

SMX family – Optical Access Device



Hardware description

The SMX family is a uMSP which can be ordered in several configurations to best fit the application. It is designed to be installed at the customer's premises for the fiber-to-the business applications or in street cabinets for fiber-to-the curb applications. Its space-efficient design allows for wall, rack or desk mounting within controlled or non controlled environment locations to ETSI 300 019-1-3 Class 3.1E.

Dimensions for all versions are equal 19" wide, 1 RU high, 180 mm deep and the product needs front access only.

Hardware configurations

There are three hardware variants which come in an AC or DC version. They can be ordered through their respective orderable item code

SMX155

is equipped with these interfaces:
 STM-1 via SFP
 2x Fast Ethernet: 10 or 100 Mb/s (RJ45)
 4x E1, 75 or 120 Ohm (RJ45)

SMX622lite

is equipped with these interfaces:
 2x STM-4 or STM-1 via SFP
 4x E1, 75 or 120 Ohm (RJ45)
 2x Gigabit Ethernet: 10/100/1000BASE-T (RJ45)

SMX622

is equipped with these interfaces:
 2x STM-4 or STM-1 via SFP
 2x STM-1 via SFP
 2x E3/DS3 (mini coax)
 4x E1, 75 or 120 Ohm (RJ45)
 2x Gigabit Ethernet: 10/100/1000BASE-T (RJ45)
 2x Fast Ethernet: 10 or 100 Mb/s (RJ45)

Common features

The SMX family shares these features

Pluggable SFP modules

STM-1 (S1.1) 15km, STM-1 (L1.1) 40km, STM-1 (L1.2) 80km
 STM-4 (S4.1) 15km, STM-4 (L4.1) 40km, STM-4 (L4.2) 80km
 STM-1 electrical
 Single fiber operation

Cross connect and Protection

Pre-defined configurations for cross connect and VCAT bandwidth allocation
 Non-blocking cross connects
 MSP *, and VC-4, VC-3 and VC-12 SNC protection
 LCAS based protection

Loopbacks on E1 and Ethernet ports

Synchronization

Internal 4.6 ppm SEC G.813 clock
 Station clock input and output: 2 MHz or 2 Mb/s, 75 or 120 Ohm
 Clock reference modes: Locked to STM-N timing or station clock input, Hold-over or Free running

Ethernet applications

Point-to-point Ethernet Private Line
 Up to full-rate 1 Gb/s end-to-end
 Ethernet rate control in steps of 1 Mb/s up to 1 Gb/s *)

Ethernet mapping

GFP-F encapsulation
 Virtual Concatenation VC-4-xv (1..7), VC3-xv (1..9) or VC12-xv (1..63)
 LCAS

OAM&P

Ethernet Port Performance counters
 SDH MS-N Performance Monitoring

Fault management and reporting

Local and remote software and database download
 Alarm contact and discrete inputs

Management

Ethernet 10/100BASE-T for local management access
 Console port (RS232)
 SNMP traps for alarming
 Web-browser based provisioning
 TCP/IP and PPP over DCC or dedicated VC12 for remote management access
 OSPF routing for remote management access

Dimensions

19" wide, 1 RU high, 180 mm deep

Power variants

...-AC has a 230V AC power
 ...-DC has a redundant 48V/60V DC power
 Power dissipation is less than 25 Watt

Environment

Operating condition: ETS 300 019, class 3.1E
 Storage condition: ETS 300 019, class 1.2
 Transport condition: ETS 300 019, class 2.3
 Free convection cooling without the need for fans

Standards compliance

In compliance with the latest ITU, ETSI, IEC and IEEE standards for SDH and Ethernet equipment

*) Future release

Important Safety Information

Warnings

- To prevent fire or shock hazard, do not expose this appliance to rain or moisture
- To reduce the risk of electric shock, do not remove the cover. There are no serviceable parts inside
- Always refer servicing to qualified service personnel
- Because invisible laser radiation may be emitted from the aperture of the SFP port when no fiber cable is connected, avoid exposure to laser radiation and do not stare into open apertures (only applicable when optical SFP are inserted in the SMX)

Cautionary Notes

- The SMX supports optical SFP which use a small laser to generate the fiber-optic signal. Keep the optical transmit and receive ports covered whenever a cable is not connected to the port
- Handle the power supply cord carefully. Do not damage or deform the power supply cord. If it is damaged or deformed, it may cause electric shock or malfunction when used. When removing from wall outlet, be sure to remove by holding the plug attachment and not by pulling the cord
- Do not place metal objects or spill liquid inside the appliance. Electric shock or malfunction may result
- Ventilation - The appliance should be situated so that the location or position does not interfere with its proper ventilation. A minimum of 1U or 50 mm must be kept free above and below the SMX
- When a product defect occurs please contact service@arcutronix.com

Installing SMX family products

The SMX is delivered in a box together with this Installation Guide. The mounting brackets have already been mounted in their default position onto the DMC. For the AC version no other items are delivered in the box. The DC version also includes two power connectors which can be used to supply the SMX with power. See illustration 6.

The SMX AC version is powered through an IEC C14 connector inlet (IEC 60320). A power cord is not included. A three-conductor IEC C13 cord, with a suitable power plug for the locality in which the SMX is used on one end and a C13 line socket on the other end, must be ordered separately. Depending on the application a straight or angled power cord can be used. See illustrations 3 and 4.

The SMX can be mounted using the provided brackets. These brackets are multi-purpose and enable to use the SMX in a 19" rack in various depths. The same brackets can be used to wall mount the SMX.

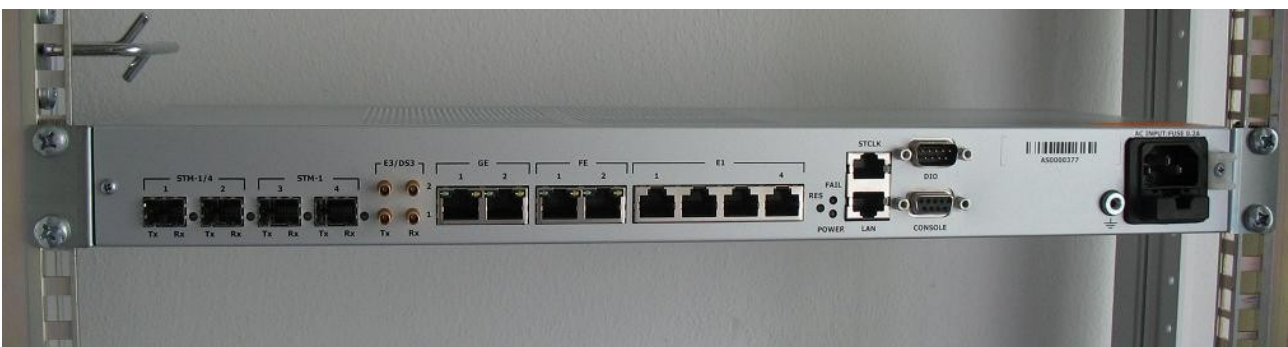


Illustration 1: SMX622-AC mounted in a 19" rack

The brackets have several holes which can be used to customize the mounting position. The SMX AC input is protected with two fuses of 0.2 A. No spare fuse is present in the AC inlet socket.

The SMX must be properly connected to protective earth via the mounting brackets or the earth bonding point on the front plate (see illustration 4)

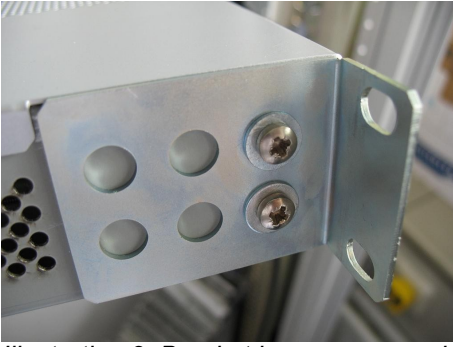


Illustration 2: Bracket in non-recessed position

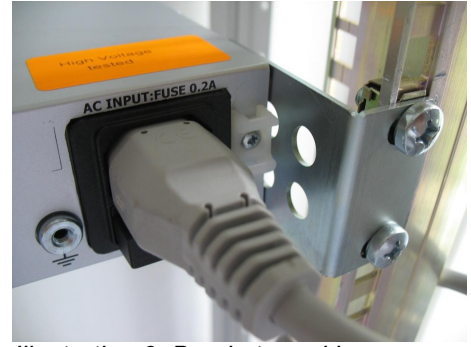


Illustration 3: Bracket used in a recessed setup with a straight power plug

In the non recessed version an angled power cord can be fixed using a tie wrap. An optional ground connection (using an M4 screw) can be made to the bolt with the earth mark below.



Illustration 4: Angled power cord and earth bonding point

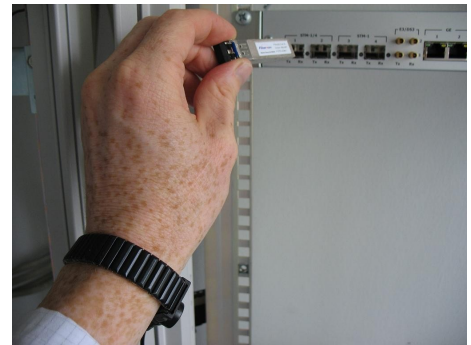


Illustration 5: Observe ESD precautions when handling SFP

The SMX family supports Small Form Pluggable (SFP) modules. When handling these SFP and inserting or extracting these in the SMX SFP cages ESD precautions are mandatory.

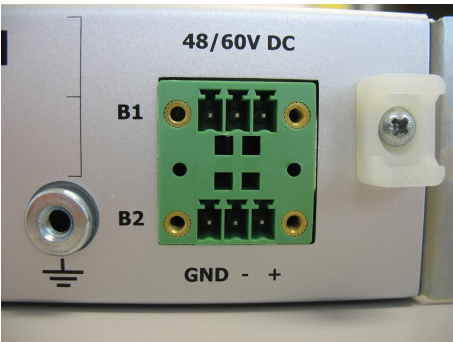


Illustration 6: For DC versions the power socket is replaced by a dual feed connector

Two DC power feeds are available. The connectors are delivered with the product.

Initial addressing of a SMX system

Every SMX system has a unique MAC address assigned to it. This address is labeled on the faceplate. The SMX system requests an IP address for its MAC address from a DHCP server on power up. When no DHCP server is present or no IP address is received a default of 10.127.127.1 is used. When DHCP is used the maintainer of the DHCP server can provide the assigned IP address. To ensure the default IP address is used do not connect the LAN cable to the network during power up. When logged in to the SMX the DHCP support can be disabled by the user.

Connecting the LAN cable

The SMX system has a dedicated LAN interface which is labeled "LAN" on the faceplate.

Log into the SMX system

As the SMX can have a default IP address it must be ensured that the connecting computer can access the SMX system. To achieve this modify the machine to use the same address range (e.g. 10.127.127.200) and ensure the netmask is set to 24 bit. It is now possible to start the web browser and connect to <http://10.127.127.1/>

If all is well the login screen should appear. Please login with "admin" and password "adm123".



The login screen changes to the System Configuration screen after a successful login. Shown screen shots are for reference only. Actual screen can differ.

Selecting the right configuration

The SMX family is shipped with pre-defined configurations to ease installation (See table 1 for more detail).

BX21=SMX155

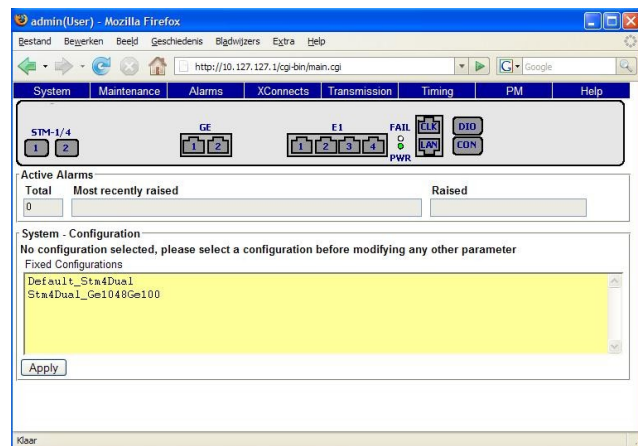
- Default_Stm1
- Stm1_Fe97Fe28
- Stm1_Fe100Fe20

BX25=SMX622lite

- Default_Stm4Dual
- Stm4Dual_Ge1048Ge100

BX28=SMX622

- Default_Stm4Dual_E3DS3
- Stm4Dual_Fe46Fe28_Ge1048_E3DS3



In the System Configuration screen one of these configurations can be selected followed by clicking the apply button.

After the apply button is pressed the SMX system will configure itself according to the pre-defined configuration. On the GUI the System Configuration window will disappear. The configuration takes approximately 2 minutes. The SMX system is now operational. Changes in the initial configuration can be made to tailor the SMX system to the customers need.

Additional help

On the top right of the user interface the "Help" button can be pressed to get more information on the SMX system..

Details regarding the predefined configurations:

SMX	Name and configuration	E1/IBM/E3/DS3 mapping (line#,AU4#,VC#)
BX21	Default_Stm1 STM-1 terminal with 4x E1, 4x IBM, 2x FE (VC12) - no crossconnects set	E1s: not crossconnected IBMs: not crossconnected, 1,1 TU12 structured
		FE1 (0)
		FE2 (0)
BX21	Stm1_Fe100Fe20 STM-1 terminal with 4x E1, 4x IBM, 2x FE (VC12)	E1s: 1,1,111-1,1,121 IBMs: 1,1,122-1,1,132 1,1 TU12 structured
		FE1 (100 Mb/s) 1,1,163-1,1,373 (VC12-46v)
		FE2 (20 Mb/s) 1,1,133-1,1,162 (VC12-9v)
BX21	Stm1_Fe97Fe28 STM-1 terminal with 4x E1, 4x IBM, 2x FE (VC3/12)	E1s: 1,1,111-1,1,121 IBMs: 1,1,122-1,1,132 1,1 TU12 structured
		FE1 (97 Mb/s) 1,1,200/300 (VC3-2v)
		FE2 (28 Mb/s) 1,1,133-1,1,173 (VC12-13v)
BX25	Default_Stm4Dual STM-4 terminal with 4x E1, 4x IBM, 2x GE, - no crossconnects set	E1s: not crossconnected IBMs: not crossconnected 1,1 TU12 structured 1,2 – 1,4 and 2,1 – 2,4 unstructured
		GE1 (0)
		GE2 (0)
BX25	Stm4Dual_Ge1048_Ge100 STM-4 dual terminal GbE with 4x E1, 4x IBM, 1x GE (Vc4), 1x GE/FE (VC12)	E1s: 1,1,111-1,1,121 IBMs: 1,1,122-1,1,132 1,1 TU12 structured 1,2 – 1,4 and 2,1 – 2,4 unstructured
		GE1 (1048 Mb/s) 1,2/3/4-2,1/2/3/4 (VC4-7v)
		GE2 (100 Mb/s) 1,1,163-1,1,373 (VC12-46v)
BX28	Default_Stm4Dual_E3DS3 STM-4 dual terminal GbE with 4x E1, 4x IBM, 1x GE, 2x FE (VC12), 1x E3/DS3 - no crossconnects set	E1s: not crossconnected IBMs: not crossconnected E3/DS3: not crossconnected 1,1,100/200 TU12 structured 1,1,300 TU3 structured 1,2 – 1,4 and 2,1 – 2,4, and 3,1 and 4,1 unstructured
		FE1 (0)
		FE2 (0)
		GE1 (0)
		GE2 (0)
BX28	Stm4Dual_Fe46Fe28_Ge1048_E3DS3 STM-4 dual terminal GbE with 4x E1, 4x IBM, 1x GE, 2x FE (VC12), 1x E3/DS3	E1s: 1,1,111-1,1,121 IBMs: 1,1,122-1,1,132 E3/DS3: 1,1,300 1,1,100/200 TU12 structured 1,1,300 TU3 structured 1,2 – 1,4 and 2,1 – 2,4, and 3,1 and 4,1 unstructured
		FE1 (46 Mb/s) 1,1,211-1,1,273 (VC12-21v)
		FE2 (28 Mb/s) 1,1,133-1,1,173 (VC12-13v)
		GE1 (1048 Mb/s) 1,2/3/4-2,1/2/3/4 (VC4-7v)
		GE2 (0)

Table 1: SMX Pre-defined Configurations

Cables and connections

EIA/TIA 568 for RJ45

There are two wiring standards defined by EIA/TIA for cables connected to a modular (RJ45) plug, called "T-568A" and T-568B". They differ only in connection sequence, not in the use of various colors. In this document the wiring sequence according to the T-568B standard is used.

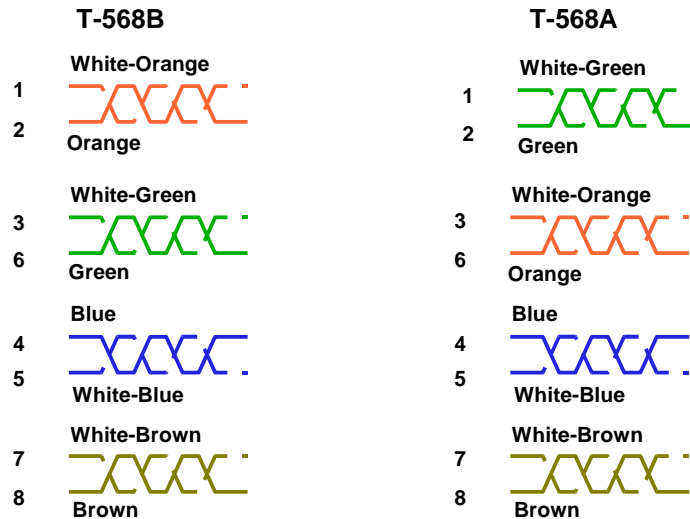


Figure 1: Wiring standards

Cable overview

Function	SMX155	SMX622lite	SMX622	Cable / Connector
AC power	x	x	x	AC power cord, angled plug
DC power	x	x	x	DC plug and 3x wire
E, FE	x		x	RJ45 plug, CAT5 shielded
GbE electrical		x	x	RJ45 plug, CAT5 shielded
STM-1o	x	x	x	LC connector, SM cordage
STM-4o		x	x	LC connector, SM cordage
E3 75ohm coax			x	1.0/2.3, 75 ohm coax
DS3 75ohm coax			x	1.0/2.3, 75 ohm coax
E1 75ohm	x	x	x	RJ45 plug, 75ohm coax
E1 120ohm	x	x	x	RJ45 plug, CAT5 shielded 4 fold UTP with OS
STM-1e 75ohm (SFP)	x	x	x	1.0/2.3, 75 ohm coax
Station Clock E1, 2MHz 75ohm		x	x	RJ45, 75ohm coax
Station Clock E1, 2MHz 120ohm		x	x	RJ45, CAT5 shielded 4 fold UTP with OS
LAN	x	x	x	RJ45 CAT5 shielded
DIO	x	x	x	D-sub 9p male, 4 fold UTP with OS
Console	x	x	x	D-sub 9p male, 4 fold UTP with OS
Grounding	x	x	x	Eye cable tag, Single wire

General cable specification

Electrical/optical cables

- Minimum required operating temperature -25°C to +60°C
System is designed to operate in an ETSI Class 3.3e environment: -25°C to +55°C
- LSZH type
- Overall shield in combination with foil (electrical only)
- UL listing/recognition or CSA certification is preferred
- Cables and connectors listed in tables are inter changeable and tested by AimSys BV
- Cables and connectors comply with IEC60950
- When shielded cable are used the shield should be connected to the connector shielding at both cable ends
- LC optical connectors should comply with the LC product specifications

RoHS compliance

For details on RoHS compliance see:

http://ec.europa.eu/environment/waste/pdf/era_technology_study_12_2004.pdf

- All Belden cable types mentioned in this document are RoHS compliant, confirmed by Belden Venlo
- All Marenq cable types mentioned in this document are RoHS compliant, confirmed by Evernew Wire
- All Marenq RJ45 T8STMAR-x connection sets are RoHS compliant, see specification Marenq
- All Nexans cables are RoHS compliant, see specification Nexans

Cable and I/O description

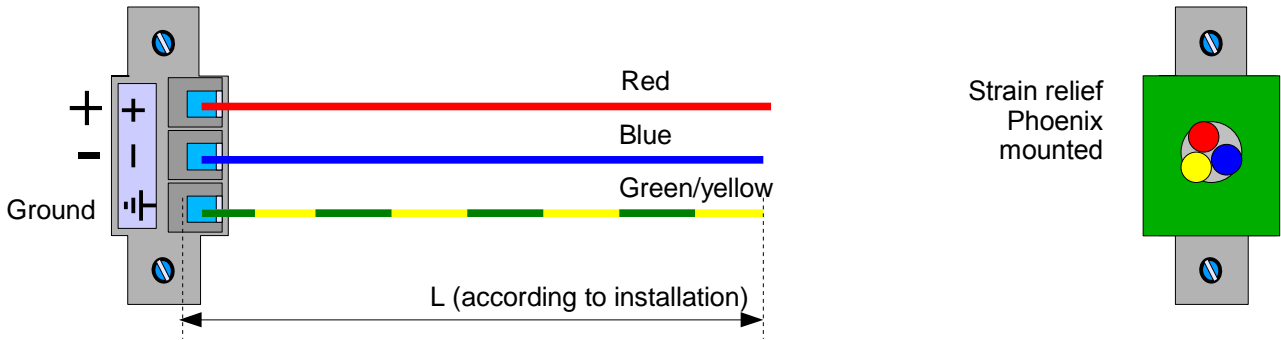
AC power cord



Plug: right angled, according CEE 7-VII
Connector: right angled, according IEC60320-1 C13
Cable: H05VV-F 3G 0.75 mm² (250V / 10A)
Length: 2 meter
Assmann code: 064060 / AK-535 2M (black)
Optional color: gray, white, RAL

<http://www.assmann.com>

DC power connector



Stock list DC power cable			
Component	Part number		
Socket block	MC 1.5/3-STF-3.81 Phoenix 1827716	BL3.81/3F Weidmuller 1792960000	-
Strain relief	KGG-MC 1.5/3 Phoenix 1834356	KGG-MC 1.5/3 Phoenix 1834356	-
Wire 1.5mm ² blue	Capable: VA3014HH	Eldra: 90404.01552.016.0084	Belden:415960812000 Nexans: 287657
Wire 1.5mm ² red	Capable: VA3014DD	Eldra: 90404.01552.016.0040	Belden:4159600808000
Wire 1.5mm ² yellow/green	Capable: VA3014FG	Eldra: 90404.01552.016.0287	-
Wire 0.75mm ² blue, red, yellow/green	Nexans: H05V-K		
Wire 1.00mm ² blue, red, yellow/green	Nexans: H05V-K		
Wire 1.5mm ² blue, red, yellow/green	Nexans: H07V-K		

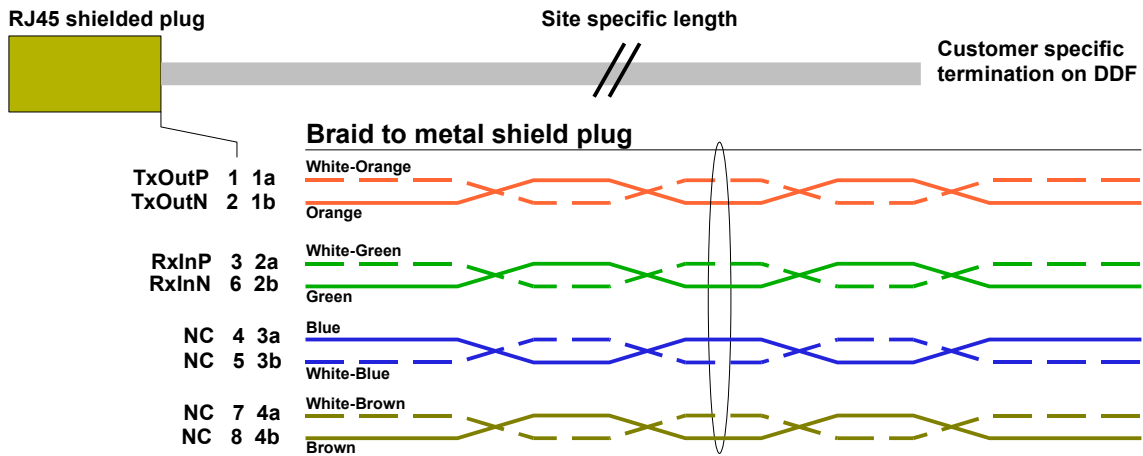
Manufacturing notes:

- Strain relief is mandatory. Safe operation without strain relief is not guaranteed.**

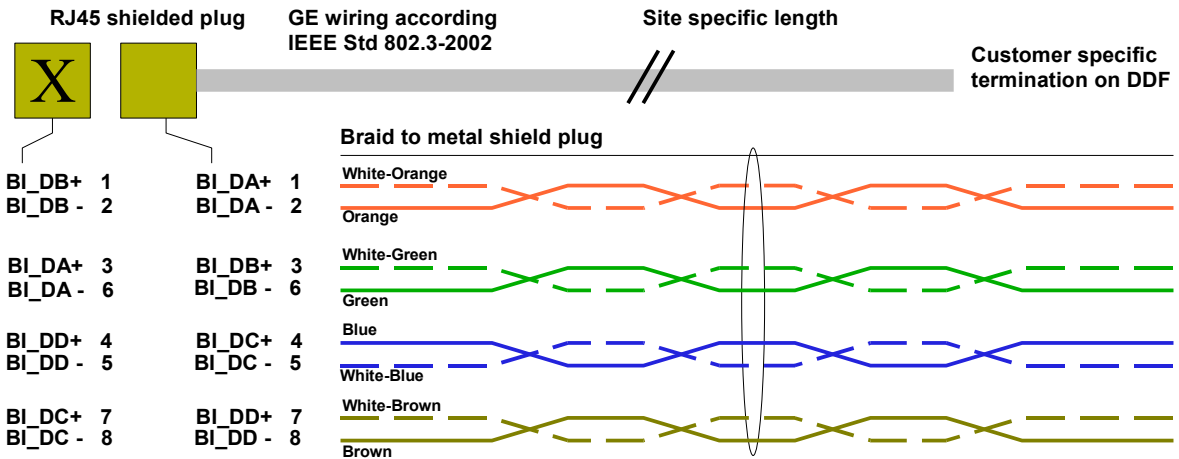
Note:

Dissipation of a SMX is < 25 Watt, with respect to current the smallest diameter will work fine.

E, FE, GbE and LAN interface



GbE interfaces are bi-directional. MDI wiring according IEEE Std 802.3-2002. Cross over function (MDI-X) is defined but is not compatible with the Cross over function as defined for E and FE interfaces. The MDI connector for a PHY that implements the cross over function is marked with symbol "X".



Stock list E, FE, GbE cable		
Component	Part number	
Modular plug shielded	Mareq: T8STMAR-1	BeeOne:TD108A
CAT5e 100 ohm cable	Mareq: CAT5e-STP-128-MAR-grey (stranded) 1) Mareq: CAT5e-STP-129-MAR-grey (solid)	BeeOne:IBM ACS Bronze S-FTP grey

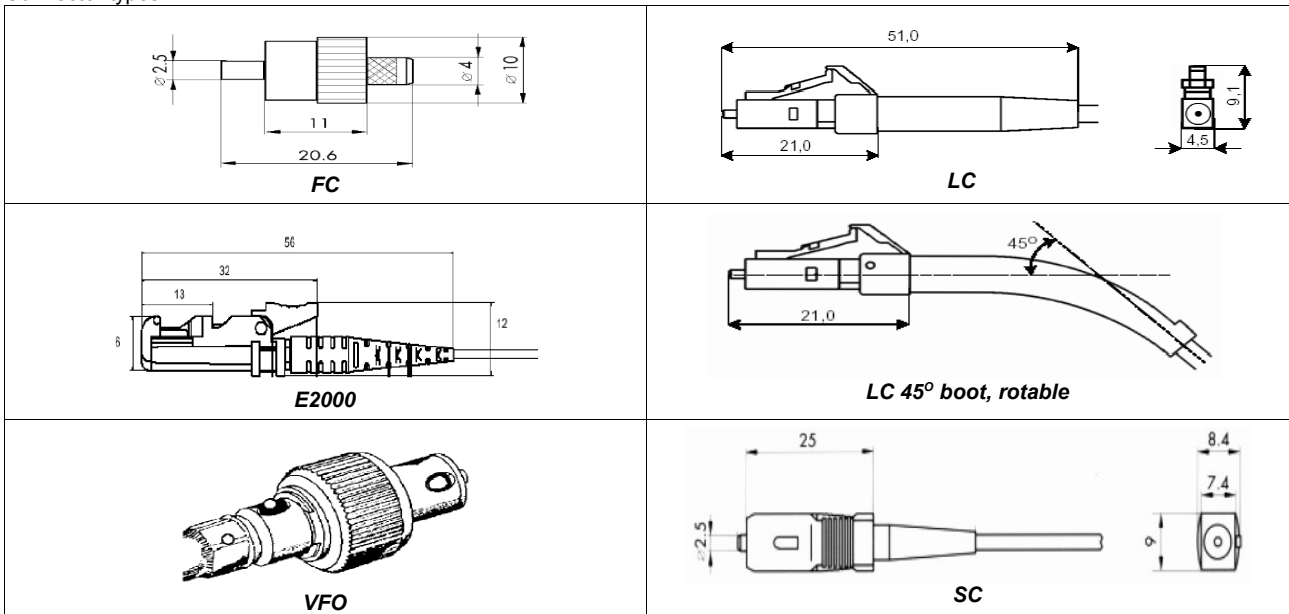
Remark 1:
Cable jacket available in color: Grey, Beige, Yellow, Blue, Green, Orange, Red, Black, Violet, Apple iMAC, Transparent Grape, Strawberry, Lime, Tangerine and Blueberry. Other colors on request.

STM-10, STM-40 optical line interfaces

- When ordering optical patch cords specify the listed parameters:
- Connector types: Both ends or only one
 - Type of fiber: Matched cladding only
 - Cordage diameter: 1.6mm and 2.0mm
 - Type of cable: Standard Single Mode fiber (9/125) according G.652
 - Cordage construction: Low Smoke, Zero Halogen, (LSZH)
 - Sheath color: Customer specific
 - Length patch cord: Site specific

Stock list optical interface cable			
Component	Part number		
Customer dependent connector: SC, LC, FC, ST, E2000, VFO, EC, DIN	-	-	-
Optical single mode LC-PC jumper connector with 45° angled, 360° rotatable, bend protection boot on equipment	FCI boot 10007200-001 to be ordered in combination with a complete cable assembly only.		
Simplex single mode fiber cordage	Belden: 46990-3309-240	-	-

Connector types:



Preferred cable colors are Orange for Multi Mode cable and Yellow for Single Mode cable

E3, DS3, STM-1e 75ohm interface



Stock list E3, DS3, STM-1e cable			
Component	Part number		
1.0/2.3 straight crimp plug, push pull	ITT Canon:	D55-F24-3035GDA	ITT Canon: D55-F24-3080GDA
1.0/2.3 75 ohm coax	Belden:	BT3002 (H133T03)	Nexans: NCX1

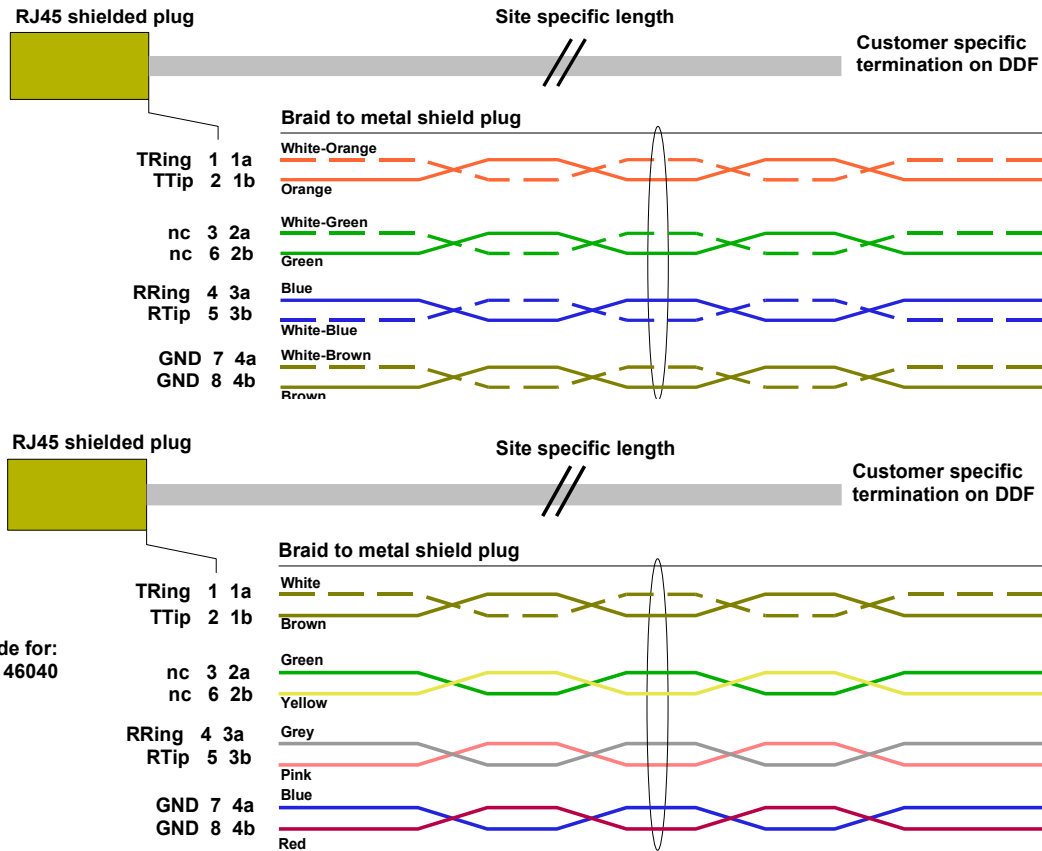
Other standard 1.0/2.3 cable connectors and cable types:

Cable type	ITT Canon 1.0/2.3 connector	Attenuation dB @ 78MHz/100m
ST212 & CT1320	D55-F24-3022GDA	
ST214	D55-F24-3024GDA	
TZC75024 & BT3002	D55-F24-3035GDA	Belden: 17.5
RA7000	D55-F24-3037GDA	
RA8000	D55-F24-3038GDA	Belden: 18.8
2.5C-2V	D55-F24-3043GDA	
2.5C-2W	D55-F24-3044GDA	
735A	D55-F24-3050GDA	Belden: 14.3
0.4/2.42/4,07	D55-F24-3052GDA	
RG179B/U	D55-F24-3079GDA	
NCX 1	D55-F24-3080GDA	Nexans: 11.5
L910/34 & 39	D55-F24-3095GDA	

STM-1e only available in combination with SFP-155E™ module.

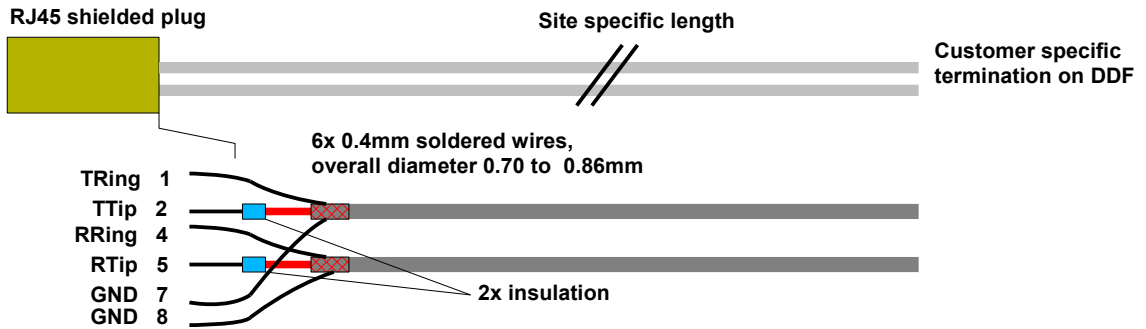
E1 interface

E1 120ohm termination



Stock list E1 120 ohm cable				
Component	Part number			
Modular plug shielded	Mareng:	T8STMAR-1		
120ohm cable	Belden:	46040	Nexans: ET2PA947	Nexans: 296452

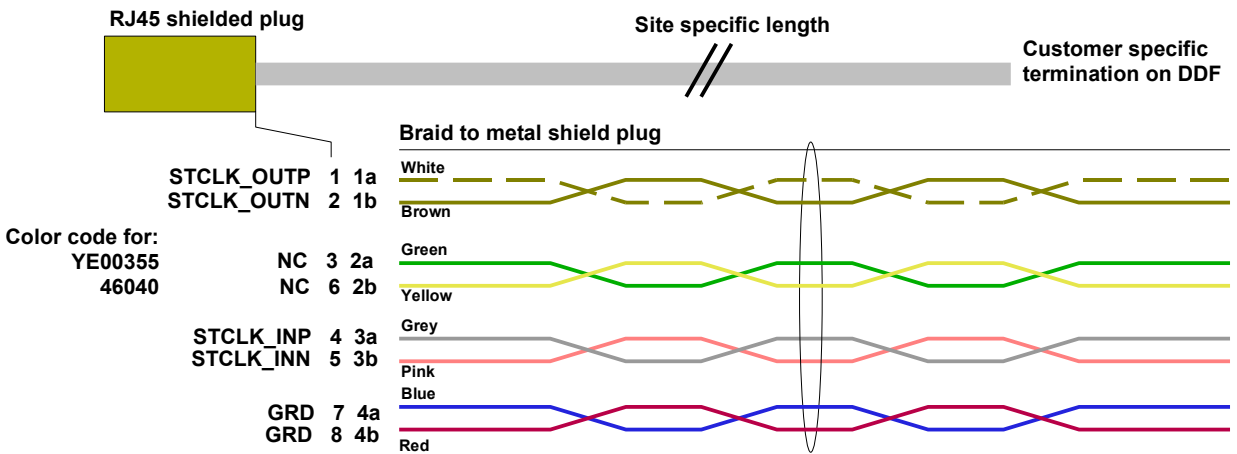
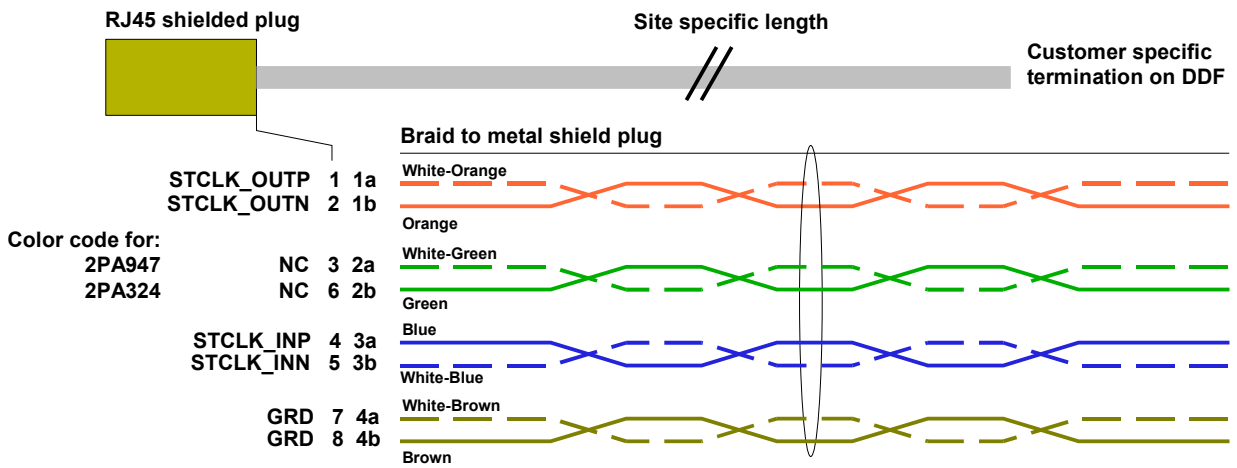
E1 75ohm termination



Stock list E1 75 ohm cable	
Component	Part number
Modular plug shielded set	Mareng: T8STMAR-1
Heatshrink tubing 1.6mm added	Heatshrink tubing 1.6mm added
75 ohm coax cable	Belden: 46160 0935 099 grey Telco 0.25-1.45-ES-2.6-H
	Nexans: ET 288526

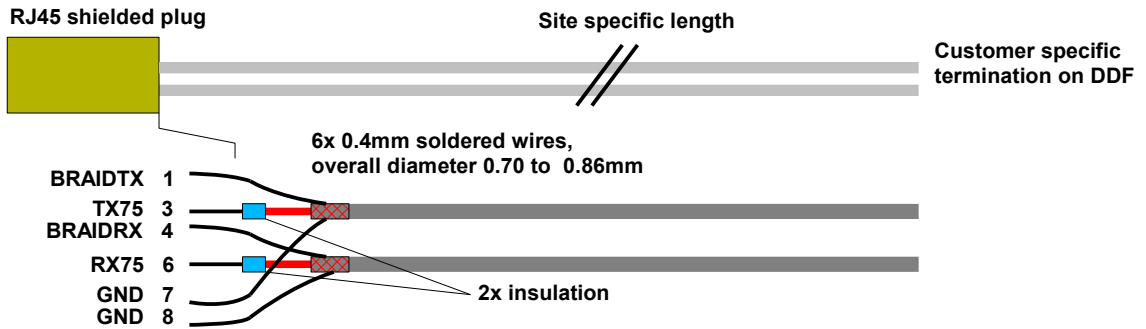
Station Clock

STCLK 120 ohm termination



Stock list STCLK cable				
Component	Part number			
Modular plug shielded	Mareng: T8STMAR-1	Mareng: T8STMAR-1	Mareng: T8STMAR-1	Mareng: T8STMAR-1
120 ohm cable	Nexans: ET2PF947	Belden: 46040	Nexans: 296452	

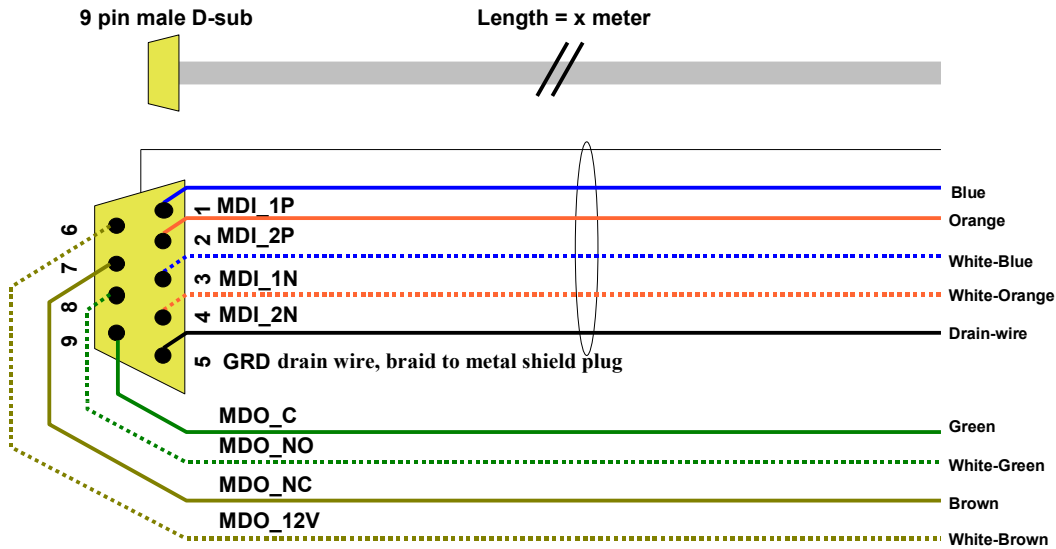
STCLK 75ohm termination



Stock list STCLK 75 ohm cable	
Component	Part number
Modular plug shielded set	Mareng: T8STMAR-6
Coax plug (if required)	Bueschel:007 18000 302008 (full crimp type)
Heatshrink tubing	Tyco: RNF heatshrink tubing 1.6mm => 0.8mm eg RS 666-852
75 ohm coax cable	Belden: 46160 Telco 0.25-1.45-ES-2.6-H
	Nexans: ET 288526

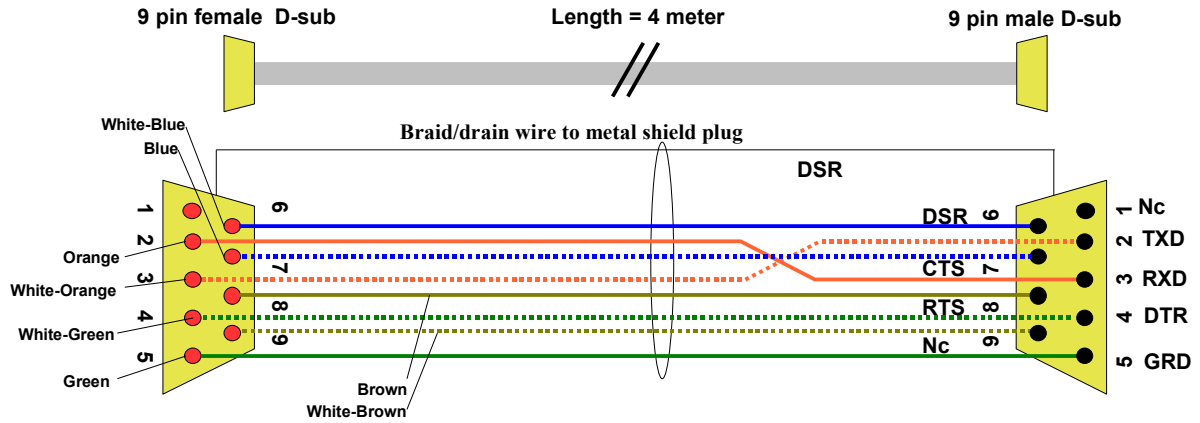
Note:
Due to small cable diameter copper foil and crimp sleeve for supporting crimp required

DIO



Stock list DIO cable			
Component	Part number		
D-sub 9p male	Amphenol:		
	FCI:	DE09P065TX	
	AMP:	747904-5	
D-sub hood shielded 2x	FCI:	8655MH0911	
	Amphenol:	17DVZK9K	
cable 100ohm type (no impedance requirements)	Evernew: Cat5e SFTP-128 stranded (C5ESFTP-128)	Evernew: Cat5e SFTP-129 solid (C5ESFTP-129)	IBM Bronze CAT5 shielded
cable 120ohm type (no impedance requirements)	Belden: 46040	Nexans: 2PF947	Nexans: 296452

Console cable



CTS	Clear To Send	DSRi (Data Set Ready In, Receive from CIT)
TXD	Transmit Data Output to CIT	
RXD	Receive Data In from CIT	
RTS	Request To Send	DSRo (Data Set Ready Out, to CIT)
DTR	Data Terminal Ready form CIT	
DSR	Data Set Ready	

1. Stock list Console cable			
Component	Part number		
D-sub 9p female	FCI:	DE09S065TLF	
	AMP:	5-747905-5	
D-sub 9p male	FCI:	DE09P065TXLF	
	AMP:	5-747904-5	
D-sub hood shielded 2x	FCI:	8655MH0911	
	Amphenol:	17DVZK9K	
100ohm cable	Evernew:	Cat5e SFTP-128 stranded (C5ESFTP-128)	IBM Bronze CAT5 shielded
120ohm cable	Belden:	46040	Nexans: 2PF947
			Nexans: 296452

Cable connects to a debug terminal during maintenance, not part of permanent station cabling (standard length 4 meter).

Grounding



Stock list subrack ground cable	
Component	Part number
M4 eye cable tag	AMP 34122
M6 eye cable tag	AMP 34124
Wire 2.5mm ²	

Glossary

AC	Alternating Current
uMSPP	Micro Multi-Service Provisioning Platform
SFP	Small form-factor pluggable
DC	Direct Current

The information in these materials is given to describe certain component concept and shall not be considered as a guarantee of characteristics. Please note that arcutronix' product information does not constitute or contain any guarantee, warranty or legal binding representation, unless expressly identified as such in duly signed writing.

arcutronix GmbH
Garbsener Landstrasse 10
30419 Hannover
Germany

tel: +49 511 277 2700

fax: +49 511 277 2709

www.arcutronix.com

service@arcutronix.com

