



URBAN VISUALISATION  
& MANAGEMENT GMBH

UVM  
SYSTEMS

City**GRID**<sup>®</sup>  
2026

City  
MANUAL  
**Orientation**

GRID<sup>®</sup>

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# 1. Introduction

With the orientation tool of City**GRID**, orientation parameters from known protocols (INPHO PRJ and ContextCapture Blocks Exchange) can be converted into a City**GRID** xml and thus prepared for further use in the City**GRID** system. (Automatic texturing, shaper)

User-defined orientation files can also be converted into a City**GRID** xml with appropriate preparation and an existing calibration protocol.

Depending on the protocol used, the orientation tool consists of three sections.

## 2. Camera definition:

In the **Camera definition** section, you can select a camera system from a drop-down list and navigate to a corresponding orientation file in order to read it in. On the other hand, the orientation parameters can be entered manually using the **Add new Camera** button and then edited accordingly (with the help of a calibration protocol). If there are existing camera definitions in the form of a JSON file, these can be used by clicking the **Load cameras** button. Edited camera definitions can be saved as JSON files by clicking the **Save camera** button.

Camera definition

Protocol: User defined

Source: Read from file

Number of Cameras: 1

Average terrain height (m): 0

Camera calibration parameters:

Camera name	Calibration date	Focal length [mm]	PPX [mm]	PPY [mm]	Dim X [Px]	Dim Y [Px]	Pixel size [mm]	Image rotation [°]	K1	K2	K3	K4
NewCamera	12.03.2026	0	0	0	0	0	0	0	0	0	0	0

### Userdefined protocols:

New cameras can either be imported via a CityGRID xml file or added manually. All columns can be edited.

Camera definition

Protocol: Inpho

Source: Read from file

Number of Cameras: 6

Average terrain height (m): 125

Camera calibration parameters:

Camera name	Calibration date	Focal length [mm]	PPX [mm]	PPY [mm]	Dim X [Px]	Dim Y [Px]	Pixel size [mm]	Image rotation [°]	K1	K2	K3	K4
Nadir	17/03/2017	89.0992	0	0	28412	11474	0.004600000000	90	0	0	0	0
110_left	31/03/2017	88.9885	0.095099940	-0.07029996	11608	8708	0.004600000000	0	calculated	calculated	calculated	calculated
111_right	31/03/2017	89.0856	-0.04700004	-0.00649979	11608	8708	0.004600000000	180	calculated	calculated	calculated	calculated
116_back	31/03/2017	89.1024	0.093899800	-0.10539980	11608	8708	0.004600000000	-90	calculated	calculated	calculated	calculated
119_front	07/04/2017	89.056	0.142000160	-0.04000022	11608	8708	0.004600000000	90	calculated	calculated	calculated	calculated
UrbanMapper_	31/03/2017	89.0992	0	0	28412	11474	0.004600000000	90	0	0	0	0

### Camera definition of an Inpho PRJ file:

No new cameras can be added to Inpho PRJ or ContextCapture Blocks Exchange protocols. Exclude individual cameras with **Delete camera** or **delete all cameras** to load a new file.

### 3. Internal orientation

When reading Inpho PRJ or ContextCapture Blocks Exchange protocols, the following values are filled in automatically. If they are entered manually, they must be specified (e.g. using a camera calibration protocol).

*Focal Length*: focal length in mm.

*PPX/PPY*: Coordinates of the principal point in mm.

*Dim X/Dim Y*: Width/height of the camera images in pixels.

*Pixel size*: Size of a pixel in mm.

*Image rotation*: In practice, it can happen that all images from a particular camera have been rotated again after the image orientation has been calculated (using aerotriangulation). For example, if the sky is at the bottom of an orientated oblique image and the image is then rotated by 180° so that the viewer can see the sky at the top. This image rotation after the calculated image orientation can be considered here using the values +90°, -90° and 180°.



Note: In the case of such a subsequent image rotation, the dimensions of the rotated image must be specified in Dim X/ Dim Y!

#### Lens distortion

With Inpho PRJ or ContextCapture Blocks Exchange protocols, the lens distortion of the respective camera is also converted to CityGRID. In CityGRID, however, only the radial distortion parameters are taken into account, as this is sufficiently accurate for texturing.

Distortion parameters are normalised:

If the camera parameters are entered manually, the radial distortion parameters K1, K2, K3 and K4 can also be entered. It should be noted that in some calibration protocols, these parameters refer to normalised image coordinates (i.e. image coordinates divided by the focal length). In this case, the values K1, K2, K3 and K4 are approximately of the same dimension and the checkbox "**Distortion parameters are normalised**" must be activated.

Non-normalised distortion parameters can be recognised, for example, by the fact that K3 and K4 are much smaller than K1.



Example: radial distortion parameters.

<i>Non normalised</i>	<i>Normalised</i>
-0,0035038536389707	-0,281789608467331
-0,000022388130811	0,122598296943032
0,0000001156937507	-0,0335000573225105

Multiply the distortion values by -1:

With INPHO PRJ protocols, it can sometimes happen that the sign of the distortion has to be swapped.

Average terrain height (m):

An *approximate* average terrain height of the processing area must be specified for each type of image orientation in order to calculate the image footprint correctly.

## 4. External orientation:

### 4.1. Inpho/ContextCapture

In the Case of a **Inpho** oder **ContextCapture** orientation protocol this page is only used for an overview, as both the internal and external orientation are part of the protocol. A preview of the first 20 entries in the input file is displayed here.



*Note: If irregularities are detected, the dialogue must be aborted, and the orientation file processed with external systems!*

Image Orientation Tool

External Orientation

User defined settings

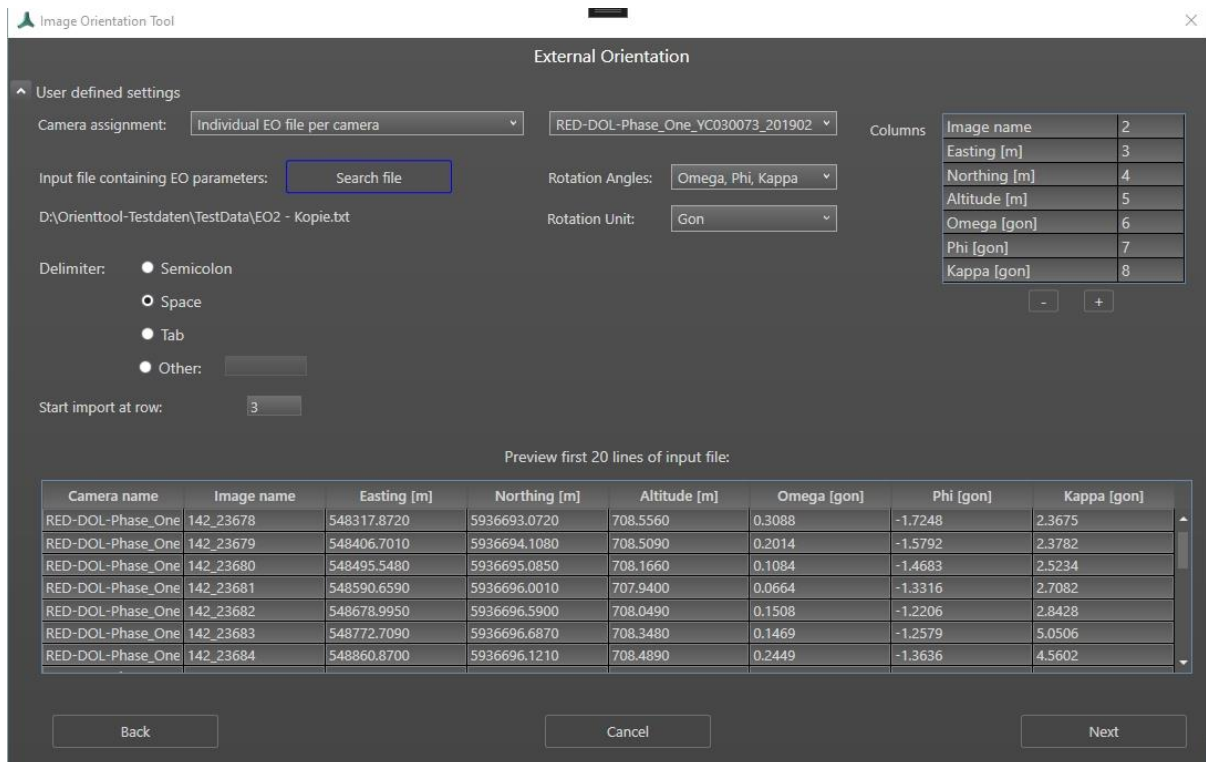
Preview first 20 lines of input file:

Camera name	Image name	Easting [m]	Northing [m]	Altitude [m]	Omega [deg]	Phi [deg]	Kappa [deg]
Nadir	001_001_NAD000814	528202.24790	5674292.59470	2107.63630	-0.041966464940844	0.0167096608734931	-0.135649242669374
Nadir	001_002_NAD000815	528631.30373	5674285.97841	2108.63076	-0.125944570427882	0.0260268411878875	-0.083335905316266
Nadir	001_003_NAD000816	529060.19164	5674283.40525	2110.29145	0.0987920335090707	0.0639827537309087	-0.045829699875893
Nadir	001_004_NAD000817	529489.13454	5674280.54348	2107.63723	-0.004762531674679	0.0053171307950727	-0.122448411472106
Nadir	001_005_NAD000818	529918.06080	5674274.20861	2107.01311	-0.149595142651178	0.0077411436986269	-0.072981101910093
Nadir	001_006_NAD000819	530347.04560	5674275.96950	2109.11854	0.0369897577935213	0.0384229505405498	0.0082953137292190
Nadir	001_007_NAD000820	530775.95998	5674288.69642	2107.91573	0.0551220013549731	0.0362477309927715	-0.094614566855030
Nadir	001_008_NAD000821	531204.74875	5674296.53304	2103.16089	-0.016340381374240	-0.005136150157205	-0.098399709290993
Nadir	001_009_NAD000822	531633.72865	5674296.22498	2102.53201	-0.013013290914100	0.0507276482449831	-0.092127895996850
Nadir	001_010_NAD000823	532062.59567	5674288.82828	2102.43554	-0.012186806967973	0.018670091238903	-0.094412043589902
Nadir	001_011_NAD000824	532491.55647	5674277.21238	2104.28312	-0.016809093721303	0.0224421546575222	-0.101536052837896
Nadir	001_012_NAD000825	532920.55708	5674269.89937	2106.56792	0.0088611372170646	-0.003522203158428	0.0228032038541736
Nadir	001_013_NAD000826	533349.35409	5674269.62778	2107.47250	0.0038196855540259	-0.014916559247686	0.0406574510677553
Nadir	001_014_NAD000827	533778.19526	5674274.36607	2106.11798	0.0328549925521692	0.0249408207792175	0.0552284602742871
Nadir	001_015_NAD000828	534207.19677	5674280.24506	2102.92317	-0.023581002428142	0.0095130291647335	0.092604367577676
Nadir	001_016_NAD000829	534636.14152	5674281.15589	2099.77443	-0.007342635621748	0.0101804720073252	0.0289485693827905
Nadir	001_017_NAD000830	535064.99194	5674279.31754	2100.21161	0.0111158248541575	0.0072731700448994	0.0330475073381952
Nadir	001_018_NAD000831	535493.68227	5674275.59563	2099.60731	0.012128002868102	-0.002221313598303	0.110892522232015
Nadir	001_019_NAD000832	535922.66051	5674269.98223	2100.23095	-0.031122497129012	-0.002763493705476	0.0953120822482317
Nadir	001_020_NAD000833	536351.59033	5674265.51287	2104.94518	-0.027017530083226	0.0154906575928189	0.0919519249294946

Back Cancel Next

### 4.2. Userdefined cameras

If cameras have been defined manually, the external orientation must be read in via a text file. The formatting of this file can be edited using additional parameters.



**EO- Configuration of a user defined camera.**

**Camera assignment:** defines whether (with more than one camera) one EO file per camera should be used or one file with several cameras. In the latter case, the camera name is extracted from the label in the EO file.

**Input file:** A .txt file with EO parameters must be selected using the Search file button. The first 20 lines of the file are displayed below in a preview.

**Rotation angle:** defines the angle system in the EO file. It must be known which angle type and which rotation sequence the rotation angles refer to.

**Rotation unit:** Deg, Gon, Rad

**Delimiter:** defines the delimiter used in the EO file.

**Start import at row:** defines the line from which the values are imported.

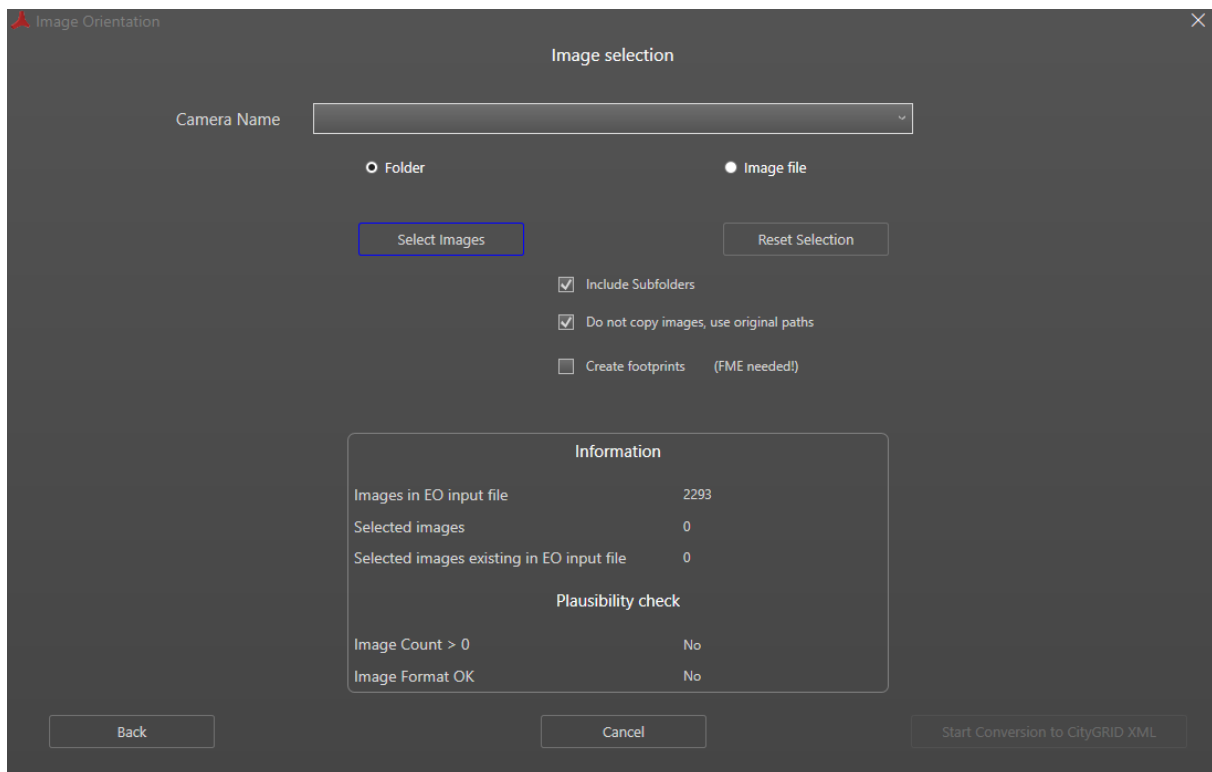
With + - below the column table, you can define which column is assigned to which values. The changes to these column definitions are immediately displayed in the preview of the EO file.

* Bild	Dateiname	Rechts	Hoch	Höhe	Omega [gon]	Phi [gon]	Kappa [gon]	Kappa [gon]
142_23_678	142_23678.tif	548317.8720	5936693.0720	708.5560	0.3088	-1.7248	2.3675	223
142_23_679	142_23679.tif	548406.7010	5936694.1080	708.5090	0.2014	-1.5792	2.3782	2323
142_23680	142_23680.tif	548495.5480	5936695.0850	708.1660	0.1084	-1.4683	2.5234	2323
142_23681	142_23681.tif	548590.6590	5936696.0010	707.9400	0.0664	-1.3316	2.7082	2323
142_23682	142_23682.tif	548678.9950	5936696.5900	708.0490	0.1508	-1.2206	2.8428	2332
142_23683	142_23683.tif	548772.7090	5936696.6870	708.3480	0.1469	-1.2579	5.0506	2323
142_23684	142_23684.tif	548860.8700	5936696.1210	708.4890	0.2449	-1.3636	4.5602	
142_23685	142_23685.tif	548949.4020	5936694.9480	708.7480	0.3108	-1.3741	4.1292	
142_23686	142_23686.tif	549046.3780	5936693.0080	708.1180	0.3304	-1.2947	3.5557	
142_23687	142_23687.tif	549133.3790	5936690.8720	708.1460	0.2878	-1.2424	3.0085	
142_23688	142_23688.tif	549227.4320	5936688.8880	708.2970	0.0708	-1.4339	2.9410	
142_23689	142_23689.tif	549315.7790	5936686.8640	708.3130	0.0048	-1.3877	3.0160	
142_23690	142_23690.tif	549404.0310	5936684.5530	708.1820	0.0943	-1.3058	3.1214	
142_23691	142_23691.tif	549492.2450	5936682.4280	708.4580	-0.1311	-1.2019	2.7061	
142_23692	142_23692.tif	549586.9230	5936680.5390	707.6060	-0.3293	-1.1093	2.1959	
142_23693	142_23693.tif	549674.9560	5936679.6910	706.4470	-0.4983	-1.1700	1.9041	
142_23694	142_23694.tif	549768.1850	5936679.7050	706.4670	-0.7296	-1.1883	2.0044	
142_23695	142_23695.tif	549855.3970	5936680.1850	706.6140	-0.9600	-1.2373	2.0062	

**Input file for the above configuration.**

## 5. Image selection

In the last step, the images are selected via a folder or file selection.



Select images button is used to specify either a directory or one or more image files.

Include subdirectories: If this checkbox is set, all directories within the specified folder are searched for images.

Use original path: If this checkbox is set, the absolute path to the original images is written to the orientation xml file. Otherwise, a relative path is written to the CityGRID images directory.

Create footprints: If an FME installation can be found on the system, this function can be used to create image footprints as shp files.

A summary of the image selection and a plausibility check are displayed in the information window.

The plausibility check queries whether there are images with a valid image format in the specified directory.

The Start conversion to CityGRID XML button opens a File Browser dialogue that allows you to enter a storage location and file name for the orientation XML file. Pressing the Save button starts the conversion process.

## 6. Error handling

The software CityGRID® is developed, tested, and maintained by UVM Systems with the ambition to be error-free. Nevertheless, we cannot exclude the possibility that errors may occur during processing.

If the error in the orientation tool is reproducible, please provide a detailed description of the error:

Please send error reports to [support@uvmsystems.com](mailto:support@uvmsystems.com)

## 7. Contact



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