

Frequently Asked Questions (FAQs) about the software 3DVEM – Register GEO (Updated in April 2015)

Summary of possibilities with the software 3DVEM – Register GEO:

Module	Transformation Parameters	Input data
3DVEM – Register	Rotation and Translation	Multiple files of local coordinates. Automatic and manual solution
3DVEM – GEO	Rotation, Translation and Scale	Files of local and global coordinates XYZ or UTM. Position, distance and rotation in interactive mode
3DVEM – Register GEO	Rotation, Translation and Scale	Multiple files of local and global coordinates XYZ or UTM. Position, distance and rotation in interactive mode

Which case studies can be solved with 3DVEM – GEO that cannot be solved with 3DVEM – Register?

- o 1. 3D point clouds coming from different stations (laser scanner). 2. UTM georeferencing to the centroid of a working area with a GNSS navigator. 3. Orientation from compass. 4. Levelling with the dual axis compensator of the laser equipment.
- o 1. 3D point cloud of an object (e. g. tower, castle, factory...) obtained from photogrammetric processes and/or automatic computer vision algorithms from images, without control points. 2. Measurement of one or more distances. 3. Facing of the front of the object. 4. Levelling with one of the object corners.
- o 1. Basis of a transverse and radiation measurements with total station. 2. Complementary data acquired with differential GNSS.
- o 1. Large extension LiDAR point cloud. 2. Several partial 3D point clouds acquired with a robotic total station. 3. Additional data captured with GNSS-RTK for line (vector) mapping.
- o 1. Medium/low resolution/precision 3D model of the whole project area. 2. Several 3D Models of details acquired at high resolution/accuracy with structured light systems.
- o 1. Point clouds at high resolution. 2. Photorealistic 3D models simplified of the areas of interest. 3. High-resolution 3D model of the iconic feature.

Is the 3DVEM – Register GEO easy to use?

Yes, it is very easy. You only need:

1. Import the laser scanning data files (menu *Data/Import Files*).
2. Set the parameters in the *Preferences* panel (optional).
3. Register (press *Register* button).
4. Export.



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Which are the main differences between 3DVEM – Register GEO and its Demo version?

Features	3DVEM – Register Demo	3DVEM – Register
Import (PTS, PTX, FLS, LAS...)	Yes	Yes
Maximum number of scans	3	Without limit
Indirect registration with targets/spheres/points	Yes	Yes
Least squares adjustment and robust estimators	Yes	Yes
Full report with the estimation of the precision of the parameters (TXT/PDF)	Yes	Yes
Fusion of photogrammetric, SfM, laser scanning/LiDAR, total station...	Yes	Yes
Absolute orientation with constraints	Yes	Yes
Adjustment with control points	Yes	Yes
Georeferencing	Yes	Yes
Save project	No	Yes
Generate 3D report (VRML and DXF)	No	Yes
Export registered data	No	Yes

Why should I purchase 3DVEM – Register if there are (or I have got) many other registration solutions in the market?

Because this software guarantees the best network solution and shows all the statistical estimates of the adjustment that will condition the quality of the project. For instance, 3DVEM – Register not only displays the transformed coordinates, rotations and residuals. From our experience with commercial software, it can be confirmed that the registration estimation improves most of the times between 2-10 times.



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3DVEM – Register software applies ICP algorithms?

No. The indirect registration is based on coordinated targets/spheres/3D points either by least squares or robust estimators. Commercial software provided by the manufacturers usually measure well their corresponding targets/spheres.

How much does 3DVEM – Register GEO cost?

Very little if you compare its price with commercial software. Check the price list at:
http://gifle.webs.upv.es/pdfs/Listado_de_precios_3DVEM-RegisterGEO_en.pdf

Which point cloud formats do accept coordinated targets/spheres/3D points?

PTS and FLS.

How can a user associate coordinates of targets/spheres/3D points for registration if the point cloud/3D model files are not including them?

By means of ASCII files either in .TXT or .ASC.

If the point cloud format does not accept target/sphere/3D point coordinates, how can the registration be carried out?

The user can select each scan and assign (import) the coordinates of the homologous point by means of ASCII files (PTS, TXT, ASC, CSV, XLS and DXF).

Does 3DVEM – Register GEO accept alphanumeric names for the targets/spheres/3D points?

No. Targets/spheres/3D points have to be numbers.

What can I do to keep the numeric identifiers (ID) assigned by the user to the targets/spheres/3D points?

To run *Manual* matching.

I am running in automatic mode, what can I do to retrieve the ASCII file imported IDs of the targets/spheres/3D points?

1. Select *Manual Matching*;
2. Select in the menu *Tools* the option *Recovery Original ID*.

Which is the minimum number of homologous targets/spheres/3D points to run *Automatic Matching* (without associated IDs)?

3.

Which is the minimum number of homologous targets/spheres/3D points to run *Manual Matching* (with associated IDs)?

Only 2. However, the scans will be considered as levelled for the adjustment. Therefore, the rotations will be constraint.



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If the scan positions were levelled during the data acquisition, can it be that the final registration error be smaller if running the registration without the *Leveled* option activated?

Yes, of course. It might happen that the assigned error to the *Dual-axis compensator* be too optimistic.

Can I undertake the registration of point clouds (for instance in PTX format) and 3D meshes (for instance in OBJ format)?

For sure, previous importation of the homologous 3D coordinates measured either in commercial software or in our free software *3DVEM – Viewer, Editor & Meter*.

If a registration running in Automatic Matching is not able to adjust some scans, what can I do?

There exist two alternatives:

1. Re-register in *Automatic Matching* after changing (enlarging) the *Point tolerance* threshold. Probably a target/sphere/3D point was moved.
2. If the targets/spheres/3D points were numbered on site, run the registration in *Manual Matching*.

If the registration in *Manual Matching* does not yield the expected result, what might be the issue?

Probably there is a gross error such as a badly numbered target.

If the registration in *Manual Matching* does not yield the expected result, what can I do?

There exist two alternatives:

1. Register in *Automatic Mode* with the default values;
2. Register in *Automatic Mode* modifying the *Point tolerance*.
3. Identify the wrongly numbered targets and rename them correctly. Carry on in *Manual Matching*.

Can the main reference system be changed after the registration?

Yes. After the registration, the user can set the origin (0,0,0) in position and (0,0,0) in rotations, without re-registration. The user should click the main scan (also known as Home ScanWorld in Cyclone's Leica Geosystems) in the *Exterior Orientation Parameters* panel.

Which scan station (scan) considers 3DVEM – Register as main by default after the registration?

3DVEM – Register sets as main reference system the scan that holds the largest number of common targets/spheres/3D points.



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Is the main 3D coordinate system local or absolute?

For **3DVEM – Register**, it depends on the input coordinates for each scan position (scan). Generally the main reference system will be local. But if the coordinates of the main reference system are absolute, the rest of the scan stations (scans) will be transformed to that system.

3DVEM – Register GEO widens the possibilities to carry out the absolute orientation, either with control points or with known constraints based on translation, rotation, scale and distance.

What can be done to obtain the registration result in absolute coordinates or in UTM?

Assign absolute coordinates to the targets/spheres/3D points of the main scan station (scan), either with a total station or with GNSS, and worth with the options available in **3DVEM – Register GEO**.

Which are the languages of the 3DVEM – Register GEO interface?

English and Spanish. You can swap them from *Tools* and *Language*.

I need to carry out a non-existent automatic task with the software 3DVEM – Register GEO, what can I do?

Please, contact us via email: gifle@upv.es.

