URBAN VISUALISATION & MANAGEMENT GMBH

UVM SYSTEMS

CityGRID® 2024

MANUAL

Image Orientation

Copyright © 2001 - 2024
UVM Systems GmbH

Contents

Aufnahme: Prague, Leonhard Niederwimmer, Pixabay

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.

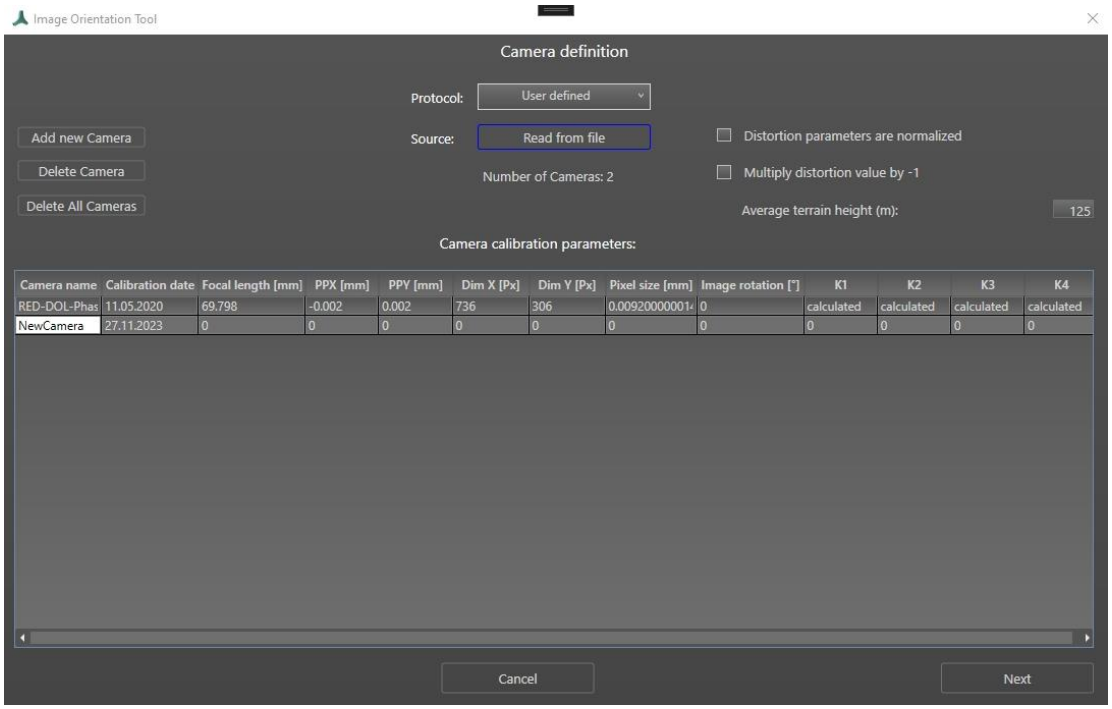
Depending on the protocol used, the orientation tool consists of three sections.

Note:

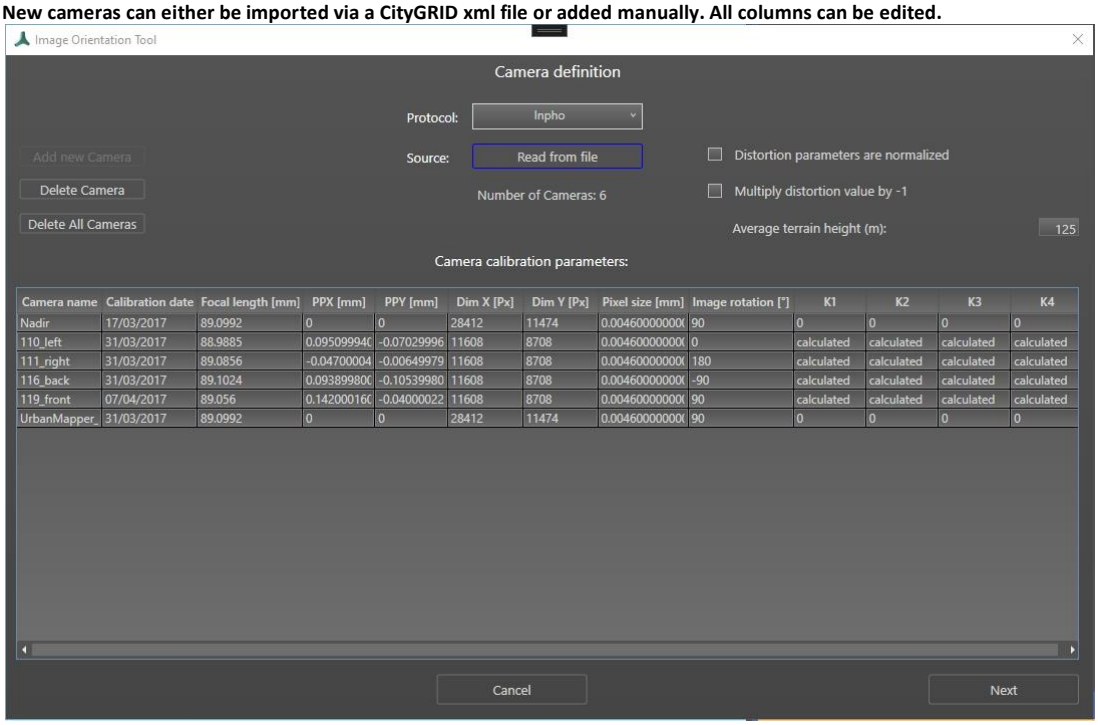
*The orientation tool is currently accessible via the City**GRID** Shaper menu bar under* **Edit > Image Orientation Tool**.

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).



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



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 City**GRID**. In City**GRID**, 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*.

Non normalised	*Normalised*
-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):`

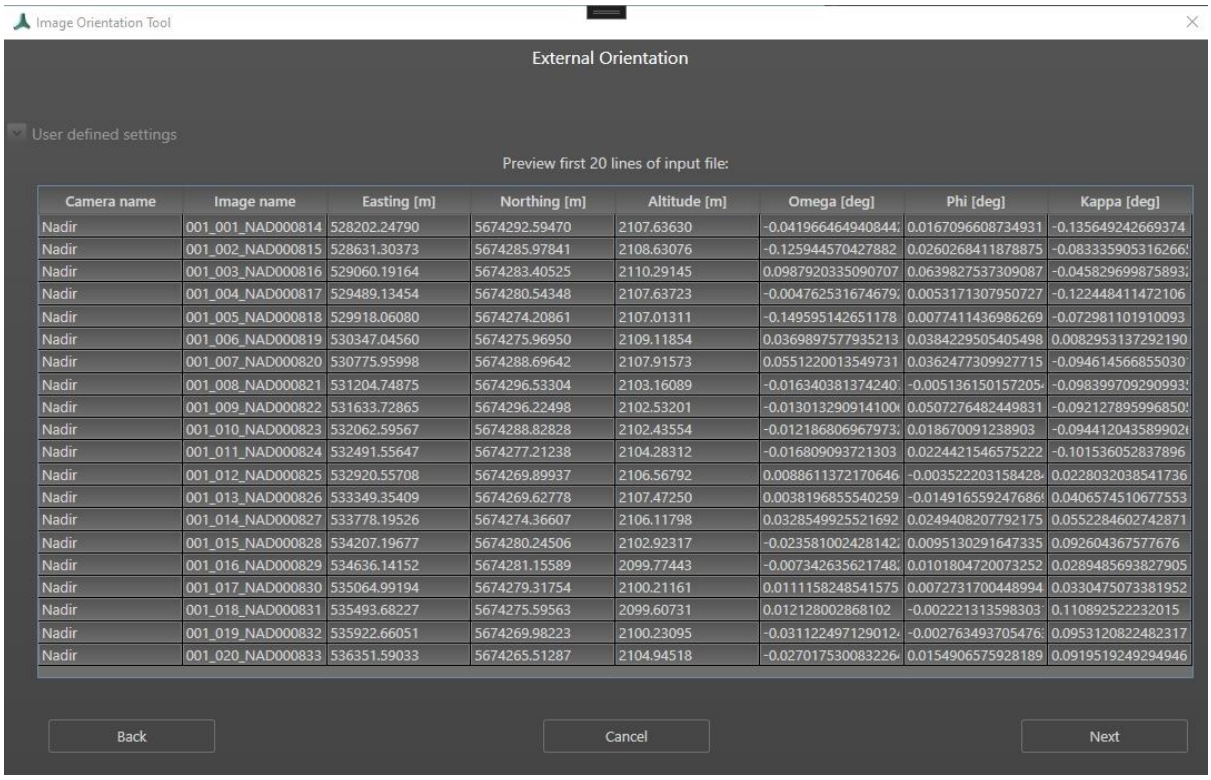
An *approximate* average terrain height of the processing area must be specified for each type of image orientation in order to calculate the image footprint correctly.

4. External orientation:

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.

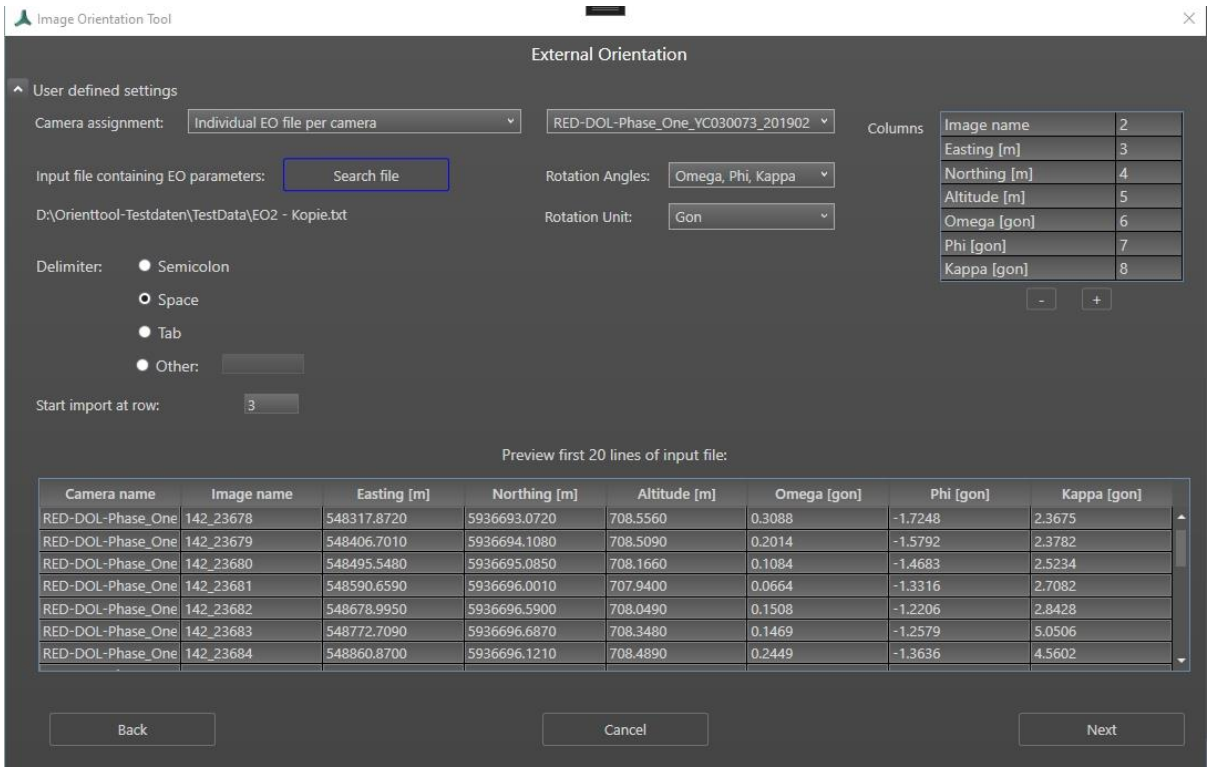
Note: If irregularities are detected, the dialogue must be aborted, and the orientation file processed with external systems!



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	0.00829531372921900
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

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.

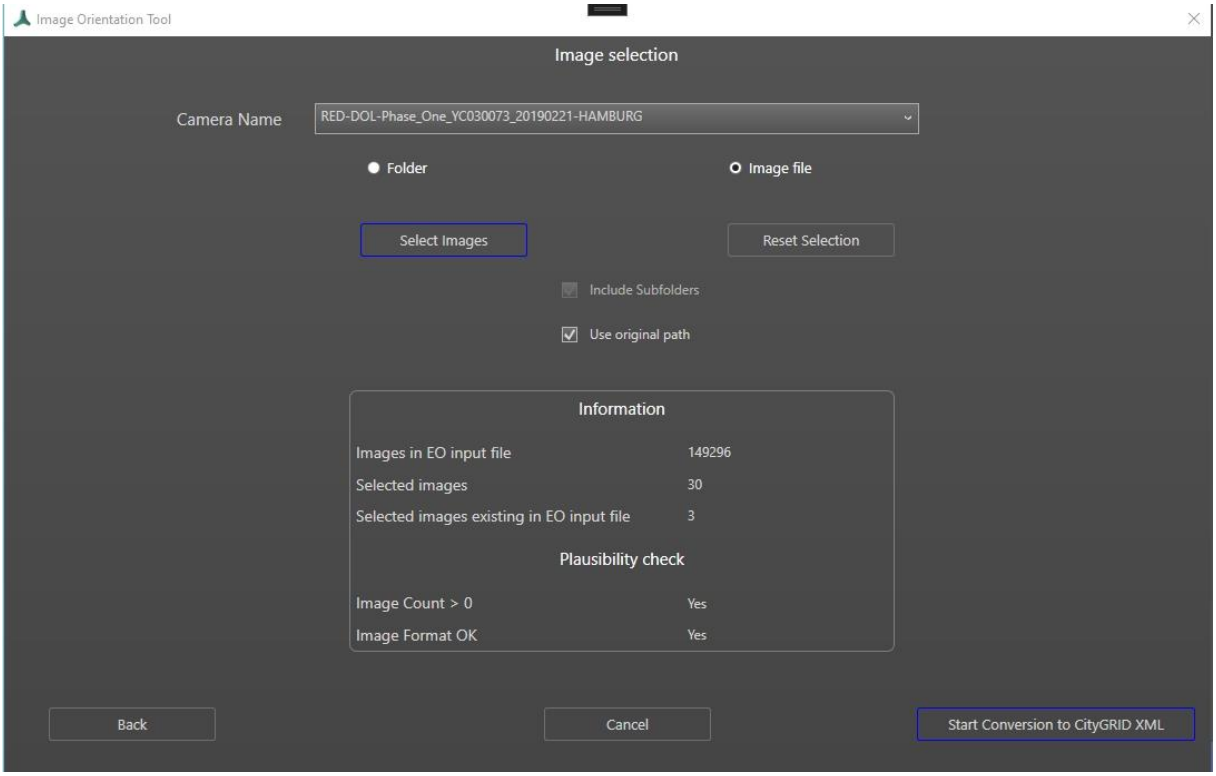
With *+ -* below the *column table*, you can define which column is assigned to which values. The changes to these column definitions are immediately displayed in the preview of the EO file.

```
* 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 City**GRID** images directory.

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 City**GRID®** 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@uvmsystenms.com

7. Contact

www.citygrid.at

www.uvmsystems.com