path protection (bidirectional switching) for protection traffic
Number of Ethernet ports	1 x 10/100 BaseT Ethernet port RJ45 connector or SFP cage for: SFP 100 Base-SX, MM, 850 nm, LC/PC SFP 100 BaseFX, SM, 1310 nm, LC/PC
NEBRE L2 Ethernet	
Number of physical ports	4 x 10/100 BaseT, RJ45 connector 2 x SFP-cages for 100 Base-FX or 1000 Base-SX/LX
Number of SDH ports	6 x SFP-cages for 100 Base-FX or 1000 Base-SX/LX
Features	Max. 63 x VC-12 or 3 x VC-3 L1-point-to-point or L2-switching According to IEEE 802.1D and 802.1Q Traffic prioritization according to IEEE 802.1p
Traffic protection	Support of GFP / VCAT / LCAS
Compatibility	SYNAE
SWITE L2 Ethernet with PoE	
Number of access ports	6 x 10/100 BaseT, RJ45 connector Power over Ethernet (PoE)
Number of trunk ports	2 x SFP-cages for 100 Base-FX or 1000 Base-SX/LX
Number of PDH ports	None
Features	L2-switching According to IEEE 802.1D and 802.1Q Traffic prioritization according to IEEE 802.1p
Traffic protection	STP, RSTP (IEEE 802.1w)
ETER1 L2/L3 Ethernet	
Number of physical ports	4 x 10/100 BaseT, RJ45 connector 64 x PBUS access
Number of PDH ports	Max. 8 x P12 (n x 64 kbit/s granularity) or Max. 16 x P12 (n x 128 kbit/s granularity) PPP / MLPPP / HDLC traffic encapsulation
L2-switching features	According to IEEE 802.1D and 802.1Q Traffic prioritization according to IEEE 802.1p
L3-routing features	Max. 8 independent switching instances OSPF v2 acc. RFC 2328, RIP v2 acc. RFC 2453 Static routing, VRRP, Inter-VLAN routing
Traffic protection	MLPPP, STP, RSTP (IEEE 802.1w), VRRP, OSPF v2, RIP v2
Compatibility	DATAx, LAWA4, OPTIF, STICK / DTM-M
Analogue telephony modules	
EXLAN / EXLA6 FXO	
Number of ports	12 x 2-wire FXO to UBUS according ITU-T Q.522 (Z-interface)
Coding	A-law according ITU-T G.711
Input (from exchange)	- 5.0 ... + 4.0 dB, programmable
Output (to exchange)	- 7.5 ... - 3 dB, programmable
Nominal impedance	Complex (EXLAN) or 600 Ω (EXLA6)
Channel bandwidth	300 ... 3400 Hz
Signalling & functionality	Seizure, ringing, ringing off, transmission of flash pulses, pulse dialling, DTMF without accompanying signal, earth key, charging using 12/16 kHz pulses
NEMSG voice and E&M	
Number of ports	8 x 2/4-wire voice channels to PBUS according ITU-T G.712 - G.715
Coding	A-law according ITU-T G.711
Input (from exchange)	- 16.0 ... + 9.5 dB, programmable
Output (to exchange)	- 20.0 ... + 7.0 dB, programmable
Nominal impedance	600 Ω
Channel bandwidth	300 ... 3400 Hz
Signalling	E, M, E', M'
Traffic protection	Support of Signalling types I to V
Features	1+1 path protection, shared protection ring 8 x voice or data conferences with up to 32 participants Point-point, point-multipoint and multipoint-multipoint topologies
SHDSL modules	
STIC1 / STIC2	
Number of SHDSL interfaces	8 x 1-pair or 4 x 2-pair to PBUS
Line code	16 Trellis coded-PAM according G.991.2
Line rate	n x 64 kbit/s duplex via 1 or 2 copper pair, n = 3 ... 32
Service rate	n x 64 kbit/s duplex via 1 or 2 copper pair, n = 1 ... 32
Transmission range	Up to 25 km
Transmission mode	1 pair or 2 pair (cable depending)
Remote powering	Only STIC2
Traffic protection	1+1 path protection
Features	Point-multipoint Tributary or aggregate interface
SHDSL modules	
TUNOR optical desktop	
Number of optical ports	1 x 8 Mbit/s, optical FC/PC connector
Transmission code	MCMI + telemetry, according to G.742
Optical wavelength	Up to 20 dB (approx. 30 km)
Number of electrical ports	4 x E1 ports according to G.703
Bit rate	2048 kbit/s ± 50 ppm
Line impedance	75 Ω asymmetrical or 120 Ω symmetrical
Local power supply	115 VAC ± 10%, 50/60 Hz 230 VAC ± 10%, 50 Hz
DTM-M SHDSL desktop	
Number of transmission ports	1 x 1-pair or 2-pair fixed G.703/G.704 120 Ω or 1 modular interface (G.703/G.704 75 Ω, V.24, X.21/V.11, V.35, Ethernet)
Number of access ports	16 Trellis coded-PAM according G.991.2
Line code	n x 64 kbit/s duplex via 1 or 2 copper pair, n = 3 ... 32
Line rate	n x 64 kbit/s duplex via 1 or 2 copper pair, n = 1 ... 32
Service rate	Up to 25 km
Options	Remote powering</td