C-WAVE

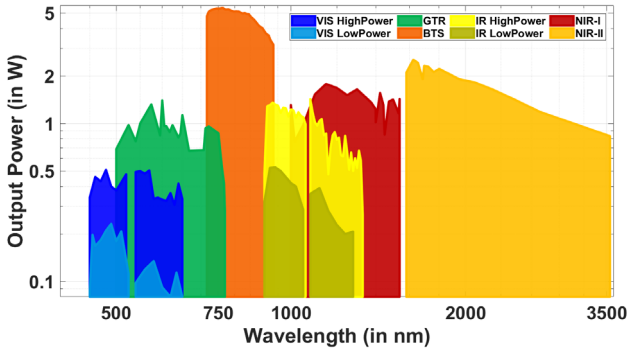
Widely Tunable | High Power | CW Laser Light Sources

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

C-Wave Spectral Coverage



The C-WAVE series combines 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) and titanium sapphire laser technology, offering a range of pump laser options to flexibly respond to your application requirements.

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C-WAVE

Optical Performance 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
Wavelength Range	VIS-I: 450 - 525 nm		VIS: 510 - 750 nm	NIR: 700 - 980 nm	IR-I: 900 - 1050 nm,		NIR-I: 1 - 1.5 µm
	VIS-II: 540 - 650 nm		NIR-I: 1 - 1.5 µm		IR-II: 1080 - 1300 nm		NIR-II: 1.7 - 3.4 µm
	IR-I: 900 - 1050 nm		NIR-II: 1.7 - 3.4 µm				
	IR-II: 1080 - 1300 mn						
Accuracy of Emission Frequency	+/- 1 nm (VIS)		VIS: < 2 THz	< 1 THz	+/- 2 nm (IR)		NIR-I, NIR-II < 1 THz
	+/- 2 nm (IR)		NIR-I, NIR-II : < 1 THz				
With AbsoluteLambda Wavemeter (Depending on Wavemeter Model)	< 2 MHz			< 1 MHz			
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	>750 mW, up to 5W @ peak wavelength	IR-I, IR-II: > 400 mW (>1W@ 940 nm)	IR-I, IR-II: 200 mW	NIR-I: > 600 mW (typ. > 800 mW) [A]
	IR-I, IR-II: > 400 mW > 1W@ 940 nm	IR-I, IR-II 200 mW	NIR-I: > 600 mW (typ. > 800 mW)				NIR-II: > 1W@ 1.7-2.2 µm, > 500 mW@ 2.2 - 3 µm, > 200 mW@3 - 3.4µm
			NIR-II: > 1 W@ 1.7 - 2.2 µm, > 500 mW@ 2.2 - 3 µm, > 200 mW@3 - 3.4µm				
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 (above pump noise, added in quadrature)	IR-I, IR-II: < 1%	IR-I, IR-II: < 1%	< 1% (10 Hz - 10 MHz)
Beam Diameter at Aperture	VIS: 0.5 mm		VIS: 1.5 mm	2 mm	IR-I, IR-II: 0.2 mm		NIR-I, NIR-II 2 mm
	IR-I, IR-II 0.2 mm		NIR-I, NIR-II 2 mm				
Beam Pointing Stability	VIS: < 250 µrad (typ: < 50 µrad)		VIS: < 250 µrad (typ: < 50 µrad)	< 50 µrad	IR-I, IR-II < 50 µrad		NIR-I, NIR-II < 50 µrad
	IR-I, IR-II < 50 µrad		NIR-I, NIR-II < 50 µrad				
Beam Polarization	linear, horizontal > 1000:0			linear, horizontal, > 100:1	linear, horizontal > 1000:0		
Spatial Mode (TEMoo), Beam quality	$M^2 < 1.2$ [B]		VIS, NIR-I: $M^2 < 1.2$ NIR-II: $M^2 < 1.4$	$M^2 < 1.5$ (typ <1.2)	$M^2 < 1.2$		NIR-I: $M^2 < 1.2$ NIR-II: $M^2 < 1.4$
Linewidth	< 1 MHz (typ. < 500 kHz)						
Mode-hop Free Tuning	VIS-I: > 20 GHz	VIS-I: > 20 GHz	VIS: >20 GHz (up to 40 GHz)	> 10 GHz	IR-I, IR-II: > 10 GHz		NIR-I, NIR-II: > 10 GHz (up to 20 GHz)
	IR-I, IR-II: > 10 GHz		NIR-I, NIR-II: > 10 GHz (up to 20 GHz)				
Warranty	12 Months, unlimited operation hours						

[A] Spec not valid >1450 nm

[B] 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

C-WAVE

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	200 mW						
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 Out-put (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)	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 [D]	34	44 [C]	44 [D]	44 [D]	34	44 [D]
Shipping weight, incl. pump laser w/o pallet (kg)	98	80	98	98	98	80	98

[D] w/o pump laser

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C-WAVE

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

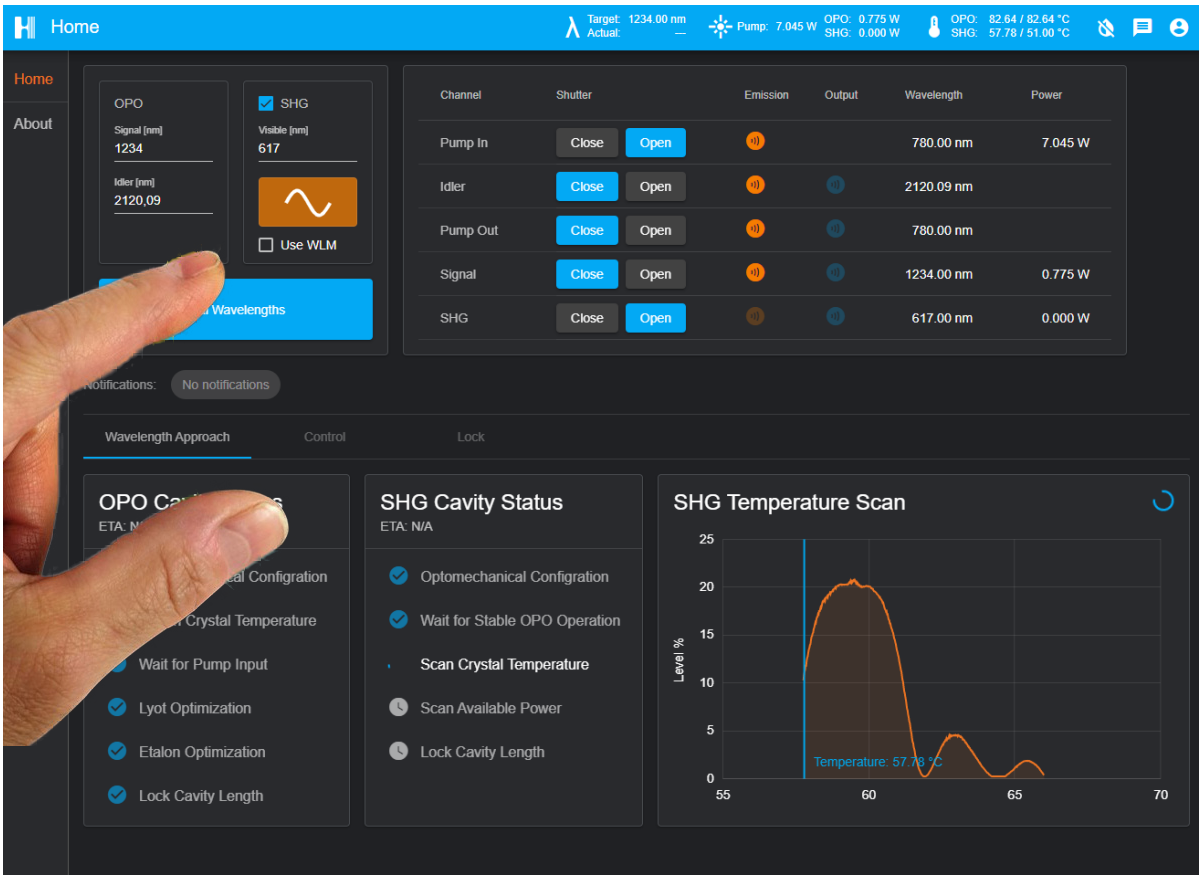
Wavelength tuning for C-WAVE BTS is based on intra-cavity filter settings and cavity-length tuning.
Hence, the fundamental wavelength is set within seconds.

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

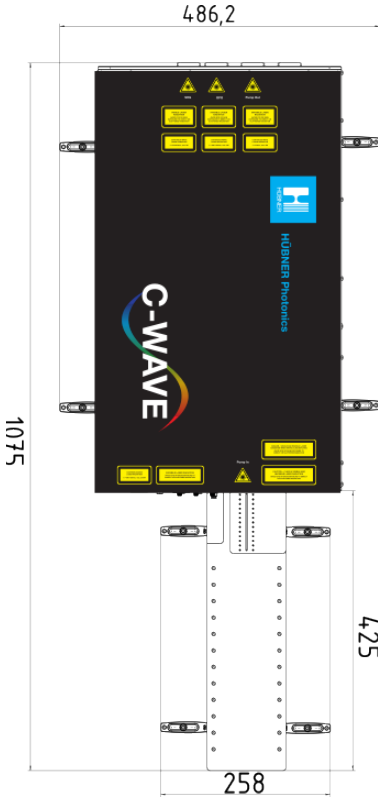


Web control interface for C-WAVE GTR, C-WAVE NIR, C-WAVE VIS HP, C-WAVE IR HP, C-WAVE BTS

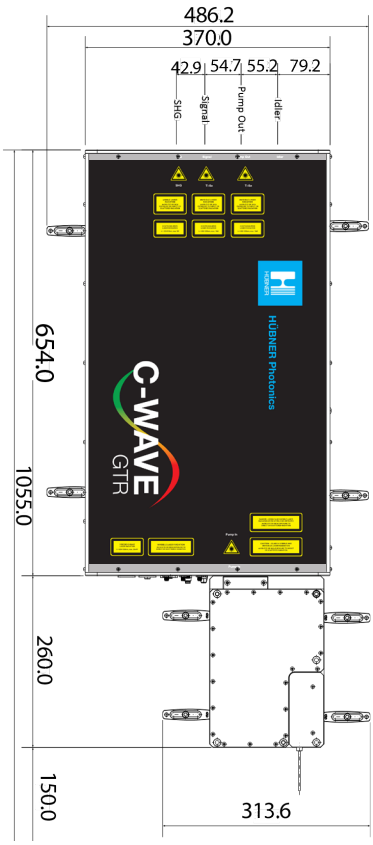
C-WAVE

Mechanical Specifications

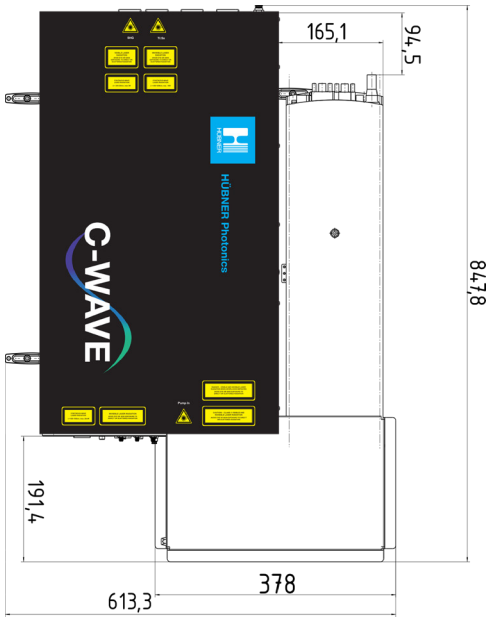
Top view C-WAVE VIS HP

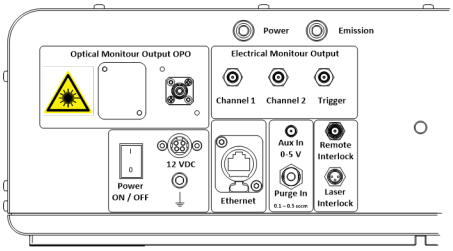


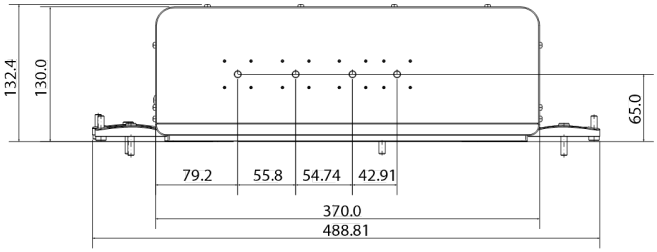
Top view C-WAVE GTR



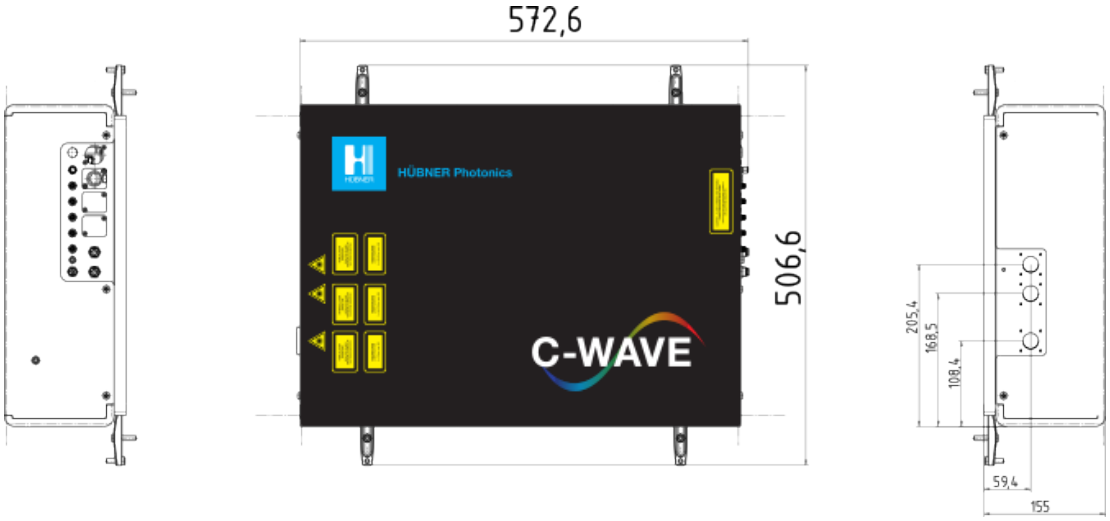
Top view C-WAVE BTS



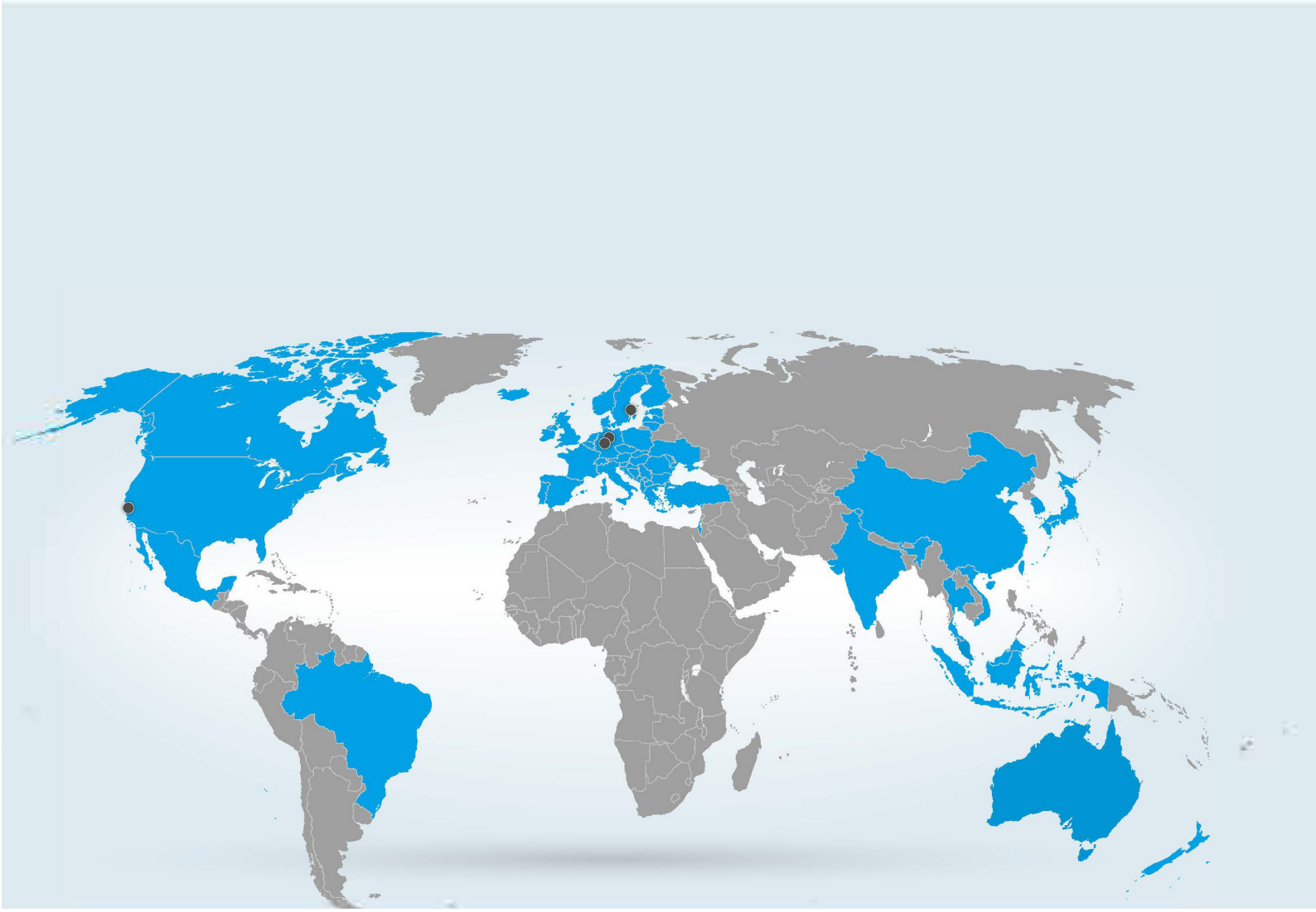




C-WAVE VIS LP



All dimensions are given in mm.



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