Garmin FIT File Data Dictionary

Generated: 2026-01-12

Source: Garmin FIT Files (Merged CSV Exports)

WELLNESS_DATA

> **Description:** Contains minute-by-minute wellness and activity data tracking steps, calories, heart rate, and activity intensity.

	Data Type	Nullable	Description
startTimestamp	Integer (Unix Epoch)	Required	Start time of the measurement period in Unix epoch seconds. Represents the beginning of a 60-second monitoring window.
endTimestamp	Integer (Unix Epoch)	Required	End time of the measurement period in Unix epoch seconds. Typically startTimestamp + 60 seconds.
elapsedTime	Integer	Required	Duration of the measurement period in seconds. Typically 60 seconds for minute-by-minute wellness data.

	Data Type	Nullable	Description
steps	Integer	Required	Number of steps taken during this measurement period. Zero indicates no movement or sedentary activity.
activityTypes	String Array	Nullable	List of activity types detected during this period (e.g., SEDENTARY, WALKING, RUNNING). Can be null or empty if no specific activity was detected.
distance	Float	Required	Distance traveled in meters during this measurement period. Zero for sedentary periods.
activeCalories	Float	Required	Active calories burned during this period, excluding basal metabolic calories. Zero for sedentary activities.
totalCalories	Float	Required	Total calories burned during this period, including both active and resting metabolic rate calories.

	Data Type	Nullable	Description
heartRate	Integer	Nullable	Heart rate in beats per minute (bpm). Null when device is off-wrist or unable to obtain a reading.
ascent	Float	Required	Vertical elevation gain in meters during this period. Measured using barometric altimeter.
descent	Float	Required	Vertical elevation loss in meters during this period. Measured using barometric altimeter.
moderateIntensityMinutes	Integer	Required	Number of minutes spent in moderate intensity activity zone during this period (typically 0 or 1 for minute-level data).
vigorousIntensityMinutes	Integer	Required	Number of minutes spent in vigorous intensity activity zone during this period (typically 0 or 1 for minute-level data).
intensity	Integer	Required	Activity intensity level ranging from 0-5, where 0 is rest, 1-2 is light, 3-4

	Data Type	Nullable	Description
			is moderate, and 5 is vigorous activity.

HEART_RATE

> **Description:** Contains continuous heart rate monitoring data, typically sampled every 30 seconds during the day.

	Data Type	Nullable	Description
timestamp	`Integer (Unix Epoch)`	Required	Time of heart rate measurement in Unix epoch seconds. Measurements typically occur every 30 seconds during active monitoring.
bpm	`Integer`	Required	Heart rate in beats per minute. Valid range is typically 30-220 bpm for adult humans.
status	`String`	Required	Status of the heart rate reading. "LOCKED" indicates a valid, stable reading with good sensor contact.

WELLNESS_STRESS

Description: Contains stress level and body battery measurements derived from heart rate variability analysis.

	Data Type	Nullable	Description
timestamp	Integer (Unix Epoch)	Required	Time of stress measurement in Unix epoch seconds. Measurements occur approximately every 60 seconds when device is worn.
stressScore	Integer	Nullable	Stress level score ranging from 0-100, where 0-25 is rest, 26-50 is low stress, 51-75 is medium stress, and 76-100 is high stress. Null when device is off-wrist or during invalid readings.
status	String	Required	Status of the stress reading. Values include "VALID" (good reading), "OFF_WRIST" (device not worn), "LARGE_MOTION" (too much movement).
averageStressIntensity	Integer	Nullable	Average stress intensity value. Positive values indicate stressful state, negative values indicate recovery. Value of 101 typically indicates invalid data.

	Data Type	Nullable	Description
bodyBattery	`Integer`	Nullable	Body Battery energy level from 0-100, where 100 is fully charged and 0 is depleted. Increases during rest and sleep, decreases during activity and stress.
bodyBatteryStatus	`String`	Nullable	Status of Body Battery measurement. Values include "BODY_BATTERY_MEASURED" (actual measurement), "BODY_BATTERY_MODELED" (estimated), "BODY_BATTERY_RESET" (manual reset).

WELLNESS_RESPIRATION

> **Description:** Contains respiration rate data measured continuously when the device is worn.

	Data Type	Nullable	Description
timestamp	`Integer (Unix Epoch)`	Required	Time of respiration measurement in Unix epoch seconds. Measurements typically occur every 60 seconds.

	Data Type	Nullable	Description
status	String/Float	Nullable	Status indicator or respiration rate value. Can contain either a status string like "OFF_WRIST" or the actual breathesPerMinute value.
breathesPerMinute	Float	Nullable	Respiration rate in breaths per minute. Normal adult range is 12-20 breaths per minute. Null when device cannot measure (e.g., off-wrist).

WELLNESS_SPO2

> **Description:** Contains blood oxygen saturation (SpO2) measurements taken continuously or on-demand.

	Data Type	Nullable	Description
timestamp	Integer (Unix Epoch)	Required	Time of SpO2 measurement in Unix epoch seconds. Frequency varies based on device settings and activity.
spo2	Integer	Required	Blood oxygen saturation percentage (0-100). Normal range is 95-100% for healthy

	Data Type	Nullable	Description
			adults. Values below 90% may indicate hypoxemia.

ACTIVITY

> **Description:** Contains summary data for recorded activities and workouts, including sports-specific metrics.

	Data Type	Nullable	Description
startTimestamp	`Integer (Unix Epoch)`	Required	Start time of the activity in Unix epoch seconds.
elapsedTime	`Float`	Required	Total elapsed time of activity in seconds, including any paused time.
sport	`String`	Required	Primary sport or activity type (e.g., Walk, Run, Cycling, Swimming).

	Data Type	Nullable	Description
subSport	String	Nullable	Sub-category of sport for more specific classification (e.g., GENERIC, TRAIL, INDOOR).
sportType	String	Required	Standardized sport type identifier (e.g., WALKING, RUNNING, CYCLING).
startLatitude	Float	Nullable	Starting GPS latitude in decimal degrees. Null for indoor activities or when GPS is unavailable.
startLongitude	Float	Nullable	Starting GPS longitude in decimal degrees. Null for indoor activities or when GPS is unavailable.
endLatitude	Float	Nullable	Ending GPS latitude in decimal degrees.
endLongitude	Float	Nullable	Ending GPS longitude in decimal degrees.
cycles	Float	Nullable	Number of cycles/strokes for swimming or rowing activities.

	Data Type	Nullable	Description
distance	Float	Nullable	Total distance traveled in meters during the activity. May be GPS-based or step-based estimation.
calories	Integer	Required	Total calories burned during the activity, including both active and BMR calories.
averageSpeed	Float	Nullable	Average speed in meters per second. Null for stationary activities.
maximumSpeed	Float	Nullable	Maximum speed reached in meters per second.
averageHeartRate	Integer	Nullable	Average heart rate in beats per minute during the activity.
maximumHeartRate	Integer	Nullable	Maximum heart rate in beats per minute reached during the activity.
minimumHeartRate	Integer	Nullable	Minimum heart rate in beats per minute during the activity.

	Data Type	Nullable	Description
averageCadence	Float	Nullable	Average cadence (steps/min for running, rpm for cycling).
maximumCadence	Float	Nullable	Maximum cadence reached during the activity.
averageAltitude	Float	Nullable	Average altitude in meters during the activity.
minimumAltitude	Float	Nullable	Minimum altitude in meters reached during the activity.
maximumAltitude	Float	Nullable	Maximum altitude in meters reached during the activity.
ascent	Float	Nullable	Total vertical elevation gain in meters during the activity.
descent	Float	Nullable	Total vertical elevation loss in meters during the activity.

	Data Type	Nullable	Description
averageSpO2	Integer	Nullable	Average blood oxygen saturation percentage during the activity (if measured).
averageStress	Integer	Nullable	Average stress level during the activity (0-100 scale).
averageRespiration	Float	Nullable	Average respiration rate in breaths per minute during the activity.
rmssdHRV	Float	Nullable	Root Mean Square of Successive Differences - a heart rate variability metric in milliseconds.
sdrrHRV	Float	Nullable	Standard Deviation of RR intervals - another heart rate variability metric in milliseconds.
averageTemperature	Integer	Nullable	Average ambient temperature in Celsius during the activity.
maximumTemperature	Integer	Nullable	Maximum temperature in Celsius during the activity.

	Data Type	Nullable	Description
minimumTemperature	Integer	Nullable	Minimum temperature in Celsius during the activity.
workoutFeel	Integer	Nullable	Subjective workout feeling rating (1-5, where 5 is best).
workoutRpe	Integer	Nullable	Rate of Perceived Exertion (RPE) score (1-10, where 10 is maximum effort).
averagePowerInWatts	Float	Nullable	Average power output in watts (cycling, running with power meters).
maximumPowerInWatts	Float	Nullable	Maximum power output in watts achieved during the activity.

SLEEP

> **Description:** Contains sleep session summaries with start and end times for each sleep period.

	Data Type	Nullable	Description
startTimestamp	Integer (Unix Epoch)	Required	Start time of the sleep session in Unix epoch seconds. Automatically detected when user falls asleep.
endTimestamp	Integer (Unix Epoch)	Required	End time of the sleep session in Unix epoch seconds. Automatically detected when user wakes up.

SLEEP_ASSESSMENT

> **Description:** Contains detailed sleep quality scores and metrics for each sleep session.

	Data Type	Nullable	Description
startTimestamp	Integer (Unix Epoch)	Required	Start time of the sleep assessment period in Unix epoch seconds, matching the SLEEP table.
endTimestamp	String (ISO 8601)	Required	End time of the sleep period in ISO 8601 format (e.g., "2025-10-24T12:20Z").

	Data Type	Nullable	Description
awakeningsCount	Integer	Required	Number of times the user woke up during the sleep period. Fewer awakenings indicate better sleep quality.
awakeningsCountScore	Integer	Required	Score (0-100) for number of awakenings, where higher is better.
awakeTimeScore	Integer	Required	Score (0-100) for time spent awake during sleep, where higher indicates less awake time.
combinedAwakeScore	Integer	Required	Combined score (0-100) for awakening frequency and duration.
deepSleepScore	Integer	Required	Score (0-100) for amount and quality of deep sleep. Deep sleep is important for physical recovery.
lightSleepScore	Integer	Required	Score (0-100) for amount of light sleep. Light sleep helps with memory consolidation.

	Data Type	Nullable	Description
overallSleepScore	Integer	Required	Overall sleep quality score (0-100) combining all sleep metrics. Higher scores indicate better sleep quality.
remSleepScore	Integer	Required	Score (0-100) for amount of REM (Rapid Eye Movement) sleep. REM sleep is critical for cognitive function.
sleepDurationScore	Integer	Required	Score (0-100) for total sleep duration relative to sleep need.
sleepQualityScore	Integer	Required	Score (0-100) for overall sleep quality based on sleep architecture.
sleepRecoveryScore	Integer	Required	Score (0-100) indicating how restorative the sleep was for physical recovery.
sleepRestlessnessScore	Integer	Required	Score (0-100) for movement during sleep, where higher indicates less restlessness.

	Data Type	Nullable	Description
interruptionsScore	`Integer`	Required	Score (0-100) for sleep continuity, where higher indicates fewer interruptions.
averageStressDuringSleep	`Integer`	Required	Average stress level (0-100) during sleep. Lower values indicate more restful sleep.

SLEEP_INTERVALS

> **Description:** Contains granular sleep stage data showing transitions between light, deep, REM, and awake states.

	Data Type	Nullable	Description
startTimestamp	`Integer (Unix Epoch)`	Required	Start time of this sleep stage interval in Unix epoch seconds.
endTimestamp	`Integer (Unix Epoch)`	Required	End time of this sleep stage interval in Unix epoch seconds.

	Data Type	Nullable	Description
sleepLevel	`String`	Required	Sleep stage during this interval. Values: "LIGHT" (light sleep), "DEEP" (deep/slow-wave sleep), "REM" (REM sleep), "AWAKE" (awake periods).

MOTION_INTENSITY

> **Description:** Contains aggregated motion intensity data over variable-length periods, used for activity classification.

	Data Type	Nullable	Description
endTimestamp	`Integer (Unix Epoch)`	Required	End time of the motion intensity period in Unix epoch seconds.
duration	`Integer`	Required	Duration of this motion intensity period in seconds. Can range from 60 seconds to several minutes.
activityType	`String`	Required	Type of activity detected during this period (e.g., SEDENTARY, WALKING, RUNNING, CYCLING).

	Data Type	Nullable	Description
intensity	Integer	Required	Motion intensity level (0-5), where 0 is no movement and 5 is vigorous activity.
hasSteps	Boolean	Required	Indicates whether steps were detected during this period. True for ambulatory activities, false for sedentary or cycling.

FILE_METADATA

Description: Contains metadata about the FIT file and the device that created it.

	Data Type	Nullable	Description
productNumber	Integer	Required	Garmin product number identifying the specific device model (e.g., 4063 for Venu 3).
fitType	Integer	Required	FIT file type identifier. 32 = monitoring/wellness data, 48 = activity data, 49 = sleep data.

	Data Type	Nullable	Description
productName	`String`	Nullable	Human-readable device model name. May be null in some file formats.
deviceUnitId	`Integer`	Required	Unique identifier for the specific device unit. Used to distinguish data from multiple devices.
timeCreatedTimestamp	`Integer (Unix Epoch)`	Required	Time when this FIT file was created on the device in Unix epoch seconds.
softwareVersion	`Float`	Nullable	Firmware/software version running on the device (e.g., 3.29).
manufacturer	`Integer`	Required	Manufacturer code. 1 = Garmin.

RESTING_HEART_RATE

> **Description:** Contains resting heart rate measurements calculated periodically throughout the day.

	Data Type	Nullable	Description
timestamp	`Integer (Unix Epoch)`	Required	Time when resting heart rate was calculated in Unix epoch seconds.
restingHeartRate	`Integer`	Required	Long-term resting heart rate baseline in beats per minute. Updated gradually over days/weeks.
currentDayRestingHeartRate	`Integer`	Required	Current day's resting heart rate in beats per minute. May differ from long-term baseline due to illness, training, etc.

MOVE_IQ

> **Description:** Contains auto-detected activity segments identified by Garmin's Move IQ feature.

	Data Type	Nullable	Description
timestamp	`Integer (Unix Epoch)`	Required	Start time of the auto-detected activity in Unix epoch seconds.

	Data Type	Nullable	Description
activityType	`String`	Required	Type of activity automatically detected (e.g., SEDENTARY, WALKING, RUNNING, CYCLING, ELLIPTICAL).
duration	`Integer`	Required	Duration of the detected activity in minutes.

ENHANCED_BBI

> **Description:** Contains enhanced Beat-to-Beat Interval data with additional quality metrics.

	Data Type	Nullable	Description
timestamp	`Integer (Unix Epoch)`	Required	Time reference in Unix epoch seconds for this batch of BBI measurements.
millis	`Integer`	Required	Milliseconds offset from the timestamp for this specific heartbeat.

	Data Type	Nullable	Description
bbi	`Integer`	Required	Beat-to-Beat Interval in milliseconds between consecutive heartbeats.
status	`String`	Required	Confidence level of the BBI measurement. Values: "HIGH_CONFIDENCE", "MEDIUM_CONFIDENCE", "LOW_CONFIDENCE".
gapDuration	`Integer`	Nullable	Duration in milliseconds of any gap in BBI recording due to signal loss or sensor issues. Null if no gap.

LAPS

> **Description:** Contains lap/interval data for activities, breaking workouts into segments.

	Data Type	Nullable	Description
startTimestamp	`Integer (Unix Epoch)`	Required	Start time of this lap in Unix epoch seconds.

	Data Type	Nullable	Description
totalElapsedTime	Float	Required	Total elapsed time for this lap in seconds.
startLatitude	Float	Nullable	GPS latitude at lap start in decimal degrees.
startLongitude	Float	Nullable	GPS longitude at lap start in decimal degrees.
endLatitude	Float	Nullable	GPS latitude at lap end in decimal degrees.
endLongitude	Float	Nullable	GPS longitude at lap end in decimal degrees.
cycles	Float	Nullable	Number of cycles/strokes in this lap (swimming, rowing).
distance	Float	Nullable	Distance covered in this lap in meters.
calories	Integer	Required	Calories burned during this lap.

	Data Type	Nullable	Description
averageSpeed	`Float`	Nullable	Average speed during this lap in meters per second.
maximumSpeed	`Float`	Nullable	Maximum speed reached during this lap in meters per second.
averageHeartRate	`Integer`	Nullable	Average heart rate during this lap in beats per minute.
maximumHeartRate	`Integer`	Nullable	Maximum heart rate during this lap in beats per minute.
averageCadence	`Float`	Nullable	Average cadence during this lap (steps/min or rpm).
maximumCadence	`Float`	Nullable	Maximum cadence during this lap.
averageTemperature	`Integer`	Nullable	Average temperature during this lap in Celsius.

	Data Type	Nullable	Description
maximumTemperature	`Integer`	Nullable	Maximum temperature during this lap in Celsius.
minimumTemperature	`Integer`	Nullable	Minimum temperature during this lap in Celsius.
averagePowerInWatts	`Float`	Nullable	Average power output during this lap in watts.
maximumPowerInWatts	`Float`	Nullable	Maximum power output during this lap in watts.

RECORDS

> **Description:** Contains second-by-second (or more frequent) detailed activity recording data.

	Data Type	Nullable	Description
timestamp	`Integer (Unix Epoch)`	Required	Time of this record in Unix epoch seconds.
latitude	`Float`	Nullable	GPS latitude in decimal degrees.
longitude	`Float`	Nullable	GPS longitude in decimal degrees.
altitude	`Float`	Nullable	Elevation in meters above sea level.
speed	`Float`	Nullable	Instantaneous speed in meters per second.
heartRate	`Integer`	Nullable	Heart rate in beats per minute at this moment.
cycles	`Float`	Nullable	Cumulative cycles/strokes count (swimming, rowing).
distance	`Float`	Nullable	Cumulative distance in meters from activity start.

	Data Type	Nullable	Description
cadence	`Float`	Nullable	Instantaneous cadence (steps/min or rpm).
respiration	`Float`	Nullable	Respiration rate in breaths per minute.
stress	`Float`	Nullable	Stress level (0-100).
temperature	`Integer`	Nullable	Ambient temperature in Celsius.
powerInWatts	`Float`	Nullable	Instantaneous power output in watts.
hrv	`Array`	Required	Array of heart rate variability measurements (typically empty "[]" in records).

SETS

> **Description:** Contains strength training set data including exercise type, reps, and duration.

	Data Type	Nullable	Description
startTimestamp	`Integer (Unix Epoch)`	Required	Start time of the exercise set in Unix epoch seconds.
duration	`Float`	Required	Duration of the set in seconds.
category	`String`	Required	Exercise category (e.g., CURL, PRESS, SQUAT, ROW).
type	`String`	Required	Set type. "ACTIVE" = exercise set, "REST" = rest period, "INVALID" = discarded set.
repetitions	`Integer`	Nullable	Number of repetitions completed in this set. Null for rest periods or invalid sets.

SPO2

> **Description:** Contains blood oxygen saturation measurements, often taken during activity or on-demand.

	Data Type	Nullable	Description
timestamp	`Integer (Unix Epoch)`	Required	Time of SpO2 measurement in Unix epoch seconds.
spO2Reading	`Integer`	Nullable	Blood oxygen saturation percentage (0-100). Null when measurement failed or device unable to read.

STEPS

> **Description:** Contains step count data over regular intervals (typically 60 seconds).

	Data Type	Nullable	Description
startTimestamp	`Integer (Unix Epoch)`	Required	Start time of step counting interval in Unix epoch seconds.
endTimestamp	`Integer (Unix Epoch)`	Required	End time of step counting interval in Unix epoch seconds.

	Data Type	Nullable	Description
stepCount	`Integer`	Required	Number of steps taken during this interval.
totalSteps	`Integer`	Required	Cumulative step count from an arbitrary starting point (often daily reset).

RESPIRATION

> **Description:** Contains respiration rate data, often collected during activities or sleep.

	Data Type	Nullable	Description
timestamp	`Integer (Unix Epoch)`	Required	Time of respiration measurement in Unix epoch seconds.
breathsPerMinute	`Float`	Required	Respiration rate in breaths per minute.
respirationStatus	`String`	Required	Status of the respiration measurement. "VALID" indicates a good reading.

STRESS

Description: Contains stress level data, similar to WELLNESS_STRESS but from different contexts (e.g., activities).

	Data Type	Nullable	Description
timestamp	Integer (Unix Epoch)	Required	Time of stress measurement in Unix epoch seconds.
stressScore	Integer	Required	Stress level score (0-100), where higher values indicate greater stress.
stressStatus	String	Required	Status of the stress reading. "VALID" indicates a good measurement.
averageStressIntensity	Integer	Nullable	Average stress intensity value. Can be null during certain measurement conditions.
bodyBattery	Integer	Nullable	Body Battery energy level (0-100) at time of measurement.

	Data Type	Nullable	Description
bodyBatteryStatus	`String`	Nullable	Status of Body Battery measurement (MEASURED, MODELED, etc.).

EVENT_DATA

> **Description:** Contains system and device events such as file operations and sensor state changes.

	Data Type	Nullable	Description
timestamp	`Integer (Unix Epoch)`	Required	Time when event occurred in Unix epoch seconds.
eventType	`String`	Required	Type of event. Examples: "FILE_OPENED_FILE_FULL", "ON_WRIST", "OFF_WRIST", "TIMER_START", "TIMER_STOP".

WRIST_EVENTS

> **Description:** Contains detailed wrist wear status tracking at regular intervals.

	Data Type	Nullable	Description
timestamp	Integer (Unix Epoch)	Required	Time of wrist status check in Unix epoch seconds. Typically checked every 60 seconds.
status	String	Required	Wrist wear status. "ON_WRIST" = device is being worn, "OFF_WRIST" = device removed.

BLOOD _PRESSURE

Description: Blood pressure measurements taken with a Garmin blood pressure cuff

	Data Type	Nullable	Description
Measurementtime	Integer	Required	Time of blood pressure measurement locally.
MeasurementTimeUTC	Integer	Required	Time of blood pressure measurement in UTC time.

	Data Type	Nullable	Description
Systolic	`Integer`	Required	The measurement's top number, representing pressure in the arteries when the heart beats
Diastolic	`Integer`	Required	The measurement's bottom number, representing the pressure in arteries between heartbeats
Pulse	`Integer`	Required	Heart rate in beats per minute measured concurrently with blood pressure
SourceType	`String`	Required	Whether measurement was taken via device or added manually using the Garmin Connect app