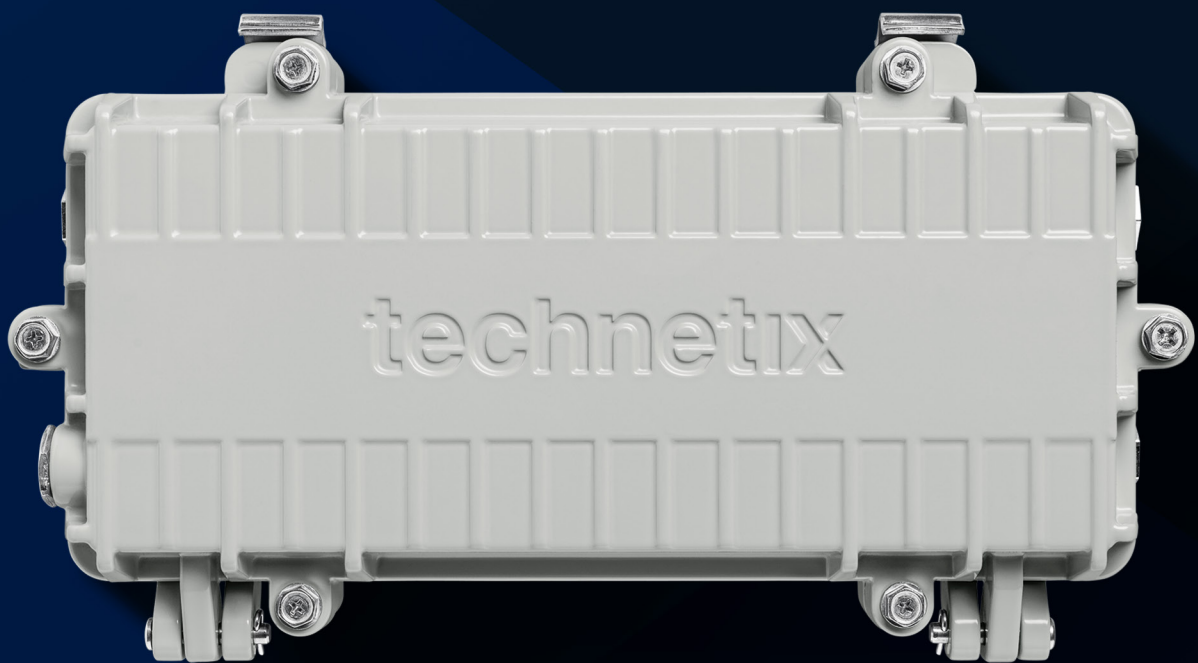




DBx

World leading access platform



technetix

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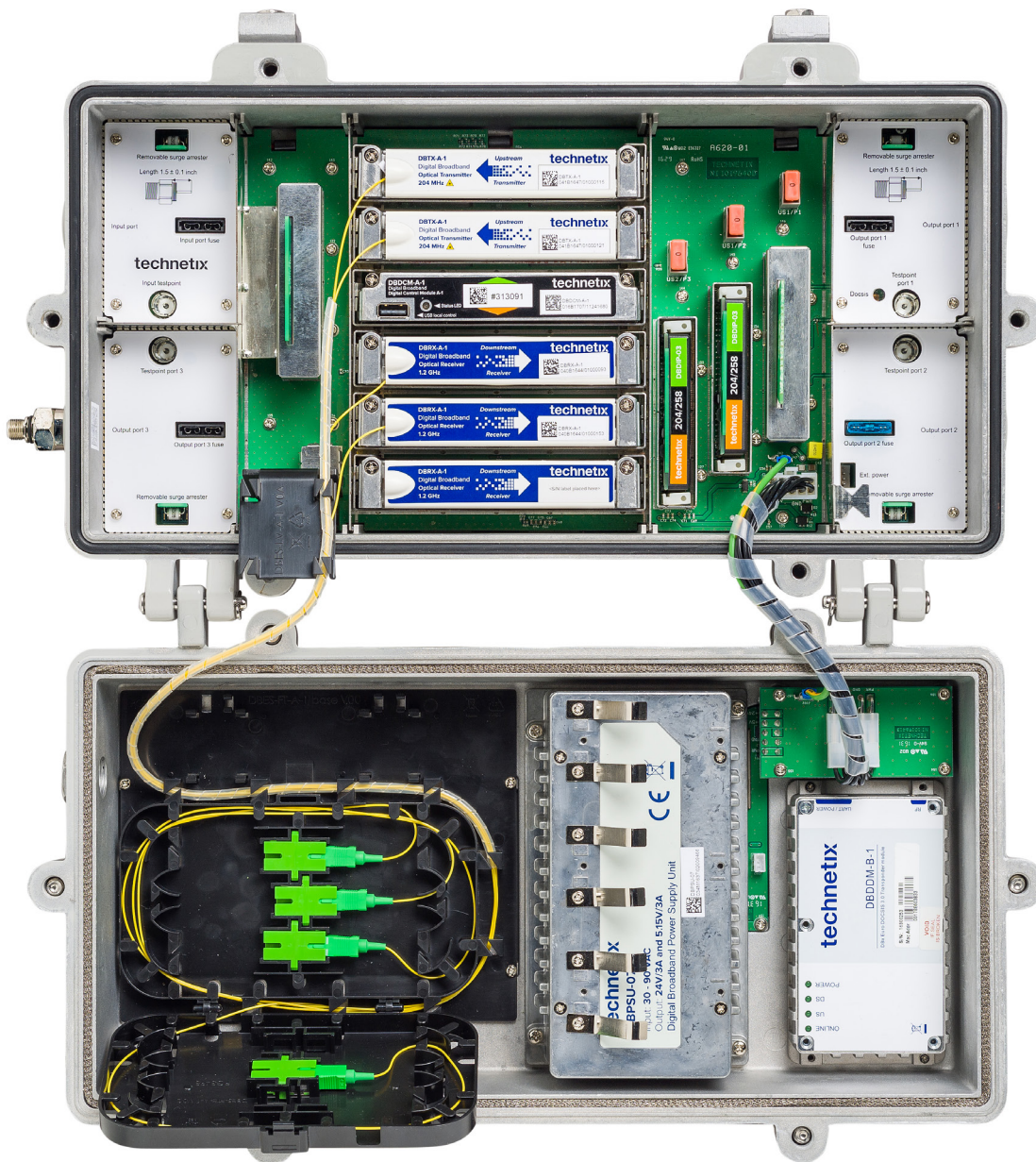
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Flexible, simple to use and future-proof **DBx node and amplifier solutions**





TECHNETIX DBx access platform

The Technetix DBx-1200 access platform is an innovative modular design with a wide range of RF amplifiers, optical nodes and Remote PHY nodes.

With over 750,000 units deployed worldwide, DBx is the world leading access platform in the market today.

Flexibility

The industrial standard DBx platform comes with a modular configuration, allowing for future retrofits and network upgrades with plug and play components. Improving the longevity and flexibility of HFC networks, operators can decide to change RF and optical modules or upgrade to Remote PHY nodes as network architectures evolve.

Power saving

To stay competitive, service providers are increasing bandwidth to improve service performance. The DBx platform allows operators to use the right amplifier modules with the correct gain, use high efficiency PSU in active devices and reduce the current through the hybrids during off-peak times, bringing substantial savings each year.

Plug and play Remote PHY upgrade

Remote PHY (R-PHY) technology enables the up- and downstream relocation of traditional headend elements, generating 10 Gbps of data on a remote location to operators seeking to extend the capacity of their coax networks. R-PHY is ready for deployment in existing DBx infrastructure or directly enabled in DBx R-PHY nodes and amplifiers.

DBx Product Family

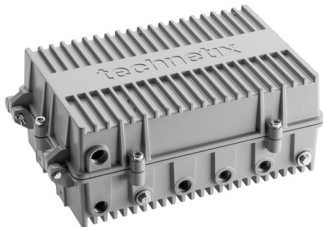
Type	Housing style	Active/passive RF outputs	Optical configuration
DBC-1200	Cabinet	1/2	1 x 1
DBC-1200S	Strand	1/2	1 x 1
DBD-1200	Cabinet	2/3	Up to 2 x 2 or hybrid RF mix
DBE-1200	Cabinet	4/4	Up to 4 x 4 or hybrid RF mix
DBE-1200S	Strand	3/3	Up to 3 x 3 or hybrid RF mix



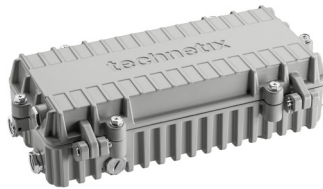
DBC-1200



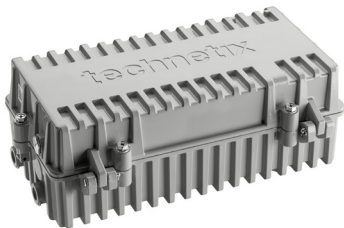
DBD-1200



DBE-1200



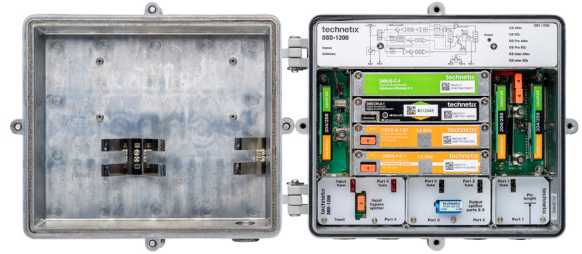
DBC-1200S



DBE-1200S

Platform features

- DOCSIS 3.1 compliant upstream and downstream
- Full modular design
- Power efficient
- Field upgradeable diplex filters offered in 42/54, 65/85, 85/102, 85/105, 204/258 MHz band splits
- Latest GaN technology with high output power
- Optional on-board EU/US DOCSIS 3.0 transponders



2x active RF configuration

RF features

- Full digital control of equalizers and attenuators in both upstream and downstream
- On-board ingress detection switches in upstream modules for each individual leg
- Wide selection of RF modules for all network applications



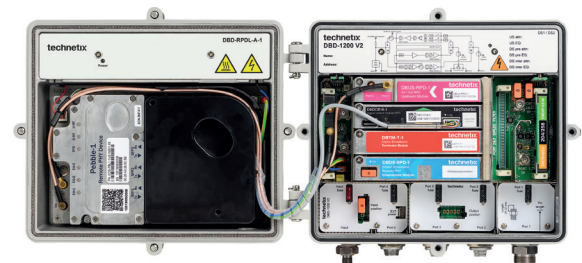
Optical 2 x 2 configuration

Optical features

- Upstream lasers in 1310, 1550 and CWDM
- Wide range of optical input power in downstream receiver -6 dBm to +1 dBm including optical AGC
- Power efficient
- On-board ingress detection switches in upstream transmitter

Business benefits

- Lowest power consumption in the industry
- Latest GaN 2.5 technology ensures a future-proof solution for digital loading
- Wide range of RF and optical modules tailored to your network
- Future upgrades to include D-OLT, Wi-Fi support, Virtual Segmentation™ support modules
- DOCSIS 3.1 today through RF amplifiers, optical nodes or RPD nodes

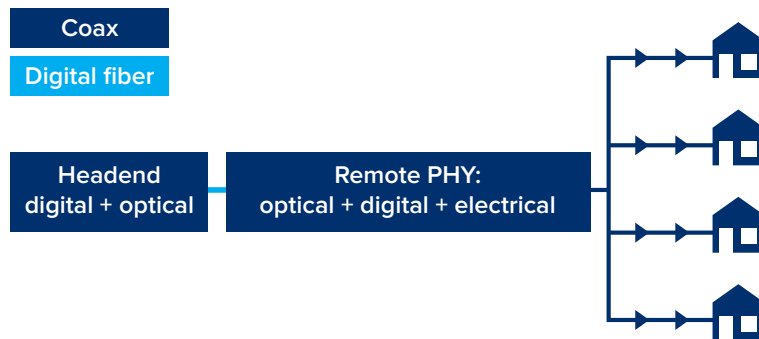


**Remote PHY
1x1 or 1x2 configuration**

DBx Future-proof

the platform grows with the needs of operators and different architectures

The requirement for increased speed and capacity has pushed the broadband cable industry into developing a faster and higher capacity network. The Technetix DBx platform is perfectly suited to adapt to these demands and gives operators the opportunity to evolve their business. **Extended bandwidth, higher modulation schemes and innovative network designs** have been incorporated into the current network, improving the longevity and flexibility of HFC networks.



DBx Remote PHY for Distributed Access Architecture

A Distributed Access Architecture (DAA) is designed to move several elements related to the physical layer (PHY) from the headend to the access network. By pushing these elements deeper into the network to the Remote PHY device (RPD), the best possible quality signal can be generated while space reduction in the headend is achieved.

While the technology has been part of the DOCSIS 3.1 standard since the release of the requirement specification, there are issues in the network that still need to be overcome. Available power, space and the size of existing street cabinets considerably limit the number of options available to operators seeking to deploy this next step in the evolution of their networks. The DBx platform allows you to upgrade existing DBx nodes and amplifiers into Remote PHY nodes.

A game of numbers: power and deployment cost savings with DBx Remote PHY

The 1x1 DBx R-PHY configuration typically consumes as little as 51 W and a simple lid upgrade is all it takes to change a deployed DBx amplifier or node into an R-PHY device. Each lid comes with dedicated cabling and a power supply to feed the R-PHY and R-PHY inserter modules. Those in turn connect the RF feed to the DBx mainboard. This solution is a major step towards 10G capable networks and the quickest route to a Distributed Access Architecture.

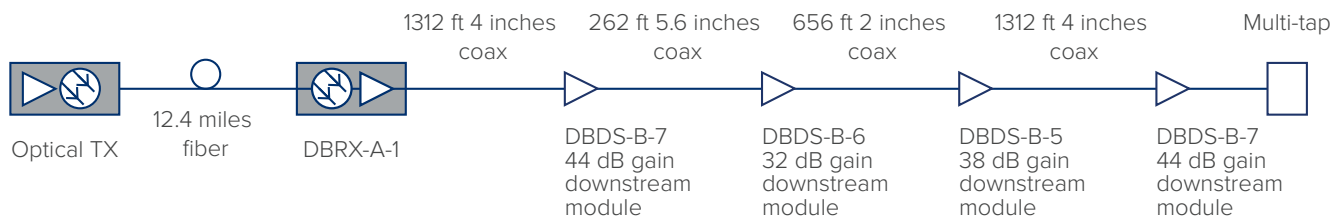
Remote PHY modules

Item code	Modules	Description
19012173	DBRPDI-A-1	Remote PHY inserter module
19012333	DBUS-RPD-1	Remote PHY upstream module for 1x1 or 1x2 applications
19012331	DBDS-RPD-1	Remote PHY high performance downstream module
19012332	DBRX-RPD-1	Remote PHY analog overlay module
19012171	DBRPD-FT-A-1	Remote PHY fiber tray for DBx

DBx RF configurations

The DBx RF modules are designed around both star and cascade networks. Using dedicated downstream gain modules for a cascade application allows you to customize your network. For exceptionally long cascade networks, dedicated flatness correction plug-in modules are available to optimize the overall frequency response. Fixed deviation in frequency response accumulates in cascade networks and it is recommended that the flatness correction plug-in is used for optimal network performance after five amplifiers.

Improved efficiencies through tailored configurations of downstream modules gain in an N+4 scenario



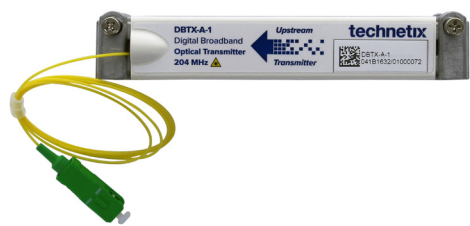
When installing high-gain modules (i.e. 44 dB) in shorter cable length applications, you have to attenuate more signal after amplification. Using lower-gain modules keeps attenuation requirements to an absolute minimum, resulting in better network performance.

RF modules

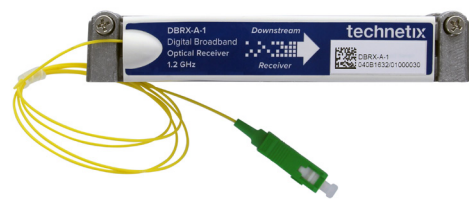
Category	Type	Description
Upstream modules	DBUS-C-1	Main module: 204 MHz upstream amplifier 26 dB gain and IDS
	DBUS-D-1	Bridger module: 204 MHz upstream amplifier 26 dB gain and IDS
Downstream modules	DBDS-B-5-1	Main module: 1.2 GHz downstream amplifier 38 dB
	DBDS-B-6-1	Main module: 1.2 GHz downstream amplifier 32 dB
	DBDS-B-7-1	Main module: 1.2 GHz downstream amplifier 44 dB - 52 dBmV output
	DBDS-B-7-ET	Main module: 1.2 GHz downstream amplifier 44 dB - ET: Extended tilt - 52 dBmV output
	DBDS-F-5-1	Bridger module: 1.2 GHz downstream amplifier 44 dB - 52 dBmV output

DBx optical configurations

The optical transmitter and receiver modules are deployed in scenarios where the DBx is used as an optical fiber node. The optical receiver has a wide optical range, which spans from -6 dBm to +1 dBm, suitable for any application. The receiver module is equipped with the latest GaN 2.5 technology for maximum output power.



DBTX-A-1

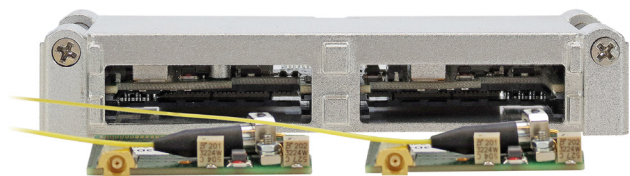


DBRX-A-1

The DBTX transmitter module can hold two DFB laser boards with standard 1310 nm or 1550 nm wavelengths and 3 dBm output power. The laser boards are also available in 17 CWDM wavelengths. The fibre is terminated with SC/APC connectors. The DBRX optical receiver can receive an optical signal from 1100 to 1650 nm.

Additional application boards available:

- Bypass boards (DBLB-BP) in a 1 x 1 DBC configuration terminating the second port in the transmitter
- Combiner boards (DBLB-CB) in a DBD/DBE unit when using a hybrid RF/optical configuration, combining the upstream feed of two downstream modules over one upstream laser



DBx optical configuration options

# of DBRX-A-1	1	2	2	2	3	1-4
# of DBTX-A-1	1	1	2	2	2	2
DBC	1					
DBD	2	2	2	2		
DBE	3	4	3	4	4	4*
DBC-S	1					
DBE-S	3	3	3	3	3	

The numbers in the table indicate the number of usable active output ports in a given optical configuration.

Ordering information

Optical modules

Item code	Modules	Description
19008435	DBRX-A-1	Optical 1.2 GHz downstream receiver, 52 dBmV output
19008438	DBTX-A-1	Optical upstream transmitter module, holds up to 2 DBLB optical transmitters

Optical plug-in boards for DBTX

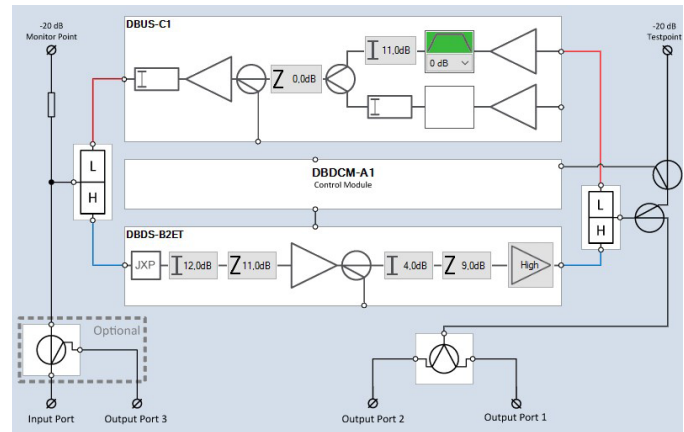
Item code	Boards	Description
19010322	DBLB-31-3D-1	Optical 204 MHz transmitter plug-in, 1310 nm, DFB, 3 dBm output, SC/APC
19010323	DBLB-55-3D-1	Optical 204 MHz transmitter plug-in, 1550 nm, DFB, 3 dBm output, SC/APC
19010324	DBLB-C27-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1271 nm, DFB, 3 dBm output, SC/APC
19010325	DBLB-C29-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1291 nm, DFB, 3 dBm output, SC/APC
19010326	DBLB-C31-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1331 nm, DFB, 3 dBm output, SC/APC
19010327	DBLB-C33-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1331 nm, DFB, 3 dBm output, SC/APC
19010328	DBLB-C35-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1351 nm, DFB, 3 dBm output, SC/APC
19011818	DBLB-C37-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1371 nm, DFB, 3 dBm output, SC/APC
19012437	DBLB-C41-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1411 nm, DFB, 3 dBm output, SC/APC
19010329	DBLB-C43-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1431 nm, DFB, 3 dBm output, SC/APC
19010330	DBLB-C45-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1451 nm, DFB, 3 dBm output, SC/APC
19010331	DBLB-C47-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1471 nm, DFB, 3 dBm output, SC/APC
19010332	DBLB-C49-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1491 nm, DFB, 3 dBm output, SC/APC
19010333	DBLB-C51-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1511 nm, DFB, 3 dBm output, SC/APC
19010334	DBLB-C53-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1531 nm, DFB, 3 dBm output, SC/APC
19010335	DBLB-C55-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1551 nm, DFB, 3 dBm output, SC/APC
19010336	DBLB-C57-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1571 nm, DFB, 3 dBm output, SC/APC
19010337	DBLB-C59-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1591 nm, DFB, 3 dBm output, SC/APC
19010338	DBLB-C61-3D-1	Optical 204 MHz CWDM transmitter plug-in, 1611 nm, DFB, 3 dBm output, SC/APC
19010339	DBLB-BP-1	Bypass laser board for DBTX-A-1 (second slot if no laser installed)
19010340	DBLB-CB-1	Combiner board to combine two upstream RF signals into a single laser

Intelligent digital controls

Monitoring and control

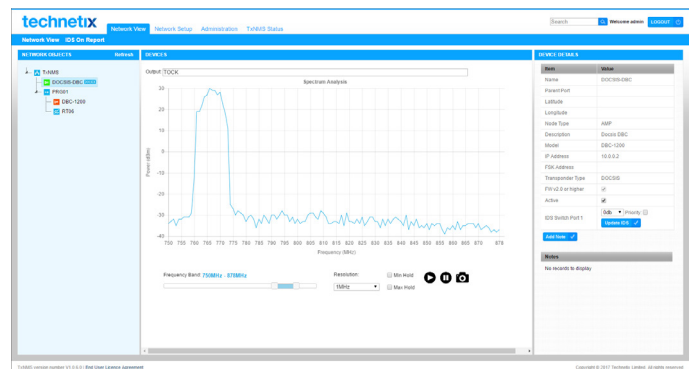
The DBx platform offers flexibility with electronically adjustable equalizers and attenuators in both upstream and downstream amplifiers. The downstream modules have both pre-stage and inter-stage equalization and attenuation to compensate for cable loss prior to the amplifier and to also provide a boost for the output cable. These values can be adjusted locally with Technetix' Basis Locon Laptop (BLL) software or remotely with the DOCSIS 3.0 transponder.

The BLL software has a user-friendly interface; by using the amplifier block diagram or the menu on the right of the screen, the amplifier can be adjusted locally to the correct settings and configuration. The diplex split type and end frequency can be specified in the software. The FSK settings can also be adjusted locally or remotely.



TxNMS software

The TxNMS software is available as a stand alone management system to control both the DBx ingress detection switches and DOCSIS 3.0 transponder. It is also available as an API for NMS (Network Management System) integration. When the FSK module is installed in the DBx series, the TxNMS software can remotely switch the on-board 'ingress detection switches' using an FSK carrier generated by the PRG-122 headend controller.



Remote Ingress Control

Attenuation of 0 dB, 6 dB or 40 dB can be remotely applied in the upstream when ingress is detected and can also identify where the issue has occurred for quick repair and service restoration.

DBDCM-A-1 FSK control module

The DBDCM-A-1 module has an embedded FSK tuner, which can be used for remote single-directional communication with an amplifier. A dedicated headend controller (PRG-122), set on a requested frequency, enables the TxNMS software to detect ingress switches in upstream modules with 6 or 40 dB. This determines the source of the ingress and specifies the location for truck rolls.

The FSK module supports three types of temperature compensation:

Automatic Temperature Compensation (ATC)

The ATC function of the amplifier is installed in the digital control module. The DBx amplifiers have been tested in all thermal circumstances within range and corrections to temperature deviations were calculated and installed in a fixed temperature table within the digital control module. This ensures that the optimum corrections are made when the temperature fluctuates within an amplifier. When you are not using AGC/ALSC, this function is automatically active.

Automatic Gain Control (AGC)

AGC functionality is an internal feature that maintains a controlled signal amplitude at its output despite any possible variation in amplitude of the input signal. The average or peak output signal level is used to dynamically adjust the input-to-output gain to a suitable level, enabling the circuit to work with a greater range of input signal levels.

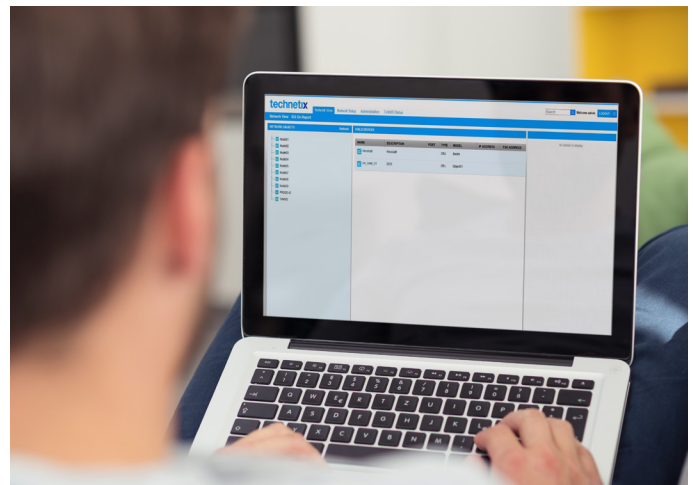
The AGC corrects both the internal temperature variation and the variation on the input of the amplifier. This is done by measuring the output level from the amplifier via one pilot frequency. If the level deviates from the set target, the AGC edits the internal attenuation switches until the output level is close enough to the target level.

Automatic Level Slope Control (ALSC)

The most advanced option for correction is the ALSC. In addition to the AGC, the ALSC uses equalizers to correct the difference in attenuation between high and low frequencies.

The ALSC function in the DBx amplifier range measures the deviation of two set-points against the pilots. The amplifier uses this information to identify the scenario and establish the best course of action.

ALSC measures the actual output level on a pre-described time schedule; this can be indicated as a closed measurement loop.



DOCSIS 3.0 transponder

The DOCSIS 3.0 transponder option offers full remote control of the amplifier through DOCSIS commands. The DOCSIS 3.0 transponder is available in Euro and US DOCSIS, enabling remote monitoring of the RF parameters, AGC/ALSC levels and amplifier temperature. The DOCSIS transponder can send SNMP alarms based on applied thresholds; it also comes with an on-board spectrum analyzer. This is the ultimate by-directional communication and monitoring addition to the DBx platform. The DOCSIS 3.0 transponder is connected to the dedicated DBDCM-B-2 DOCSIS control module in the amplifier and the modem connection port. The on-board ingress detection switches can also be controlled remotely with the DOCSIS transponder without additional headend equipment.

Features:

- DOCSIS 3.0 compliant transponder module
- Remote monitoring and control of any DBx-1200(s) amplifier
- RF parameters such as gain, tilt and ingress detection switches
- AGC/ALSC levels
- RF levels
- Temperature, voltage
- Alarm settings and generation (SNMP alarms)
- Optical received power
- Amplifier configuration
- SNMP interface to network management system
- Usable with 42/54, 65/85, 85/102 and 204/258 MHz band splits
- Downstream frequency range 108-1002 MHz
- Upstream frequency range 5-83 MHz
- Firmware remotely upgradeable



DBDDM-A-1 DOCSIS transponder



DBDDM-B-1 Euro DOCSIS transponder

DOCSIS 3.0 transponder metrics

The following metrics can be read and set (where applicable) from the DBx device through the DOCSIS transponder SNMP interface.

Note: Not all settings can be changed directly via SNMP. Technetix BLL software is required to obtain full control over the amplifier via the DOCSIS transponder.

RF:

- Attenuator settings
- Equalizer settings
- Ingress detection switches
- Upstream amplifier on/off switch for the upstream module(s)
- Hi/low power level of the end amplifier stage in the downstream module(s)
- AGC levels for the downstream module
- ALSC levels for the downstream module
- Actual downstream power level at a given frequency

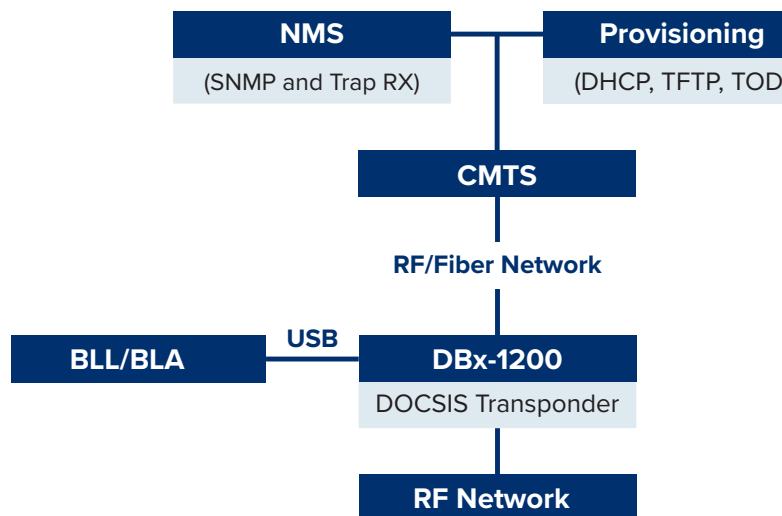
Optical:

- Receive power of the optical receiver module(s)
- Transmit power of the optical transmitter module(s)

Miscellaneous:

- Amplifier temperature
- Alarm level for device temperature
- Voltage from +5 and +24 VDC power supply
- Alarm levels for power supply voltages

System level diagram:





Ordering information

RF amplifier configurations

Item code	Description
DBC-1200	DBC-1200 cabinet RF amplifier, 1.2 GHz 65/85 MHz, single output, FSK
DBD-1200	DBD-1200 cabinet RF amplifier, 1.2 GHz 65/85 MHz, dual active output, FSK
DBE-1200	DBE-1200 cabinet RF amplifier, 1.2 GHz 65/85 MHz, triple output, FSK
DBC-1200S	DBC-1200S strand-mount RF amplifier, 1.2 GHz, 85/102 MHz, single output, FSK
DBE-1200S	DBE-1200S strand-mount RF amplifier, 1.2 GHz, 85/102 MHz, triple output, FSK

Optical node configurations	Description
DBC-1200 set - 1 x 1 optical, 1310 nm, 204/258 MHz	DBC-1200 optical fiber node set. 1 x 1 optical configuration, 1 x forward receiver, 1 x 1310 nm transmitter, 204/258 diplex filters, including power supply and fiber management tray.
DBD-1200 set - 1 x 1 optical, 1310 nm, 204/258 MHz	DBD-1200 optical fiber node set. 1 x 1 optical configuration, 1 x forward receiver, 1 x 1310 nm transmitter, 2 active output ports, 204/258 diplex filters, including power supply and fiber management tray
DBD-1200 set - 2 x 2 optical, 1310 nm, 204/258 MHz	DBD-1200 optical fiber node set. 2 x 2 optical configuration, 2 x forward receivers, 2 x 1310 nm transmitters, 2 active output ports, 204/258 diplex filters, including power supply and fiber management tray
DBE-1200 set - 1 x 1 optical, 1310 nm, 204/258 MHz	DBE-1200 optical fiber node set. 1 x 1 optical configuration, 1 x forward receiver, 1 x 1310 nm transmitter, 3 active output ports, 204/258 diplex filters, including power supply and fiber management tray
DBE-1200 set - 2 x 2 optical, 1310 nm, 204/258 MHz	DBE-1200 optical fiber node set. 2 x 2 optical configuration, 2 x forward receivers, 2 x 1310 nm transmitters, 3 active output ports, 204/258 diplex filters, including power supply and fiber management tray
DBE-1200 set - 3 x 3 optical, 1310 nm, 204/258 MHz	DBE-1200 optical fiber node set. 3 x 3 optical configuration, 3 x forward receivers, 3 x 1310 nm transmitters, 3 active output ports, 204/258 diplex filters, including power supply and fiber management tray
DBE-1200 set - 4 x 4 optical, 1310 nm, 204/258 MHz	DBE-1200 optical fiber node set. 4 x 4 optical configuration, 4 x forward receivers, 4 x 1310 nm transmitters, 4 active output ports, 204/258 diplex filters, including power supply and fiber management tray
DBC-1200S set - 1 x 1 optical, 1310 nm, 204/258 MHz	DBC-1200S optical fiber node set. 1 x 1 optical configuration, 1 x forward receiver, 1 x 1310 nm transmitter, 204/258 diplex filters, including power supply and fiber management tray.
DBE-1200S set - 1 x 1 optical, 1310 nm, 204/258 MHz	DBE-1200S optical fiber node set. 1 x 1 optical configuration, 1 x forward receiver, 1 x 1310 nm transmitter, 3 active output ports, 204/258 diplex filters, including power supply and fiber management tray
DBE-1200S set - 2 x 2 optical, 1310 nm, 204/258 MHz	DBE-1200S optical fiber node set. 2 x 2 optical configuration, 2 x forward receivers, 2 x 1310 nm transmitters, 3 active output ports, 204/258 diplex filters, including power supply and fiber management tray

RF and optical modules

Category	Item code	Type	Description
Upstream modules	19008429	DBUS-C-1	Main module: 204 MHz upstream amplifier 26 dB gain and IDS
	19008430	DBUS-D-1	Bridger module: 204 MHz upstream amplifier 26 dB gain and IDS
Downstream modules	19008867	DBDS-B-5-1	Main: 1.2 GHz downstream amplifier 38 dB - I2 C
	19008869	DBDS-B-6-1	Main: 1.2 GHz downstream amplifier 32 dB - I2 C
	19009835	DBDS-B-7-1	Main: 1.2 GHz downstream amplifier 44 dB - I2 C - 52 dBmV output
	19010488	DBDS-B-7-ET	Main: 1.2 GHz downstream amplifier 44 dB - ET: 25 dB tilt I2 C - 52 dBmV output
	19009834	DBDS-F-5-1	Bridger: 1.2 GHz downstream amplifier 44 dB - I2 C - 52 dBmV output
Digital control and monitoring	19005026	DBDCM-A-1	Control module: AGC/ALSC, FSK, USB-A
	19005027	DBDCM-B-2	Control module: AGC/ALSC, DOCSIS transponder compatible, USB-A
	19005029	DBDDM-A-1	DOCSIS 3.0 transponder, requires DBDCM-B-2
	19010542	DBDDM-B-1	EuroDOCSIS 3.0 transponder, requires DBDCM-B-2
Optical modules	19008435	DBRX-A-1	Optical 1.2 GHz downstream receiver, 52 dBmV output
	19008438	DBTX-A-1	Optical upstream transmitter module. Holds up to 2 DBLB optical transmitters
	19010322	DBLB-31-3D-1	Optical 204 MHz transmitter plug-in, 1310 nm, DFB, 3 dBm output, SC/APC
	19010323	DBLB-55-3D-1	Optical 204 MHz transmitter plug-in, 1550 nm, DFB, 3 dBm output, SC/APC
	Enquire	DBLB-Cxx-3D-1	Optical 204 MHz CWDM transmitter plug-in, DFB, 3 dBm output, SC/APC
	19010339	DBLB-BP-1	Bypass laser board for DBTX-A-1 (second slot if no laser installed)
	19010340	DBLB-CB-1	Combiner board to combine two upstream RF signals into a single laser
Remote PHY modules	19012173	DBRPDI-A-1	Remote PHY inserter module
	19012333	DBUS-RPD-1	Remote PHY upstream module for 1x1 or 1x2 applications
	19012331	DBDS-RPD-1	Remote PHY high performance downstream module
	19012332	DBRX-RPD-1	Remote PHY analog overlay module
	19012171	DBRPD-FT-A-1	Remote PHY fiber tray for DBx



Upgrade kits

DBE-1200 RPKD		Remote PHY Upgrade Kit for DBE-1200
DBRPD-CS-1		Remote PHY cable set for DBx-1200
DBRPDI-A-1		Remote PHY inserter module for DBx-1200
DBE-RPD-L		Remote PHY lid for DBE-1200
DBRPD-FT-A-1		Remote PHY fiber tray for DBx
DBUS-RPD-1		Remote PHY 1x1 or 1x2 upstream module
DBDS-RPD-1		Remote PHY optimized downstream module
DBDS-RPD-1		Remote PHY optimized downstream module

DBE-1200S RPKD		Remote PHY Upgrade Kit for DBE-1200S
DBRPD-CS-1		Remote PHY cable set for DBx-1200
DBRPDI-A-1		Remote PHY inserter module for DBx-1200
DBES-RPD-L		Remote PHY lid for DBE-1200S
DBRPD-FT-A-1		Remote PHY fiber tray for DBx
DBUS-RPD-1		Remote PHY 1x1 or 1x2 upstream module
DBDS-RPD-1		Remote PHY optimized downstream module

Accessories

Category	Order number	Type	Description
DBx fibre tray	19010835	DBC-FT-A-1	Fibre management for DBC cabinet
	19010836	DBD-FT-A-1	Fibre management for DBD cabinet
	19010837	DBE-FT-A-1	Fibre management for DBE cabinet
	19010838	DBCS-FT-A-1	Fibre management for DBC strand mount
	19010839	DBES-FT-A-1	Fibre management for DBE strand mount
Diplex filters	19008513	DBDIP-01(-W)	65/85 MHz diplexer
	19008514	DBDIP-02(-W)	85/105 MHz diplexer
	19008515	DBDIP-03(-W)	204/258 MHz diplexer
	19008516	DBDIP-04(-W)	42/54 MHz diplexer
	19009966	DBDIP-05(-W)	85/102 MHz diplexer
	19012966	DBDIP-05-5	85/102 MHz diplexer with 5 dB insertion loss in downstream
	19012967	DBDIP-05-5-W	85/102 MHz wide diplexer with 5 dB insertion loss in downstream
Power supplies	19005023	DBPSU-04	35 W power supply 65 VAC without PFC
	19008569	DBPSU-05	35 W power supply 230 VAC without PFC
	19005025	DBPSU-06	35 W power supply 65 VAC without PFC for DBC-1200S
	19008330	DBPSU-07	90 W PSU for DBE-1200(S)
	19011295	DBPSU-08	35 W power supply 65 VAC without PFC 2-wire powering power passing
Optical accessories	Enquire	DB-MU-C-xxxx	CWDM multiplexer mini-CWDM-style up to 1:4
	Enquire	DB-DM-C-xxxx	CWDM de-multiplexer mini-CWDM-style up to 4:1
	Enquire	DB-MU-D-xxxx	DWDM multiplexer mini-CWDM-style up to 1:4
	Enquire	DB-DM-D-xxxx	DWDM de-multiplexer mini-CWDM-style up to 4:1
Other	19008482	DBTM-T-1	75 Ω terminating module

DBx device and performance specifications

Standard RF amplifier platform specifications

Device configuration used:

Control module: DBDCM-A-1

Upstream module: DBUS-C1

Downstream module(s): DBDS-B-7-1 and DBDS-F-5-1
bridger amplifier

Diplex filters: DBDIP-04

Forward path	DBC-1200	DBD-1200	DBE-1200	DBC-1200S	DBE-1200S	Value
Pass band (dependent on diplex filter)	54-1218	54-1218	54-1218	54-1218	54-1218	MHz
Active outputs	1	2	4	1	3	
Available outputs (with splitter)	2	3	4	2	3	
Frequency response 54-1218 MHz ⁽¹⁾	±0.75	±0.75	±0.75	±0.75	±0.75	dB
Gain ⁽¹⁰⁾	44	44	44	44	43	dB
Gain tolerance	0.5	0.5	0.5	0.5	0.5	dB
Return loss ⁽²⁾	18	18	18	18	18	dB
Noise figure (with zero dB attenuation) ^{(3) (6)}	8	9	9	8	9	dB
Operating output level IEC60728-3-1 ⁽¹¹⁾	112	112	112	112	112	dBμV
Gain control (electronic) pre-stage ⁽⁹⁾	0-20	0-20	0-20	0-20	0-20	dB
EQ control (electronic) pre-stage ⁽⁹⁾	0-17	0-17	0-17	0-17	0-17	dB
Gain control (electronic) inter-stage ⁽⁹⁾	0-15	0-15	0-15	0-15	0-15	dB
EQ control (electronic) inter-stage ⁽⁹⁾	0-12.5	0-12.5	0-12.5	0-12.5	0-12.5	dB
Input monitoring point ⁽⁸⁾	-20 ±1.5	-20 ±1.5	-20 ±1.5	-20 ±1.5	-20 ±1	dB
Output test-points	-20 ±1	-20 ±1	-20 ±1	-20 ±1	-20 ±1	dB

RF amplifier platform specifications (continued)

Reverse path	DBC-1200	DBD-1200	DBE-1200	DBC-1200S	DBE-1200S	Value
Pass band (dependent on diplex filter)	5-204	5-204	5-204	5-204	5-204	MHz
Gain	25	25	25	25	24	dB
Return loss ⁽²⁾	16	16	16	16	16	dB
Frequency response 5-204 MHz	±0.5	±0.5	±0.5	±0.5	±0.5	dB
NPR 5-65 MHz	>50 dB: 24 dB dynamic range					
NPR 5-204 MHz	>50 dB: 21 dB dynamic range					
Ingress detection switches	0/6/40(off)	0/6/40(off)	0/6/40(off)	0/6/40(off)	0/6/40(off)	dB
Gain control (electronic)	0-20	0-20	0-19	0-20	0-19	dB
EQ control (electronic)	0-15	0-15	0-15	0-15	0-15	dB

General specifications	DBC-1200	DBD-1200	DBE-1200	DBC-1200S	DBE-1200S
Hum modulation ⁽⁵⁾	-65 dBc at 7.5 A	-65 dBc at 7.5 A	-65 dBc at 7.5 A	-65 dBc at 15 A	-65 dBc at 15 A
Class of enclosure	IP68 IEC 60529 2.1 am 1-2 meters underwater				
ESD	4 kV EN 61000-4-2:2008				
Surge protection	6 kV IEEE C62.41 CAT C3				
EMC	EN 50083-2:2012				
Safety	EN 60728-11:2011				
Test points	F-Female	F-Female	F-Female	F-Male	F-Male
Operating voltage ⁽⁷⁾	30-65 VAC sine wave, 35-90 VAC square wave				
Power consumption ⁽⁴⁾	17 W	30 W	39 W	19 W	41 W
AC bypass and capacity & input	7.5 A	7.5 A	7.5 A	15 A	15 A
Operating temperature range	-40 to +65°C				
Housing dimensions (metric)	195 x 205 x 92 mm	215 x 260 x 92 mm	250 x 365 x 137 mm	188 x 355 x 89 mm	265 x 430 x 150 mm
Coaxial connections	PG11 or 5/8"	PG11 or 5/8"	5/8"	PG11 or 5/8"	5/8"
Housing finish	Painted conductive chromate finish				
Impedance	75 Ω				
Equipment approval	CE/RoHS/FCC	CE/RoHS/FCC	CE/RoHS/FCC	CE/RoHS/FCC	CE/RoHS/FCC

Remarks:

1. Aligned with 20 dB coax, add ±0.5 dB (typical) for port 2,3,4 on DBE products
2. @40 MHz, deduct 1.5 dB per octave (never worse than 12 dB)
3. From 1006 to 1218 MHz up to 9 dB in bridger modules
4. Typical, without DOCSIS transponder @50 VAC - low power mode
5. Max value up to 1 GHz. From 1 GHz to 1.2 GHz max value -60 dB
6. DBE-1200S NF is one dB higher due to bi-directional test point
7. DBPSU-05 100-240 VAC also available upon request
8. Measured with 22 dB ATT JXP in DS 1 module
9. When selecting 204/258 diplex filters with end frequency @ 1.2 GHz, extended tilt modules available offering 5 dB additional tilt
10. DBDS-B-7 modules have 44 dB gain, DBDS-B-5 modules have 38 dB gain, DBDS-B-6 modules have 32 dB gain
11. - 120 x 8 MHz channel, 256QAM, F1= 266 MHz, F120 = 1218 MHz - @9dB tilt

Optical node platform specifications

Device configuration used:

Control module: DBDCM-A-1

Upstream module: DBTX-A-1

Downstream module(s): DBRX-A-1

Diplex filters: DBDIP-04

Forward path	DBC-1200	DBD-1200	DBE-1200	DBC-1200S	DBE-1200S	Value
Pass band (dependent on diplex filter)	54-1218	54-1218	54-1218	54-1218	54-1218	MHz
Active outputs	1	2	4	1	3	
Available outputs (with splitter)	2	3	4	2	3	
Input wavelength	1100-1650	1100-1650	1100-1650	1100-1650	1100-1650	nm
Optical input range	-6 to +1	-6 to +1	-6 to +1	-6 to +1	-6 to +1	dBm
Optical AGC ⁽¹⁾	-5 to +1	-5 to +1	-5 to +1	-5 to +1	-5 to +1	
Optical input return loss	45	45	45	45	45	dB
Optical power measurement accuracy	±0.3	±0.3	±0.3	±0.3	±0.3	dB
Connectors (default)	SC/APC	SC/APC	SC/APC	SC/APC	SC/APC	
Frequency response 54-1218 MHz ⁽²⁾	±0.75	±0.75	±0.75	±0.75	±0.75	dB
Return loss ⁽³⁾	18	18	18	18	18	dB
Operating output level IEC60827-3-1 ⁽⁴⁾	112	112	112	112	112	dBμV
Gain control (electronic) inter-stage ⁽⁵⁾	0-15	0-15	0-15	0-15	0-15	dB
EQ control (electronic) inter-stage ⁽⁵⁾	0-13	0-13	0-13	0-13	0-13	dB
Input monitoring point	-20 ±1.5	-20 ±1.5	-20 ±1.5	-20 ±1.5	-20 ±1.5	dB
Output test points	-20 ±1	-20 ±1	-20 ±1	-20 ±1	-20 ±1	dB

Reverse path	DBC-1200	DBD-1200	DBE-1200	DBC-1200S	DBE-1200S	Value
Pass band (dependent on diplex filter)	5-204	5-204	5-204	5-204	5-204	MHz
Frequency response 5-204 MHz	±0.5	±0.5	±0.5	±0.5	±0.5	dB
Return loss ⁽³⁾	16	16	16	16	16	dB
Laser type ⁽¹⁾	DFB/CWDM	DFB/CWDM	DFB/CWDM	DFB/CWDM	DFB/CWDM	
Optical isolator	>30	>30	>30	>30	>30	dB
Wavelength	1310/1550/ CWDM	1310/1550/ CWDM	1310/1550/ CWDM	1310/1550/ CWDM	1310/1550/ CWDM	nm
Optical output power	3	3	3	3	3	dBm
Gain control (electronic 0.5 dB steps)	0-25.5	0-25.5	0-20	0-25.5	0-20	dB
OMI test point on laser plug-in board ⁽³⁾	0	0	0	0	0	dBμV
OMI test point accuracy	±0.3	±0.3	±0.3	±0.3	±0.3	dBμV
NPR 5-65 MHz	>40 dB: 24 dB dynamic range					
NPR 5-65 MHz	>50 dB: 9 dB dynamic range					
NPR 5-204 MHz	>40 dB: 22 dB dynamic range					
NPR 5-204 MHz	>50 dB: 7 dB dynamic range					
Ingress detection switches	0/6/40(off)	0/6/40(off)	0/6/40(off)	0/6/40(off)	0/6/40(off)	dB



Optical node platform specifications (continued)

General specifications	DBC-1200	DBD-1200	DBE-1200	DBC-1200S	DBE-1200S
Hum modulation ⁽¹⁾	-65 dBc At 7.5 A	-65 dBc At 7.5 A	-65 dBc At 7.5 A	-65 dBc At 15 A	-65 dBc At 15 A
Class of enclosure	IP68 IEC 60529 2.1 am 1-2 meters underwater				
ESD	4 kV EN 61000-4-2:2008				
Surge protection	6 kV IEEE C62.41 CAT C3				
EMC	EN 50083-2:2012				
Safety	EN 60728-11:2011				
Test points	F-Female	F-Female	F-Female	F-Male	F-Male
Operating voltage ⁽⁸⁾	30-65 VAC sine wave, 35-90 VAC square wave				
Power consumption ⁽⁹⁾	18 W	34 W	54 W	18.5 W	44 W
AC bypass and capacity & input	7.5 A	7.5 A	7.5 A	15 A	15 A
Operating temperature range	-40 to +65°C				
Housing dimensions (metric)	195 x 205 x 92 mm	215 x 260 x 92 mm	250 x 365 x 137 mm	188 x 355 x 89 mm	265 x 430 x 150 mm
Coaxial connections	PG11 or 5/8"	PG11 or 5/8"	5/8"	PG11 or 5/8"	5/8"
Optical connections	SC/APC	SC/APC	SC/APC	SC/APC	SC/APC
Housing finish	Painted conductive chromate finish				
Impedance	75 Ω				
Equipment approval	CE/RoHS/FCC	CE/RoHS/FCC	CE/RoHS/FCC	CE/RoHS/FCC	CE/RoHS/FCC

Remarks:

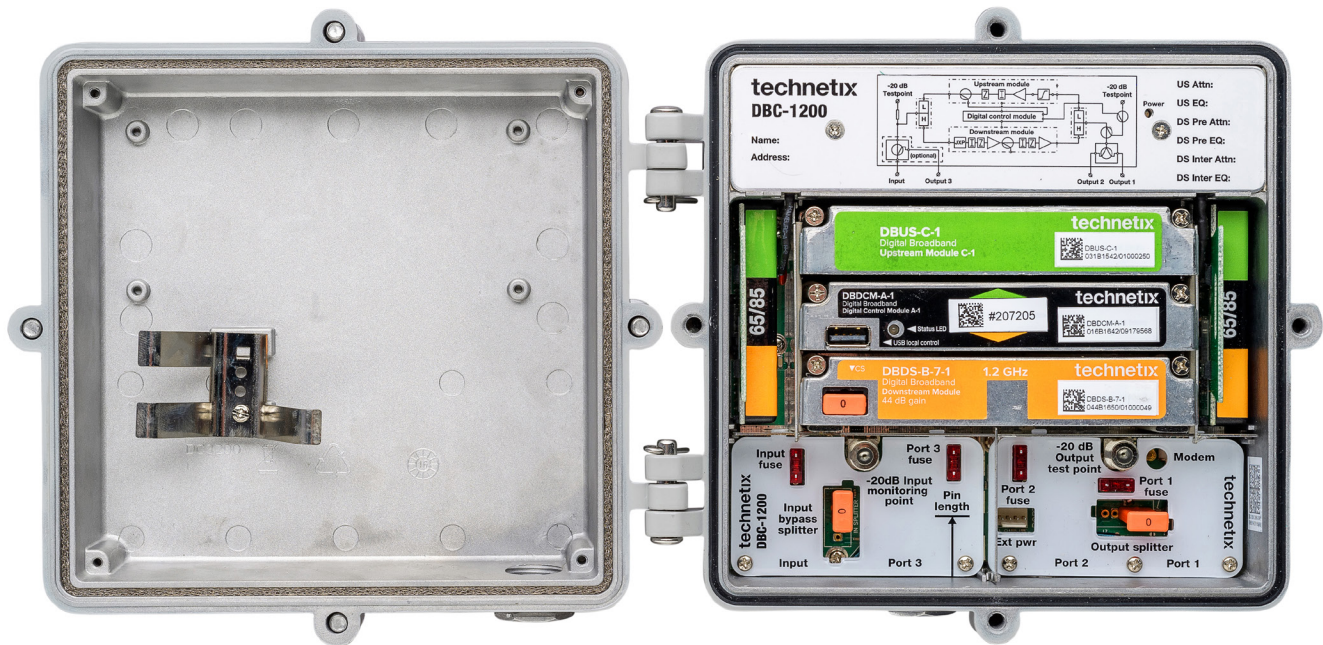
- Optical AGC accuracy ± 2 dB - Used in conjunction with electrical AGC ± 0.5 dB
- When using hybrid RF/Optical configurations typical increase of ± 0.5 dB
- @40 MHz, deduct 1.5 dB per octave (never worse than 12 dB)
- 120x 8 MHz channel, 256 QAM, F1= 266 MHz, F120 = 1218 MHz - @9 dB tilt
- When selecting 204/258 duplex filters with end frequency @ 1.2 GHz
- 80 dBuV for 10% OMI' - test-point is 0 dB - ask your sales representative for full OMI table
- Max value up to 1 GHz. From 1 GHz to 1.2 GHz max value -60 dB
- DBPSU-05 100-240 VAC also available upon request
- Typical, without DOCSIS transponder @50 VAC low power mode

Remote PHY specifications

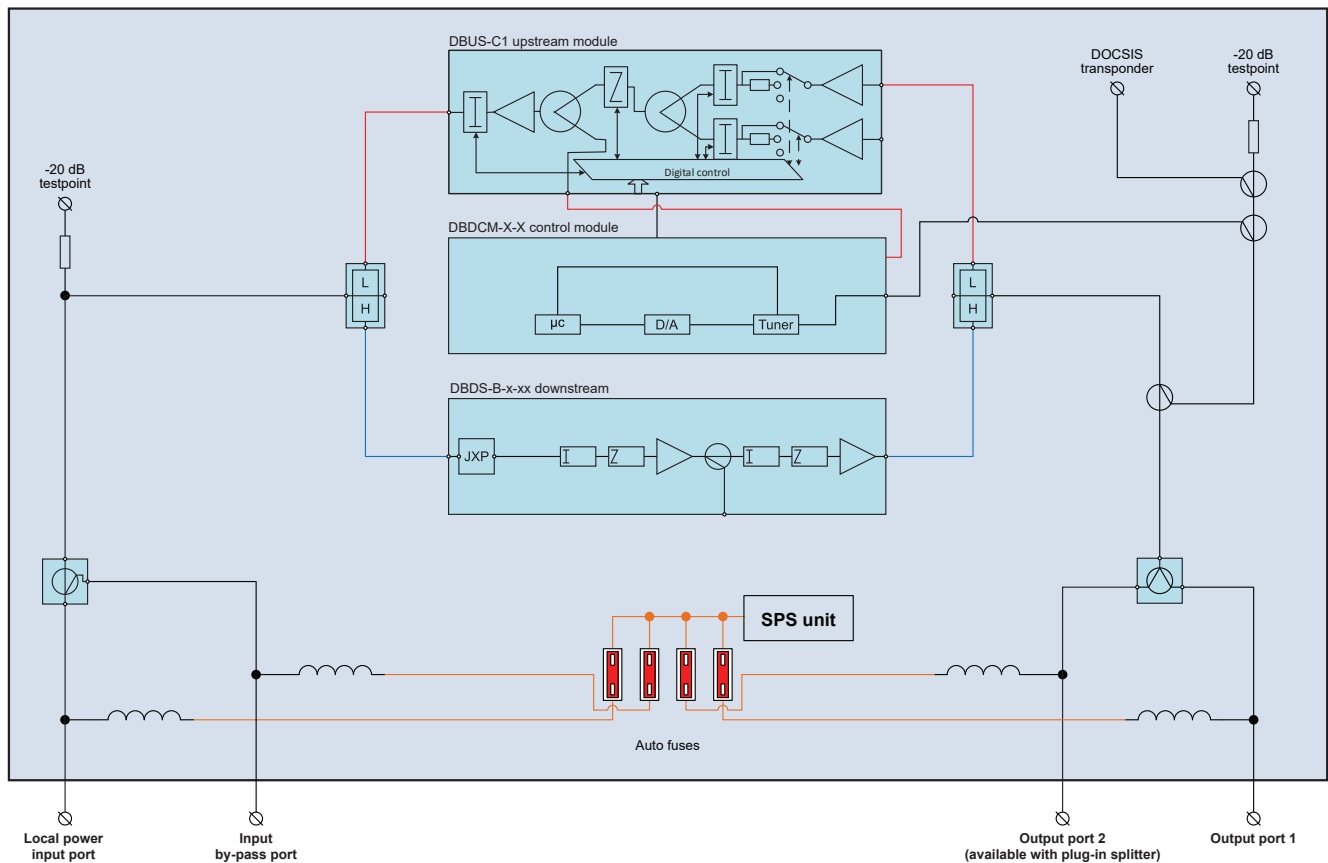
Description	Units	Specifications			Conditions/comments
		Min.	Typ.	Max.	
Specification support		PHY3.1, DRFI annex D, MHA v2			
Available RF outputs		1	2	4	Depending on number of DBx amplifier modules installed
DS:US SG ratio		1:1 or 1:2			
RF ports impedance	Ohm		75		
DOCSIS 3.0 DS channels					
Annex A (8 MHz channel)				120	
Annex B/C (6 MHz channel)				158	
DOCSIS 3.0 US channels				12	
ATDMA				12	
SCDMA				4	
ATDMA+SCDMA				8+4	
DOCSIS 3.1 DS channels				6	Bandwidth of 24 MHz to 192 MHz bandwidth per channel
DOCSIS 3.1 US channels				2	Bandwidth of 6.4 MHz to 96 MHz per channel
DS RF Performances					
DS spectrum range for SC-QAM	MHz	54		1006	
DS spectrum range for OFDM	MHz	108		1218	
Carrier frequency resolution	Hz			312.5	
DS RF port return loss	dB	16			
Operating output level	dBmV/	52 dBmV			Full QAM + 1 OFDM 11 dB tilt high power mode
For less than 158 SC-QAM	dBmV/	$PL_{158}^a + \text{ceil}(3 * \text{LOG}_2(158/N'))$			PL_{158}^a – power level per channel for 158 loaded D3.0 SC-QAM channels for active RF chain
	6 MHz				
D3.0 and D3.1 DS channels location		Flexible, Programmable			Over DS spectrum including SC-QAM inside OFDM, Annex A and Annex B
All other DS performances		As specified in DRFI annex D and R-PHY			
US RF Performances					
US spectrum range for SC-QAM	MHz	5		85	
US spectrum range for OFDMA	MHz	5		204	
US input RF power level	dBmV/ ch	8			
US flatness 5-204 MHz	dB			1.5	
US RF port return loss	dB	16			
All other US performances		As specified in DRFI annex D and R-PHY			
DS to US isolation	dB	60			
Power consumption Pebble 1 Remote PHY plug-in	Watt	24	25	26	Excluding SFPs
Power consumption DBE-1200 Remote PHY solution	Watt	59	60	61	Excluding SFPs, calculated with 2 active RF outputs

Block diagrams

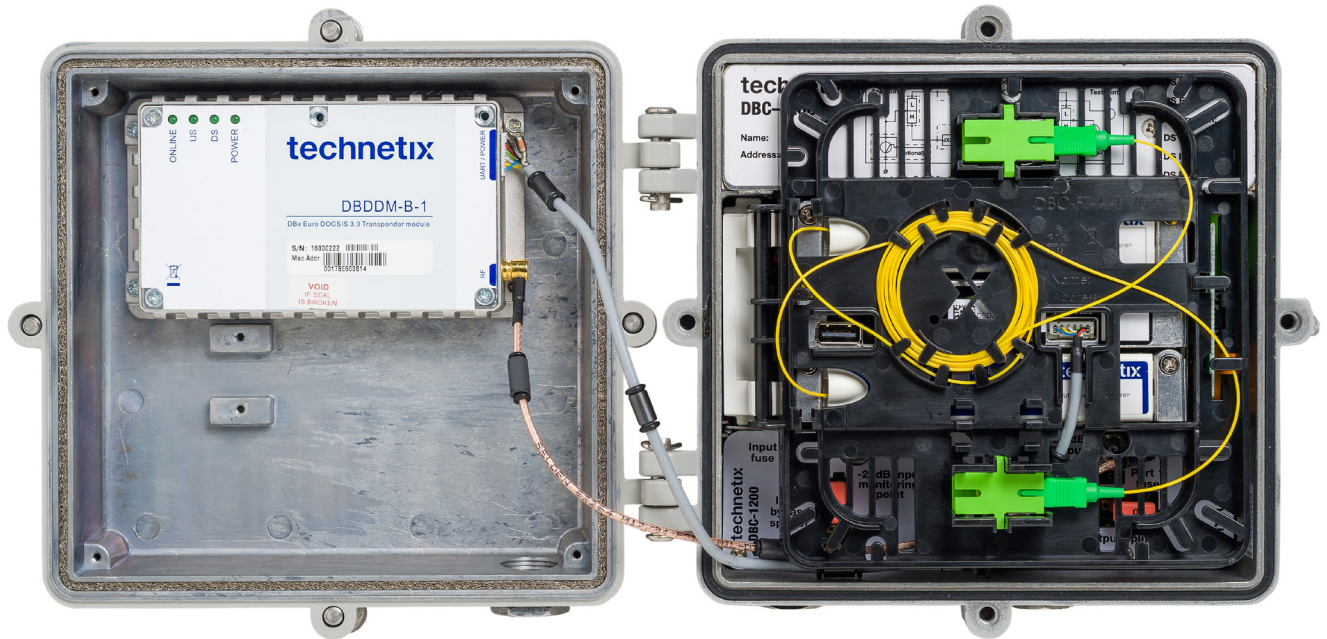
DBC-1200 RF



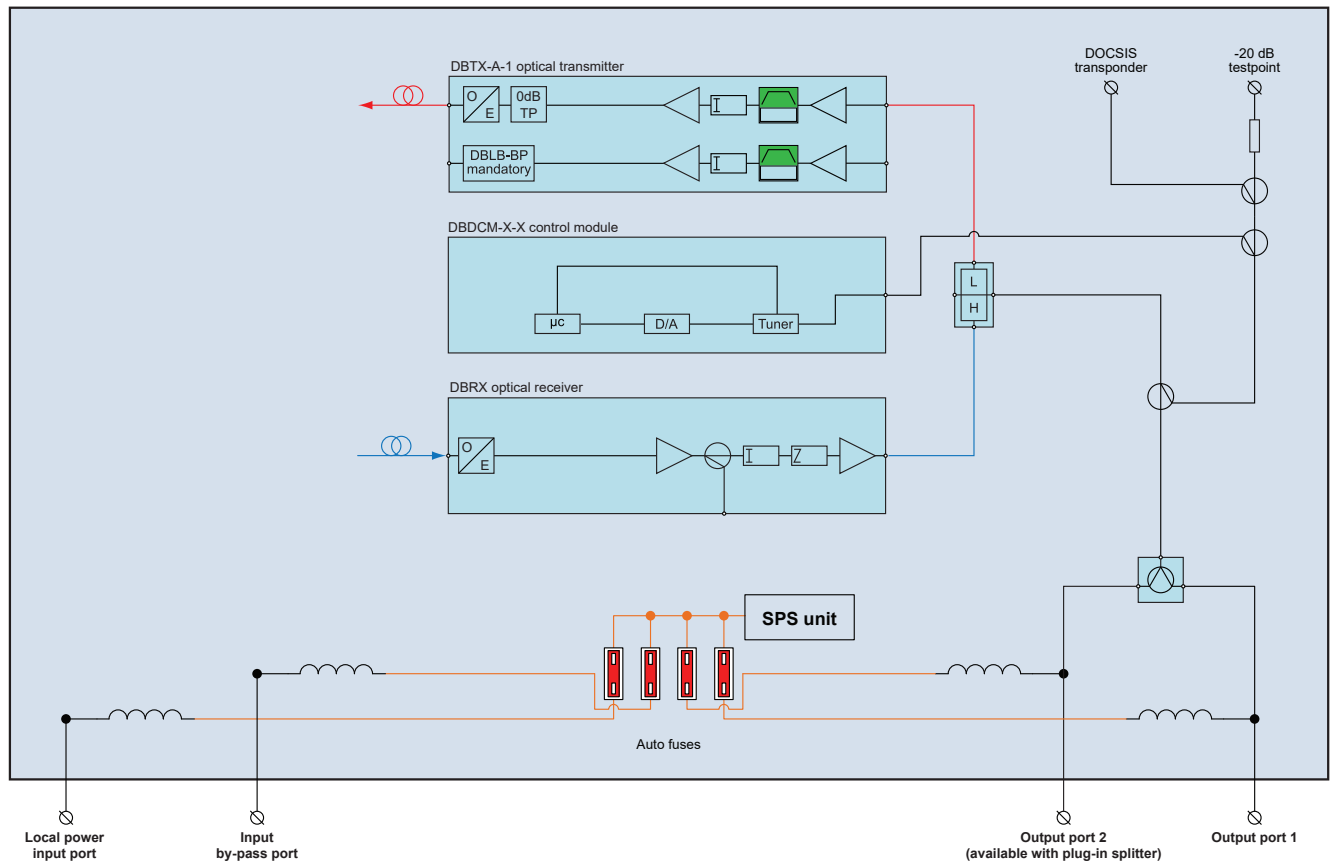
Block diagram RF configuration



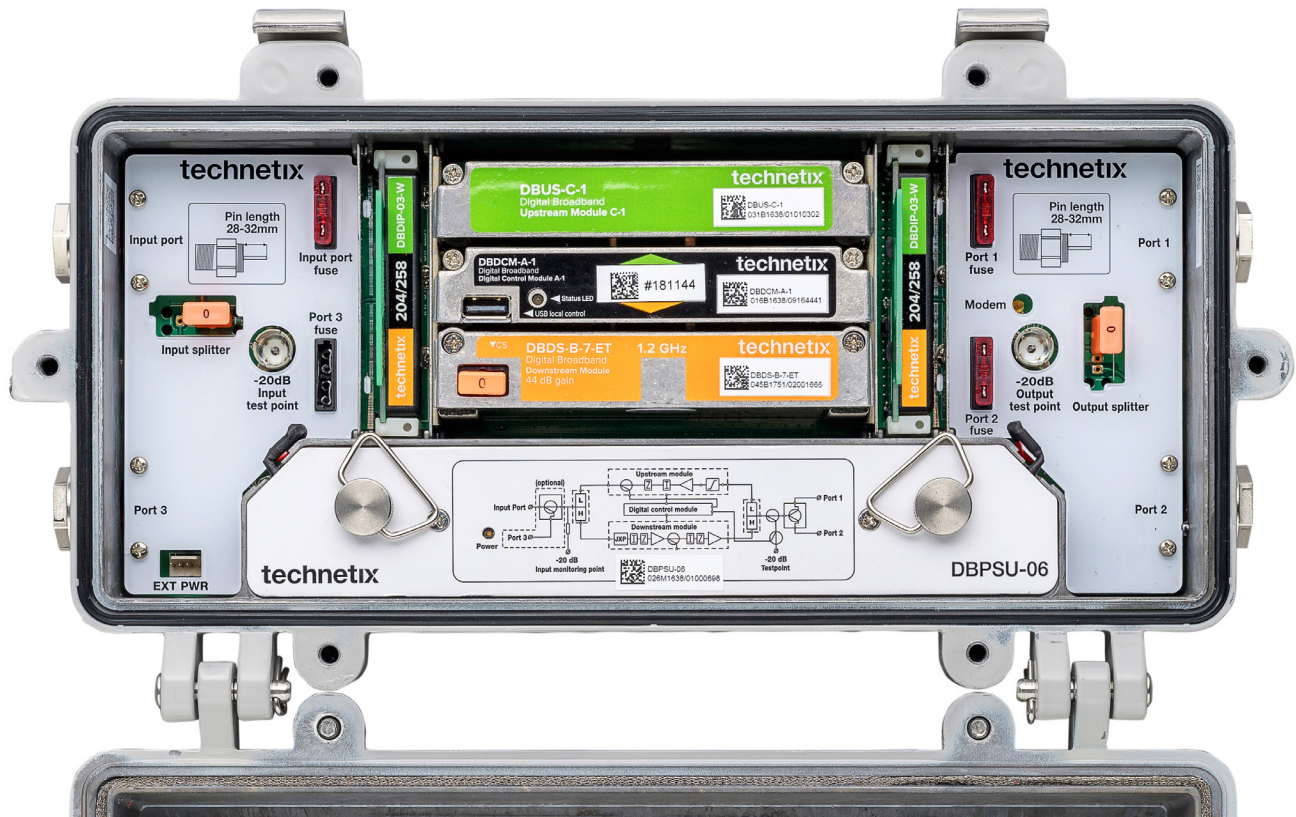
DBC-1200 optical



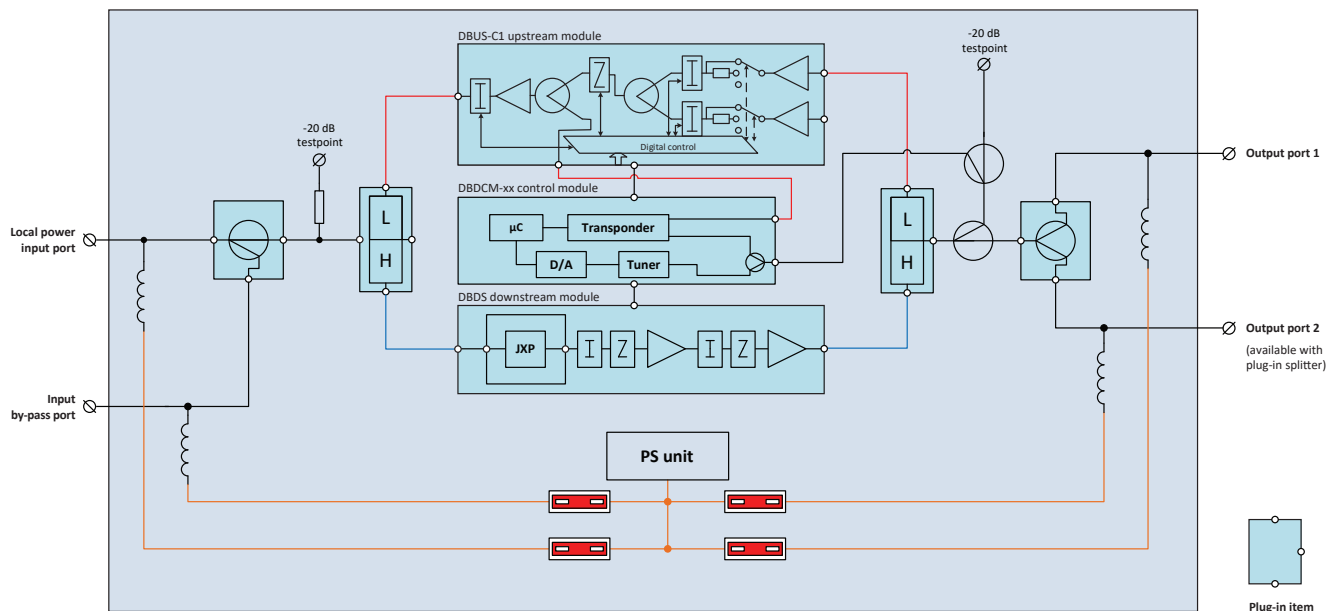
Block diagram fiber configuration



DBC-1200S RF

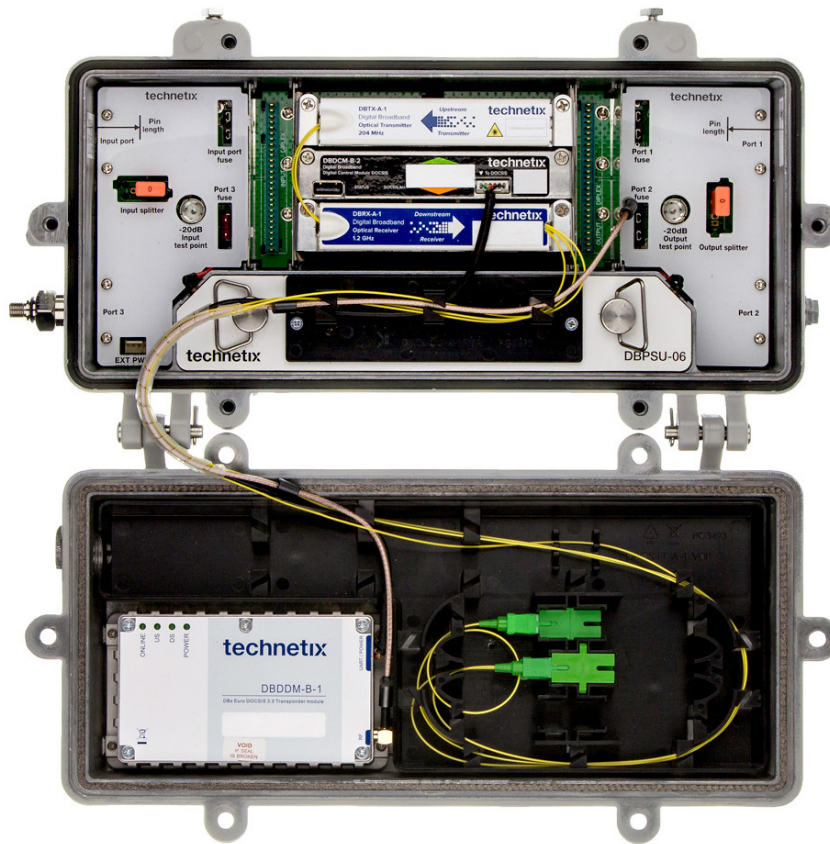


Block diagram RF configuration

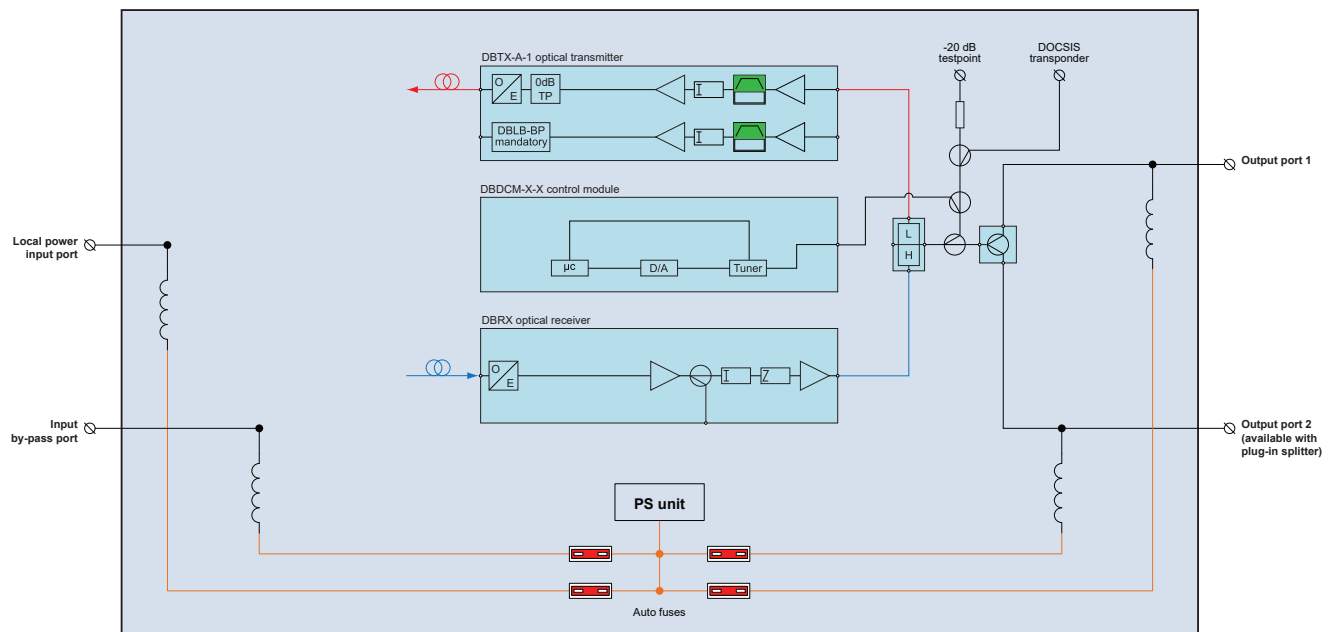


RF configuration

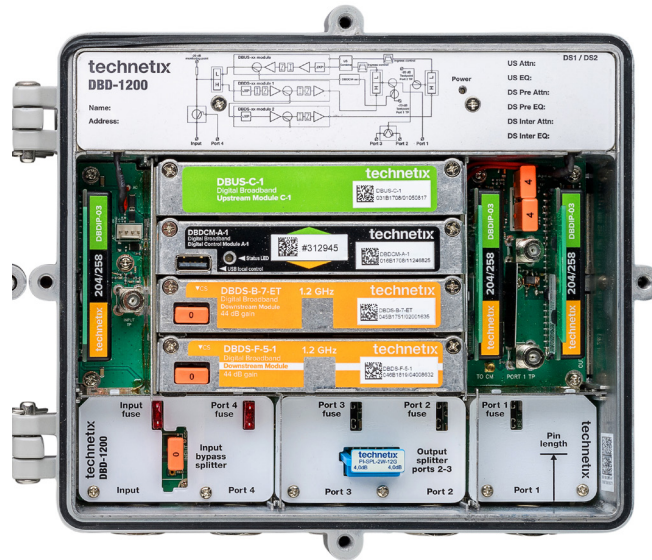
DBC-1200S optical



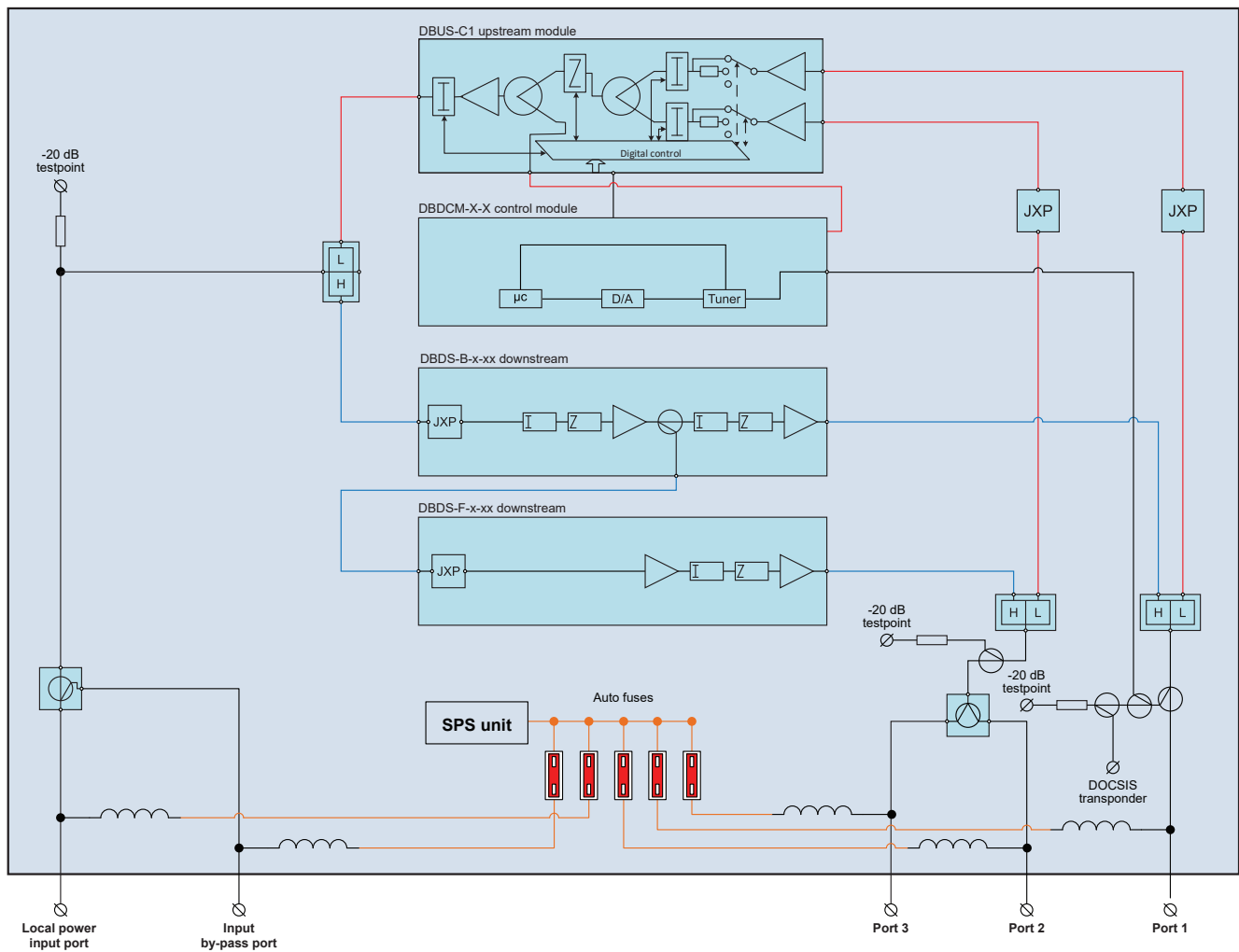
Block diagram fiber configuration



DBD-1200 RF



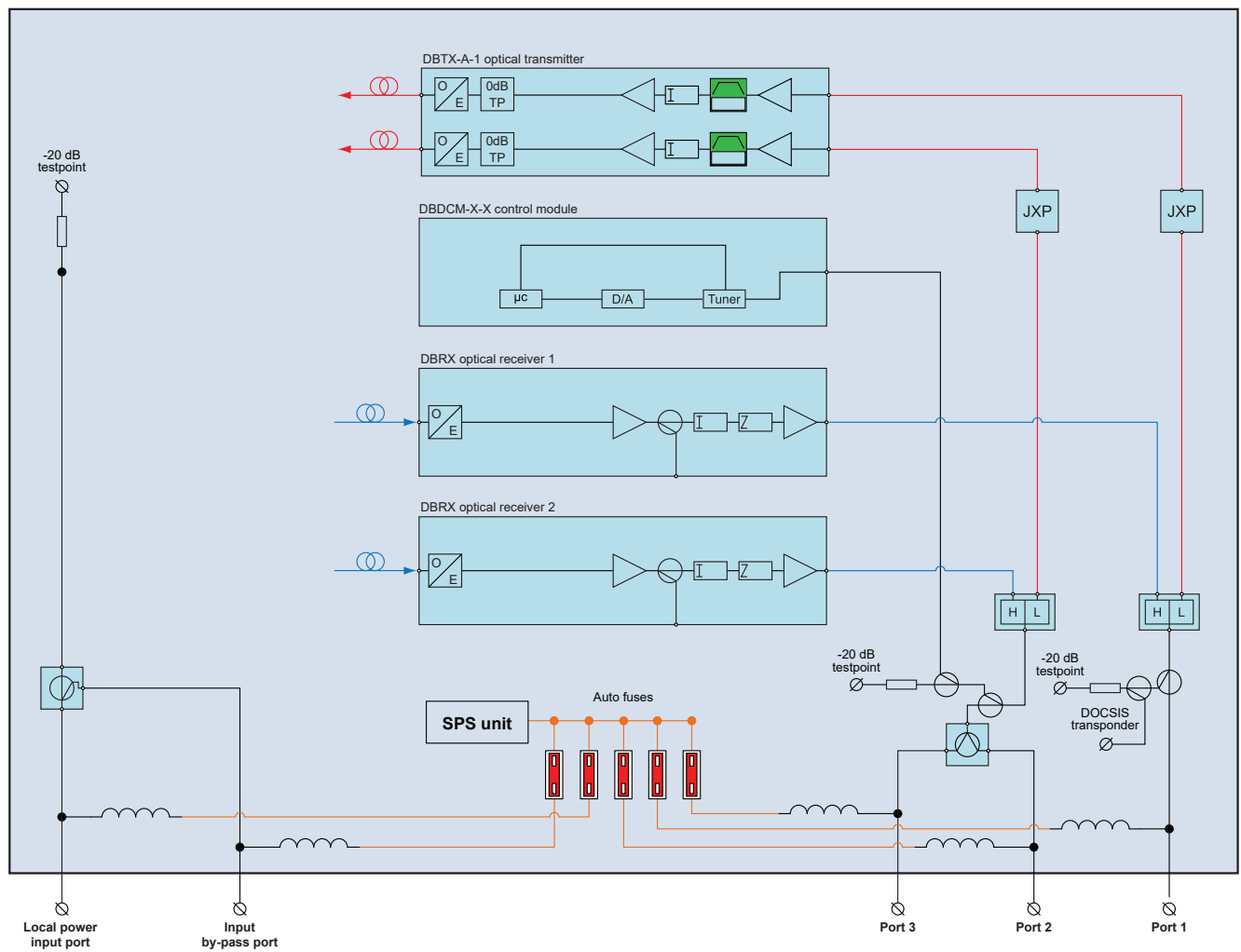
Block diagram RF configuration



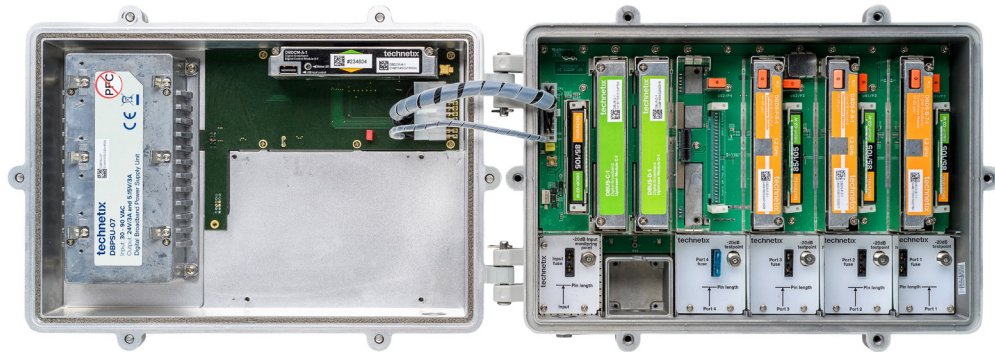
DBD-1200 optical



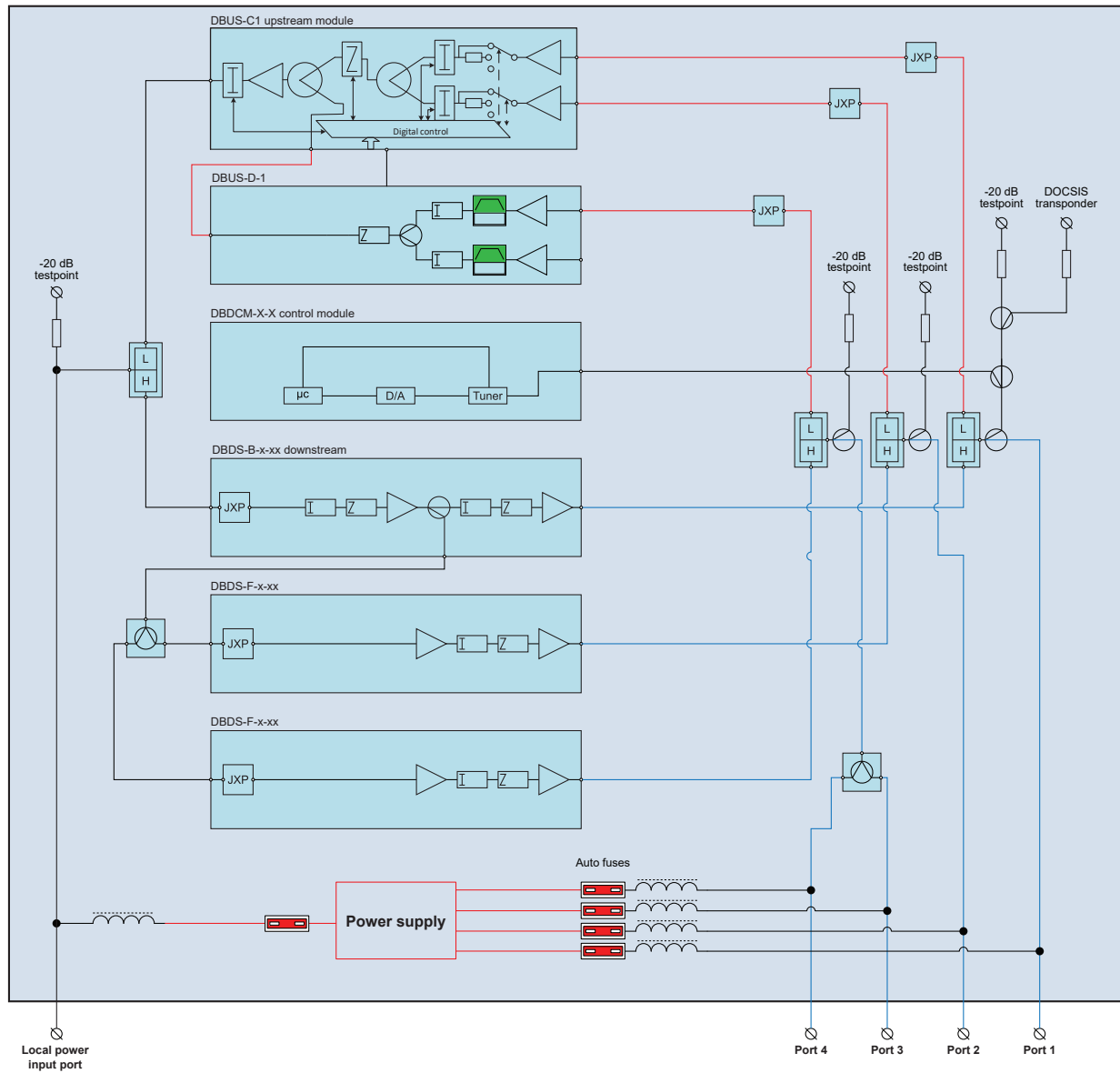
Block diagram fiber configuration



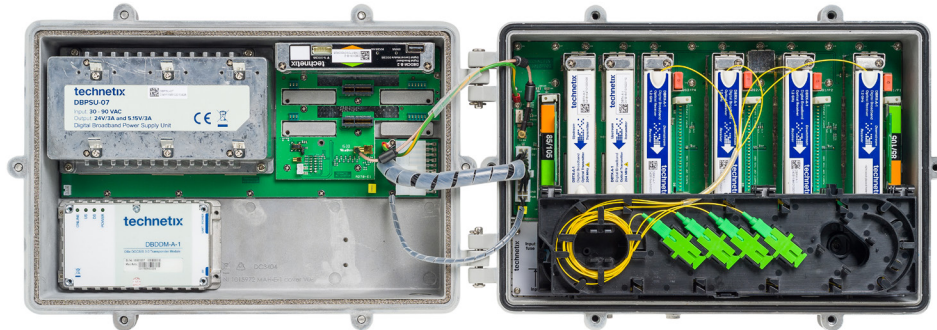
DBE-1200 RF



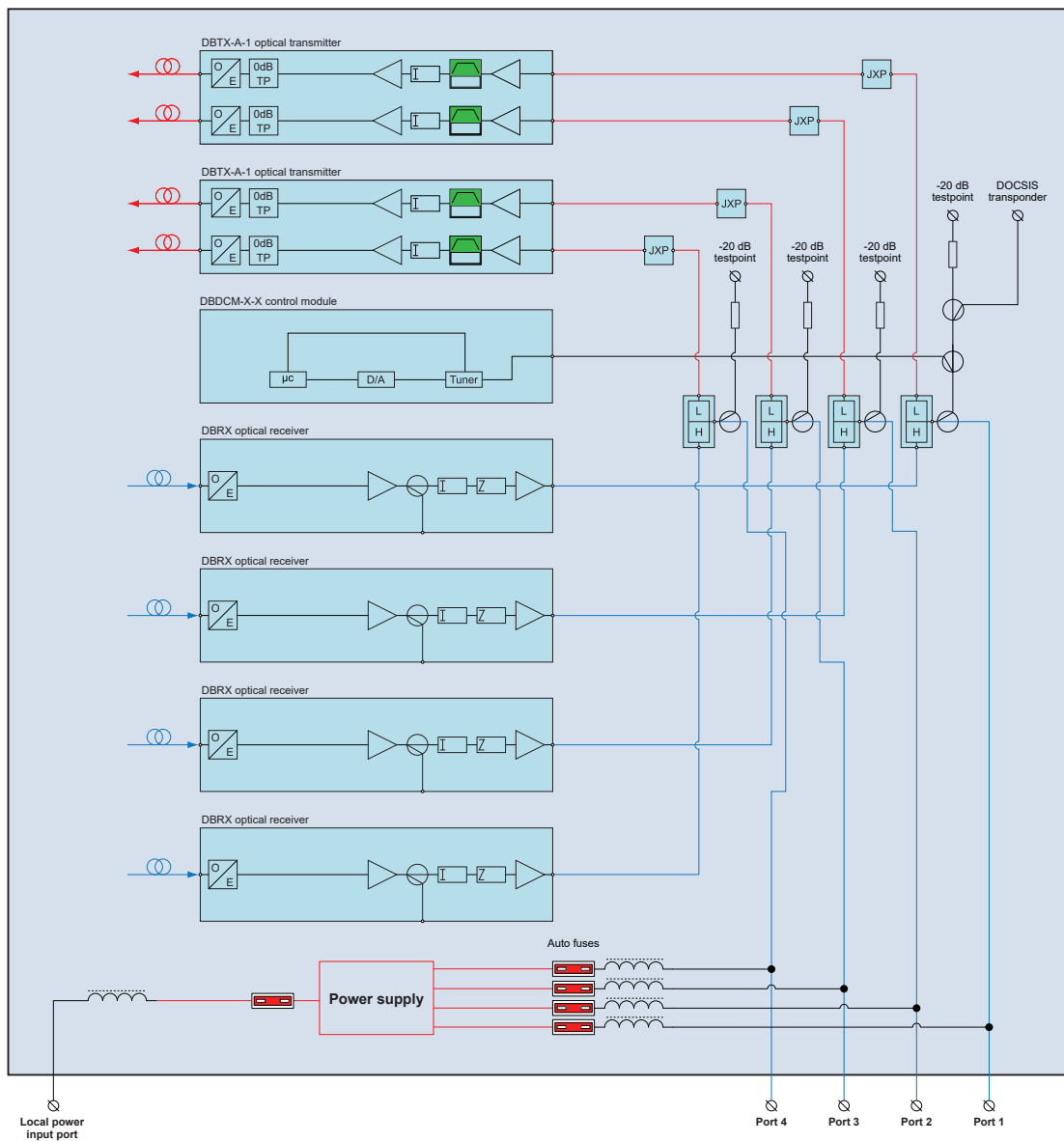
Block diagram RF configuration



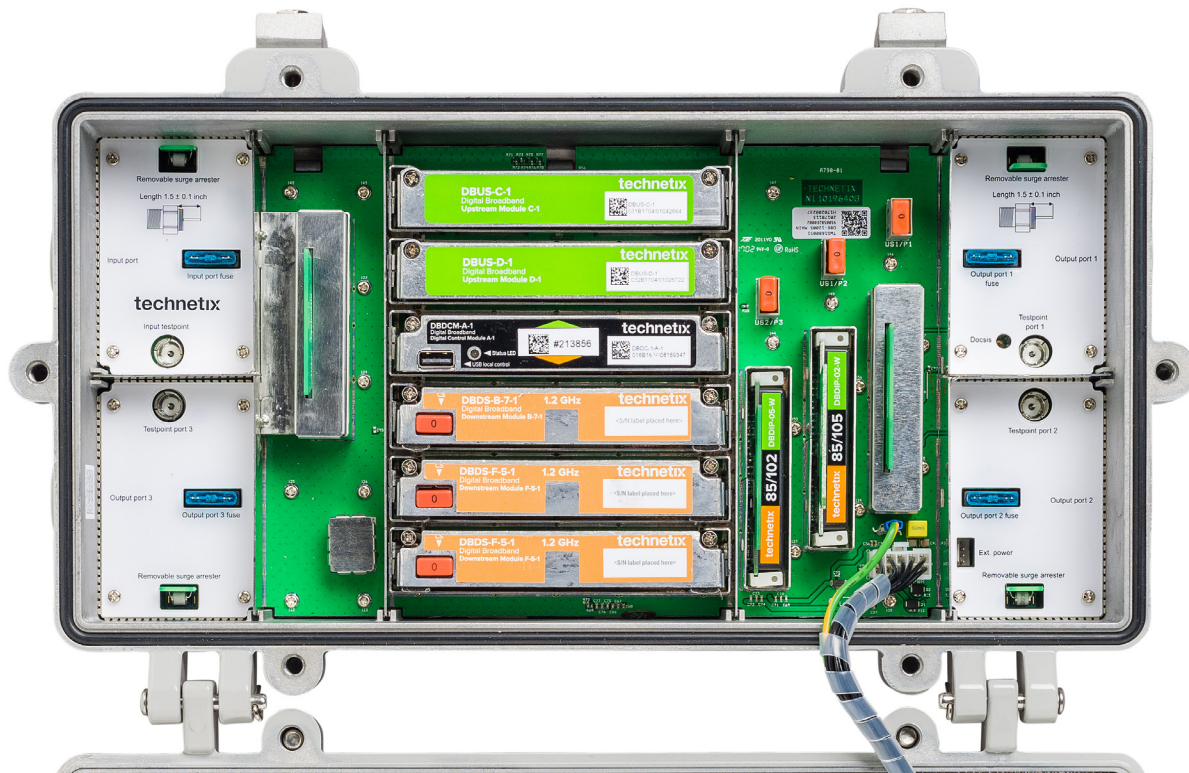
DBE-1200 optical



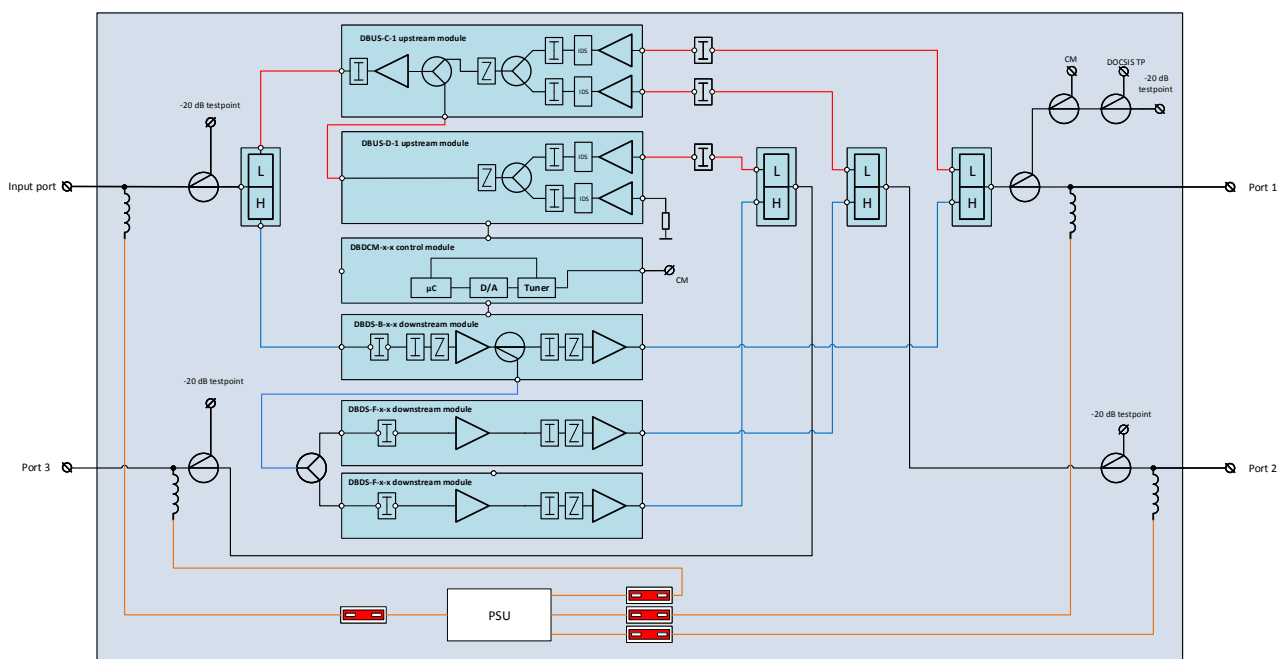
Block diagram fiber configuration



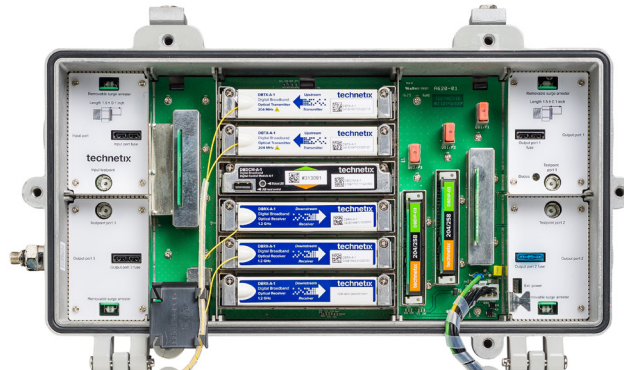
DBE-1200S RF



Block diagram RF configuration



DBE-1200S optical



Block diagram fiber configuration

