JUMBO BLOCK ENGINEERING SUITE

JUMBO BLOCK Temp

User Manual · Version 9.0.0

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1. Overview

JUMBO BLOCK Temp does not simply calculate a cooling effect. It calculates the thermal infrastructure balance (TIB) of an accessible, water-bearing and critical-infrastructure-ready space below sealed surfaces. This guiding principle is stated directly at the top of the tool.

TEMP assesses water, concrete and structural masses as thermal storage, heat inputs from surface, cables, pipes and technical systems, heat absorption, dissipation and thermal reserve, medium temperatures and thermal coupling, and the local as well as the site-wide effect.

The program runs entirely locally in the browser as a single HTML file. There is no cloud connection, no server, and no user account. TEMP reads building geometry from PLAN/HYDRO via the shared project.dbm and supplements it with its own thermal inputs.

TEMP is one of several standalone tools in the suite (including HYDRO, PLAN, BUDGET, STATIC, Project). A clear notice in the tool states: TEMP is a simplified technical pre-assessment. The split into dry space, water space and optional flood operation does not replace site-specific thermal simulation, electrical planning, sealing design, fire-protection/critical-infrastructure assessment or water-law evaluation.

2. Getting Started

When temp.html is opened for the first time, all fields are pre-filled with technical default values (500 modules, climate profile “Central Europe – Annual Average”, 32,000 m² sealed surface, among others — see also chapter 10), and the data-exchange status shows “Ready for import and export via project.dbm.” Every input automatically triggers a recalculation.

The typical workflow: define the installation layout in PLAN and export it as project.dbm, then import that file into TEMP. TEMP automatically takes over building geometry (modules, plate dimensions); all thermal inputs (climate profile, heat inputs, installations) remain to be added project-specifically.

There is no persistent storage in the browser. The current working state exists only in the memory of the open page until it is deliberately saved as a project.dbm file via “Export” (chapter 3).

3. Data Exchange (Import/Export project.dbm)

TEMP reads and writes only the shared project.dbm. Building geometry and existing TEMP data are taken from the same project file.

“Import” opens the file selection dialog. If the imported file already contains a complete data state previously exported by TEMP itself, TEMP takes over all its own inputs unchanged. If it contains only PLAN/HYDRO geometry data (without a genuine TEMP state), TEMP takes over only the building geometry (module count, plate dimensions, etc.); all thermal TEMP inputs remain unaffected and to be added project-specifically. The data-exchange status reports precisely, after every import, which values were applied.

“Export” calculates an updated SHA-256 hash over the entire stored dataset and downloads the file named YYYYMMDD_HHMMSS_project.dbm. TEMP writes only its own fields (constants, inputs, derived key values) and leaves fields already present from other tools unchanged.

The data-exchange status notice and the hash status notice each show the current processing state: ready for import/export, project.dbm imported (stating which values were applied), project.dbm exported, or an error notice if the file is not a valid project.dbm.

4. Site Data

These values describe the thermal baseline of the entire site and feed directly into the Site TIB (chapter 16): the sealed surface of the entire site (m²), the baseline thermal site input (MWh during the calculation period, site area and buildings excluding technical systems), and an additional site input (MWh, sum of technical system loads).

A note explains the calculation effect: the sealed surface determines the classical surface load; baseline load and additional load are separately balanced against the JUMBO BLOCK compensation.

5. Inputs: Project / Module Split

Defines the basic split of the installation: total modules (1 module = 6.25 m² footprint), dry-space modules (watertight, dry infrastructure space — the difference to the total automatically gives the water-space module count), an optional flood option for the dry space (special operation with suitably protected components) with an associated flood filling in %, and the water-space filling in % (default 50%).

6. Inputs: Construction Build-Up / PLAN Import

Floor plates, side plates, cover plates and a possible overburden influence the TIB as additional thermal mass and as part of the thermal coupling between surface, block and ground. These values can be imported from PLAN or overwritten for the project.

For each of the three plate types (floor, side, cover), count, length, width and thickness are captured; single volume (length × width × thickness) and total volume (count × single volume) are calculated automatically and are read-only.

In addition, density and specific heat capacity cp of the plate concrete (default 2350 kg/m³ and 0.88 kJ/(kg·°C)), a possible overburden above the cover with its own density and cp (default 0 m, 1800 kg/m³, 0.84 kJ/(kg·°C) — 0 m for a direct road slab), and ΔT construction build-up (effective mean temperature difference of plates/overburden, default 1 °C) are captured.

7. Inputs: Storage / Evaporation

Captures the effective mean temperature differences (not absolute temperatures) for water (ΔT water), concrete (ΔT concrete), and the optional flood operation (flood mode ΔT water), plus the concrete mass per module (default 4205 kg, Central European default value), the water-space evaporation rate (mm/day, profile-based default, scaled by area, filling level and period), and the calculation period in hours (daily evaporation is scaled proportionally; linearly above 24 h).

A note clarifies: evaporation is estimated as a rough approximation from the profile-based evaporation rate per m², water-space filling level, effective active evaporation area, and calculation period; reliable site-specific assessments would require extended models such as Penman-Monteith.

8. Inputs: Ground / Air

A climate profile sets air, ground, humidity, wind and evaporation rate to consistent values with one click:

- ❄ Central Europe – Winter Days: air temperature 0 °C, ground temperature 8 °C, humidity 85%, wind 4 m/s, h air 4 W/(m²·°C), evaporation 0.7 mm/day, ΔT water/concrete/flood 2/1.5/2 °C.
- □ Central Europe – Annual Average (default selection): air temperature 10 °C, ground temperature 10 °C, humidity 75%, wind 3 m/s, h air 3 W/(m²·°C), evaporation 2.0 mm/day, ΔT water/concrete/flood 2/1.5/2 °C.
- ☀ Central Europe – Summer Days: air temperature 25 °C, ground temperature 11 °C, humidity 65%, wind 2.5 m/s, h air 2.5 W/(m²·°C), evaporation 4.0 mm/day, ΔT water/concrete/flood 4/3/4 °C.
- 🔥 Central Europe – Heatwave Days: air temperature 38 °C, ground temperature 12 °C, humidity 45%, wind 1.5 m/s, h air 2 W/(m²·°C), evaporation 7.0 mm/day, ΔT water/concrete/flood 8/6/8 °C.
- ⚙ User Defined: activated automatically as soon as any of the associated fields is changed manually — the values then remain fully editable.

Further fields in this section: U-value ground (default 0.8 W/(m²·°C)), JUMBO BLOCK system temperature (default 12 °C), ground temperature at installation depth (default 10 °C — this explicitly does not refer to the near-surface soil layer, but to the thermally effective installation depth of the JUMBO BLOCK system, typically around 2.7 m, depending on floor slab, cover slab and build-up), h air (default 3 W/(m²·°C)), air temperature, relative humidity, and wind speed. Active air surface and active ground area are calculated automatically.

A temperature note explains: inputs are deliberately entered in °C; for temperature differences, the numerical value in °C and K is identical, TEMP internally uses differences only.

9. Inputs: Heat Inputs from Infrastructure and Above

Solar load (default 750 W/m²), absorption factor (0–1, default 0.85), and coupling surface → block (0–1, default 0.18) describe the heat input from the sun via the surface.

Three optional installation types can be activated independently of each other, each with a dry-space/water-space routing choice:

- Cable installations: cable loss (W/m), number of cables, routing zone (dry/water space), cable length per cable (initial PLAN value = installation length), and cable simultaneity (0–1). Total cable length is calculated automatically from count × length per cable. If the option is off, TEMP assesses classic stormwater retention without cable heat input.
- Waste-heat/media pipes: waste-heat pipe loss (W/m), number of pipes, routing zone, pipe length per pipe (initial PLAN value = installation length). Total pipe length is calculated automatically. If the option is off, no thermal pipe input occurs.
- Technical installations: a technical load in kW (default 2 kW) for pumps, sensors, or switch cabinets. If the option is off, no additional technical loads occur.

If a cable or pipe installation is assigned to the water space, a plausibility notice appears automatically: protection class, sealing, corrosion, fire protection, electrical isolation, or pipe protection, insulation, buoyancy and maintainability must be separately verified for the project. If all three installation types are disabled, TEMP explicitly notes that classic stormwater retention is assessed without additional infrastructure heat inputs.

10. Calculate and Defaults

The “Calculate” button triggers a full recalculation of all key values and the TIB Engineering Monitor; in practice, almost every input change already triggers a recalculation automatically.

The “Defaults” button resets all fields to the technical factory settings without confirmation and then automatically reapplies the “Annual Average” climate profile. Default values include: sealed surface 32,000 m², 500 total modules, 0 dry-space modules, water filling 50%, plate concrete density 2350 kg/m³, overburden density 1800 kg/m³, ΔT construction build-up 1 °C, ΔT water/concrete/flood 2/1.5/2 °C each, concrete mass per module 4205 kg, evaporation rate 2.0 mm/day, calculation period 10 h, U-value ground 0.8 W/(m²·°C), block system temperature 12 °C, ground temperature 10 °C, air temperature 10 °C, relative humidity 75%, wind speed 3 m/s, h air 3 W/(m²·°C), solar load 750 W/m², absorption factor 0.85, coupling 0.18, all three installation types disabled.

11. Calculated Key Values

This section summarises geometric and volumetric intermediate results that feed into the actual thermal balance: JUMBO BLOCK area, water- and dry-space modules, net volume of water and dry space, dry-space flood reserve, active water volume (water-space volume × water filling, plus flood volume if the flood option is active), active evaporation area and evaporation volume, concrete volume (from gross minus net module volume), plate volume and mass from PLAN, overburden volume and mass, the coverage of the sealed surface by the JUMBO BLOCK installation (in %), and the effective temperature differences to ground and air (block temperature minus ground or air temperature respectively, not negative).

12. TIB Engineering Monitor: Core Balance

The core balance compares the installation's total heat absorption and dissipation capacity (capacity) with the total heat input. The capacity is made up of seven partial terms: heat storage in water (active water volume × water density × specific heat capacity of water 4.186 kJ/(kg·°C) × ΔT water), heat storage in the flood volume (analogous, with ΔT flood), heat storage in the module concrete (modules × concrete mass per module × 0.88 kJ/(kg·°C) × ΔT concrete), heat storage in the construction build-up (plate and overburden mass with their respective specific heat capacity × ΔT construction build-up), evaporative cooling (evaporation volume × 0.63 kWh/litre), heat dissipation to ground (U-value × active ground area × ΔT ground × calculation period), and convection to air (h air × active air area × ΔT air × calculation period).

The heat input is made up of the solar surface input (area × solar load × absorption factor × calculation period, damped by a dynamic coupling that decreases with increasing cover-plate and overburden thickness) plus the activated installation loads (cable, waste-heat pipe, technical equipment).

From capacity and heat input, net balance (capacity minus input), thermal utilisation in % (input relative to capacity), thermal reserve, heat input per m² of JUMBO BLOCK area, and capacity per module are derived. A bar chart graphically compares capacity, heat input, and net balance.

The status assessment is automatic and has three levels, based on thermal utilisation: 🟢 Very good/robust at ≤ 60%, 🟡 Elevated at ≤ 85%, 🔴 Critical above 85%. At “very good”, the summary status text reports significant reserve; at “elevated”, a site-specific assessment is recommended, especially for cables, waste-heat pipes and flood operation; at “critical”, additional measures, a separate simulation, or changed zoning are stated as required.

13. TIB Engineering Monitor: Medium Temperatures

Estimates four medium temperatures: water-space air, water-space water, dry-space air, and flood-operation water. Each estimate is based on a baseline temperature (mixed from ground temperature and block temperature or the entered ΔT values) plus the respectively assigned heat input relative to a medium-specific thermal buffer capacity.

In addition, water-space state, active water volume, and active air and ground area are shown. A temperature profile chart graphically compares ambient air, ground, and the four medium temperatures.

The status assessment is based on the highest of the four determined medium temperatures: 🟢 Uncritical at ≤ 28 °C, 🟡 Elevated at ≤ 35 °C, 🔴 Critical above 35 °C.

14. TIB Engineering Monitor: Operation and Maintenance

Derives a maintenance assessment for water space and dry space, plus a brief summary of the water-space medium, from the medium temperatures.

The status assessment uses the same temperature thresholds as the medium temperatures (chapter 13): 🟢 Unrestricted at ≤ 28 °C, 🟡 Restricted at ≤ 35 °C, 🔴 Not recommended above 35 °C. A maintenance note clarifies: the medium temperatures are simplified TIB estimates for temperature-related orientation. Accessibility, isolation, oxygen level, electrical safety, hygiene, fire protection and critical-infrastructure operation must be assessed separately.

15. TIB Engineering Monitor: Site Effect

Compares the classical surface load of the entire site (site area × solar load × absorption factor × calculation period) with the classical load on exactly the area underbuilt by JUMBO BLOCK (JB area instead of total area). From the latter and the available thermal absorption capacity (minus installation loads), local surface relief and the JB residual top load (the uncompensated share) are derived.

In addition, a surface temperature is estimated: classical (from air temperature and solar input) and with JUMBO BLOCK (classical value minus a temperature reduction limited by the thermal coupling and the local relief share). A chart graphically compares both surface temperatures plus the resulting temperature relief, supplemented by the weighted site relief and the coverage of the sealed surface.

The status assessment has three levels: 🟢 Locally high at a local relief share of 45% or more, 🟡 Effective at at least 20% local share or at least 5% relief share relative to the classical total load, otherwise ⚪ Low.

16. TIB Engineering Monitor: Site TIB

Relates the baseline thermal site input and additional site input entered in chapter 4 to the local surface relief from chapter 15 (as JB compensation, capped at the site input). This yields three indicators, each as a thermal compensation ratio (TCR) in %: thermal site relief (relative to the total site input), thermal additional-load relief (relative exclusively to the additional/technical site input — often the most important indicator for project and public dialogue), and total thermal relief as a combined percentage value.

A bar chart compares the three indicators; if no site input is present (chapter 4 empty), the chart shows a corresponding empty state. Further indicators: total site input, additional site input, JB compensation (in MWh), residual site heat, and compensation per m² of JUMBO BLOCK area.

The status assessment is based on the average of the two TCR shares (or the available share, if only one of the two site inputs is greater than 0): ▧ High relief from 25%, ◍ Noticeable relief from 10%, otherwise ⚬ Low relief.

A model note clarifies: the classical surface load remains a separate comparison value and is not additionally added to the site input. JUMBO BLOCK compensation is derived from the actually underbuilt area; the calculation does not replace detailed microclimate simulation.

17. Detailed Balance

A tabular detailed balance lists all individual balance items with their sign: all absorption/dissipation terms from chapter 12 (positive), the classical load on JB surface and the JB residual load (shown negative as comparison values), the local surface relief (positive), the gross solar surface input plus the share of it effective on the media (damped), the individual installation loads with their respective assignment to water or dry space, the summed heat inputs per space, and all Site TIB items from chapter 16 (in kWh or marked as a percentage value).

This table provides complete traceability of the core balance and the Site TIB at the item level and appears unchanged in the print report (chapter 18).

18. Print / PDF

The “Print / PDF” button opens a standalone, cleanly formatted report in a new window (bilingual, according to the current interface language). The report contains site data, project/module split, construction build-up/PLAN geometry, climate and thermal boundary conditions, installations/infrastructure, the complete TIB Engineering Monitor with all five sub-sections including charts, the detailed balance, and document information with input and result hashes.

Before the report is generated, a full recalculation is performed automatically, so the report always reflects the current input state. A note in the report clarifies that the hash values serve plausibility and integrity checking, and that changes to inputs or results produce different hash values.

19. Language (German/English)

Language switching is handled via the suite's global menu (menue.js) above the tool. TEMP fully switches all labels, notices, info content, and the print report between German and English without altering any input values.

20. Data Integrity (SHA-256)

Every exported project.dbm file contains a SHA-256 hash over the entire stored dataset — the same procedure as in HYDRO, PLAN, BUDGET and STATIC. On import, this hash is checked automatically; the hash status notice shows the current verification state (clean and valid, modified/not reproducible with a detected hash mismatch, or invalid file).

The print report (chapter 18) additionally contains a separate input hash and result hash, documenting the state of the TEMP inputs and the calculated key values at the time the report was created.

21. Info Buttons (Contextual Help)

Nearly every input field and many result values have a small **ℹ** button next to them. Clicking it opens an overlay window with a precise technical explanation of that specific field — including what it means, its default value, and how it feeds into the calculation.

The overlay can be closed by clicking outside the window, via the close button, or with the Escape key. The info content follows the same language switch as the rest of the tool.

22. Limitations, Notes and Best Practices

- TEMP is a simplified technical pre-assessment. The split into dry space, water space and optional flood operation does not replace site-specific thermal simulation, electrical planning, sealing design, fire-protection/critical-infrastructure assessment or water-law evaluation.
- The evaporation calculation is a rough approximation from profile-based rate, filling level, area and period; reliable site-specific assessments require extended models such as Penman-Monteith.
- The ground temperature refers to the thermally effective installation depth of the system (typically around 2.7 m), not to the near-surface soil layer.
- All ΔT values are effective mean temperature differences over the calculation period, not absolute temperatures.
- The medium temperatures (chapters 13, 14) are simplified TIB estimates for temperature-related orientation. Accessibility, isolation, oxygen level, electrical safety, hygiene, fire protection and critical-infrastructure operation must be assessed separately.
- If cables or waste-heat pipes are assigned to the water space, protection class, sealing, corrosion, fire protection, electrical isolation or pipe protection, insulation, buoyancy and maintainability must be separately verified project-specifically.
- The Site TIB (chapter 16) does not replace detailed microclimate simulation; the classical surface load remains a separate comparison value and is not added to the site input.
- Without persistent browser storage, unsaved input is lost when the page is closed or reloaded — regular export is recommended.

23. Quick Reference of Icons and Buttons

Icon / Button	Meaning
ℹ Info	Opens the technical explanation for the respective field
Import	Reads in a project.dbm file (from PLAN/HYDRO or TEMP) and checks its hash
Export	Saves the current state as a project.dbm file and recalculates the hash
Calculate	Triggers a full recalculation of all key values
Defaults	Resets all inputs to the technical factory settings without confirmation
Print / PDF	Opens the complete TIB report in a new window
▓ Very good / Uncritical / Unrestricted / High	Best assessment status per monitor section
▒ Elevated / Restricted / Effective / Noticeable	Medium assessment status, review recommended
□ Critical / Not recommended	Highest warning level, measures required
○ Low	Neutral status with no significant effect
🔒 Hash status	Current SHA-256 verification status of the project.dbm