Appendix 6. Data export file: contents

The Firstbeat HEALTH software contains a data export feature, with which the essential information calculated from heartbeat data can be stored into a .csv file. This file format is compatible with common data analysis programs, e.g. MS Excel and SPSS.

CSV-Files

Data export provides three separate files. One contains the analysis version, measurement start time, original and corrected RR data and artifact data that counterparts with corrected RR data and tells if the RR-interval is modified with artifact correction. This file has _IBI suffix in file name. The second contains the analysis version and an RMSSD vector in five and one minute sampling frequency. This file has _MiscVectors suffix in file name. The third is main export file containing the most essential analysis results.

The table below describes the main .csv file format produced by the Data export. One file will include data from one single session analyzed. File comprises from PERSON PROFILE, SCALAR VARIABLES and VECTORS.

PERSON PROFILE includes personal background values used in the analysis of the session. SCALAR VARIABLES are single values calculated from the session and VECTORS describe value from each respective moment of the session. Sampling frequency of the vectors is one second, meaning that each data point corresponds to one second in time, e.g., vector 120 points long corresponds to two minutes in time.

PERSON PROFILE		
Identifier	Unit	Explanation
Person name		Name
Date of birth	dd.mm.yyyy	Date of birth
Gender		Gender
Smoking	TRUE|FALSE	Does the person smoke more than 10 cigarettes per day?
Height	Cm	Height
Weight	Kg	Weight
Activity class	(0 -> 10)	Activity class 0-7 according to Jackson et al. (1990), 7.5, 8, 8.5, 9, 9.5 ja 10 according to Firstbeat.
Heart beat max	times/min	Maximal heart rate
Heart beat min	times/min	Resting heart rate
MET max	MET	Maximal performance METs (MET max = VO_{2max} (ml/kg/min) / 3,5 ml/kg/min)
Vital capacity	L	Lung volume
SCALAR VARIABLES		
Identifier	Unit	Explanation
Description	Text	Value of the Description field in Firstbeat Pro software.
SessionStartDate	dd.mm.yyyy	Session start date
SessionStartTime	hh:min:sec	Session start time

SessionTotalTime	Min	Session total time
DetectedArtifactPercentage	%	Grade of detected and corrected artifacts in RRVector.
RelaxationTime	Min	Total time of relaxation
StressTime	Min	Total time of stress
TimeBelow20pMETMax	Min	Total time in minutes of periods where intensity was less than 20% of METmax.
Time20pTo30pMETMax	Min	Total time in minutes of periods where intensity was between 20% and 30% of METmax.
TimeOver30pMETMax	Min	Total time in minutes of periods where intensity was over 30% of METmax.
Time4MinPeriods30pTo40pMETMax	Min	Total time in minutes of over 4 minute periods where intensity was between 30% and 40% of METmax.
Time4MinPeriodsOver40pMETMax	Min	Total time in minutes of over 4 minute periods where intensity was over 40% of METmax.
AverageHR	times/min	Session average heart rate
AverageRespR	times/min	Session average respiration rate
AverageVentilation	l/min	Session average ventilation
AverageVO2	ml/kg/min	Session average oxygen consumption
AveragepMETmax	%	Session average relative oxygen consumption
MaxHR	times/min	Session highest 10 second average heart rate
MaxRespR	times/min	Session peak respiration rate
MaxVentilation	l/min	Session peak ventilation
MaxVO2	ml/kg/min	Session peak oxygen consumption
MaxpMETmax	%	Session peak relative oxygen consumption
MinHR	times/min	Session lowest 10 second average heart rate
EETotal	Kcal	Session total energy expenditure
EECH	Kcal	Session total energy expenditure from carbon hydrates
EEFat	Kcal	Session total energy expenditure from fat
EEPredictRest	Kcal	An estimate of energy expenditure for 24 hours based on measurement. For the unmeasured period there is assumed that energy expenditure is in resting level.
EEBelow20pMETMax	Kcal	Total energy expenditure in periods where intensity was less than 20% of METmax.
EE20pTo30pMETMax	Kcal	Total energy expenditure in periods where intensity was between 20% and 30% of METmax.
EEOver30pMETMax	Kcal	Total energy expenditure in periods where intensity was over 30% of METmax.
TrainingEffect	(1.0 -> 5.0)	Training Effect revealing the effect of session exercise on performance level
EPOCPeak	ml/kg	Session peak EPOC value
HealthIndex	(0 -> 100)	Health index revealing whether session physical activity had an health enhancing effects
AbsoluteStressIndex	Index	Absolute index of stress as the average absolute stress level of the session during periods when stress

		state is detected
AbsoluteRelaxationIndex	Index	Absolute index of relaxation as the average absolute relaxation level of the session during periods when stress state is detected
RelaxationPercentage	%	Proportion of relaxation from session total time
StressPercentage	%	Proportion of stress from session total time
StressBalance	(-1.00 -> 1.00)	Index revealing the balance between stress and relaxation. Negative values indicate that the balance is towards stress and positive values positive values that the balance is towards relaxation
BeatByBeatRMSSD	Ms	Heart rate variability variable RMSSD (Root Mean Square of Successive Differences in RR intervals) describing the variation in consecutive rr-intervals.
BeatByBeatSD	Ms	Heart rate variability variable, standard deviation of successive heart beat intervals of the whole session
HFAverage	ms^2	Mean of the high frequency (0.15-0.4 HZ) heart rate variability power during the session
LFAverage	ms^2	Mean of the low frequency (0.04-0.15 HZ) heart rate variability power during the session
HF2Average	ms^2	Mean of the high frequency (0.15-1.0 HZ) heart rate variability power during the session
LFHFRatio	Ratio	Mean ratio between the low frequency (0.04-0.15 HZ) and the high frequency (0.15-0.4 HZ) heart rate variability power (LF/HF) during the session
LFHF2Ratio	Ratio	Mean ratio between the low frequency (0.04-0.15 HZ) the high frequency (0.15-1.0 HZ) heart rate variability power (LF/HF2) during the session
VECTORS		
Identifier	Unit	Explanation
CumulativeSecondVector	hh:min:sec	Cumulative time starting from the beginning of the session
RealTimeVector	hh:min:sec	Real time
StateVector	(1 -> 10)	Statevector indicating which Firstbeat determined state is currently on at each respective moment. State indexes: 1) physical exercise >95%VO_{2max}, 2) 95-75%VO_{2max}, 3) 75-50%VO_{2max}, 4) 50-30%VO_{2max}, 5) light physical activity, 6) relaxation, 7) recovery from physical exercise, 9) stress, 10) unrecognized state.
ArtifactCorrectedHRVector	beats/min	Artefact corrected heart rate vector
METMaxPercentageVector	%	Proprotional intensity vector: oxygen consumption vector scaled according to maximal oxygen consumption
VO2Vector	ml/kg/min	Oxygen consumption vector
EPOCVector	ml/kg	EPOC vector
RespRVector	breaths/min	Respiration rate vector
VentilationVector	liters/min	Ventilation vector

EEVector	kcal/min	Total Energy expenditure vector
EepFatVector	kcal/min	Energy expenditure from fats vector
ResourceVector	Index	Resources vector revealing the accumulation or reduction of body resources during the session
AbsoluteStressVector	Index	Absolute vector of stress, revealing the momentary absolute level of stress during the session
AbsoluteRelaxationVector	Index	Absolute vector of relaxation, revealing the momentary absolute level of relaxation during the session
ScaledStressVector	(0.00 -> 1.00)	Relative vector of stress, revealing the momentary proportional level of stress proportioned by the maximal stress value during the session
ScaledRelaxationVector	(0.00 -> 1.00)	Relative vector of relaxation, revealing the momentary proportional level of relaxation proportioned by the maximal relaxation value during the session
VLFVector	ms^2	Vector of very low frequency (0.03-0.04 Hz) heart rate variability power, determining the momentary level of heart rate variability at this spectral band during the session
LFVector	ms^2	Vector of low frequency (0.04-0.15 Hz) heart rate variability, determining the momentary level of heart rate variability at this spectral band during the session
HFVector	ms^2	Vector of high frequency (0.15-0.4 Hz) heart rate variability power, determining the momentary level of heart rate variability at this spectral band during the session
HF2Vector	ms^2	Vector of very low frequency (0.15-1.0 Hz) heart rate variability power, determining the momentary level of heart rate variability at this spectral band during the session
RSAAmplitudeVector	Ms	Vector of RSA (respiratory sinus arrhythmia) amplitude, which is determined as the mean heart rate variability power at the heart beat derived respiration frequency (+0.01- -0.01). This reveals the effect of respiration on heart rate variability power.