SolarDoc
WEATHER DATA, DIAGNOSED

Station Data Quality Report

SolarDoc · demo-problem-station.csv · site 28.61, 77.21 · generated 2026-11-19

Station Health Check

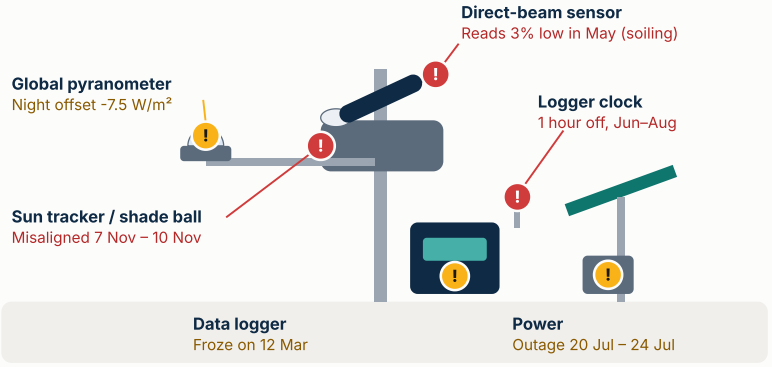
2024-01-01 to 2025-01-01 · 10-minute data · 52,080 records · GHI, DNI, DHI



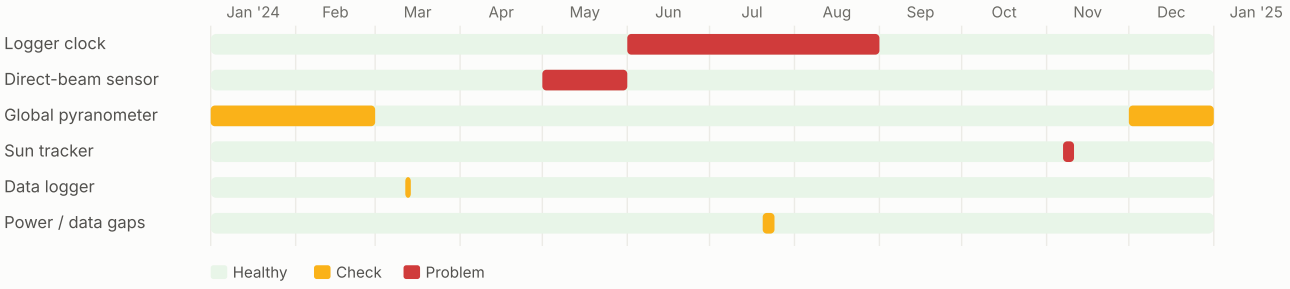
67 / 100 · Grade C

Significant problems. Correct the issues below before using this data.

Time	Sensors	Logger	Data	3
			99%	sensors



WHEN IT HAPPENED



What we found

- **Problem:** One-hour time shift in some months
- **Problem:** Sensors drift out of balance in 2024-05
- **Problem:** GHI reads down to -7.5 W/m² at night (thermal offset)
- **Problem:** GHI physically possible limit: 14% of checked records fail

- Problem: DHI physically possible limit: 14% of checked records fail
- Problem: GHI extremely rare limit: 15% of checked records fail
- Problem: DHI extremely rare limit: 15% of checked records fail
- Problem: Tracker / shade-ball alignment: 2.2% of checked records fail
- Problem: Closure test fails for 13% of records
- Check: DNI extremely rare limit: 0.6% of checked records fail
- Check: Clearness index Kt < 1.4: 0.6% of checked records fail
- Check: Direct transmittance Kn < Kt: 0.4% of checked records fail
- Check: Diffuse transmittance Kd < 0.6: 1.2% of checked records fail
- Check: Step change / spike: 0.3% of checked records fail
- Check: Stuck (frozen) value: 18 records fail
- Check: Sunlight at night: 0.7% of checked records fail
- Check: 1 gap of a day or more
- Check: Duplicate or out-of-order time stamps
- OK: Time stamps line up with the sun
- OK: Data availability is 99%

Prescription

What to fix, and the equipment that stops each problem coming back.



Fix now **Logger clock shifts by one hour in some months**

Set the logger to UTC or fixed local standard time, enable automatic time sync, and correct the affected records.

Kipp & Zonen RaZON+ Get a quote
all-in-one solar monitoring system with built-in GPS for time and position



Fix now **Direct-beam sensor reading low in some months (soiling or alignment)**

Introduce a documented cleaning schedule (daily in dust seasons), log every cleaning, and check levelling and alignment.

Kipp & Zonen DustIQ Get a quote
soiling monitor that shows when cleaning is due



Fix now **Sun tracker or shade ball misaligned**

Realign the tracker, check the shade ball geometry, and add an alignment check to the O&M routine.

Kipp & Zonen SOLYS2 Get a quote
sun tracker with GPS, with sun sensor kit for active tracking

Kipp & Zonen RaZON+ Get a quote
compact tracker system measuring DNI and DHI



Fix now **1 outage of a day or more**

Add backup power and remote monitoring so outages are noticed and fixed within hours.

Equipment: Solar + battery power supply (UPS) and a cellular / satellite remote-monitoring modem

Recommended **Large night-time thermal offset on the pyranometers**

Fit ventilation units and apply an offset correction to historical data.

Kipp & Zonen SMP12 Get a quote
Class A pyranometer with integrated ventilation and heating

Kipp & Zonen SMP10 Get a quote
Class A smart pyranometer with low thermal offset (pair with a CVF4)

Kipp & Zonen CVF4 Get a quote
ventilation unit for existing pyranometers

Recommended **Logger freezes or electrical spikes**

Inspect wiring, grounding and surge protection; update the logger program and add a watchdog.

Equipment: Surge protection and grounding kit; industrial data logger with remote diagnostics

Product suggestions are independent recommendations; product names are trademarks of their owners.

Running a plant? What this does to your PR

PRO PREVIEW

1 hour off, Jun–Aug
Hourly PR swings up and down; daily and monthly PR stay about right.

Reads 3% low in May (soiling)
If this sensor is used for PR, a dirty or misaligned sensor reads low and makes PR look better than it is.

Night offset -7.5 W/m²
A sensor reading low makes PR look too good; a night offset adds a small bias.

Misaligned 7 Nov – 10 Nov
Wrong diffuse and direct values for those days; PR from a tracker station is unreliable then.

Froze on 12 Mar
Frozen or spiking values give a wrong PR for those hours.

Outage 20 Jul – 24 Jul
Irradiance missing while the plant keeps running: if the gap counts as zero, PR jumps.

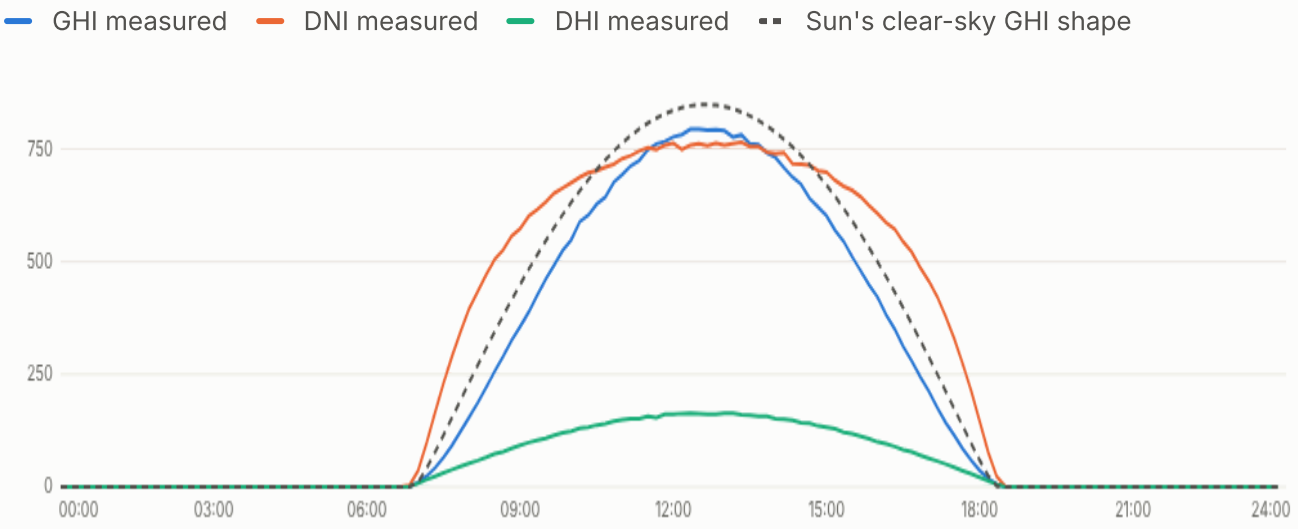
IEC 61724-1 quick check: 10-minute records meet the Class B recording interval; Class A needs 5 minutes or less. The full class check (sensor count, calibration, cleaning) is in Pro.

Check your whole plant | See a sample plant report

Pro (early access, with a code) compares all your stations, checks your monitoring class and recalculates PR with your plant's energy.

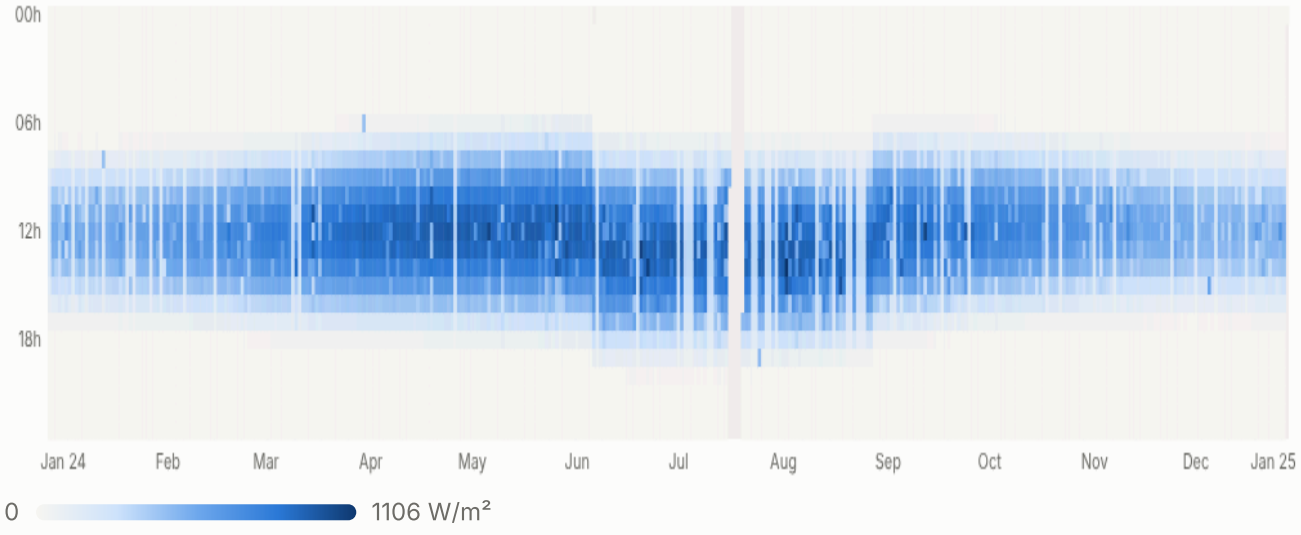
Timing check: clearest days

On a clear day the measured curve should sit on the sun's curve (dashed) with its peak at the same time. A curve shifted left or right means the time stamps are off.



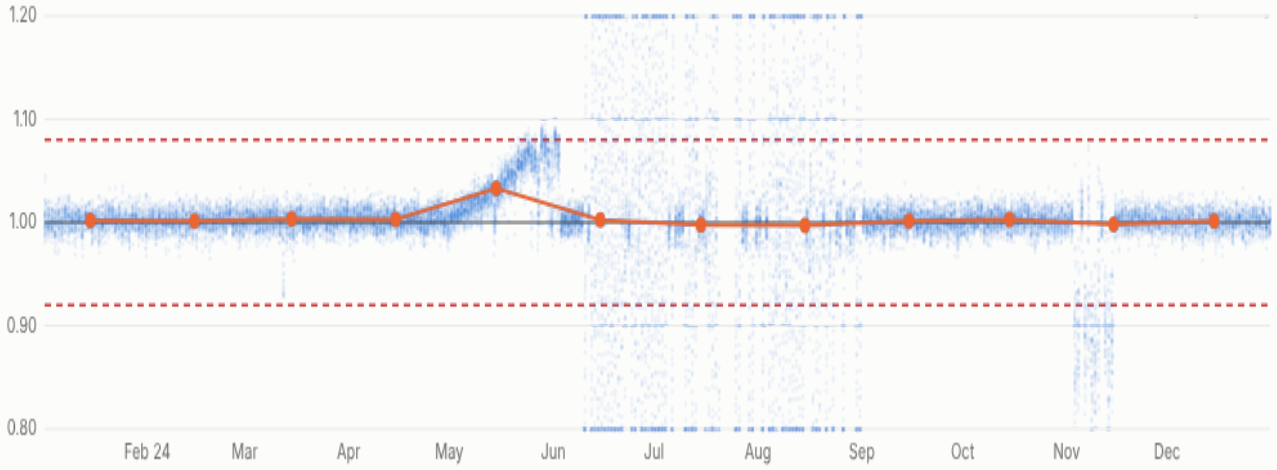
Every hour of the record

Mean GHI for every hour (rows) of every day (columns), in the time stamps as given. Daylight should form a smooth band that widens in summer. Gaps show as empty, and a band that jumps up or down by an hour means time-stamp problems.



Do the three sensors agree?

Ratio of measured GHI to DHI + DNI·cosZ (sun higher than 15°). It should stay at 1.00. Dashed lines are the ±8% quality-control limits. A step or a slow slide in the monthly median (line) points to calibration, soiling or alignment problems.



Appendix: detailed numbers

For engineers and lenders: how the score is made, every test and every month.

HOW THE SCORE IS MADE

Records passing all QC tests	**21 / 40**
Completeness	**20 / 20**
Closure stability over time	**12 / 20**
Components measured (GHI, DNI, DHI)	**10 / 10**
Time-stamp integrity	**5 / 10**

QUALITY TESTS

Test	Checked	Failed	Fail rate
GHI physically possible limit GHI below −4 W/m² or above 1.5·ETR·cos$^{1.2}$Z + 100. Values like these cannot occur in nature.	52,074	7,352	14.12%
DNI physically possible limit DNI below −4 W/m² or above the extraterrestrial irradiance.	52,060	0	0.00%
DHI physically possible limit DHI below −4 W/m² or above 0.95·ETR·cos$^{1.2}$Z + 50.	52,080	7,470	14.34%
GHI extremely rare limit GHI below −2 W/m² or above 1.2·ETR·cos$^{1.2}$Z + 50. Possible but very rare, so worth checking.	52,074	7,828	15.03%
DNI extremely rare limit DNI below −2 W/m² or above 0.95·ETR·cos$^{0.2}$Z + 10.	52,060	289	0.56%
DHI extremely rare limit DHI below −2 W/m² or above 0.75·ETR·cos$^{1.2}$Z + 30.	52,080	7,770	14.92%
Closure: GHI = DHI + DNI·cosZ Measured GHI differs from DHI + DNI·cosZ by more than 8% (Z < 75°) or 15% (75° ≤ Z < 93°). At least one sensor is wrong.	23,393	2,987	12.77%
Diffuse ratio DHI/GHI Diffuse exceeds global by more than 5% (Z < 75°) or 10% (higher zenith). Diffuse can never really exceed global.	23,399	0	0.00%
Clearness index Kt < 1.4 GHI is more than 1.4 × the extraterrestrial horizontal irradiance.	23,222	139	0.60%
Direct transmittance Kn < Kt Beam fraction is larger than total transmittance, which would imply negative diffuse.	23,214	100	0.43%

Test	Checked	Failed	Fail rate
Kn upper limit DNI above (1100 + 0.03·altitude) W/m², higher than a perfectly clear sky allows.	23,214	0	0.00%
Diffuse transmittance Kd < 0.6 DHI above 0.6 × extraterrestrial horizontal irradiance.	25,337	308	1.22%
Tracker / shade-ball alignment Sky looks clear (GHI near clear-sky) but diffuse fraction is above 0.85: the diffuse sensor is probably not shaded.	5,223	114	2.18%
Step change / spike Jump between consecutive readings larger than physically plausible for this time step (logger or sensor fault).	24,974	70	0.28%
Stuck (frozen) value The same daytime reading repeats for 30+ minutes, typical of a frozen logger channel.	22,539	18	0.08%
Sunlight at night More than 10 W/m² while the sun is 6° or more below the horizon. Usually a time-stamp or time-zone error.	23,951	178	0.74%

MONTH BY MONTH

Month	Complete	Failed QC	GHI kWh/m²	DNI kWh/m²	Closure	Time shift
2024-01	100%	0.1%	88.4	81.6	1.002	0 min
2024-02	100%	0.0%	113.9	119.8	1.002	+1 min
2024-03	100%	0.8%	163.1	176.1	1.003	+2 min
2024-04	100%	0.1%	193.7	208.6	1.003	0 min
2024-05	100%	2.2%	210.4	183.8	1.033	0 min
2024-06	100%	36.3%	200.9	166.1	1.002	+43 min
2024-07	86%	38.2%	142.9	102.2	0.998	+62 min
2024-08	100%	39.8%	164.1	125.5	0.997	+62 min
2024-09	100%	0.0%	155.8	146.2	1.001	+2 min
2024-10	100%	0.0%	138.9	161.0	1.003	0 min
2024-11	100%	18.4%	98.4	78.8	0.998	+1 min
2024-12	100%	0.2%	86.8	88.1	1.001	+1 min

PRO

Need a lender-ready answer, or a real PR?

SolarDoc Pro ranks your sites with P50 / P90 and an uncertainty budget, and for operating plants compares every station, checks the monitoring class and recalculates PR.

Bankability sample

Plant sample

© SolarDoc. Automated checks are a fast screen and complement, not replace, an expert review of your data.