# **Doc 2A — Common Variables: Core Parameters**

**Scope:** Ballot (001–007), Allocation (010–015), Thresholds/Quorum (020–027), Weighting (030–031)  
 **Rule:** All percentages are **integer %** (e.g., 55 = 55%). Names match Docs **1/4/5**. Defaults are in **bold**.

## **A) Ballot**

| **ID** | **Name** | **Allowed values** | **Default** | **Depends on** | **Rationale** | **Used in (Doc 4 / Doc 5)** |
| --- | --- | --- | --- | --- | --- | --- |
| **VM-VAR-001** | ballot\_type | plurality | approval | score | ranked\_irv | ranked\_condorcet | **approval** | — | Approval captures breadth; neutral baseline. | §3 tabulation / VM-FUN-003 TabulateUnit |
| **VM-VAR-002** | score\_scale\_min | integer 0..10 | **0** | ballot\_type=score | Standard low anchor. | §3 Score / VM-FUN-003 |
| **VM-VAR-003** | score\_scale\_max | integer 1..10 and > min | **5** | ballot\_type=score | Compact 0–5 reduces noise. | §3 Score / VM-FUN-003 |
| **VM-VAR-004** | score\_normalization | off | linear | **off** | ballot\_type=score | Keep raw intensity by default. | §3 Score / VM-FUN-003 |
| **VM-VAR-005** | condorcet\_completion | schulze | minimax | **schulze** | ballot\_type=ranked\_condorcet | Widely used, stable. | §3 Condorcet / VM-FUN-003 |
| **VM-VAR-006** | ranked\_exhaustion\_policy | reduce\_continuing\_denominator | **reduce\_continuing\_denominator** | ballot\_type=ranked\_irv | Matches agreed IRV semantics. | §3 IRV / VM-FUN-003 |
| **VM-VAR-007** | include\_blank\_in\_denominator | on | off | **off** | any ballot | Majority tests use **valid ballots** by default. | §3.4 denominators; §6 gates / VM-FUN-006 |

Note: For **approval**, decision-gate “support %” uses **approval rate** = approvals\_for\_change ÷ valid ballots (Doc 4 §3/§6).

## **B) Allocation (unit-level seats/power)**

| **ID** | **Name** | **Allowed values** | **Default** | **Depends on** | **Rationale** | **Used in (Doc 4 / Doc 5)** |
| --- | --- | --- | --- | --- | --- | --- |
| **VM-VAR-010** | allocation\_method | winner\_take\_all | proportional\_favor\_big | proportional\_favor\_small | largest\_remainder | mixed\_local\_correction | **proportional\_favor\_small** | — | Protects minorities by default. | §4 allocation / VM-FUN-004 AllocateUnit |
| **VM-VAR-011** | use\_unit\_magnitudes | on | off | **on** | — | Respect registry-defined magnitudes. | §4; validations / VM-FUN-004, -002 |
| **VM-VAR-012** | pr\_entry\_threshold\_pct | integer % 0..10 | **0** | allocation\_method ∈ {proportional\_favor\_big, proportional\_favor\_small, largest\_remainder} | Optional eligibility floor. | §3.3, §4 / VM-FUN-004 |
| **VM-VAR-013** | mlc\_topup\_share\_pct | integer % 0..60 | **30** | allocation\_method = mixed\_local\_correction | Typical corrective tier size. | §4 (MMP) / VM-FUN-004 |
| **VM-VAR-014** | overhang\_policy | allow\_overhang | compensate\_others | add\_total\_seats | **allow\_overhang** | allocation\_method = mixed\_local\_correction | Simple, transparent default. | §4 (MMP) / VM-FUN-004 |
| **VM-VAR-015** | target\_share\_basis | natural\_vote\_share *(v1 fixed)* | **natural\_vote\_share** | allocation\_method = mixed\_local\_correction | Aligns targets to the ballot’s natural totals (approval=approvals, score=score\_sum, ranked=first prefs). | §4 (MMP) / VM-FUN-004 |

Constraint: If allocation\_method=winner\_take\_all, **Unit.magnitude must be 1** (Doc 4 §4; validated in VM-FUN-002).

## **C) Thresholds & Quorum (legitimacy gates)**

| **ID** | **Name** | **Allowed values** | **Default** | **Depends on** | **Rationale** | **Used in (Doc 4 / Doc 5)** |
| --- | --- | --- | --- | --- | --- | --- |
| **VM-VAR-020** | quorum\_global\_pct | integer % 0..100 | **50** | — | Widely recognized quorum. | §6.1 / VM-FUN-006 |
| **VM-VAR-021** | quorum\_per\_unit\_pct | integer % 0..100 | **0** | (primarily used with frontier or regional scoping) | Optional local legitimacy floor. | §6.1, §7 / VM-FUN-007, -006 |
| **VM-VAR-022** | national\_majority\_pct | integer % 50..75 | **55** | — | Supermajority default for constitutional/border questions. | §6.2 / VM-FUN-006 |
| **VM-VAR-023** | regional\_majority\_pct | integer % 50..75 | **55** | double\_majority\_enabled=on | Parity with national threshold. | §6.3 / VM-FUN-006 |
| **VM-VAR-024** | double\_majority\_enabled | on | off | **on** | — | Protects local consent. | §6.3 / VM-FUN-006 |
| **VM-VAR-025** | symmetry\_enabled | on | off | **on** | — | Neutral, direction-agnostic thresholds. | §6.4 / VM-FUN-006 |
| **VM-VAR-026** | affected\_region\_family\_mode | by\_list | by\_tag | by\_proposed\_change | **by\_proposed\_change** | double\_majority\_enabled=on | Default: derive affected set from proposed status change. | §6.3 / VM-FUN-006 |
| **VM-VAR-027** | affected\_region\_family\_ref | list of Unit IDs **or** a registry tag | **(none)** | affected\_region\_family\_mode ∈ {by\_list, by\_tag} | Explicit scoping when not derived. | §6.3 / VM-FUN-006 |

Note: If double\_majority\_enabled=on **and** frontier\_mode=none, then affected\_region\_family\_mode **must not** be by\_proposed\_change; use by\_list or by\_tag (Doc 4 §6.3; enforced in VM-FUN-002).

## **D) Aggregation & Weighting**

| **ID** | **Name** | **Allowed values** | **Default** | **Depends on** | **Rationale** | **Used in (Doc 4 / Doc 5)** |
| --- | --- | --- | --- | --- | --- | --- |
| **VM-VAR-030** | weighting\_method | equal\_unit | population\_baseline | **population\_baseline** | baseline present in registry | “One person, one vote” by default. | §5 aggregation / VM-FUN-005 |
| **VM-VAR-031** | aggregate\_level | country *(v1 fixed)* | **country** | — | National decisions at country level. | §5 / VM-FUN-005 |

### **Coherence checks (enforced in VM-FUN-002 ValidateInputs)**

* If allocation\_method=winner\_take\_all ⇒ every **Unit.magnitude=1**.
* If weighting\_method=population\_baseline ⇒ all aggregated units have a **population baseline** (Doc 1).
* If double\_majority\_enabled=on and frontier\_mode=none ⇒ **use by\_list/by\_tag** for affected regions with a non-empty reference.
* Percent variables must be integers within the ranges above.

**Done.** This completes Doc **2A** with stable IDs, allowed values, defaults, dependencies, rationales, and cross-refs to **Doc 4** (sections) and **Doc 5** (functions).

Alright — here’s the **reconstructed Doc 2B** so it fits neatly between **2A** and **2C**, using the same structure, naming, and cross-referencing logic we established in this conversation.

# **Doc 2B — Common Variables: Standard Operational Controls**

**Scope:** This set covers **standard operational parameters** that are not part of the *core ballot/allocation rules* in Doc 2A, and are not *special/advanced exceptions* in Doc 2C. These variables apply to most simulations, controlling tie resolution, reporting precision, sensitivity analysis, and default frontier visual/aggregation modes.

**Variable Range:** **VM-VAR-032..039**, **VM-VAR-040..046**.

## **Table of Variables**

| **ID** | **Name** | **Allowed Values** | **Default** | **Dependencies** | **Rationale** | **Cross-Refs** |
| --- | --- | --- | --- | --- | --- | --- |
| VM-VAR-032 | tie\_policy | status\_quo | random | deterministic | status\_quo | If random, requires tie\_seed (VAR-033); if deterministic, uses Option.order\_index. | Standardizes how ties are resolved in allocation, avoiding ad-hoc local rules. | Doc 4C §3; VM-FUN-008 ResolveTies |
| VM-VAR-033 | tie\_seed | Integer ≥ 0 | 0 | Used only if tie\_policy = random. | Ensures reproducibility for random tie breaks. | Doc 4C §3; Doc 6C determinism tests |
| VM-VAR-034 | report\_precision\_decimals | 0..3 | 1 | None | Controls decimal display precision in all public reports. Internal calculations always full precision. | Doc 7A §9 (Integrity); Doc 7B templates |
| VM-VAR-035 | sensitivity\_analysis\_enabled | on | off | off | When on, requires CompareScenarios (VM-FUN-013). | Allows generating ±1/±5 pp scenario comparisons in reports. | Doc 5C VM-FUN-013; Doc 7A Sensitivity section |
| VM-VAR-036 | frontier\_map\_enabled | on | off | off | None | Toggles whether frontier visualization is produced in the run. | Doc 5A output: FrontierMap; Doc 7B visuals |
| VM-VAR-037 | frontier\_map\_default\_mode | binary | sliding | ladder | binary | Requires frontier\_map\_enabled=on. | Sets default mapping mode for frontier decisions. | Doc 4C Frontier; Doc 7B visuals |
| VM-VAR-038 | aggregate\_display\_mode | absolute | percent | percent | None | Determines how results are presented in aggregation panels. | Doc 7A Outcome section |
| VM-VAR-039 | unit\_sort\_order | alpha | pop\_desc | result\_margin\_desc | alpha | None | Defines how units are sorted in output tables. | Doc 7A report layout |
| VM-VAR-040 | contiguity\_modes\_default | {land, bridge, water} | {land, bridge} | None | Sets the default allowed contiguity modes unless overridden in 2C. | Doc 4C Frontier; Doc 7B map rules |
| VM-VAR-041 | island\_rule\_default | none | ferry\_allowed | corridor\_required | none | None | Sets default handling for island unit connections unless overridden. | Doc 4C Frontier; Doc 7B map rules |
| VM-VAR-042 | protected\_area\_policy | none | block\_change | require\_supermajority | none | None | Sets default handling for units marked as protected. | Doc 4C Frontier & Gates |
| VM-VAR-043 | per\_unit\_quorum\_scope | eligible\_roll | frontier\_scope | eligible\_roll | None | Sets how quorum is measured for each unit by default. | Doc 4C Quorum rules |
| VM-VAR-044 | default\_majority\_label\_threshold | Integer % (50..100) | 50 | None | Sets the minimum % for “majority” label in reports when not otherwise specified. | Doc 7A Legitimacy Panel |
| VM-VAR-045 | decisiveness\_label\_policy | fixed\_thresholds | dynamic\_margin | fixed\_thresholds | None | Controls how decisiveness labels are assigned in reports. | Doc 4C labels; Doc 7A Outcome |
| VM-VAR-046 | unit\_display\_language | ISO 639-1 code | en | None | Controls display language for unit names in reports. | Doc 7B bilingual handling |

## **Notes & Cross-Referencing**

* Variables **032–033** are primarily consumed by **Doc 4C** (ties) and **Doc 6C** (determinism tests).
* Variables **034–039** affect **Doc 7A** (report content) and **Doc 7B** (visuals).
* Variables **040–041** overlap with advanced rules **047–048** in Doc 2C, but these are defaults applied when exceptions are not set.
* Variables **042–043** apply to **Doc 4C** (protected areas, quorum scope) and tie into **Doc 5A** pipeline artifacts.
* Variables **044–046** affect labeling, decisiveness, and multilingual presentation in **Doc 7A/7B**.

✅ This closes the **gap between 2A and 2C**:

* **2A** covers essential mechanics (ballots, allocation, thresholds, weighting).
* **2B** covers standard operational defaults.
* **2C** covers advanced/special-case rules and new controls.

# **Doc 2C — Common Variables: Clarifications & New Controls**

**Scope:** supplemental controls introduced to close gaps.  
 **Rule:** Names/IDs match Docs **1/4/5/7**. Where applicable, percentages are **integer %**.  
 **Cross-refs:** Doc 4B/4C (logic), Doc 5 (validation/pipeline), Doc 7 (reporting).

## **Variables**

| **ID** | **Name** | **Allowed values** | **Default** | **Depends on** | **Rationale** | **Used in (Doc 4 / Doc 5 / Doc 7)** |
| --- | --- | --- | --- | --- | --- | --- |
| **VM-VAR-016** | **mlc\_correction\_level** | national | regional | **national** | allocation\_method=mixed\_local\_correction | Fixes **where** the MMP correction is computed. | **4B §3** (MMP targets & deficits) / **VM-FUN-004** / affects Outcome section (seat totals by level). |
| **VM-VAR-017** | **total\_seats\_model** | fixed\_total | variable\_add\_seats | **fixed\_total** | allocation\_method=mixed\_local\_correction | Disambiguates whether total seats can grow during correction (with overhang). | **4B §3.2–3.5** / **VM-FUN-004** / Report notes if totals expanded. |
| **VM-VAR-028** | **roll\_inclusion\_policy** | residents\_only | residents\_plus\_displaced | custom:list | **residents\_only** | — | Defines **who is in the eligible roll** for turnout/quorum math. | **4C §Quorum** (uses eligible\_roll) / **VM-FUN-002/006** / **7 §Eligibility** prints policy & provenance. |
| **VM-VAR-047** | **contiguity\_modes\_allowed** | set ⊆ {land, bridge, water} | **{land, bridge}** | frontier\_mode ≠ none | Declares which adjacency types count as contiguous for frontier checks. | **4C §Frontier/Contiguity** / **VM-FUN-007** / **7 §Frontier** legend. |
| **VM-VAR-048** | **island\_exception\_rule** | none | ferry\_allowed | corridor\_required | **none** | frontier\_mode ≠ none | Resolves island/peninsula edge cases consistently. | **4C §Frontier/Contiguity** / **VM-FUN-007** / **7 §Frontier** (mediation note). |
| **VM-VAR-029** | **symmetry\_exceptions** | list of Unit IDs **or** registry tag + rationale text | **(empty)** | symmetry\_enabled=on | If negotiated asymmetries exist, list them explicitly for audit. | **4C §Symmetry** / **VM-FUN-006** (records) / **7 Legitimacy Panel** prints “Not respected: …”. |
| **VM-VAR-073** *(optional)* | **executive\_double\_majority\_enabled** | on | off | **off** | executive\_enabled=on | Exposes rare case: executive subject to double-majority. | **4C §Gates (Executive note)** / **VM-FUN-006** / **7 Legitimacy Panel** (if on). |
| **VM-VAR-021\_scope** *(optional)* | **quorum\_per\_unit\_scope** | frontier\_only | frontier\_and\_family | **frontier\_only** | quorum\_per\_unit\_pct>0 | Clarifies whether per-unit quorum blocks only status changes or also membership in “affected region family.” | **4C §Quorum & Frontier** / **VM-FUN-006/007** / **7 §Frontier** footnote if family affected. |

## **Clarifications & Dependency Notes**

* **MMP controls (016, 017)**
  + *Validation:* **VM-FUN-002** must ensure 016/017 are set when allocation\_method=mixed\_local\_correction.
  + *Reporting:* If variable\_add\_seats grows totals, Doc 7 Outcome must state final **T** and note added seats.
* **Eligible roll (028)**
  + *DB linkage:* Doc 1 Unit.eligible\_roll must exist; DivisionRegistry should include roll provenance.
  + *Validation:* **VM-FUN-002**: if quorum\_global\_pct > 0, eligible\_roll must be present and eligible\_roll ≥ ballots\_cast.
  + *Reporting:* Doc 7 “Who Could Vote” prints **roll\_inclusion\_policy** and provenance.
* **Contiguity (047, 048)**
  + *Adjacency types:* Doc 1 Adjacency.type ∈ {land, bridge, water}.
  + *Validation:* **VM-FUN-002** ensures contiguity\_modes\_allowed is a non-empty subset; **VM-FUN-007** enforces during mapping.
  + *Output:* Mediation/enclave flags appear in FrontierMap and are summarized in Doc 7.
* **Symmetry exceptions (029)**
  + *Usage:* If present, **VM-FUN-006** records “Symmetry: Not respected” with the provided rationale; Doc 7 shows it in the Legitimacy Panel.
* **Executive gating (073)**
  + *Default off:* Executives follow their ballot logic (IRV/Condorcet/plurality) and quorum; double-majority is only applied when **073=on**.
* **Per-unit quorum scope (021\_scope)**
  + *Effect:* With **frontier\_only**, units failing per-unit quorum cannot change status but still count for family composition; with **frontier\_and\_family**, they are **excluded** from the affected-family gate computation.

## **Validation Summary (enforced in VM-FUN-002)**

1. If **MMP**: **016/017** must be set to allowed values.
2. If **quorum\_global\_pct > 0**: each aggregated Unit has **eligible\_roll**; and eligible\_roll ≥ ballots\_cast.
3. If **frontier\_mode ≠ none**:  
   * **047** is a valid subset; **048** is one of the allowed values.
4. If **double\_majority\_enabled=on** and frontier\_mode=none: affected\_region\_family\_mode must be by\_list or by\_tag (Doc 2A), independent of 021\_scope.
5. **029/073/021\_scope**: if set, values must be in their domains; if **029** non-empty, a rationale string is required per entry.

**Done.** Doc **2C** now defines each new control with allowed values, defaults, dependencies, rationale, and clear cross-references to **Doc 4/5/7**.