



# Scope of Performance

## On-Premise Licensing

**CadnaA** is available with On-Premise Licensing for purchase or with Cloud Licensing on subscription basis. In case of On-Premise Licensing (CadnaA PL), CadnaA is obtainable in three different main configurations: **Standard, Basic and Modular**. All three are fully featured and vary only in the number of noise types and number of implemented standards. The range of powerful features includes grid noise maps (horizontal, vertical), building noise maps, grid arithmetic, distributed calculation (PCSP), 64-bit program version, multithreading up to 16 logical cores (threads), GIS integration, web export, Dynamic-3D, plot designer and numerous import and export interfaces such as AutoCAD DXF, ArcView Shape, MapInfo, Open Street Map, ASCII, QSI, etc. Additionally, CadnaA CALC allows to outsource the calculation to external machines.

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The information presented in this document refers to **CadnaA 2024 MR1** (July 2024) and is subject to changes without notice.

Use of CadnaA is subject to the End-User License Agreement (“EULA”) of DataKustik GmbH. Cadna is a registered trademark of DataKustik GmbH.

# 1 CadnaA with On-Premise Licensing main configurations overview

## CadnaA Standard

- ✓ Noise types industry, road and railway
- ✓ All implemented calculation standards and guidelines for these noise types included

## CadnaA Basic

- ✓ Noise types industry, road and railway
- ✓ One calculation standard or guideline for each noise type included

## CadnaA Modular

- ✓ One noise type (industry, road or railway)
- ✓ One calculation standard for this noise type

# 2 CadnaA Options overview (available for all CadnaA PL main configurations)

## BMP (Bitmap and other interfaces)

- ✓ Bitmap handling (more than 40 different file formats).
- ✓ Google Maps interface.
- ✓ Connection with Web Mapping Services (WMS).
- ✓ Import and visualization of 3D symbols in the 3D special view.
- ✓ Export of results to Google Earth (.kmz).

## PRO (Extended Multithreading and additional tools which enhance efficiency)

- ✓ Multithreading up to 64 cores.
- ✓ Additional tools to speed up and facilitate your work like e.g: Migration assistant, Transfer attributes, Find errors in DTM, Thin out height points, Automatic closing of polygon points.

## BPL (Back-tracing of sound power levels)

- ✓ Manual or automatic optimization of noise emission.
- ✓ Calibration of area sources of which the sound power level is unknown.
- ✓ Automatic fixation of noise quota for urban development projects.

## X (Extended analysis and postprocessing features)

- ✓ Extended features for analysis and postprocessing, especially valuable for e.g. noise mapping: Object-scan, population density estimation, monetary evaluation, conflict maps.
- ✓ LUA scripting language for automation of CadnaA tasks and many more user-definable functionalities.
- ✓ Additional features: automatic closing of polygons, thin out height points.

Requires CadnaA Standard or CadnaA Basic

## L (Large scale projects)

- ✓ Calculation with unlimited number of screening objects (16 Mio. Buildings, 16 Mio. screens) for large scale projects.

Requires CadnaA Standard or CadnaA Basic

## SET (Sound Emission & Transmission)

- ✓ Calculation of frequency spectra of radiated sound power determined from the technical parameters of a sound source.
- ✓ Modeling of complex devices with multiple sound sources and radiating areas, reproducing their inner sound flux and transmission to connected parts.
- ✓ User-defined sound source models.

## FLG (Aircraft noise)

- ✓ Calculation of noise contours around airports.
- ✓ Calculation of evaluation parameters such as the number of exceedances or flight statistics.

Requires CadnaA Standard or CadnaA Basic

## FLG-Radar Tracks

- ✓ Aircraft noise calculation based on radar data.
- ✓ RADAR Import formats: Fanomos, Stanly, Topsonic, user-defined.
- ✓ Time period selection.
- ✓ Group classification according to ICAO-code.
- ✓ Automatic filtering of RADAR tracks.

Requires Option FLG

## APL (Air pollution)

- ✓ Calculation of air pollutants distribution for more than 50 pollutants.
- ✓ Exposure maps for air pollutants for industrial and road sources.
- ✓ Import of annual or multi-annual statistics of meteorological parameters.
- ✓ Standardized emission factors for road traffic.

### 3 Implemented standards and guidelines

Industrial noise	Road noise	Railway noise	Aircraft noise (Option FLG required)
ISO 9613-2 (1996) ISO 9613-2 (2024) CONCAWE VDI 2714, VDI 2720 DIN 18005 (1987) ÖAL Richtlinie Nr. 28 (1987) BS 5228 Nordic General Prediction Method (1996) Nord 2000 Ljud från vindkraftverk Harmonoise, P2P model NMPB08-Industry HJ2.4 (2009 & 2021) Schall 03 (2014) CNOSSOS 2015/996 EU CNOSSOS 2021/1226 EU	NMPB-Routes-96 RLS-90, VBUS RLS-19 DIN 18005 (1987) RVS 04.02.11 (2006) STL 86 SonRoad SonRoad 18 CRTN (1998) TemaNord 1996:525 Czech Method (1996) NMPB-Routes-08 TNM 2.5 (2004) HJ2.4 (2009 & 2021) CNOSSOS 2015/996 <sup>1</sup> CNOSSOS 2021/1226 EU CNOSSOS 2021/1226 DE (BUB 2021) CNOSSOS 2021/1226 AT (RVS 2021)	RMR, SRM II Schall 03 (1990), VBUSch Schall03 2014 DIN 18005 (1987) ONR 305011 Semibel NMPB-Fer CRN TemaNord 1996:524 FTA/FRA (2018) NMPB08-Fer HJ2.4 (2021) CNOSSOS 2015/996 <sup>1</sup> CNOSSOS 2021/1226 EU CNOSSOS 2021/1226 DE (BUB 2021) CNOSSOS 2021/1226 AT (RVE 2022) CNOSSOS 2021/1226 BE (Infrabel 2022) CNOSSOS 2021/1226 FR (SCNF 2022)	DIN 45684 AzB 2008 / ICAN ÖAL 24 ECAC Doc. 29 2 <sup>nd</sup> Edition 1997 ECAC Doc. 29 3 <sup>rd</sup> Edition ECAC Doc. 29 4 <sup>th</sup> Edition Integrated Noise Model (INM 7.0d) AzB 1975, AzB-MIL, LAI-Landeplatzlinie VBUF CNOSSOS 2015/996 EU & DE (BUF 2018) CNOSSOS 2021/1226 EU & DE (BUF 2021)
	<sup>1</sup> containing: CNOSSOS 2015/996 EU CNOSSOS 2015/996 DE (BUB 2018) CNOSSOS 2015/996 AT (RVS 2019)	<sup>1</sup> containing: CNOSSOS 2015/996 EU CNOSSOS 2015/996 DE (BUB 2018) CNOSSOS 2015/996 AT (RVE 2019) CNOSSOS 2015/996 FR (SCNF 2021)	

## 4 Technical Specifications of CadnaA with On-Premise Licensing main configurations

### 4.1 Calculation technology

Feature	Main configurations			Options								
	Modular	Basic	Standard	BMP	BPL	PRO	X	L	FLG	FLG-Radar Tracks	SET	APL
<b>64-Bit program version</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Multi-threaded calculation</b> using up to 16 logical cores (threads)* *if more than 16 logical cores are available, the first 16 logical cores will be used.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Multi-threaded calculation</b> with up to 64 logical cores (threads)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input checked="" type="checkbox"/>						
<b>Ray Tracing calculation method</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Angle Scanning calculation method</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Projection at line and area sources</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Maximum order of reflection</b>	20	20	20									
<b>Batch calculation</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>PCSP distributed calculation</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Maximum 2000 buildings and 2000 barriers per project</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Unlimited number (16 Mio.) of buildings and barriers per project</b>	x	<input type="checkbox"/>	<input type="checkbox"/>					<input checked="" type="checkbox"/>				
<b>DYNMAP</b> Update of calculated noise maps based on measurements	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Air Pollution</b> AUSTAL2000 Calculation Method	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									<input checked="" type="checkbox"/>

- included (in main configuration or Option)
- needed as pre-requisite (in case of multiple entries in the section "main configurations" only one of them is needed)
- x not available

## 4.2 Source object types

Feature	Main configurations			Options								
	Modular	Basic	Standard	BMP	BPL	PRO	X	L	FLG	FLG-Radar Tracks	SET	APL
<b>Point source</b> <b>Line source</b> <b>Area source (horizontal)</b> <b>Vertical area source</b> <b>Tennis point of serve</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Optimizable area source</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>							
<b>Sound power level input modes:</b> Direct PWL, PWL based on interior sources, PWL based on sound pressure level	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Sound power level based on moving machinery for line and area industrial sources</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Sound power level estimation based on transmission loss and interior level</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Estimation of sound power from the technical parameters of a sound source (32 modules)</b> Fans and Blades (5)   Diesel Motors (4)   Electric Motors (6)   Pumps (13)   Trafo (4)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Extended database of source modules based on technical parameters</b> (306 source modules included)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input checked="" type="checkbox"/>	
<b>User-defined sound source modules based on technical parameters</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input checked="" type="checkbox"/>	
<b>Calculation of sound power level</b> of complex interconnected source systems, accounting for Radiation and Transmission	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input checked="" type="checkbox"/>	
<b>Road source</b> <b>Traffic light-controlled road crossing</b> <b>Parking lot</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Railway source</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Airport</b> <b>Air route source</b>	x	<input type="checkbox"/>	<input type="checkbox"/>						<input checked="" type="checkbox"/>			
<b>RADAR track</b>	x	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input checked="" type="checkbox"/>		

- included (in main configuration or Option)
- needed as pre-requisite (in case of multiple entries in the section "main configurations" only one of them is needed)
- x not available

### 4.3 Further object types

Feature	Main configurations			Options								
	Modular	Basic	Standard	BMP	BPL	PRO	X	L	FLG	FLG-Radar Tracks	SET	APL
Receiver	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Building evaluation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Barrier												
Barrier with cantilever												
Barrier with curved cantilever (3D)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Floating barrier												
Roof edge (3D)												
Building	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Embankment	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Bridge plate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
3D-Reflector	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Area of ground absorption	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Foliage area	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Built—up area	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Cylinder	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Contour line	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Line of fault	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Height point	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Area of designated land use	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Bitmap Object	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
Section	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Text box	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Level box	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Auxiliary polygon	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Symbol	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
3D Symbol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
Station	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Calculation area (horizontal)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Vertical calculation area	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>CadnaB building</b> Sound source and obstacle object for the interoperability with CadnaB (requires CadnaB as additional separate software)	<input type="checkbox"/> Module Industry	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									

- included (in main configuration or Option)
- needed as pre-requisite (in case of multiple entries in the section “main configurations” only one of them is needed)
- x not available

## 4.4 Calculation results and postprocessing

Feature	Main configurations			Options								
	Modular	Basic	Standard	BMP	BPL	PRO	X	L	FLG	FLG-Radar Tracks	SET	APL
<b>Calculation at receiver points</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Partial levels at receiver points</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Calculation protocol for receiver points</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Building noise maps</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Horizontal grid calculations</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Vertical grid calculations</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Unlimited number of grid receivers</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Calculation of up to 4 evaluation parameters</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Arithmetic of grids</b> Up to 7 grid collections (4 eval. parameters and terrain)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Noise evaluation parameters</b> L <sub>day</sub>   L <sub>evening</sub>   L <sub>night</sub>   L <sub>dn</sub>   L <sub>de</sub>   L <sub>en</sub>   L <sub>den</sub>   L <sub>to</sub> (CRTN)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Calculation of the loudest hour level L<sub>1hMax</sub> for day, evening and night</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Calculation of L<sub>max</sub> for industrial sources</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>User defined noise evaluation parameters</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Partial noise-type related evaluation parameters</b> e.g. Industry Noise Map in projects with other types of noise sources (such as roads)	<input checked="" type="checkbox"/> Need 2 modules	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Multiple source effect Calculation</b> according to VDI3722, Miedema and EU Directive 2020/367	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Frequency maps</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Uncertainty maps</b> (combined uncertainty for source and propagation) SigmaD   SigmaE   SigmaN	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Calculation of terrain maps</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Automatic optimization of noise barriers</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Pass-by level calculation</b> time-based sound pressure levels based on passing sound sources like cars or trains.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Pass-by level based auralization</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Aircraft related noise evaluation parameters</b> DNL   CNEL   LAEQ   LAEQd   LAEQn   SEL   LAMAX   EPNL   PNLTM *relevant with INM/ECAC 3-/CNOSSOS Standards	x	<input type="checkbox"/>	<input type="checkbox"/>						<input checked="" type="checkbox"/>			
<b>Calculation of wake-up reactions during night period</b>	x	<input type="checkbox"/>	<input type="checkbox"/>						<input checked="" type="checkbox"/>			
<b>Number of Aircraft Events Above Threshold</b> NATd   NATe   NATn   SigmaNATd   SigmaNATe   SigmaNATn	x	<input type="checkbox"/>	<input type="checkbox"/>						<input checked="" type="checkbox"/>			
<b>Evaluation of maximum Level statistics</b> FlgStatD   FlgStatE   FlgStatN   SigFlgStatD   SigFlgStatE   SigFlgStatN	x	<input type="checkbox"/>	<input type="checkbox"/>						<input checked="" type="checkbox"/>			
<b>Automatic generation of noise protection zones</b>	x	<input type="checkbox"/>	<input type="checkbox"/>						<input checked="" type="checkbox"/>			
<b>Automatic generation of conflict maps</b>	x	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>					

- included (in main configuration or Option)
- needed as pre-requisite (in case of multiple entries in the section "main configurations" only one of them is needed)
- x not available

Feature	Main configurations			Options								
	Modular	Basic	Standard	BMP	BPL	PRO	X	L	FLG	FLG-Radar Tracks	SET	APL
<b>Estimation of the population density</b>	x	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>					
<b>Monetary evaluation according to BUWAL method</b> Evaluation of noise reduction measures with regards to the reduction in value of rented flats caused by high noise levels	x	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>					
<b>Noise impact evaluation by single number ratings</b>	x	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>					
<b>Object Scan</b> Statistical Evaluation of object attributes or calculated values by using expressions. Includes predefined settings for EU-Directives 2015/996, 2020/367 and 2021/1226 as well as BEB 2021	x	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>					
<b>3D animated noise maps</b> Noise map video captured from the 3D view for moving sources	x	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>					
<b>Air pollution maps for different components:</b> Benzene, F, NH3, NO, NO2, NOx, SO2, Tetrachlorethylen, As, Cd, Hg, Ni, Pb, Tl, PM10 (fine particles), and odor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									<input checked="" type="checkbox"/>

- included (in main configuration or Option)
- needed as pre-requisite (in case of multiple entries in the section "main configurations" only one of them is needed)
- x not available



## 4.5 Import formats

Feature	Main configurations			Options								
	Modular	Basic	Standard	BMP	BPL	PRO	X	L	FLG	FLG-Radar Tracks	SET	APL
<b>AutoCAD (.dxf)</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Trimble SketchUp</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>GIS formats</b> ESRI Shape files (.shp)   Atlas GIS (.bna)   GYpSiNOISE   MapInfo (.mif)   AED-Sicad	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>ASCII formats</b> ASCII-Objects   ASCII-Grid DTM (.asc)   ASCII-Spectra   Building Height Points   Winput-DGM   Numbers of Trains (.txt)   Height points (.xyz)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>XML formats</b> Open Street Map (.osm)   GML   CityGML   NMPB08-Trains (.xml)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Other formats</b> EDBS   T-Mobil   Slip   SOSI   NTF   STRATIS (.cst)   Noise Mapping England (.nme)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>QSI Interchange format according to DIN 45687</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Other CAD formats</b> AutoCAD (.dwg)   Microstation (.dgn)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<b>Google Maps interface</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<b>Import from Web Mapping Services (WMS)</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<b>Bitmap formats</b> CALs Raster, DCX, DWF, ECW, IMG, GIF, ICA, JFIF, JPEG, JTIF, LEAD, CMP, PCT, MAC, MSP, MPT, OS/2 Bitmap, PCD, PCX, PSD, PNG, PostScript Raster, RAS, TIFF, TIFF CCITT, LZW, TARGA, BMP, WMF), WinFax Group 3, WinFax Group 4, WPG WordPerfect raster files	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<b>Raster formats</b> CadnaA Grids (.cnr)   ESRI-ASCII Grids (.asc, .hdr)   ASCII-Grids (.rst)   LimA Grids (.ert)   SoundPLAN Grids   IMMI Grids (.ird)   AUSTAL Grids (.dmna)   Miskam Grids (.zwk)   NMGF Grids (.grd)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Aircraft INM import formats</b> ANP Database   INM Study   INM Operations <i>*Only with INM Calculation Standard</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						<input checked="" type="checkbox"/>			
<b>Import of RADAR tracks</b> FANOMOS   STANLY   Topsonic   User-Defined	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<b>Import from MS Excel files</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>ODBC— interface</b> Import of external databases of object's attributes and libraries (i.e. Sound Power Levels, Absorptions, Noise Reduction Indices, directivities and measurements from sound analyzers.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Import of directivities of loudspeakers in CLF format (*.CF1, *.CF2 and *.XHN)</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Import of annual or multi-annual statistics of meteorological parameters</b> (.akt, .akterm)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									<input checked="" type="checkbox"/>

- included (in main configuration or Option)
- needed as pre-requisite (in case of multiple entries in the section "main configurations" only one of them is needed)
- x not available

## 4.6 Modelling tools and project organization

Feature	Main configurations			Options								
	Modular	Basic	Standard	BMP	BPL	PRO	X	L	FLG	FLG-Radar Tracks	SET	APL
<b>Actions applied to single objects</b> Edit, Delete, Import here, Show on Google Maps, Zoom to Object, Copy Attributes, Duplicate, Force Rectangle, Orthogonalize, Convert to, Transformation, Generate Label, Parallel Object, Break Lines, Break Areas, Simplify Geo, Spline, Modify Order of Points, Change ObjectTree assignment, Break into Pieces, Connect Lines, Fit DTM to Object, Fit Object to DTM, Hyperlink, Generate Station, Edit Facades, Generate Radiating Building, Set Length, Generate Rails, Cross Section, Generate Floors, Snap Object to Façade	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Actions applied to multiple objects</b> (“modify objects” command) Delete, Modify Attributes, Copy Attributes, Duplicate, Force Rectangle, Orthogonalize, Object Snap, Modify order of Points, Spline, Simplify Geo, Break into Pieces, Connect Lines, Transformation, Convert to, Generate Rails, Generate Station, Generate Building Evaluation, Multiselect, Change ObjectTree assignment, Generate Label, Generate Floors, Parallel Object, Activation, Swap Name/ID, Delete Duplicates, Fit DTM to Object, Fit Object to DTM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Object Tree</b> Project Organization in hierarchical structure	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Up to 16 variants/scenarios per CadnaA project file</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Assignment of groups to variants.</b> Including copy group activation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>User-defined Global and Local libraries</b> Sound Levels (Sound Power Levels and Sound Pressure Levels), Absorptions, Sound Reduction Indices, Directivities, 2D & 3D Symbols, Diurnal Patterns, Road Surfaces, Road Types and Vehicle Classes, Parking Lot Movements, Train Classes, Color Palettes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Default Library</b> Always includes latest datasets for many of the above-mentioned libraries including e.g. Road and Railway related Datasets for many national implementations of EU Directives 2015/996 and 2021/1226.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Library Manager</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Lua scripting</b> e.g. for task automation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>					
<b>Additional action for multiple objects</b> (“modify objects” command) Lua command	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>					
<b>Automatic closing of auxiliary polygons</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
<b>Thin out height points</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
<b>Find errors in DTM</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input checked="" type="checkbox"/>						
<b>Transfer attributes</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input checked="" type="checkbox"/>						
<b>Migration assistant RLS90-&gt;RLS19</b> data conversion for existing project file when switching calculation standard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input checked="" type="checkbox"/>						
<b>Automatic filtering of RADAR—tracks</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input checked="" type="checkbox"/>		

- included (in main configuration or Option)
- needed as pre-requisite (in case of multiple entries in the section “main configurations” only one of them is needed)
- not available

## 4.7 Presentation of results and 3D visualization

Feature	Main configurations			Options								
	Modular	Basic	Standard	BMP	BPL	PRO	X	L	FLG	FLG-Radar Tracks	SET	APL
<b>Display of calculated rays</b> in 2D view	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>2D Horizontal noise maps</b> Iso dB-Lines, noise contours, Raster Oversampling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>2D Vertical noise maps</b> Iso dB-Lines, noise contours, Raster Oversampling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Building noise maps</b> in 2D view Ribbons, Spheres, Octagons, Level boxes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Pass-by level graph</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Pass-by level based auralization</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>2D animated noise maps</b> for line moving sources	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>PlotDesigner</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>User defined table of results</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Open-GL based 3D visualization</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Selection and editing of objects</b> in the 3D view	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Recalculation of DTM and objects</b> directly in 3D view	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Free movement and save up to 10 predefined views</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Appearance of objects in 3D depending on attributes</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Display of calculated rays</b> in the 3D view	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Display of 3D directivities</b> in the 3D view	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Display of horizontal noise maps</b> in 3D view Projected or at the real height	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Display of vertical noise maps</b> in 3D view	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Noise map of buildings</b> Color map, Spheres, Octagons, Level boxes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Display of text labels</b> in 3D view	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Display of ground maps</b> in 3D view	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Import and visualization of 3D symbols</b> (* .obj format)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<b>Animation of 3D symbols</b> (rotation)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<b>Stereoscopic 3D display with passive 3D glasses</b> *Compatible 3D TV required	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Interactive scene video recording (.avi)</b> from 3D view	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Display of light sources</b> (street lights)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Import of skybox ambient images</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<b>Import of facade images to the buildings</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<b>Projection of background images</b> i.e. Google Maps or aerial imagery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								

- included (in main configuration or Option)
- needed as pre-requisite (in case of multiple entries in the section "main configurations" only one of them is needed)
- x not available

## 4.8 Export formats

Feature	Main configurations			Options								
	Modular	Basic	Standard	BMP	BPL	PRO	X	L	FLG	FLG-Radar Tracks	SET	APL
<b>AutoCAD— DXF</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>GIS formats</b> ESRI /ArcInfo (.shp)   ArcView Grid (.asc, .hdr)   GYpSiNOISE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>ASCII formats</b> Text Files (.txt)   Building Height Points   Numbers of Trains (.txt)   Rich Text Format (.rtf)   Compact Protocol	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Export of full reports to Ms Office</b> Ms Word (.docx)   Ms Excel (.xlsx)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>QSI Interchange Format According to DIN 45687</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Google SketchUp Materials (.skm)</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>Bitmap Files (.bmp)</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<b>Google Earth (.kml)</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<b>Web Bitmaps</b> PNG files at different magnification levels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>								
<b>AzB related export formats</b> AzB-QSI, AzB-DES, AzB-XML, AzB-Lmax, AzB-Segment, AzB-Zones	x	<input type="checkbox"/>	<input type="checkbox"/>						<input checked="" type="checkbox"/>			
<b>SET-T Graph (.gv)</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input checked="" type="checkbox"/>	
<b>Grid formats</b> CadnaA Grids (.cnr)   ASCII-Grids (.rst)   LimA Grids (.ert)   NMGF Grids (.grd)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
<b>QSI Statistical Analysis report DIN 45687</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									

- included (in main configuration or Option)
- needed as pre-requisite (in case of multiple entries in the section “main configurations” only one of them is needed)
- x not available

## 5 Technical Specifications of CadnaA CALC with On-Premise Licensing

CadnaA CALC allows to outsource the calculation to external machines. With CadnaA CALC, CadnaA can be executed exclusively in the in the so-called "Batch-Mode" which comes with a limited set of features exclusively for calculations. With CadnaA CALC it is possible to:

- automatically open CadnaA files which have previously been created with CadnaA Standard/Basic/Modular (or a CadnaA CL Light/Professional product with Cloud Licensing) and stored in a definable working directory,
- Automatically perform calculations of the opened files,
- Automatically save the files after the calculation.

The following calculations can be performed with CadnaA CALC:

- Calculation at receiver points (for the current variant or all variants)
- Calculation at grid receiver points (horizontal and vertical, for the current variant or all variants)

Which of the above listed calculations are to be executed is defined during the preparation of the CadnaA file (using CadnaA Standard/Basic/Modular or a CadnaA CL Light/Professional product with Cloud Licensing).

Regarding the noise types and calculation standards and guidelines, CadnaA CALC can calculate any file you were able to create with your CadnaA Standard/Basic/Modular main configuration or Cadna CL Light/Professional product. Which standard or guideline is used for the calculation is defined during the preparation of the CadnaA file (using CadnaA Standard/Basic/Modular or a CadnaA CL Light/Professional product with Cloud Licensing) and can not be changed during the use of CadnaA CALC.

The features of Option L are implicitly included in CadnaA CALC, therefore projects with up to 16 Mio. buildings and 16 Mio. barriers can be calculated.

Creating or editing projects, im- or exporting data, post-processing etc. are not possible with CadnaA CALC.

With CadnaA CALC, CadnaA can be opened in Batch-Mode at five machines in the same local network simultaneously to perform calculations as described above.

## 6 System requirements

CadnaA can be installed on any system which fulfils the following requirements:

- Multi-core processor from Intel (Core i series, 6th generation, „Skylake“ architecture or newer) or from AMD (Ryzen series, starting from the 1<sup>st</sup> generation, „Zen“ architecture or newer) with at least 4 cores, instruction set extensions SSE 4.2 and AVX as well as 64-bit extensions (Intel 64 or AMD64)
- 8 GB RAM
- OpenGL 3.3 graphics card with minimum 1 GB real graphic memory to use the hardware accelerated 3D-view. Using processor graphics or graphics card with no dedicated graphics memory ("shared memory") may result in display errors. When using CadnaA CALC or CadnaA in Batch-Mode, this requirement does not apply.
- Windows 64-bit operating system
  - Microsoft Windows 10 (Version 22H2)
  - Microsoft Windows 11 (Version 22H2 or newer)