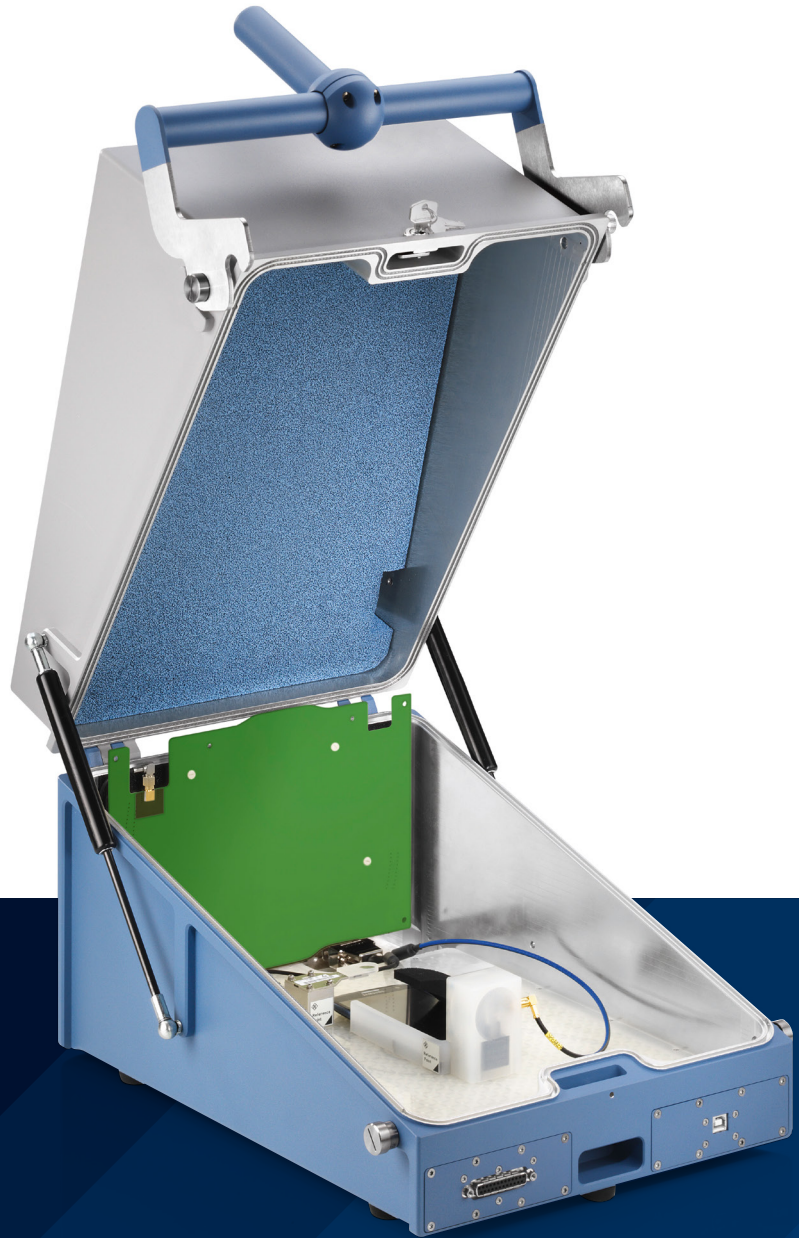


# R&S® CMW-Z10 RF SHIELD BOX, R&S® CMW-Z11 ANTENNA COUPLER

The standard in shielding and coupling



Product Brochure  
Version 07.00

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# AT A GLANCE

The R&S®CMW-Z10 RF shield box with the R&S®CMW-Z11 antenna coupler clearly set standards. Offering excellent shielding effectiveness and superior coupling characteristics, both devices can be used for frequencies up to 6 GHz. These outstanding features combined with a modular options concept make the R&S®CMW-Z10 with R&S®CMW-Z11 indispensable for any radiocommunications tester.

Modern mobile devices usually do not have an external antenna connector. Connection to a radiocommunications tester must therefore be made over the air. The link between the device under test (DUT) and the test equipment should be reliable and path losses kept to a minimum. Interference from external radio sources should be prevented as far as possible. The R&S®CMW-Z10 RF shield box with the high-quality R&S®CMW-Z11 antenna coupler together perfectly meet these requirements.

The R&S®CMW-Z10 is made of solid aluminum. It is firmly closed by means of a lever handle with a defined stop. The bottom and cover will not distort under normal conditions. This ensures uniform compression of the sealing cords provided around the entire box – an important prerequisite for effective RF shielding. The cover is lined with absorber material, which minimizes reflections.

The antenna structure on the R&S®CMW-Z11 antenna coupler board has been optimized to enable an excellent radio connection between the DUT and the tester. The highly broadband spiral antenna allows a wide variety of applications. Further highlights of the R&S®CMW-Z11 include low coupling attenuation and the ability to place the DUT at any desired position inside the box without affecting attenuation caused by reflection.

## Key facts

- ▶ Frequency range up to 6 GHz
- ▶ Excellent shielding characteristics (< 80 dB)
- ▶ Broadband spiral antenna allowing a wide variety of applications
- ▶ Optimized antenna structure for extremely good RF coupling
- ▶ Ergonomic closing mechanism
- ▶ Sufficient space for tablets



As an aid to both opening and closing the shield box, the R&S®CMW-Z120 option provides an additional rotatable handle.

# BENEFITS AND KEY FEATURES

## Wide frequency range up to 6 GHz

Both the R&S®CMW-Z10 and the R&S®CMW-Z11 are suitable for applications up to 6 GHz, thereby covering all common wireless standards such as GSM, UMTS, CDMA2000®, WLAN, LTE, Bluetooth® and GPS. The R&S®CMW-Z10 offers high shielding effectiveness, so that the effects of external interference are reduced to a minimum. The R&S®CMW-Z110 RF cable also provides excellent shielding for frequencies from 4 GHz to 6 GHz.

## Ultralow reflections

The cover of the R&S®CMW-Z10 is lined with absorber material in order to minimize reflections. Strong reflections would cause a significant variation in attenuation as a function of the DUT position.

## Modular options concept and flexible assignment of modules

The R&S®CMW-Z10 has four module slots for different optional modules. Available options currently include a 25-pole D-Sub feedthrough (R&S®CMW-Z12), a USB 2.0 feedthrough (R&S®CMW-Z13), a twin N connector (R&S®CMW-Z14), a 15-pole D-Sub feedthrough (R&S®CMW-Z15) and a LAN feedthrough (R&S®CMW-Z18) for bidirectional audio testing. All modules are optimized so that their effect on shielding characteristics is kept to a minimum. The module slots are identical, allowing each module to be inserted into any slot. The optional connectors can be flexibly assigned. It is also possible to insert customer-specific modules.

## Sufficient space allows optimum positioning, even for large DUTs such as tablets

Even large DUTs, such as tablets, can be accommodated. The RF shield box provides ample space for positioning DUTs to minimize the coupling attenuation between the DUT and the tester.

## Designed for harsh, continuous duty and ergonomic operation

The R&S®CMW-Z10 RF shield box and the R&S®CMW-Z11 antenna coupler are designed to withstand the harsh conditions encountered in service and manufacturing environments. The hinges and dampers are extremely robust. The aluminum case offers high resistance to distortion, ensuring precise closing of the box over time. The closing mechanism has been optimized for ergonomic use, ensuring fatigue-proof handling while providing high-quality results.



### Antenna diversity and MIMO tests

Mobile devices and wireless networks use multiple antenna concepts to benefit from diversity gain and enhance the signal to noise ratio or to exploit the spatial multiplexing scenario of the radio channel to offer users significantly more data capacity. The R&S®CMW-Z16 second antenna option, a circular polarized second antenna element, makes it possible to test the limits of wireless communications and benefit from transmit diversity antennas and measurements of the data throughput increase provided by multiple input multiple output (MIMO) systems.

Mounted on the rear of the RF shield box, the R&S®CMW-Z16 allows radiated coupling of a MIMO DUT such as LTE MIMO 2x2. In applications like these, the standard antenna provides a coupling field in a 90° direction to the second antenna element (R&S®CMW-Z16). This provides the best coupling of MIMO devices in a near field environment and eliminates the need for using RF cables to connect the DUT to a wireless communications tester like the R&S®CMW500.

### Bidirectional audio tests

The R&S®CMW-Z15 audio measurement option offers the accessories required for bidirectional audio measurements in the R&S®CMW-Z10. The microphone and loudspeaker needed for the audio measurements can be connected and optimally positioned within the RF shield box. The audio signals are transmitted via a D-Sub feedthrough. This feedthrough is specially shielded to minimize the effects of external interference on the shield box's characteristics. Audio signals applied via the loudspeaker are picked up by the DUT's microphone and transmitted over the RF interface to a radiocommunications tester. The tester uses a voice decoder to recover the audio signal and compares it to the original signal. To test the audio path with the DUT's loudspeaker, the tester generates an audio signal and sends it to the DUT via the RF interface. There, the audio signal is recovered and picked up by the microphone included with the R&S®CMW-Z15 option. Again, the audio path can be measured by comparing the original fed-in signal to the recovered signal.

The perfect solution for service applications: the R&S®CMW-Z10 with the R&S®CMW family wideband radiocommunications testers and the R&S®CMWrun sequencer software tool for automated measurements.



The R&S®CMW-Z10 together with the R&S®CMW-Z11 with the R&S®CMW-Z17 option for video analysis based on barcode scanner in conjunction with R&S®CMWrun (R&S®CMW-KT104) for evaluation of basic video performance parameters: missing frames, frame delay and jumbled frames.



### Simple interface for video testing

Video stability and performance are important criteria for E2E video streaming, which must be optimized for a variety of wireless standards, including LTE (FDD/TDD), WCDMA/HSPA, GSM/(E)GPRS and WLAN. Throughput measurements can be performed during video streaming under fading or IP impairment conditions, which are built-in features of the R&S®CMW500 data application unit (DAU).

When assessing user experience, the R&S®CMW-Z17 barcode scanner in conjunction with the R&S®CMWrun sequencer tool R&S®CMW-KT104 offers an easy way to evaluate basic and key parameters of video performance based on video frame evaluation: missing frames, frame delay and jumbled frames. Here, a high-speed barcode scanner evaluates the reception and decoding of barcodes that have been previously integrated into the streamed video. A set of reference videos is part of the delivery package. In these videos, each frame contains a barcode with the sequence number in all video frames. The R&S®CMWrun/R&S®CMW-KT104 evaluates the feedback

from the high-speed barcode scanner and outputs diagrams in which the user can see missing, delayed or jumbled frames. It also delivers a pass/fail verdict based on user-defined limits.

The key advantage of this solution (R&S®CMW-Z17 barcode kit for video analysis in combination with R&S®CMWrun/R&S®CMW-KT104 barcode video analysis) for video performance testing is its simplicity. It supports all available phones without the need for HML or HDMI™ interfaces. The high-speed barcode scanner decodes the barcodes directly from the DUT screen. In addition, the attenuation values of the R&S®CMW-Z10 based on its positioning coordinate system can be used for video testing in the same way as for parametric tests such as modulation, power, etc. The R&S®CMW-Z17/R&S®CMW-KT104 solution is tailored for assessing video performance directly from the device screen when streaming a video under different channel conditions (fading, IP impairment). It can also be used to measure and identify a possible gap during LTE WLAN offload or any other E2E handover, e.g. between LTE and HSPA.



# R&S®CMWrun SEQUENCER SOFTWARE TOOL

Automate your measurements with the ready-to-use solution for configuring RF and data application test sequences by remote control – for all standards supported by the R&S®CMW family

## Easy configuration of test sequences







The R&S®CMWrun sequencer software tool meets all requirements for executing remote control test sequences on the R&S®CMW500 in R&D, quality assurance, production and service for current and future wireless equipment.

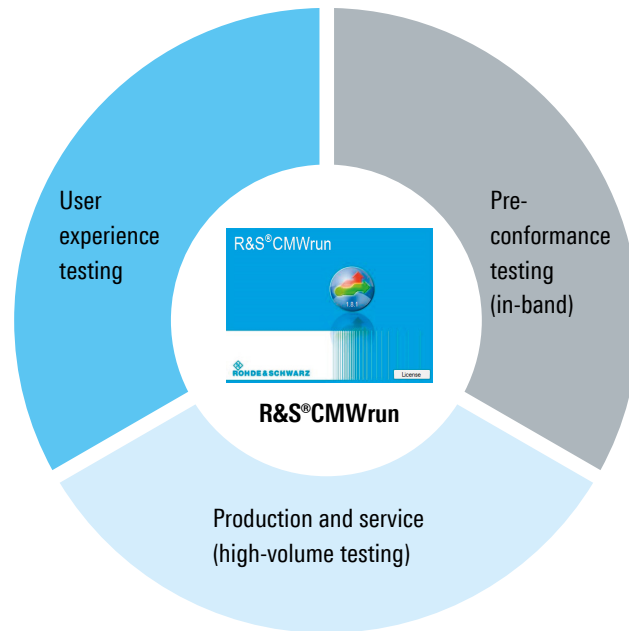
The software engine is based on the execution of test DLLs (plug-in assemblies). This architecture allows easy and straightforward configuration of test sequences without knowledge of specific remote programming of






the instrument. It provides full flexibility in configuring the parameters and limits of the test items provided in the R&S®CMWrun package options for the different standards.

Using a standalone R&S®CMW500 and with just a few configuration clicks for bands, channels and bandwidth, the tool provides a comprehensive result report and gives the user a first impression of in-band compliance. This provides benefits in the very early stage of verification, before doing more complex system tests or validation.

## R&S®CMWrun use cases

	Throughput testing
	Audio performance
	Video analysis
	Battery life testing
<b>MIMO</b>	MIMO performance testing
	Coexistence testing
	IP connection security testing



<b>3GPP</b>	3GPP TS testing (all technologies)
<b>3GPP2</b>	CDMA2000® 1xRTT/1xEV-DO
	Bluetooth®
	eCall/ ERA-GLONASS
	Basic signaling with different technologies
	Find attenuation routines
	Chipset support in non-signaling mode

### Management of attenuation values

When carrying out RF measurements via the air interface, it is necessary to compensate the RF attenuation between the antenna coupler and the DUT. Each mobile device has a specific RF characteristic. Specific attenuation values must therefore be considered for each device under test when performing RF measurements using the R&S®CMW-Z11 antenna coupler. The R&S®CMWrun software enables easy measurement and management of attenuation values.

After a DUT has registered with the R&S®CMW base station emulator, the attenuation values previously stored for this specific type of mobile device are automatically loaded and taken into account in the measurements. Attenuation values are technology- and frequency-dependent. The R&S®CMWrun attenuation value database therefore includes reference values for various frequencies and technologies, which are automatically set during the test run. This facilitates measurements with the RF shield box, especially in service applications. Errors are avoided, and reproducibility and throughput are enhanced.

## HIGHLIGHTS

### Multitechnology solution for all standards supported by the R&S®CMW family

- ▶ Basic signaling suite for all technologies (LTE, WCDMA/HSPA, TD-SCDMA, GSM/(E)GRPS, CDMA2000® 1xRTT/CDMA2000® 1xEV-DO, WLAN and Bluetooth®) necessary in service and repair stations for mobile phones
- ▶ GSM/GRPS and WCDMA/HSPA RF, functional and preformance testing (R&S®CMW-KT053 option)
- ▶ TD-SCDMA RF, functional and preformance testing (R&S®CMW-KT054)
- ▶ LTE/LTE-A (FDD and TDD) RF, functional and preformance testing (R&S®CMW-KT055 option)
- ▶ Cellular IoT (eMTC/NB-IoT) RF, functional and preformance testing (R&S®CMW-KT052)
- ▶ Connectivity applications, WLAN and Bluetooth® RF, functional and preformance testing (R&S®CMW-KT057 option)
- ▶ CDMA2000® 1xRTT/CDMA2000® 1xEV-DO, RF, functional and preformance testing (R&S®CMW-KT058 option)

### Ready-to-use solution for superior user experience test scenarios

- ▶ Audio testing (with R&S®CMW-KT051 <sup>1)</sup>)
- ▶ Video testing (with R&S®CMW-KT104 or R&S®CMW-KT105 <sup>1)</sup>)
- ▶ IP throughout with IP analysis (with R&S®CMW-KT051 <sup>1)</sup>)
- ▶ Battery life measurements (with R&S®CMW-KT051 <sup>1)</sup>)
- ▶ MIMO performance testing under fading conditions (with R&S®CMW-KT100)
- ▶ eCall/ERA-GLONASS (with R&S®CMW-KT110)

### Ease-of-use due to dedicated interfaces for operation, editing sequences, measurement reports and debugging test sequences

### Application for SCPI remote control via LAN or GPIB interface

<sup>1)</sup> Requires extension for dedicated signaling radio access technology.

# SPECIFICATIONS IN BRIEF

## Specifications in brief

### R&S®CMW-Z10 RF shield box and R&S®CMW-Z11 antenna coupler

#### Shielding effectiveness

Including R&S®CMW-Z11/-Z12/-Z14	0.4 GHz to 4 GHz	> 80 dB
	4 GHz to 6 GHz	> 60 dB
With R&S®CMW-Z13 USB 2.0 feedthrough	0.4 GHz to 4 GHz	> 60 dB
	4 GHz to 6 GHz	> 55 dB
With R&S®CMW-Z18 LAN feedthrough	0.4 GHz to 4 GHz	> 80 dB
	4 GHz to 6 GHz	> 70 dB

#### Outer dimensions

W × H × D  
320.9 mm × 267.5 mm × 527.7 mm  
(12.6 in × 10.5 in × 20.8 in)

#### Weight

9 kg (19.8 lb)

### R&S®CMW-Z11 antenna coupler

VSWR	VSWR without DUT, with R&S®CMW-Z110, R&S®CMW-Z10 open	
	0.4 GHz to 1.4 GHz	< 3.5
	1.4 GHz to 3.5 GHz	< 2
	3.5 GHz to 6 GHz	< 3.5
Max. power rating	from DUT	+37 dBm
	from R&S®CMW	+33 dBm
Polarization		circular
Connector		N female

### R&S®CMW-Z12 Var02 D-Sub feedthrough

Power pins 14 to 18	max. current rating, per pin	1 A
	max. rated voltage	15 V
	cut-off frequency	1 kHz
Data pins 1 to 13 and 19 to 25	max. current rating	50 mA
	max. rated voltage	15 V
	max. pass frequency	5 MHz
	filter shunt capacitance	< 800 pF

### R&S®CMW-Z12 Var04 D-Sub feedthrough, extended DC power pin connectors

Power pins 12 to 18, 24, 25	max. current rating, per pin	1 A
	max. rated voltage	15 V
	cut-off frequency	1 kHz
Data pins 1 to 11 and 19 to 23	max. current rating	50 mA
	max. rated voltage	15 V
	max. pass frequency	5 MHz
	filter shunt capacitance	< 800 pF

### R&S®CMW-Z13 USB 2.0 feedthrough

Connector inside antenna coupler		USB-A
Connector outside antenna coupler		USB-B
Power supply	max. rated current	0.5 A
	rated voltage	5 V
Data rate		low speed
		full speed
		USB 2.0 high speed

### R&S®CMW-Z14 RF feedthrough

Connector inside antenna coupler		2 × N female
Connector outside antenna coupler		2 × N female
Impedance		50 Ω
Frequency range		0 Hz to 6 GHz



<b>Specifications in brief</b>		
<b>R&amp;S®CMW-Z15 audio measurement option</b>		
Supply pin 1, ground pin 2	rated voltage	5 V
	supply current	< 10 mA
Microphone output pin 11, microphone ground pin 3	recommended operating frequency	1 kHz
	operating frequency range	300 Hz to 10 kHz
	max. rated output voltage	1 V (pp)
Speaker input pin 5, speaker ground pin 15	gain settings (switches inside)	+10 dB (default), 20 dB and 0 dB
	operating frequency range	300 Hz to 5 kHz
	max. rated input voltage	20 V (pp)
	rated input impedance	600 Ω
<b>R&amp;S®CMW-Z16 second antenna element for diversity/MIMO measurements (R&amp;S®CMW-Z14 required)</b>		
VSWR	VSWR without DUT, with R&S®CMW-Z110, R&S®CMW-Z10 open	
	0.45 GHz to 1.4 GHz	< 3.5
	1.4 GHz to 3.5 GHz	< 2.3
Max. power rating	3.5 GHz to 6 GHz	< 3.5
	from DUT	+37 dBm
	from R&S®CMW	+33 dBm
Polarization		circular
Connector		N female with N feedthrough
<b>R&amp;S®CMW-Z17 barcode kit for video analysis (R&amp;S®CMW-Z12 required)</b>		
Preconditions	with R&S®CMW-Z10/R&S®CMW-Z11	requires R&S®CMW-Z12 for power supply R&S®CMW-Z13 recommended for DUT automation via USB interface, requires the R&S®CMWrun software option R&S®CMW-KT104 plus dedicated signaling extension for control and evaluation of video quality based on barcodes
	standalone operation	requires R&S®CMWrun software option R&S®CMW-KT104 plus dedicated signaling extension for control and evaluation of video quality based on barcodes.
Decode rate		60 decodes per second
Focal range	minimum distance between barcode scanner and DUT screen for a DUT screen width of	
	39 mm (1.5 in)	50 mm (2.0 in)
	114 mm (4.5 in)	170 mm (6.7 in)
Power supply	max. current rating	800 mA
	rated voltage	5 V DC ± 5%
Dimensions (W × H × D) <sup>1)</sup>	horizontal DUT position	255 mm × 166 mm × 285 mm (10.0 in × 6.5 in × 11.2 in)
	vertical DUT position	255 mm × 146 mm × 285 mm (10.0 in × 5.8 in × 11.2 in)
<b>R&amp;S®CMW-Z18 LAN feedthrough</b>		
Supported speed classes		10 Mbit/s, 100 Mbit/s, 1 Gbit/s
Support for power over Ethernet (PoE)		not supported

<sup>1)</sup> Height is reduced by 5 mm (0.2 in) when base plate is not used.

# ORDERING INFORMATION

Designation	Type	Order No.
<b>Base unit</b>		
RF shield box, internal gas springs, assembled	R&S®CMW-Z10	1204.7008.02
RF shield box, external gas springs, assembled	R&S®CMW-Z10	1204.7008.04
Antenna coupler, up to 6 GHz (mandatory selection)	R&S®CMW-Z11	1204.7108.02
<b>Options</b>		
D-Sub feedthrough	R&S®CMW-Z12 Var02	1204.7208.02
D-Sub feedthrough, extended power pin connector	R&S®CMW-Z12 Var04	1204.7208.04
USB 2.0 feedthrough	R&S®CMW-Z13	1204.7308.04
RF feedthrough	R&S®CMW-Z14	1204.7408.02
Audio measurement	R&S®CMW-Z15	1204.7508.02
Second antenna element for diversity/MIMO measurements (requires R&S®CMW-Z14)	R&S®CMW-Z16	1204.7808.02
Barcode kit for video analysis (requires R&S®CMW-Z12 for power supply, R&S®CMW-Z13 is recommended for DUT automation via USB interface; requires R&S®CMWrun software option R&S®CMW-KT104 plus dedicated signaling extension for control and evaluation of video quality based on barcodes)	R&S®CMW-Z17	1204.7850.02
1 Gbit/s LAN feedthrough	R&S®CMW-Z18	1204.7050.02
RF cable, up to 6 GHz	R&S®CMW-Z110	1204.7608.02
Additional handle, rotatable	R&S®CMW-Z120	1204.7708.02
<b>Scope of delivery</b>		
R&S®CMW-Z10: shield box, 1 m RF cable with N connectors for frequencies up to 3 GHz		
R&S®CMW-Z11: antenna coupler, PE bracket and stabilizing piece and spacers for secure repeatable positioning of DUTs		
R&S®CMW-Z15: microphone, speaker, internal and external audio cables		
R&S®CMW-Z17: high speed barcode scanner, power supply, feedthrough USB and power cable based on the R&S®CMW-Z12 interface and fixture accessories for horizontal or vertical mobile positioning		

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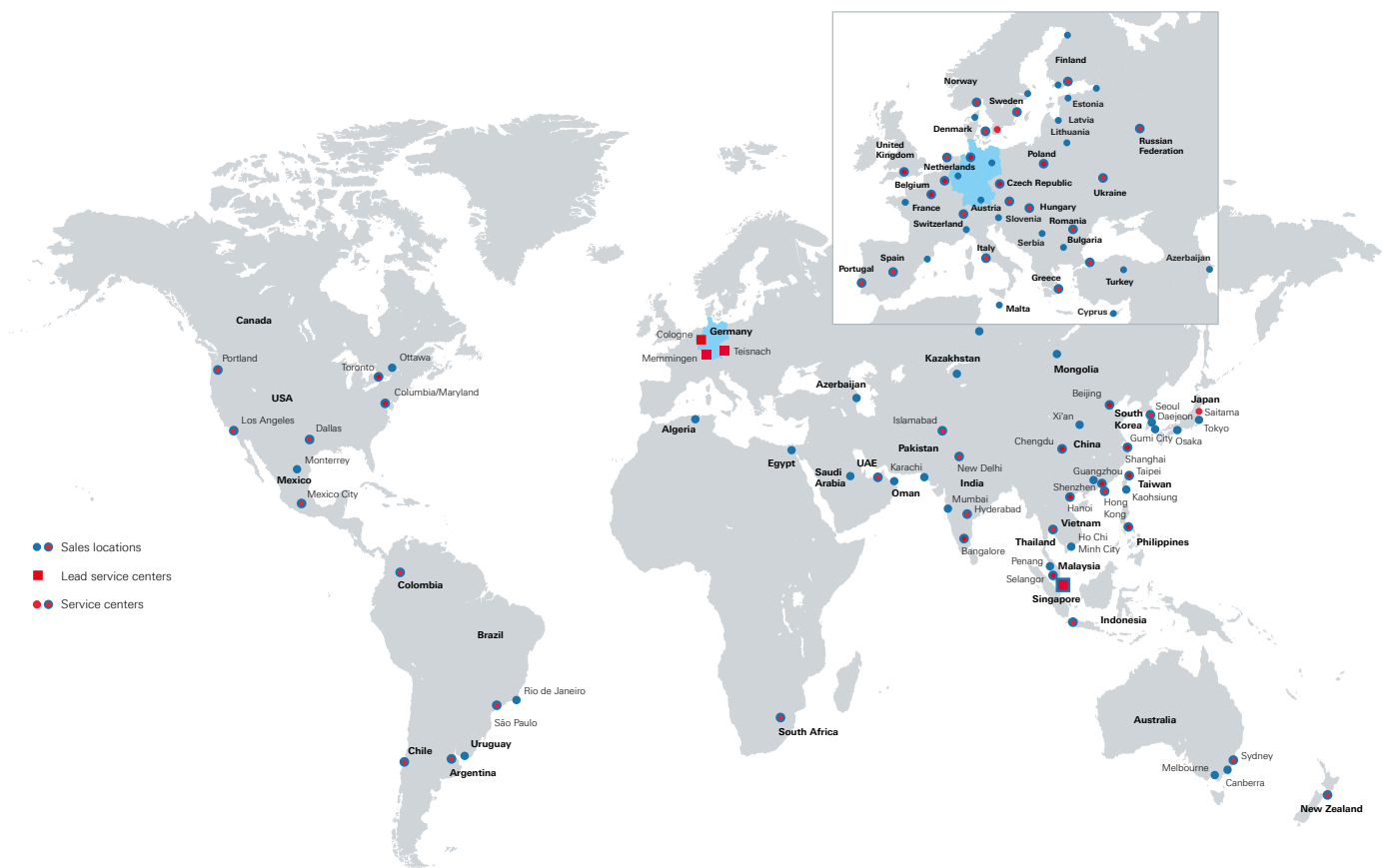
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