Polar HRM2
File Format Description

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1. General Information

The following Polar HRM file format is used in Polar software products. The data includes the exercise information transferred from the following Polar products:

- Polar Sport Tester (PST)
- Polar Vantage XL (VXL)
- Polar Vantage NV (VNV)
- Polar Accurex Plus (Acc+)
- Polar XTrainer Plus (XTr+)
- Polar Coach
- Polar S610 / S610i / S625X
- Polar S710 / S710i / S720i / S725 / S725X
- Polar S810 / S810i
- Polar E600
- Polar AXN500, Polar AXN700

For further information about HR monitor specific features, see HR monitor user's manuals. Make sure to handle the HRM file version number correctly. Version modifications are marked with * and #.

The data is stored in ASCII format. CR and LF (0Dh and 0Ah) at the end of each line. There is one empty line between each data section. The data section name is separated from actual data always with brackets [ ].

2. General Parameters

DATA	COMMENTS
[Params]	Basic settings
Version=107	Exact hrm file version (1.02, 1.05*, 1.06#, 1.07&).
Monitor=1	Heart rate monitor type 1 = Polar Sport Tester / Vantage XL 2 = Polar Vantage NV (VNV) 3 = Polar Accurex Plus 4 = Polar XTrainer Plus 6 = Polar S520 7 = Polar Coach 8 = Polar S210 9 = Polar S410 10 = Polar S510 11 = Polar S610 / S610i 12 = Polar S710 / S710i / S720i 13 = Polar S810 / S810i 15 = Polar E600

	20 = Polar AXN500 21 = Polar AXN700 22 = Polar S625X / S725X 23 = Polar S725
Mode=110 (abc) With versions → 1.05	Data types: a) Cad/Alt: 0 = Cad, 1 = Alt, 3 = None b) CC data 0 = HR data only, 1 = HR + cycling data c) US / Euro unit 0 = Euro (km, km/h, m) 1 = US (miles, mph, ft) All distance, speed and altitude values depend on US/Euro unit selection (km / miles, km/h / mph, m / ft).
SMode=11011010 (abcdefgh) With versions 1.06 SMode=110110100 (abcdefghi) With versions 1.07 →	Data type parameters a) Speed (0=off, 1=on) b) Cadence (0=off, 1=on) c) Altitude (0=off, 1=on) d) Power (0=off, 1=on) e) Power Left Right Balance (0=off, 1=on) f) Power Pedalling Index (0=off, 1=on) g) HR/CC data 0 = HR data only, 1 = HR + cycling data h) US / Euro unit 0 = Euro (km, km/h, m, °C) 1 = US (miles, mph, ft, °F) All distance, speed, altitude and temperature values depend on US/Euro unit selection (km / miles, km/h / mph, m / ft, °C / °F). i) Air pressure (0=off, 1=on) [&]
Date=20040831	Date of exercise (yyyymmdd) For example 20040831means 31st August 2004)
StartTime=14:23:36.0	Start time (hh:mm:ss.d) If hours are less than 10, format h:mm:ss.d have also been used. Check time format by checking : character.
Length=00:30:00.4	Length of exercise (hh:mm:ss.d) If hours are less than 10, format h:mm:ss.d have also been used. Check time format by checking : character.
Interval=5	Data type: 5 = 5 seconds recording interval 15 = 15 seconds recording interval 30 = 30 seconds recording interval 60 = 60 seconds recording interval 120 = 120 seconds recording interval (dynamic) 240 = 240 seconds recording interval (dynamic) 300 = 5 minutes recording interval 480 = 480 seconds recording interval (dynamic) 238 = R - R data (VNV, S810, S810i) 204 = intermediate times only (PST, VXL, VNV, XTr+, Acc+)

Upper1=160	Upper limit 1 (bpm)
Lower1=80	Lower limit 1 (bpm)
Upper2=160	Upper limit 2 (bpm)
Lower2=80	Lower limit 2 (bpm)
Upper3=160	Upper threshold / Upper limit 3 (bpm)
Lower3=80	Lower threshold / Lower limit 3 (bpm)
Timer1=00:00	Exercise timer 1 (mm:ss)
Timer2=00:00	Exercise timer 2 (mm:ss)
Timer3=00:00	Exercise timer 3 (mm:ss)
ActiveLimit=0	Limits in use in “File Summary”: 0 = Limits 1 and 2, 1 = Treshold limits
MaxHR=195	Personal max heart rate (bpm)
RestHR=52	Personal resting heart rate (bpm)
StartDelay=300	RR Start delay (ms) (Vantage NV RR data only)
VO2max=50	VO2max at time of exercise (for calories calculation) ml/min/kg #
Weight=75	Weight at time of exercise (for calories calculation) kg#

3. Polar Coach Parameters

DATA			COMMENTS
[Coach]			Polar Coach data section
000128			Coach flag data in bit fields
0	0		Recovery data ; result HR, result time (in seconds)
0	0		Interval data ; HR average, interval time (in seconds)
0	1175	26	Target zone 1 data ; (below tz, in tz, above tz) in seconds
0	0	0	Target zone 2 data ; (below tz, in tz, above tz) in seconds
0	0	0	Target zone 3 data ; (below tz, in tz, above tz) in seconds
128	164		Average Hr of the exercise, maximum Hr of the exercise

Flags 8 - bits are in use, (87654321), rest of the bits are reserver for future needs
- 8 bit, 1 = recovery not used
- 7 bit, 1 = negative recovery
- 6 bit, 1 = recording in continious interval mode
- 5 bit, 1 = interval mode used during recording
- 4 bit, 1 = time recovery calculation enabled during recording
- 3 bit, 1 = HR recovery calculation enabled during recording
- 2 bit, 1 = Limit 3 enabled during recording
- 1 bit, 1 = Limit 2 enabled during recording

Note: Coach parameters are only from Polar Coach HR monitor.

4. Exercise Note

DATA	COMMENTS
[Note]	Notes
Note!	Max 250 ASCII characters

5. HR Zones

DATA	COMMENTS
[HRZones]	Heart rate zones used for this exercise
190	Zone 1 upper limit (bpm)
180	Zone 2 upper limit (bpm) = Zone 1 lower limit
170	Zone 3 upper limit (bpm)
160	Zone 4 upper limit (bpm)
150	Zone 5 upper limit (bpm)
140	Zone 6 upper limit (bpm)
0	Zone 7 upper limit (bpm)
0	Zone 8 upper limit (bpm)
0	Zone 9 upper limit (bpm)
0	Zone 10 upper limit (bpm)
0	Zone 10 lower limit (bpm)

6. HR Limit Swaps

DATA		COMMENTS
[SwapTimes]		Time when HR limits have been swapped between limits 1, 2 and 3. By default the limits 1 are starting limits. Limit index is zero-based.
00:10:00.0	1	Time when limits have been changed to limits 2
00:20:00.0	2	Time when limits have been changed to limits 3
00:30:00.0	0	Time when limits have been changed to limits 1

7. HR/CC Mode Swaps

HR/CC mode swaps are available only with Polar XTrainer Plus.

DATA		COMMENTS
[HRCCModeCh]		Mode change
00:00:0.0	32	HR to CC (The change from HR measurement to cycling measurement mode at time hh:mm:ss.d)
00:05:54.7	16	CC to HR

8. Lap Times

DATA			COMMENTS			
[IntTimes]						Lap times
00:03:43.7		123	100	150	200	Row 1
32	0	0	0	0	0	Row 2 Lap time 0
0	0	0	0	0		Row 3
0	400	455	21	0	0	Row 4#
0	0	0	0	0	0	Row 5#
00:04:54.7		159	130	170	200	Row 1
32	0	0	0	0	0	Row 2 Lap time 1
0	0	0	0	0		Row 3
0	400	470	21	0	0	Row 4#
0	0	0	0	0	0	Row 5#

Field descriptions:

[IntTimes]						Lap times
Time	HR	HR min	HR avg	HR max		Row 1
Flags	Rec. Time	Rec. HR	Speed	Cad	Alt	Row 2
Extra1	Extra2	Extra3	Asc	Dist		Row 3
Lap type	Lap Dist	Power	Temperature	PhaseLap	0	Row 4#
0	0	0	0	0		Row 5#

Row 1

Time	Lap time in format hh:mm:ss.d
HR	Momentary heart rate value in bpm
HR min	Lap's minimum heart rate value in bpm
HR avg	Lap's average heart rate value in bpm
HR max	Lap's maximum heart rate value in bpm

Row 2

Flags	Misc lap time information in 8 bits, 87654321 bit 8 = Polar Coach lap/interval flag (0 = lap, 1 = interval) bit 7 = Int. time erased (for conconi test, not included to calculation) bit 6 = Int. type (0 = fixed, 1 = from hrm) bit 5 = Extra data 3 (1 = selected to draw) bit 4 = Extra data 2 (1 = selected to draw) bit 3 = Extra data 1 (1 = selected to draw) bits 1,2 = Recovery (0 = no rec, 1 = Time rec, 2 = HR rec)
Rec. Time	Recovery time (seconds)
Rec. HR	Recovery HR (bpm)
Speed	Momentary speed in Xtrainer units (km/h or mph = X/128)

Cad Momentary cadence (rpm)
Alt Momentary altitude (HRM version 1.02: 10m / 10ft, version 1.05→ 1m/1ft)*

Row 3
Extra 1 - 3 Values of extra data series (0 - 3000) (the actual value is multiplied by ten)
Asc Lap ascent value from XTr+ 10m / 10ft
Dist Lap distance value from XTr+ 0.1km / 0.1ft

Row 4#
Lap type Lap type identifier, replaces flag 8 (Polar Coach lap/interval flag) value

Type	Description	Type	Description
0	normal lap	8192	end of exercise
1	interval	16384	off road
2	start of exercise	32768	road
4	finishing line	65536	head wind
8	uphill	131072	tail wind
16	downhill	262144	Score / goal
32	service	524288	penalty
64	stopped		
128	orienteering marker		
256	u-turn		
512	summit / peak		
1024	sprint		
2048	crash		
4096	timeout		

Lap Dist Manually given lap distance in meters / yards, units are depending on US/Euro unit selection
Power Momentary power value in Watts
Temperature Momentary temperature value in Celcius / Fahrenheit, units are depending on US/Euro unit selection (temperature automatically only from S710)
PhaseLap Internal phase/lap information used for interval calculation

The rest of the new lap time parameters are reserved for future usage.
Lap times were fromerly known as Intermediate times.

9. Lap Time notes

DATA		COMMENTS
[IntNotes]		Intermediate time note texts
3	Traffic lights	Third intermediate time's note text.
5	Interval	Fifth intermediate time's note text.

10. Extra Data Series

DATA	COMMENTS
[ExtraData]	Extra data names and units (max 3 series)
Lactate mmol/l 15 0 Power W 2000 0	Extra data 1 name Extra data 1 unit, max value, min value Extra data 2 name Extra data 2 unit, max value, min value

11. HR Limit Summary

DATA						COMMENTS
[Summary-123]						File summary
3780 195	10 160	40 80	3700 52	30	0	Summary for limits 1 (row 1) Limit values for limits 1 (row 2)
0 195	0 160	0 80	0 52	0	0	Summary for limits 2 (row 1) Limit values for limits 2 (row 2)
0 195	0 160	0 80	0 52	0	0	Summary for limits 3 (row 1) Limit values for limits 3 (row 2)
0	756					756 x 5 secs/sample = 3780 sec Maximum of 20 selections/file

Row 1

3780 = Total time for selection in seconds (=10+40+3700+30+0)
10 = Time in seconds when the HR was above maximum
40 = Time in seconds when the HR was between UL1 and maximum
3700 = Time in seconds when the HR was between UL1 and LL1
30 = Time in seconds when the HR was between LL1 and rest HR
0 = Time in seconds below rest HR

Row 2

195 = Max. HR
160 = Upper limit 1
80 = Lower limit 1
52 = Rest HR

Summary information for limits 2 and 3 follow the same pattern.

The row of selection

0 = Selection start sample
756 = Selection end sample

12. HR Threshold Summary

DATA						COMMENTS
[Summary-TH]						
3780	10	40	3700	30	0	Summary for threshold limits (row 1)
195	160	80	52			Limit values for th. limits (row 2)
0	756					756 x 5 secs/sample = 3780 sec
						Maximum of 20 selections/file

Row 1

- 3780 = Total time for selection in seconds (=10+40+3700+30+0)
- 10 = Time in seconds when the HR was above maximum
- 40 = Time in seconds when the HR was between upper TH and maximum
- 3700 = Time in seconds when the HR was between lower and upper TH
- 30 = Time in seconds when the HR was lower TH and rest HR
- 0 = Time in seconds below rest HR

Row 2

- 195 = Maximum HR
- 160 = Upper (anaerobic) threshold
- 80 = Lower (aerobic) threshold
- 52 = Resting HR

Row 3

- 0 = Selection start sample
- 756 = Selection end sample

13. Cycling Parameters

Cycling parameters are available from XTr+, S710, S710i, S720i, S725.

DATA	COMMENTS
[Trip]	Cycling trip data
87	Distance = 8,7 km / mile
1400	Ascent (hrm 1.02 10m / 10ft, hrm 1.05→ 1m / 1ft) *
92982	Total time in seconds
1159	Average altitude (HRM 1.02 10m / 10ft, HRM 1.05→ 1m / 1ft) *
1304	Maximum altitude (HRM 1.02 10m / 10ft, HRM 1.05→ 1m / 1ft) *
1882	Average speed = 1882 / 128 = 14,7 km/h / mph
3396	Maximum speed = 3396 / 128 = 26,5 km/h / mph
418	Odometer value at the end of an exercise, 418 = 418 km / mile

14. Heart Rate Data

The following data format is valid when there is only heart rate information in exercise file.

DATA	COMMENTS
[HRData]	Heart rate data
83 86 85 94 103 106 107	Heart rate When the recording interval is 5,15, 60, … seconds, the value of the heart rate is between 0 and 250 bpm. When the recording interval (=data type) is 238 (=R-R), the value is R-R interval in milliseconds (=>HR[bpm] = 60000/RR). When the interval is 204 (= int times only), there are no values, only the header "[HRData]".

15. Extended Heart Rate Data

The following data format is for HRM versions →1.05

DATA	COMMENTS	
[HRData] Heart Rates (bpm)	Speed (0.1 km/h / mph)	Cadence (rpm) *or* Altitude (m/ft, see below) *(optional field)*
86 94 107 108	161 165 118 126	770 770 770 790

Values are separated by tab characters.

Speed: If US units are used, speed value 165 means 16.5 mph. If Euro units are used, speed value 165 means 16.5 km/h.

Altitude: Altitude values with hrm version 1.02 in format 10m / 10ft (to get correct value, multiply the altitude value by ten) and with hrm version 1.05 in format 1m / 1ft *

Cadence: The cadence field is optional and available only when cadence was recorded into exercise file. The availability of cadence is saved into Mode=… (→ v1.05, a) Cad/Alt = 1).

Air pressure: The air pressure field is optional and available only when air pressure was recorded into file. Air pressure can be saved with Polar AXN500 and AXN700 outdoor computers.

The following data format is for HRM version 1.06→

DATA	COMMENTS				
[HRData] Heart Rates (bpm)	Speed (0.1 km/h or mph)	Cadence (rpm)	Altitude (m/ft)	Power (Watts)	Power Balance and Pedalling Index
83 85 94	173 171 165	81 90 92	760 780 770	325 340 335	12857 12857 12857

The following data format is for HRM version 1.07 →

DATA	COMMENTS					
[HRData] Heart Rates (bpm)	Speed (0.1 km/h or mph)	Cadence (rpm)	Altitude (m/ft)	Power (Watts)	Power Balance and Pedalling Index	Air pressure
83 85 94	173 171 165	81 90 92	760 780 770	325 340 335	12857 12857 12857	1004 1003 1003

The cycling data fields are optional and are available if exercise contains cycling data. The SMode field at [Params] section describes the data available.

- Speed is available if SMode a=1
- Cadence is available if SMode b=1
- Altitude is available if SMode c=1
- Power (watts) is available if SMode d=1
- Power (LRB and PI) are available if SMode e=1
- Air pressure is available if SMode i=1

Power LRB + PI: The second power value contains Left Right Balance (LRB) and Pedalling Index (PI) values in the following formula:

value = PI * 256 + LRB

PI bits 15-8	LRB bits 7-0

LRB is the value of left foot ➔ for example if LRB = 45, actual balance is L45 - 55R.
PI values are percentages from 0 to 100. For example value 12857 (= 40 * 256 + 47) means: PI = 40 and LRB = 47 => L47 - 53R