Compliance sheet — star-rootfind

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

1. Identity

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

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_rootfind-
0.1.0-py3-none-any.whl
```

FILE	SHA-256
star_rootfind-0.1.0-py3-none-any.whl	943984b32d2a1212bdc68875deb8ee4550 4c09f1cee62e0ce864b5043a75100a
star_rootfind.py	14bd52ede61ac2bc042e09e05ad72f7671 6eb232a3f5a276958074206fca360b
star_rootfind-0.1.0-source.zip	e62f4ec68626dd00598ec0ce91d54f4cac cb161a9387bbc478ee1f5cd147286d

5. What it does, and its limits

Root of a real function inside a bracket by bisection over the floats (no tolerance, at most 64 evaluations after the two ends, the result within one float of the change of sign) and a scan for every change of sign over equal pieces; 600 problems in six families, Kepler's equation included, agree with mpmath at 50 digits, SciPy brentq and fluids brenth within 2.1e-15 relative.

A change of sign is found, not proved to be a root: for a discontinuous function the result is the jump. The result is exact for f as computed; its distance from the true root is the rounding error of f divided by its slope, which this module cannot know (x*x − 2 on [0, 2] returns the float below sqrt(2) rounded). Roots without a change of sign (double roots) are not found, and `find_roots` misses two roots that fall in the same piece: it is a scan, not a guarantee of completeness. Bisection uses up to 64 evaluations where Brent's method often needs ten: this is for certainty of termination and of the last digit, not for speed. One dimension only.

- `find_root(f, a, b)`, a < b, with f(a) and f(b) of opposite sign (or one of them zero), returns a float of [a, b] such that f changes sign between it and a neighbouring float, or f is exactly zero there.
- The interval is halved in the number of floats it contains: f is evaluated at a, at b, and then at most 64 times, whatever the width of the bracket. `find_roots(f, a, b, pieces)` splits [a, b] into equal pieces and returns, sorted, one root for each piece with a change of sign and every piece edge where f is zero.
- Measured on 600 bracketed problems in six families (cube root, exponential, cosine, Kepler's equation up to e = 0.95, tanh, logarithm): the result agrees with mpmath at 50 digits, SciPy `brentq` and fluids `brenth` within 2.1e-15 relative.

- Every function returns floats or raises `ValueError`: f not callable, limits that are not finite numbers within 1e300 or not in increasing order, no change of sign, a value of f that is not a finite real number, an invalid number of pieces. An exception raised by f itself is not caught.

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_rootfind_0_1_0,
  author  = {Cavazzini, Andrea},
  title   = {{star-rootfind}: Bracketed roots to the last float},
  version = {0.1.0},
  year    = {2026},
  url     = {https://andrea07072000.github.io/S.T.A.R.-/software/star_rootfind/},
  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

Provided "as is", without warranties or conditions of any kind (Apache License 2.0, sections 7 and 8), to the extent the law allows. This never excludes liability that the law does not allow to exclude.

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