Compliance sheet — star-anomaly

Everything a supplier qualification, a legal review or an export check usually asks about star-anomaly 0.1.0, in one document.

1. Identity

Document	STAR-PKG-STAR-ANOMALY-EN · v2.3 · 2026-11-14
Package	star-anomaly
Version	0.1.0
Capability	star.orbit.anomalies
Maturity	Released & Verified (RELEASED)
Python	>=3.9
Source commit	dc09f61d
Source	https://github.com/Andrea07072000/S.T.A.R.-/tree/main/packages/star_anomaly

2. Licence and obligations

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3. What it needs at run time

Nothing beyond the Python standard library: it works offline.

4. Integrity

SHA-256 fingerprints of the files published on this website. Check a downloaded file with:

```
python -c "import
hashlib,sys;print(hashlib.sha256(open(sys.argv[1],'rb').read()).hexdigest())" star_anomaly-
0.1.0-py3-none-any.whl
```

FILE	SHA-256
star_anomaly-0.1.0-py3-none-any.whl	ef50d76b035b0f0ea4eacb9c743dacba4f619395af98cdea02634c1b14a92a92
star_anomaly.py	76f3de92f09322b24e3c45c652b3063583486a03b023535c152ab6489a7f44ea
star_anomaly-0.1.0-source.zip	3e5da0c594b2b71bad7d1aae71f65b4713fc6b1f9df05c4c8ef01c01c6e7528c

5. What it does, and its limits

Kepler's equation and the conversions between mean, eccentric, hyperbolic and true anomaly for closed and open orbits: a bracketed Newton solver that cannot diverge, a residual that does not cancel near the periapsis of nearly parabolic orbits, the revolution kept; within 1e-14 rad of 50-digit arithmetic on 1120 orbits.

The parabola (e exactly 1) is not covered: use Barker's equation elsewhere. Some conversions are badly conditioned by nature and no code can repair that: near a parabola, the eccentric anomaly recovered from a true anomaly close to 180 degrees, and the hyperbolic anomaly recovered from a true anomaly close to the asymptote, hold fewer digits than the input (the function is accurate for the float it is given; the float does not hold the information). The 50-digit reference uses other formulas than the module's but was written by the same author. No propagation in time: converting a time to a mean anomaly is one multiplication, left to the caller.

- Closed orbits (0 <= e < 1): `eccentric_from_mean`, `mean_from_eccentric`, `true_from_eccentric`, `eccentric_from_true`, `true_from_mean`, `mean_from_true`. Open orbits (e > 1): `hyperbolic_from_mean`, `mean_from_hyperbolic`, `true_from_hyperbolic`, `hyperbolic_from_true`. Angles in radians.
- The closed-orbit functions keep the revolution (nothing is wrapped). Kepler's equation is solved by Newton's method inside a bracket that always contains the root, with the residual written so that it does not cancel near the periapsis of a nearly parabolic orbit; the true anomaly comes from a form with no quadrant to choose.
- Measured on 1120 orbits (620 closed, 500 open, a fifth of them nearly parabolic) and two published examples, four conversions each: within 1e-14 rad of 50-digit arithmetic on every case; within 2e-14

rad of hapsira and Orekit on the ordinary orbits (the nearly parabolic ones are reported apart in the evidence file).

- Every function returns a float or raises `ValueError`: values that are not finite real numbers, an eccentricity on the wrong side of 1 for the function called, an angle beyond 1e9 rad, a true anomaly at or beyond the asymptote of an open orbit, a result too large for a float.

6. Export, use and certification

The package is published and freely available. That usually takes software out of export-control lists, but not every use of it: read the page on space activities and export control before using it in a controlled programme. It is not certified or qualified for flight; the evidence describes what was tested and how.

7. Citation and bill of materials

```
@software{cavazzini_star_anomaly_0_1_0,
  author  = {Cavazzini, Andrea},
  title   = {{star-anomaly}: Mean, eccentric, hyperbolic and true anomaly},
  version = {0.1.0},
  year    = {2026},
  url     = {https://andrea07072000.github.io/S.T.A.R.-/software/star_anomaly/},
  note    = {Apache-2.0. Source: https://github.com/Andrea07072000/S.T.A.R.-, commit dc09f61d}
}
```

CITATION.cff · BibTeX · SBOM CycloneDX 1.5 · SBOM SPDX 2.3

8. Warranty and liability

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