

Widely Tunable | High Power | CW Laser Light Sources



Applications

High-resolution spectroscopy
Quantum technology
Holography
Raman spectroscopy
Fluorescence microscopy
Detector calibration

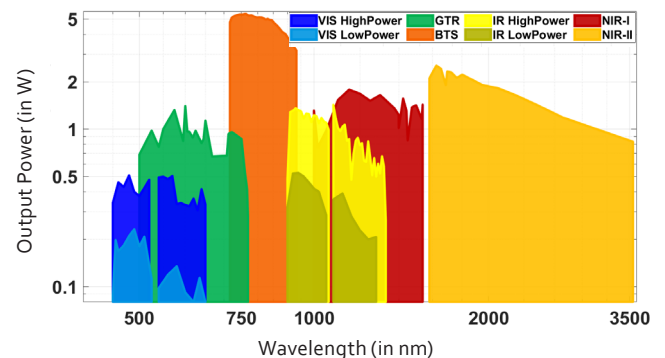
- Tunable lasers from green to infrared without a gap
- Wide gap-free tuning ranges in the visible and near-infrared
- Fully automated wavelength approach
- More than 20 GHz mode-hop free tuning range in the visible
- Single frequency operation with < 500 kHz typical linewidth
- Output powers up to Watt-level

The PRISM award winning HÜBNER Photonics C-WAVE is known for the widest coverage of tunable single frequency cw laser light on the market at the push of a button. Between all of the models the platform offers full coverage of the visible spectrum from 450 nm up to 3,400 nm.

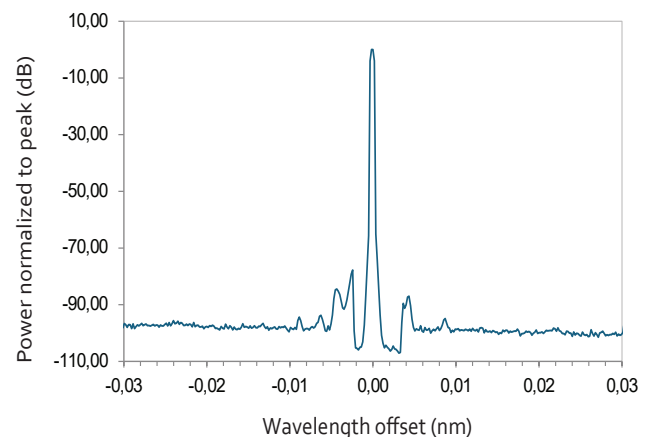
The C-WAVE Series lasers combine user-friendly and fully automated handling with wide tunability in the infrared and visible wavelength range. It offers mode-hop free tunable single-frequency emission in a nearly perfect Gaussian beam with wavelength-independent stable beam pointing.

C-WAVE's proven platform of tunable laser sources includes various models based on optical parametric oscillators (OPO) or titanium sapphire laser technology, offering a flexible range of pump laser options for many applications.

C-WAVE Spectral Coverage

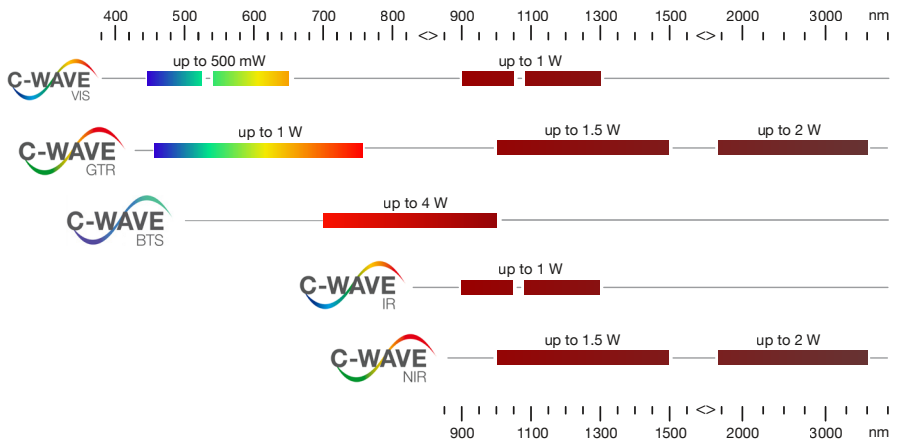


C-WAVE GTR side mode suppression



	C-WAVE VIS HP	C-WAVE VIS LP	C-WAVE GTR	C-WAVE BTS	C-WAVE IR HP	C-WAVE IR LP	C-WAVE NIR
Wavelength Range (nm) (All listed bands are included.)	VIS-I: 450 - 525 VIS-II: 540 - 650 IR-I: 900 - 1050 IR-II: 1080 - 1300		VIS: 510 - 750 NIR-I: 1000 - 1500 NIR-II: 1700 - 3400	NIR: 700 - 980	IR-I: 900 - 1050 IR-II: 1080 - 1300		NIR-I: 1000 - 1500 NIR-II: 1700 - 3400
Accuracy of Emission Frequency	+/- 1 nm (VIS)		VIS: < 2 THz	N/A			
	+/- 2 nm (IR)		NIR-I, NIR-II : < 1 THz	< 1 THz	+/- 2 nm (IR)		NIR-I, NIR-II < 1 THz
With Absolute Lambda X10 (MHz)	< 2			< 1			
Output Power	VIS-I, VIS-II: >200 mW > 500 mW @470 nm	VIS-I, VIS-II > 80 mW	VIS: > 300 mW (typ: >500 mW) > 800 mW @600 nm	N/A			
	IR-I, IR-II > 400 mW > 1W @940 nm	IR-I, IR-II > 200 mW	NIR-I > 600 mW (typ. > 800 mW)	>750 mW up to 5W ^	IR-I, IR-II > 400 mW >1W @940 nm	IR-I, IR-II > 200 mW	NIR-I > 600 mW (typ. > 800 mW) ^
	N/A		NIR-II: > 1 W@ 1.7 - 2.2 μm > 500 mW@ 2.2 - 3 μm > 200 mW@3 - 3.4 μm	N/A			NIR-II: > 1W @ 1.7-2.2 μm > 500 mW @ 2.2 - 3 μm > 200 mW @3 - 3.4 μm
Amplitude/Intensity Noise (typical values)	VIS-I, VIS-II: < 5% IR-I, IR-II: < 1%	VIS-I, VIS-II: < 5% IR-I, IR-II: < 1%	< 1% (10 Hz - 10 MHz)	< 0.1 % rms ^	IR-I, IR-II < 1%	IR-I, IR-II < 1%	< 1% (10 Hz - 10 MHz)
Beam Diameter at Aperture (mm)	VIS: 0.5		VIS: 1.5	N/A			
	IR-I, IR-II: 0.2		NIR-I, NIR-II: 2	2.0	IR-I, IR-II: 0.2		NIR-I, NIR-II: 2.0
Beam Pointing Stability (μrad)	VIS: < 250 (typ: < 50)		VIS: < 250 (typ: < 50)	N/A			
	IR-I, IR-II: < 50		NIR-I, NIR-II: < 50	< 50	IR-I, IR-II: < 50		NIR-I, NIR-II: < 50
Beam Polarization	linear, horizontal > 1000:1						
Spatial Mode (TEM ₀₀), Beam quality	M² < 1.2 ^		VIS, NIR-I: M² < 1.2 NIR-II: M² < 1.4	M² < 1.5 (typ < 1.2)	M² < 1.2		NIR-I: M² < 1.2 NIR-II: M² < 1.4
Linewidth	< 1 MHz (typ. < 500 kHz)						
Mode-hop Free Tuning (GHz)	VIS-I: > 20	VIS-I: > 20	VIS: >20 (up to 40)	N/A			
	IR-I, IR-II: > 10		NIR-I, NIR-II: > 10 (up to 20)	> 10	IR-I, IR-II: > 10		NIR-I, NIR-II: > 10 (up to 20)
Warranty	12 Months, unlimited operation hours						

^A @peak wavelength
^B Spec not valid >1450 nm
^C Above pump noise, added in quadrature
^D Not specified at 450 – 480 nm and 900 – 960 nm



WARNING
INVISIBLE LASER RADIATION
Specifications and technical data are subjects to
change without notice due to technical developments.

Avoid eye or skin exposure to direct or scattered radiation.
Class 4 Laser Product
Classified per IEC 60825-1: 2014

Operational Environment

	C-WAVE VIS HP	C-WAVE VIS LP	C-WAVE GTR	C-WAVE BTS	C-WAVE IR HP	C-WAVE IR LP	C-WAVE NIR
Power Supply	110V / 230V						
Communication Interface	Ethernet / RJ45						
Intended use environment	Laboratory, air free of dust (recommended ISO 9 or better)						
Mounting surface	vibration-insulated optical table						
Storage Temperature	10 - 40°C						
Storage Humidity	0 - 90 % relative humidity, non-condensing						
Operation Temperature range	20 -25°C						
Ambient air pressure	10 - 85 % relative humidity, non-condensing						
Power Consumption	300 W						
Cooling	air cooling	closed-loop chiller, included	air cooling	closed-loop chiller, included	air cooling	closed-loop chiller, included	air cooling

Interfaces

Beam Output	Free space, optional Fiber Coupling for SHG
Optical Monitor Output OPO (optional)	< 20 mW of OPO Signal, FC/APC
Electrical Monitor Output (Channel 1, 2)	-5 V to 5 V out, SMA
Electrical Trigger Output	0V to 5V, TTL out, SMA
12 VDC in	Connects with the enclosed power supply
Common Ground	GND, Flat Plug 6.3 x 0.8
Aux In	0V to 5V in, SMA ^C
Purge In	0.1 to 0.5 sccm, 4mm hose, dry air or N2 gas
Interlock	Remote Interlock, (short plug provided)

^C not available for C-WAVE VIS-IR LP

Mechanical Specifications

	C-WAVE VIS HP	C-WAVE VIS LP	C-WAVE GTR	C-WAVE BTS	C-WAVE IR HP	C-WAVE IR LP	C-WAVE NIR
Dimensions (LxWxH, mm ³) ^D	645 x 486 x 133	575 x 410 x 155	645 x 486 x 133	645 x 486 x 133	645 x 486 x 133	575 x 410 x 155	645 x 486 x 133
Weight (kg)	44 ^E	34	44 ^E	44 ^E	44 ^E	34	44 ^E
Shipping weight, incl. pump laser w/o pallet (kg)	98	80	98	98	98	80	98

^D Without pump laser and clamps.

^E w/o pump laser

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Tuning Mechanisms

The OPO based C-WAVE models C-WAVE GTR, VIS, NIR and IR can be wavelength tuned based on multiple mechanisms. The main three wavelength tuning mechanisms accessible are temperature tuning of the non-linear crystal (coarse tuning), intra-cavity Etalon scanning (quasi-continuous stepwise tuning) and scanning the OPO cavity length by a piezo-element (continuous mode-hop free tuning). These mechanisms can be combined and fully automated for truly continuous wavelength coverage.

	Range		Resolution	
	IR/NIR	VIS/GTR	IR/NIR	VIS/GTR
Coarse - Crystal Temperature (THz)	Full System Range		< 1	< 2
Stepwise - Intracavity Etalon Position (GHz)	50	100	< 3	< 6
Continuous, Mode-hop free Intracavity Piezo Mirror Position	10 GHz	20 GHz	100 kHz / mV	200kHz / mV

Wavelength tuning for C-WAVE BTS is based on intra-cavity filter settings and cavity-length tuning. Hence, the fundamental wavelength is set within seconds.

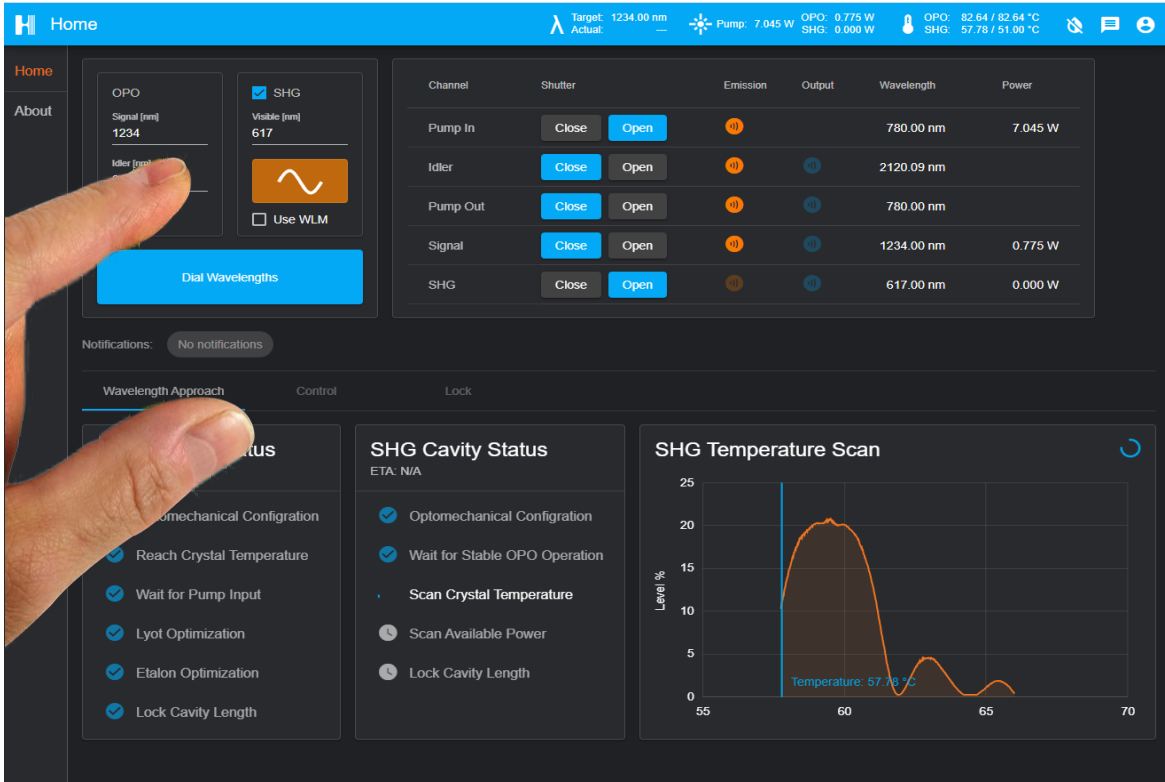
Control Software

C-WAVE can be controlled via the intuitive user interface on a web browser from any device within your network ^E. The user interface provides fundamental functionalities, such as automated wavelength approaches by the click of a button. In advanced mode, users get comprehensive access to control actuators and parameters of C-WAVE. The user interface comprises real-time monitoring of all internal sensor readings making the control of C-WAVE highly responsive and user-friendly.

Communication with C-WAVE is based on websockets, allowing for flexible platform independent integration of the system into your software environment regardless of which programming language you prefer. Python bindings and example code are included.

^E Control of C-WAVE VIS LP and C-WAVE IR LP via Windows software

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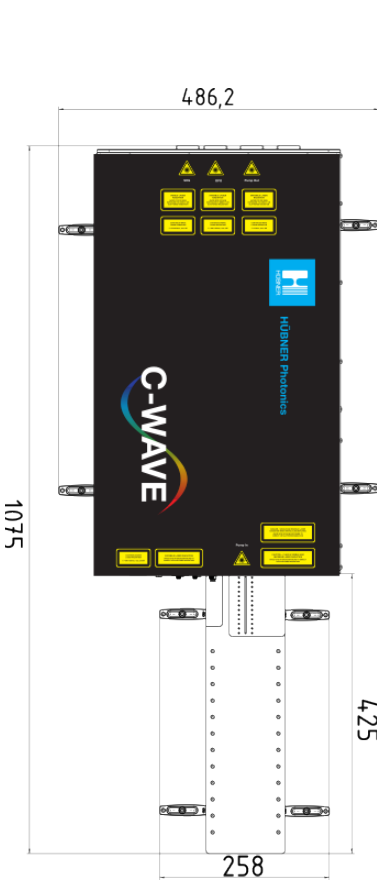
Web control interface for C-WAVE GTR, C-WAVE NIR, C-WAVE VIS HP, C-WAVE IR HP, C-WAVE BTS

C-WAVE

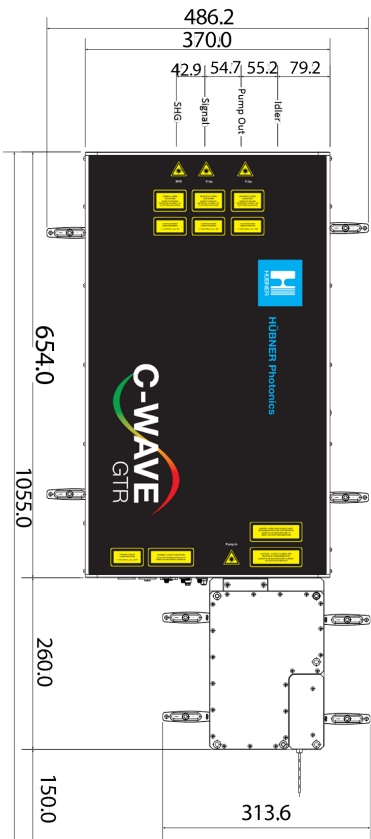
Mechanical Specifications

* All dimensions are given in mm.

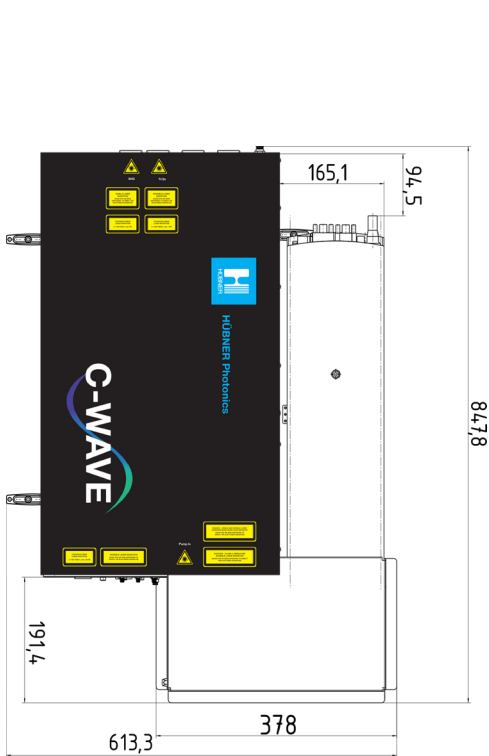
Top view C-WAVE VIS HP



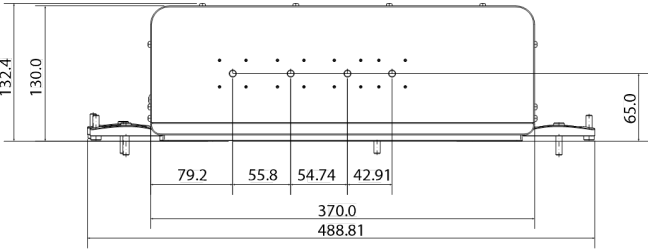
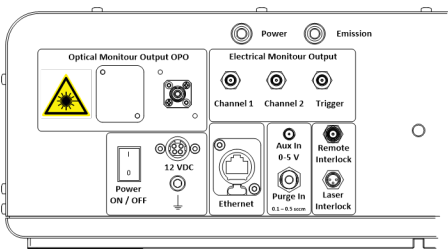
Top view C-WAVE GTR



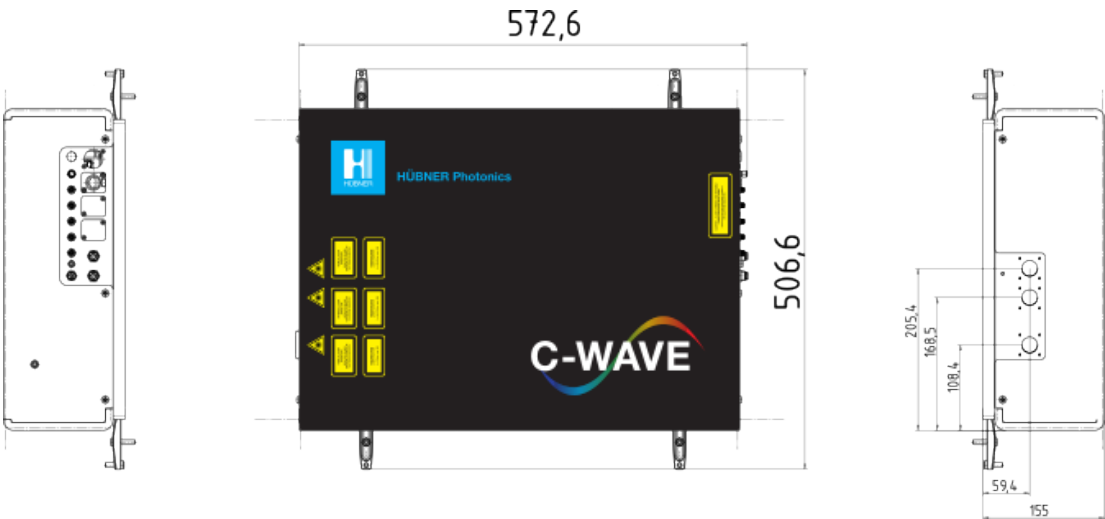
Top view C-WAVE BTS

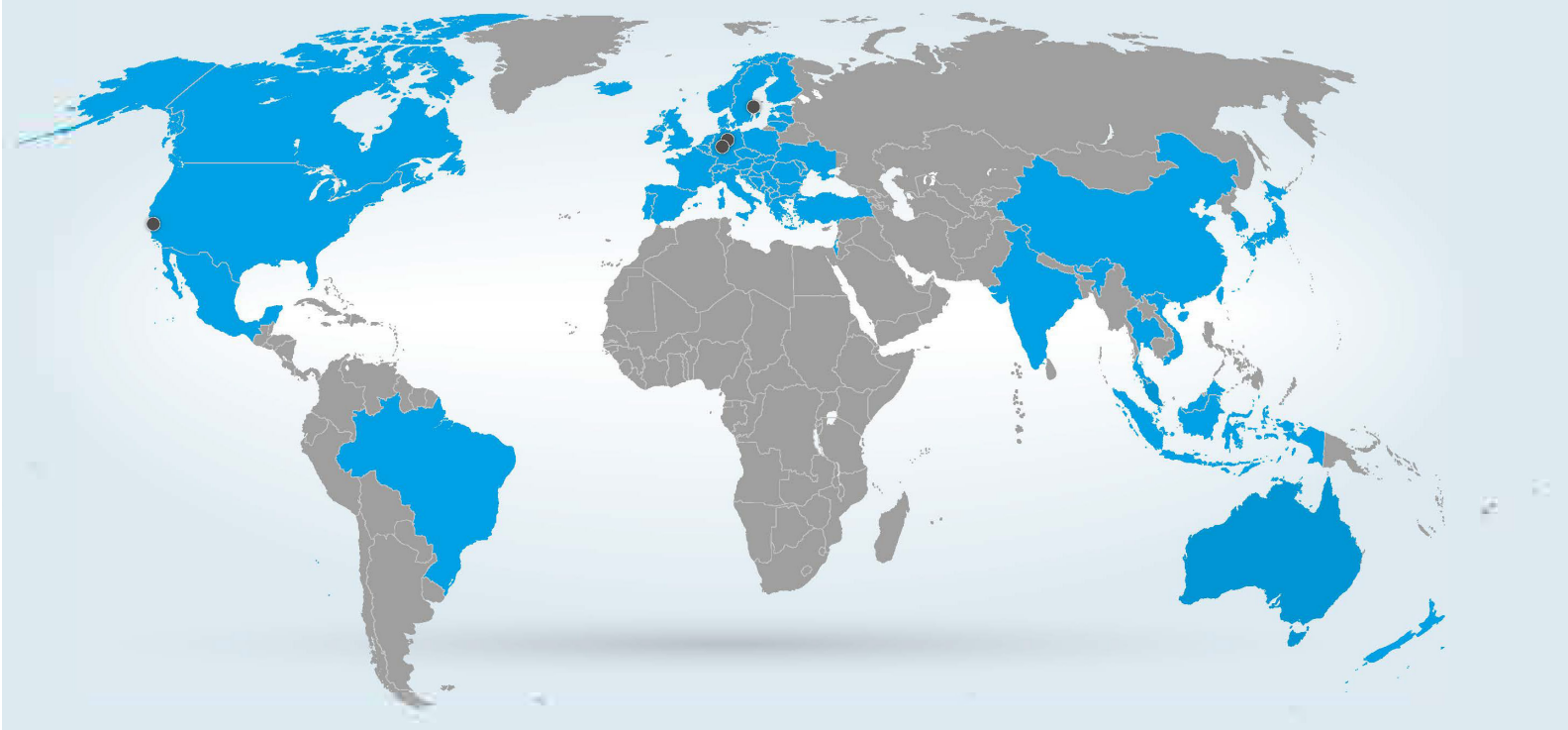


Front & Back of C-WAVE VIS HP, GTR, and BTS



C-WAVE VIS LP





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