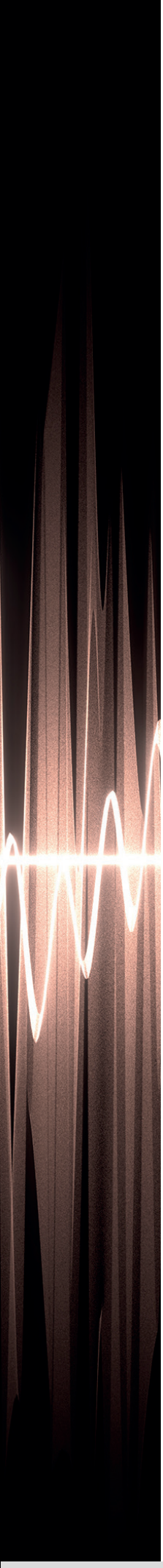


High voltage DC blocks

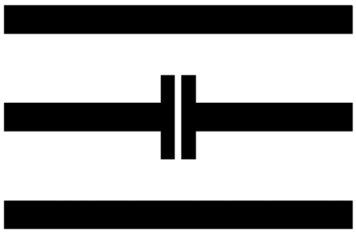
Series 9077 – high voltage DC blocks

Description
The HUBER+SUHNER DC Block product line include DC blocks (inner conductor disconnected) and DC-DC blocks (inner and outer conductor disconnected) for galvanic isolation up to 15 kV. They block high-amplitude and low frequency surge voltages e.g. occurring during regular electric railway operation along railway lines. They provide sufficient safety even in the worst case scenario if the overhead high voltage lines fall to the ground.

Applications
DC and DC-DC blocks are coaxial components which block the flow of DC and low frequency signals up to 100 kHz while permitting RF signals to flow without loss through the component. They are used in line with coaxial feeder cables within communication installations.

Features
- Galvanic isolation of the RF signal path
- Protects from effects caused by ground potential rise
- Provides ground potential separation
- Protects against electrolytic corrosion caused by parasitic current
- DC blocking configuration on inner and/or outer conductor
- Blocking DC voltage up to 15 kV
- Broadband operation up to 3000 MHz
- Low intermodulation performance
- Bulkhead mounting and grounding
- Waterproof design
- Maintenance free
- Protects against electromagnetic interference caused by traction return current

DC block

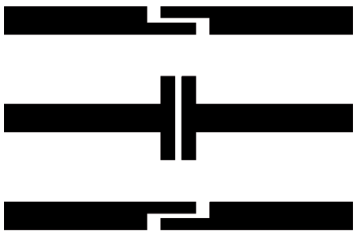


Outer conductor

Inner conductor

Outer conductor

DC-DC block



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1 kV broadband HV DC block

General specifications

Electrical Data	
RF characteristics	
Impedance	50 Ω
Frequency range	from 350 to 3000 MHz
Return loss (RL)	20.0 dB min. from 350 to 3000 MHz 26.5 dB min. from 650 to 2700 MHz
Insertion loss (IL)	0.1 dB max.
Passive intermodulation (PIM)	–160 dBc typ.
RF power transmission	370 W CW, 25 kW PIP
DC characteristics	
Leakage current	5 µA
Test leakage current	10 µA
Blocking voltage	1000 V (only galvanic DC isolation in centre conductor)

Mechanical data	
Coupling nut torque force	according to IEC/MIL-STD (refer to page 172)
Durability (matings)	500 min.

Environmental data	
Operation temperature range	–40 up to +85 °C (–40 up to +185 °F)
Waterproof degree (IEC 60529)	IP67 min., according to shown product specification, data refer to the coupled state
Moisture resistance	MIL-STD-202, method 106
Thermal shock	MIL-STD-202, method 107, condition B
Vibration, high frequency	MIL-STD-202, method 204, condition D

The product is designed to meet the cited test procedures. Any additional or different requirements arising from specific applications or environmental conditions not covered by the test specifications mentioned above are subject to request and need to be confirmed by the single product detail specification.
We recommend additional taping for long-term outdoor applications in any case.

Material data		
Component part	**Material**	**Plating**
Housings	brass	SUCOPLATE®
Male contacts	brass	silver plating
Female contacts	bronze	silver plating
Insulators	PTFE	
Gaskets	elastomer rubber	

HUBER+SUHNER type	Connectors port 1 – port 2 side of bulkhead marked «b».	Mounting/grounding MH – hole for «b»	Fig.
9077.41.0035	7/16 (f) – 7/16 (m)	M6	1

All dimensions in mm

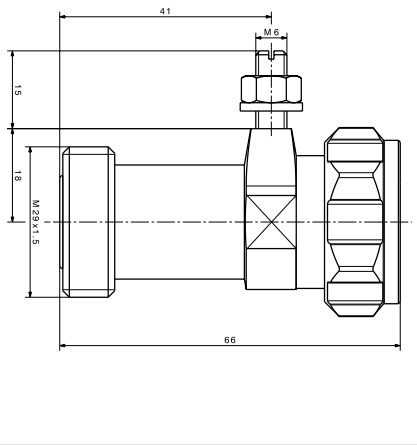

Fig. 1

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1 kV broadband HV DC-DC block

General specifications

Electrical Data	
RF characteristics	
Impedance	50 Ω
Frequency range	from 360 to 3000 MHz
Return loss (RL)	20 dB min. from 360 to 3000 MHz 26 dB min. from 650 to 2700 MHz
Insertion loss (IL)	0.1 dB max.
Passive intermodulation (PIM)	–160 dBc typ.
RF power transmission	750 W CW, 25 kW PIP
DC characteristics	
Leakage current	5 µA
Test leakage current	10 µA
Blocking voltage	1000 V (galvanic DC isolation in centre conductor and outer conductor)

Mechanical data	
Coupling nut torque force	according to IEC/MIL-STD (refer to page 172)
Durability (matings)	500 min.

Environmental data	
Operation temperature range	–40 up to +85 °C (–40 up to +185 °F)
Waterproof degree (IEC 60529)	IP67 min., according to shown product specification, data refer to the coupled state
Moisture resistance	MIL-STD-202, method 106
Thermal shock	MIL-STD-202, method 107, condition B
Vibration, high frequency	MIL-STD-202, method 204, condition D

The product is designed to meet the cited test procedures. Any additional or different requirements arising from specific applications or environmental conditions not covered by the test specifications mentioned above are subject to request and need to be confirmed by the single product detail specification.

We recommend additional taping for long-term outdoor applications in any case.

Material data		
Component part	**Material**	**Plating**
Housings	brass / POM	SUCOPLATE®
Male contacts	brass	silver plating
Female contacts	bronze	silver plating
Insulators	PTFE	
Gaskets	elastomer rubber	

HUBER+SUHNER type	Connectors port 1 – port 2 side of bulkhead marked «b».	Mounting/grounding MH – hole for «b»	Fig.
9077.41.0036	7/16 (f) - 7/16 (m)	MH110	1

*Suitable mounting bracket 9075.99.0095

All dimensions in mm

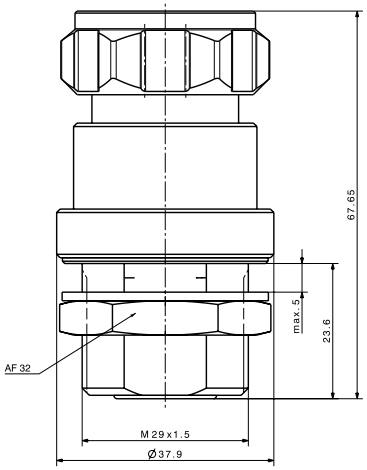


Fig. 1

All mounting holes are shown on pages 182 – 183.

4 kV broadband HV DC block

General specifications

Electrical Data	
RF characteristics	
Impedance	50 Ω
Frequency range	from 140 to 2500 MHz
Return loss (RL)	16 dB min. from 140 to 200 MHz 20 dB min. from 200 to 2500 MHz
Insertion loss (IL)	0.5 dB max.
Passive intermodulation (PIM)	–150 dBc typ.
RF power transmission	80 W CW
DC characteristics	
Leakage current	5 µA
Test leakage current	100 µA
Blocking voltage	4000 V (only galvanic DC isolation in centre conductor)

Mechanical data	
Coupling nut torque force	according to IEC/MIL-STD (refer to page 172)
Durability (matings)	500 min.

Environmental data	
Operation temperature range	–40 up to +85 °C (–40 up to +185 °F)
Waterproof degree (IEC 60529)	IP65 min., according to shown product specification, data refer to the coupled state
Moisture resistance	MIL-STD-202, method 106
Thermal shock	MIL-STD-202, method 107, condition B
Vibration, high frequency	MIL-STD-202, method 204, condition D

The product is designed to meet the cited test procedures. Any additional or different requirements arising from specific applications or environmental conditions not covered by the test specifications mentioned above are subject to request and need to be confirmed by the single product detail specification.
We recommend additional taping for long-term outdoor applications in any case.

Material data		
Component part	**Material**	**Plating**
Housings	brass	SUCOPLATE®
Male contacts	brass	silver plating
Female contacts	copper beryllium or bronze	silver plating
Insulators	PTFE	
Gaskets	elastomer rubber	

HUBER+SUHNER type	Connectors port 1 – port 2 side of bulkhead marked «b».	Mounting/grounding MH – hole for «b»	Fig.
9077.17.0015	N (f), b – N (f)	MH110	1
9077.17.0016	N (m) – N (f), b		2
9077.41.0015	7/16 (f), b – 7/16 (f)		3
9077.41.0016	7/16 (m) – 7/16 (f), b		4

* Suitable mounting bracket 9075.99.0095

All dimensions in mm

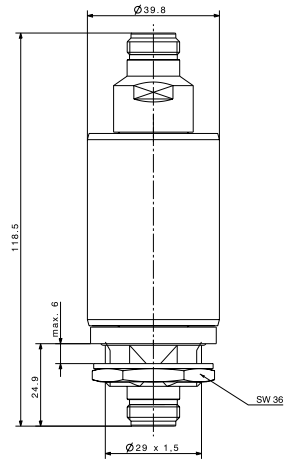


Fig. 1

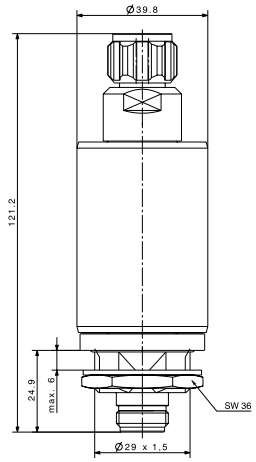


Fig. 2

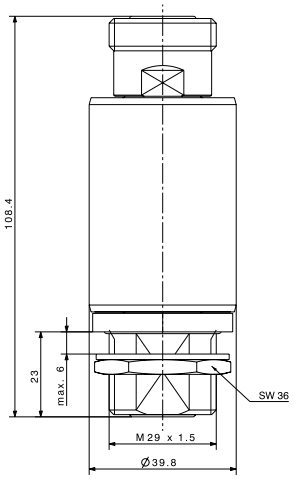


Fig. 3

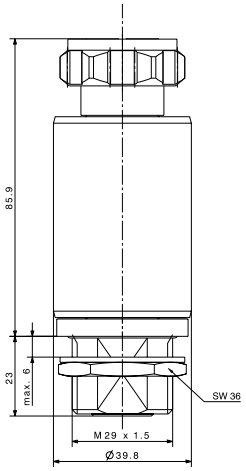


Fig. 4

All mounting holes are shown on pages 182 – 183.

4 kV broadband HV DC-DC block

General specifications

Electrical Data	
RF characteristics	
Impedance	50 Ω
Frequency range	from 160 to 3000 MHz
Return loss (RL)	22.0 dB min. from 160 to 3000 MHz 26.4 dB min. from 300 to 2500 MHz
Insertion loss (IL)	0.1 dB max.
Passive intermodulation (PIM)	–150 dBc typ.
RF power transmission	500 W CW
DC characteristics	
Leakage current	5 µA
Test leakage current	10 µA
Blocking voltage	4000 V (galvanic DC isolation in centre and outer conductor)

Mechanical data	
Coupling nut torque force	according to IEC/MIL-STD (refer to page 172)
Durability (matings)	500 min.

Environmental data	
Operation temperature range	–40 up to +85 °C (–40 up to +185 °F)
Waterproof degree (IEC 60529)	IP65 min., according to shown product specification, data refer to the coupled state
Moisture resistance	MIL-STD-202, method 106
Thermal shock	MIL-STD-202, method 107, condition B
Vibration, high frequency	MIL-STD-202, method 204, condition D

The product is designed to meet the cited test procedures. Any additional or different requirements arising from specific applications or environmental conditions not covered by the test specifications mentioned above are subject to request and need to be confirmed by the single product detail specification.
We recommend additional taping for long-term outdoor applications in any case.

Material data		
Component part	**Material**	**Plating**
Housings	brass / POM	SUCOPLATE®
Male contacts	brass	silver plating
Female contacts	copper beryllium or bronze	silver plating
Insulators	PTFE	
Gaskets	elastomer rubber	

HUBER+SUHNER type	Connectors port 1 – port 2 side of bulkhead marked «b».	Mounting/grounding MH – hole for «b»	Fig.
9077.17.0031	N (f), b – N (f)	MH110	1
9077.17.0030	N (m) – N (f), b		2
9077.17.0035 **	N (m) – N (f), b		
9077.41.0031	7/16 (f), b – 7/16 (f)		3
9077.41.0032	7/16 (m) – 7/16 (f), b		4

* Suitable mounting bracket 9075.99.0095

** Extended frequency range: 160 to 3000 MHz and 4900 to 6000 MHz

All dimensions in mm

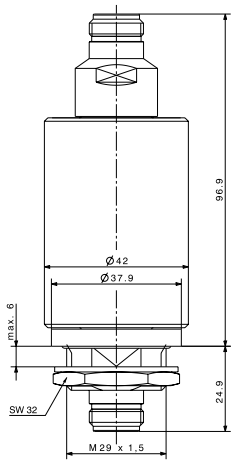


Fig. 1

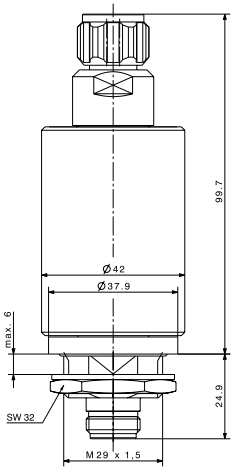


Fig. 2

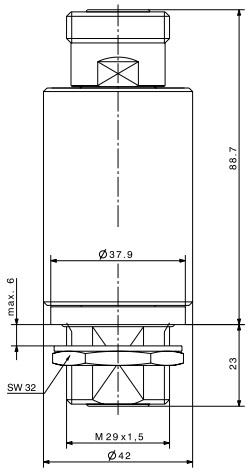


Fig. 3

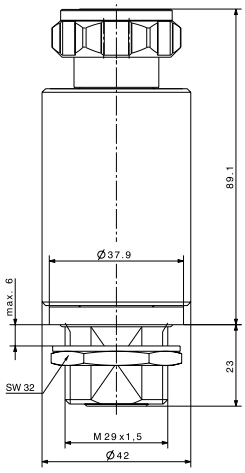


Fig. 4

All mounting holes are shown on pages 182 – 183.

15 kV broadband HV DC-DC block

General specifications

Electrical Data	
RF characteristics	
Impedance	50 Ω
Frequency range	from 180 MHz to 3000 MHz
Return loss (RL)	16 dB min. from 180 to 380 MHz 20 dB min. from 380 to 3000 MHz
Insertion loss (IL)	0.5 dB max.
Passive intermodulation (PIM)	–150 dBc typ.
RF power transmission	80 W CW
DC characteristics	
Leakage current	50 µA
Test leakage current	100 µA
Blocking voltage	15000 V (galvanic DC isolation in centre and outer conductor)

Mechanical data	
Coupling nut torque force	according to IEC/MIL-STD (refer to page 172)
Durability (matings)	500 min.

Environmental data	
Operation temperature range	–40 up to +85 °C (–40 up to +185 °F)
Waterproof degree (IEC 60529)	IP65 min., according to shown product specification, data refer to the coupled state
Moisture resistance	MIL-STD-202, method 106
Thermal shock	MIL-STD-202, method 107, condition B
Vibration, high frequency	MIL-STD-202, method 204, condition D

The product is designed to meet the cited test procedures. Any additional or different requirements arising from specific applications or environmental conditions not covered by the test specifications mentioned above are subject to request and need to be confirmed by the single product detail specification.
We recommend additional taping for long-term outdoor applications in any case.

Material data		
Component part	**Material**	**Plating**
Housings	brass / POM	SUCOPLATE®
Male contacts	brass	gold or silver plating
Female contacts	copper beryllium or bronze	gold or silver plating
Insulators	PTFE	
Gaskets	elastomer rubber	

HUBER+SUHNER type	Connectors port 1 – port 2 side of bulkhead marked «b».	Mounting/grounding MH – hole for «b»	Fig.
9077.17.0022	N (f), b – N (f)	MH110	1
9077.17.0006	N (m) – N (f), b		2
9077.41.0009	7/16 (f), b – 7/16 (f)		3
9077.41.0010	7/16 (m) – 7/16 (f), b		4

* Suitable mounting bracket 9075.99.0095

All dimensions in mm

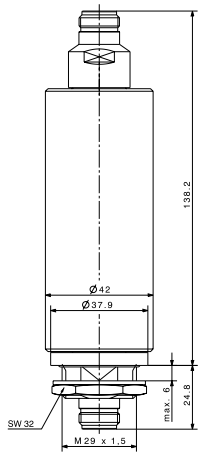


Fig. 1

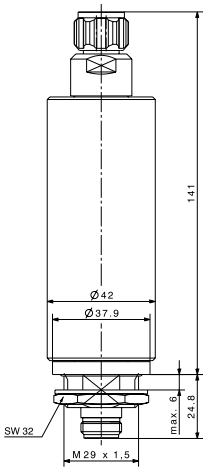


Fig. 2

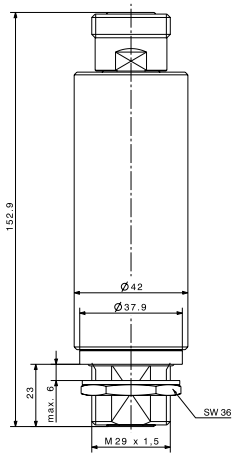


Fig. 3

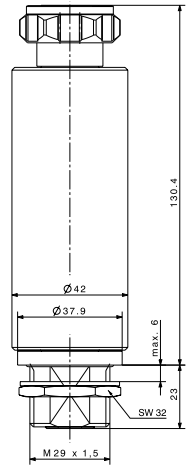
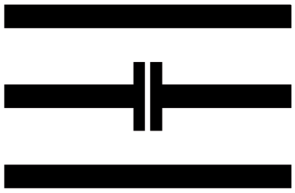


Fig. 4

All mounting holes are shown on pages 182 – 183.

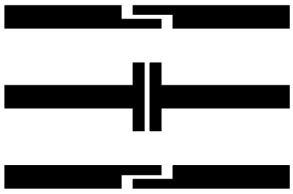
High voltage DC and DC-DC blocks for communication applications

Models with inner conductor blocked



DC block

Models with inner and outer conductor blocked



DC-DC block

DC and DC-DC blocks are coaxial components which block the flow of DC and low frequency signals up to 100 kHz while permitting RF signals to flow without loss through the component. They are used in line with coaxial feeder cables within communication installations.

In this application note you find a selection of high voltage DC and DC-DC block applications as well as the HUBER+SUHNER product portfolio for these applications:

Eliminate ground loops in installations where system equipment is installed/bonded to different earth potential

Communication equipment installed on high tension power line poles

On or in close vicinity of high tension power line poles the so called ground potential rise (GPR) can lead to destruction of installed communication equipment.

GPR is caused

a) By unsymmetrical current distribution through the 3 phases of the power lines,

b) By a short circuit between two or more wires (phase) or between phase and ground.

Since the communication equipment is powered by the public mains supply, there is a voltage difference between the local earth and the far earth of the public mains supply. Besides an isolated installation of the communication hardware DC-DC blocks are one element to prevent destructive fault currents and increase safety on the site.

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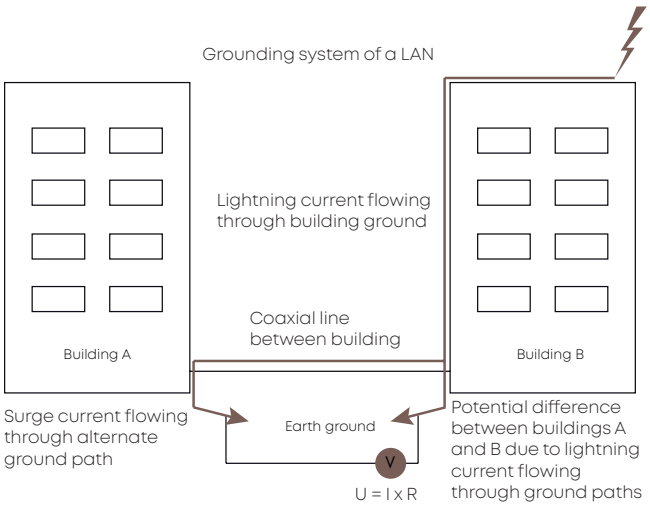
Communication equipment installed at sites with different earth potential

Cables bridging the distance between two sites which are installed/bonded to different earth potential must carry electric stray currents on the outer conductor. DC-DC blocks are used as corrective measure to interrupted such currents.



Reduce noise and improve the signal to noise ratio of the system

Communication installations near railways or on trains are affected by inductive coupling of the traction currents

The traction currents of electric trains create extensive magnetic fields which lead to inductive coupled signal disturbance in communication cables which are placed along the tracks or within the train. This interference is typically at 16.7 Hz, 50 Hz and 300 Hz, but due to the use of converters the disturbing signals can reach 100 MHz. communication installations within tunnels have to deal with the additional problem that the return currents of the trains engine create high local earth potential when passing-by. This is due to the fact that the earth resistance within tunnels are high. DC blocks and DC-DC blocks help in above described cases.

Installations in industrial environment are affected by electromagnetic radiation from heavy induction engines, frequency and AC/DC power converters etc.

In the classic industrial environment the electromagnetic pollution caused by engines couples into communication systems and causes signal disturbance. DC Blocks will stop the low frequency interference before entering the sensitive receiver hardware.

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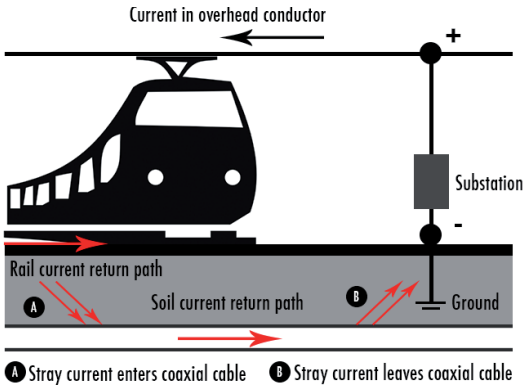
Prevent the flow of DC stray current in coaxial cables which causes galvanic (electrolytic) corrosion

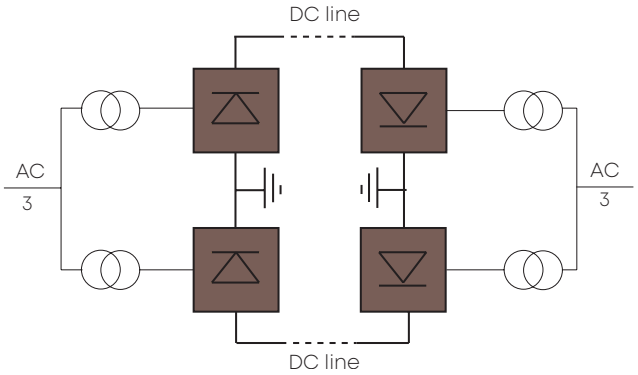
Near DC powered railways (subway or tram systems) stray currents originating from the trains return currents

DC powered trains or trams create stray currents flowing along the track path. These currents flow in any metallic subjects, such as cables and create electrochemical corrosion at the place where the stray current leaves the RF cable or connector. DC-DC blocks in line with the coaxial cables prevent the DC stray current to flow within the RF cable and therefore prevent destructive long-term corrosion.



Close to high voltage DC transmission systems (HVDC)

The same effect (stray current and electrochemical corrosion in metallic conductors) happens in the vicinity of high voltage DC transmission systems (HVDC). DC-DC blocks in line with the coaxial cables prevent the DC stray current to flow within the RF cable and therefore prevent destructive long-term corrosion.



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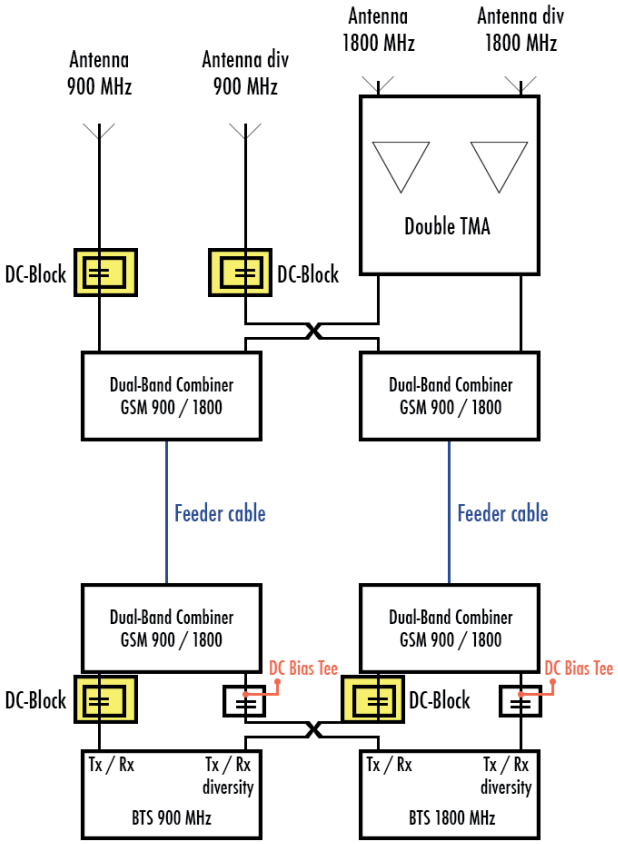
Routing DC to tower-mounted amplifiers in dual- or multiband cell site installations where only specific frequencies demand for TMA's

In cellular BTS sites where multiple antennas (services) are supplied through the same coaxial feeder cable DC blocks are used to guide DC to the amplifier ports and block DC in front of equipment which is DC shorted.



Provide isolation as specified in the safety regulations

Depending on the country and the application, the safety rules and regulations demand blocking of dangerous voltage potential by means of DC-DC blocks of the appropriate blocking voltage.

For all of the above mentioned applications it is important to select the correct DC blocking voltage.

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