

Optical PARTicle Size and fall VELOCITY distribution Parsivel

DATA FROMAT

Date;Time;Intensity (mm/h);Precipitation since start (mm);Weather code SYNOP WaWa;Radar reflectivity (dBz);MOR Visibility (m);Number of detected particles;Temperature in sensor (°C);Spectrum

Example:

12.09.2008; 23:28:00; 0.000; 0.77; 0; -9.999; 5000; 0; 29;
<SPECTRUM>ZERO</SPECTRUM>

Date (ddmmyyyy); 12.09.2008

Time (UTC); 23:28:00

Intensity (mm/h); 0.000

Precipitation since start (mm); 0.77

Weather code SYNOP WaWa; 0 (description see below; Table 4680)

Radar reflectivity (dBz); -9.999

MOR Visibility (m); 5000

Number of detected particles; 0

Temperature in sensor (°C); 29

Spectrum (number of counts): if the number of detected particles = 0 the no spectrum is detected; Spectrum is recorded first 32 diameter classes, then 32 fall velocity classes (see below)

Appendix B: Classification of precipitation types

After determining the volume equivalent diameter (D) and the particle speed (V) Parsivel subdivides the particles into appropriate classes. The scale of this classification is smaller for small, slow particles than for large and fast particles.

B.1 Class limits

The measured particles are subdivided into D and V classes in a two-dimensional field, wherein there are 32 different D and V classes so that there are a total of $32 \times 32 = 1024$ classes.

Classification according to volume-equivalent diameter

Class Number	Class Average in mm	Class Spread in mm
1	0.062	0.125
2	0.187	0.125
3	0.312	0.125
4	0.437	0.125
5	0.562	0.125
6	0.687	0.125
7	0.812	0.125
8	0.937	0.125
9	1.062	0.125
10	1.187	0.125
11	1.375	0.250
12	1.625	0.250
13	1.875	0.250
14	2.125	0.250
15	2.375	0.250
16	2.750	0.500
17	3.250	0.500
18	3.750	0.500
19	4.250	0.500
20	4.750	0.500
21	5.500	1.000
22	6.500	1.000
23	7.500	1.000
24	8.500	1.000
25	9.500	1.000
26	11.000	2.000
27	13.000	2.000
28	15.000	2.000
29	17.000	2.000
30	19.000	2.000
31	21.500	3.000
32	24.500	3.000

Note:

Class 1 and Class 2 are limits and are not evaluated at the current time in measurements using the Parsivel since they are outside the measurement range of the device.

Classification according to speed

Class Number	Class average in m/s	Class spread in m/s
1	0.050	0.100
2	0.150	0.100
3	0.250	0.100
4	0.350	0.100
5	0.450	0.100
6	0.550	0.100
7	0.650	0.100
8	0.750	0.100
9	0.850	0.100
10	0.950	0.100
11	1.100	0.200
12	1.300	0.200
13	1.500	0.200
14	1.700	0.200
15	1.900	0.200
16	2.200	0.400
17	2.600	0.400
18	3.000	0.400
19	3.400	0.400
20	3.800	0.400
21	4.400	0.800
22	5.200	0.800
23	6.000	0.800
24	6.800	0.800
25	7.600	0.800
26	8.800	1.600
27	10.400	1.600
28	12.000	1.600
29	13.600	1.600
30	15.200	1.600
31	17.600	3.200
32	20.800	3.200

Appendix C: Characterization of precipitation types by precipitation codes

From the classification of precipitation particles, Parsivel calculates the rain rate. The type of precipitation is based on the number of particles within the measurement range, and the precipitation code is determined from the precipitation rate R (in mm/h of an equivalent amount of water).

C.1 Precipitation code according to SYNOP

The definitions of the precipitation codes below are listed according to the following tables:

► SYNOP $w_a w_a$ Table 4680

► SYNOP $w w$ Table 4677

Drizzle

Intensity	Rain rate [mm/h]	Tab. 4680	Tab. 4677
light	≤ 0.2	51	51
moderate	0.2 ...0.5	52	53
strong	≥ 0.5	53	55

Drizzle with rain

Intensity	Rain rate [mm/h]	Tab. 4680	Tab. 4677
light	≤ 0.2	57	58
moderate	0.2 ...0.5	58	59
strong	≥ 0.5	58	59

Rain

Intensity	Rain rate [mm/h]	Tab. 4680	Tab. 4677
light	≤ 0.2	61	61
moderate	0.5 ...4.0	62	63
strong	≥ 4.0	63	65

Rain, drizzle with snow

Intensity	Rain rate [mm/h]	Tab. 4680	Tab. 4677
light	≤ 0.5	67	68
moderate	> 0.5	68	69

Snow

Intensity	Rain rate [mm/h]	Tab. 4680	Tab. 4677
light	≤ 0.5	71	71
moderate	0.5 ...4.0	72	73
strong	≥ 4.0	73	75

Snow grains

Intensity	Rain rate [mm/h]	Tab. 4680	Tab. 4677
light	≤ 0.5	77	77
moderate	0.5 ...4.0	77	77
strong	≥ 4.0	77	77

Freezing rain

Intensity	Rain rate [mm/h]	Tab. 4680	Tab. 4677
light	≤ 0.4	87	87
moderate	> 0.4	88	88

Hail

Intensity	Rain rate [mm/h]	Tab. 4680	Tab. 4677
light	≤ 7.5	89	89
moderate	≥ 7.5	89	90

