OPERATIONAL GUIDE

Golden Run Protocol — Calibration of the health baseline

Data capture methodology, validation, and approval of the healthy vehicle behavior profile. Operational guide for fleet engineers and maintenance teams.

Document	IN-SIGHT-GR-001 · Public version 1.0
Date	June 2026
Organization	Ingérop Spain — Transport Division (T3)
Applicable to	Any IN-SIGHT installation prior to alert engine activation
Audience	Fleet engineers, operator maintenance managers

1. What the Golden Run is and why it is critical

The Golden Run is the process that establishes the healthy vehicle behavior profile: the set of statistics and model parameters against which the system will compare all future operation. Without a valid baseline, alerts lack statistical significance. It is the first process executed after kit installation, and its quality directly determines the system's false positive rate throughout its entire service life.

> **Model, not recording**
> The baseline is not a literal recording of the vehicle to be compared: it is the calibration of a parametric model that incorporates operational conditions (speed, load, ambient temperature) as input. Therefore, it is essential that the data capture covers the range of conditions representative of the vehicle's real operation: the model is only reliable within the operational domain observed during calibration.

2. Validity conditions

Before starting the data capture, the vehicle must meet **all the following** conditions. Failure to meet any of them invalidates the Golden Run.

#	Condition	Required Evidence
C1	Preventive inspection level 2 or higher passed within the last 30 days; all monitored components declared fit by maintenance	Inspection record in the operator's CMMS
C2	Wheel profiles within EN 13715 tolerances	Written certification from the maintenance manager

#	Condition	Required Evidence
C3	Representative operating conditions: average load, commercial speeds, usual line circuit	Service plan for the data capture days
C4	Minimum duration: 3 full service days (at least 8 hours of continuous operation per day)	Telemetry recording from the kit itself
C5	Verified IN-SIGHT kit: all sensors reporting, correct time synchronization, no packet loss	Portal commissioning checklist

For vehicles without monitoring history (fleet without TCMS), it is recommended to complement with a physical inspection of the subsystem: wheel profile measurement with a profilometer and bearing clearance measurement with a gauge. This information is recorded as context in the vehicle profile.

3. Data capture procedure

Step	Activity	Responsible	Output
1	Pre-capture verification: sensor checklist on the administration portal (status, last synchronization, signal quality)	IN-SIGHT Engineer	Signed checklist
2	Golden Run session start from the portal (Golden Run tab, Start action). The system marks all captured series as baseline candidates	IN-SIGHT Engineer	Active session with traceable ID
3	Normal commercial operation of the vehicle during planned shifts. No special restrictions: the baseline value reflects its representativeness	Operator	Raw time series
4	Operational context record for each day: composition, estimated occupancy, weather, incidents	Operator + Engineer	Daily report
5	Closing of the data capture session from the portal upon completion of the days	IN-SIGHT Engineer	Frozen calibration dataset

4. Dataset validation

Validation is performed in three successive passes over the frozen dataset:

- **Capture integrity.** Inspection of time series to discard acquisition anomalies: signal loss, sensor saturation, abnormal noise, synchronization gaps. Affected segments are excluded from the calculation.
- **Statistical characterization.** Calculation of statistics per sensor and operating condition (speed bands, external temperature, load): mean, standard deviation, and percentiles P5, P50, P95, P99, and P99.9. This segmentation by condition prevents comparing apples to oranges in operation.
- **Model consistency.** Calibration of dynamic model parameters and verification that the filter residual on the calibration dataset is statistically consistent (the NIS follows the theoretical chi-square distribution within the acceptable margin). If not, noise covariances are adjusted and verification is repeated.

5. Detection Thresholds

Threshold	Default Value	Action
WARNING	P99 percentile of the baseline per sensor and condition	Dashboard alert + email to the maintenance team

Threshold	Default Value	Action
CRITICAL	P99.9 percentile of the baseline per sensor and condition	Priority alert + email + escalation according to the operator's protocol

Both thresholds are adjustable from the configuration panel by the IN-SIGHT administrator. **Cross-validation with the operator's maintenance team is mandatory** before activating alerts: the joint review ensures that the calculated thresholds are consistent with the operational experience of those familiar with the vehicle.

6. Approval and activation

The baseline becomes effective only after formal **approval by the operator**, recorded in the portal with user, date, and comments (auditable record). From that moment, the system enters **passive monitoring**: during a 4-week shadowing period, alerts are generated and recorded but not notified, allowing threshold adjustments with real data without undermining the maintenance team's confidence due to early false positives. Once the shadowing period is completed with an acceptable false alarm rate, notification is activated and the system goes into production.

> **When to recalibrate**
> The Golden Run must be repeated after any major intervention on a monitored subsystem (bearing replacement, wheel reprofiling, door actuator change), as the healthy behavior of the new component differs from the calibrated one. Seasonal drift and allowable natural aging are modeled as process noise and do not require recalibration; a systematic deviation of the NIS detected by continuous monitoring of the filter itself automatically indicates the need to review the calibration.

Inquiries about the application of the protocol to your fleet: **in3-insight.cloud**.