

ATTACHMENT

CREX TEMPLATE EXAMPLES

PROPOSED BLOEMHOF FLOOD MONITORING CREX CODE (HYDROLOGY)

INDICATOR SECTION AND DATA DESCRIPTION SECTION

CREX++
T000101 A000 D05004++

STATION IDENTIFICATION

Sequence : D01030 consisting of
B01018 : WMO Station Identifier
B02001 : Type of Station
D01011 : Date
D01024 : Latitude and Longitude and Height

HOURLY ENVIRONMENTAL DATA

Sequence : D05002 consisting of
D01012 : Time (hour,minute)
B12001 : Air Temperature
B13003 : Relative Humidity
B14051 : Direct Solar radiation during the last hour
B13060 : Total Accumulated Precipitation (modulo 10000kg m⁻²)
B13072 : Downstream Water Level
B13080 : pH
B13081 : Conductivity
B13082 : Water Temperature
B13083 : Dissolved Oxygen
B13084 : Turbidity

MULTIPLE MEASUREMENT ARRAY DEFINITION

Sequence : D05003 consisting of
D01012 : Time of first measurement (hour,minute) minus increment
B04065 : Short time increment - Time interval between measurements in the array (12 minutes)
R01000 : Delayed replication of one next descriptor (D05001) - Number of measurements in the array (5)
D05001 : Single measurement

SINGLE MEASUREMENT

Sequence : D05001 consisting of
B11001 : Wind direction
B11002 : Wind speed
B13060 : Total Accumulated Precipitation (modulo 10000kg m⁻²)
B13071 : Upstream Water Level

END OF MESSAGE

...++
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Thus the format of the message D05004 for the BLOEMHOF Flood Monitoring System will be :

Indicator section and data description section then:
D01030 : Identification
D05002 : Hourly instantaneous values
D05003 : Array Definition
n x D05001 : Multiple measurements
++ 7777 : End of message

EXAMPLE

A CREX message transmitted at 10h46 would be the following:

```
CREX++
T000101 A000 D05004++
12345 2 1998 02 03 -2600 2800 01570
10 00 285 065 0326 03842 0683 075 2600 2805 // 0156
09 00 12 0005
290 0102 00012 1226
250 0250 00025 1230
245 0175 00028 1235
230 0105 00004 1241
220 0025 00001 1249++
7777
```

Note that: the + at end of lines are not needed, only at the end of the whole report (in that case after 1249 - last line) and only if a whole message was to be repeated, one or more times. The whole message from 12345 to 1249 is called a "subset" (see regulation 95.4.1). The space before -2600 is required for transmission purpose, but optional for display (to keep alignment). Fifth line, last group = delayed replication - 4 digits only = 0005.

Line 1 : message identification

Line 3 :

Station number : 12345
Station Type : 2
Date of main measurement : 3rd Feb 1998
Position of station : 26 degrees South, 28 degrees East, 1570m high

Line 4 :

Time of hourly measurement : 10:00
Air temperature at 10H00 : 28,50°C
Relative Humidity at 10H00 : 65%
Direct solar radiation integrated over the period 9H00 to 10H00 : 326000 J m⁻²
Total accumulated precipitation at 10H00 : 0384.2 kg m⁻²
Down Stream Water Level at 10H00 : 6,83m
Water pH : 7.5
Conductivity at 10H00 : 2,6 Siemens m⁻¹ = 26 mS cm⁻¹
Water temperature at 10H00 : 280,5K
Dissolved Oxygen at 10H00 : Not available
Turbidity at 10H00 : 156 Lumen

Line 5 : Measurement array definition

First measurement minus 12 minutes at 9H00
Interval between measurements is 12 minutes
Number of measurements is 5

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Line 6 : First set of measurements at 09H12
Instantaneous wind direction at 9H12 : 290
Instantaneous wind speed at 9H12 : 10,2 m s⁻¹
Total precipitation between 9H00 and 9H12 : 1,2 kg m⁻²
Upstream water level at 9H12 : 12,26m

Line 7 : Second set of measurements at 09H24
Instantaneous wind direction at 9H24 : 250
Instantaneous wind speed at 9H24 : 25,0 m s⁻¹
Total precipitation between 9H12 and 9H24 : 2,5 kg m⁻²
Upstream water level at 9H24 : 12,30m

Line 8 : Third set of measurements at 09H36
Instantaneous wind direction at 9H36 : 245
Instantaneous wind speed at 9H36 : 17,5 m s⁻¹
Total precipitation between 9H36 and 9H12 : 2,8 kg m⁻²
Upstream water level at 9H36 : 12,35m

Line 9: Fourth set of measurements at 09H48
Instantaneous wind direction at 9H48 : 230
Instantaneous wind speed at 9H48 : 10,5 m s⁻¹
Total precipitation between 9H48 and 9H12 : 0,4 kg m⁻²
Upstream water level at 9H48 : 12,41m

Line 10: Fifth set of measurements at 10H00
Instantaneous wind direction at 10H00 : 220
Instantaneous wind speed at 10H00 : 2,5 m s⁻¹
Total precipitation between 10H00 and 9H12 : 0,1 kg m⁻²
Upstream water level at 10H00 : 12,49m

Line 11: End of message identifier

TIDE GAUGE DATA EXAMPLE

```
CREX++  
T000101 A001 D06025++  
RI010 1998 01 23 15 00 2761 00 00 30 -30  
01407 1225 01384 1217 01382 1221 01395 1220 01473 1262 01502 1227+  
CT010 1998 01 23 15 00 2781 01 00 30 -30  
02024 1757 02043 1717 02124 1728 02177 1716 // // // // 02259 1670++  
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```

Interpretation of the example:

Line	Group	Meaning
1	CREX	Indicator of a CREX message
2	T000101 A0001 D06024	CREX Master Table Number 00, Edition 01, Version 01 Data type 001: Surface data - sea Tide elevation series

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3 RI010 Tide station RI010
 1998 Year: 1998
 01 Month: January
 23 Day: 23
 15 Hour: 1500 UTC
 00 Minute: 00
 2761 Sea/water temperature: 276.1 K
 00 Tide station automated water level check: Good data
 00 Tide station manual water level check: Operational
 30 **Time increment:** time is now hour 1500, minute 30
 -30 Short time increment: increment is applied prior to each replication of two descriptors indicated by the group R02006, thus the time is now hour 1500, minute 00

4 01407 Tide elevation of 1407 mm at hour 1500, minute 00
 1225 Meteorological residual tidal elevation of 1225 mm at hour 1500, minute 00
 01384 Tide elevation of 1384 mm at hour 1400, minute 30
 1217 Meteorological residual tidal elevation of 1217 mm at hour 1400, minute 30
 01382 Tide elevation of 1382 mm at hour 1400, minute 00
 1221 Meteorological residual tidal elevation of 1221 mm at hour 1400, minute 00
 01395 Tide elevation of 1395 mm at hour 1300, minute 30
 1220 Meteorological residual tidal elevation of 1220 mm at hour 1300, minute 30
 01473 Tide elevation of 1473 mm at hour 1300, minute 30
 1262 Meteorological residual tidal elevation of 1262 mm at hour 1300, minute 00
 01502 Tide elevation of 1502 mm at hour 1200, minute 30
 1227 Meteorological residual tidal elevation of 1227 mm at hour 1200, minute 30
 + End of report for station RI010

5 CT010 Tide station CT010
 1998 Year: 1998
 01 Month: January
 23 Day: 23
 15 Hour: 1500 UTC
 00 Minute: 00
 2761 Sea/water temperature: 276.1 K
 00 Tide station automated water level check: Good data
 00 Tide station manual water level check: Operational
 30 **Time increment:** time is now hour 1500, minute 30
 -30 Short time increment: increment is applied prior to each replication of two Descriptors indicated by the group R02006, thus the time is now hour 1500, minute 00

6 02024 Tide elevation of 2024 mm at hour 1500, minute 00
 1715 Meteorological residual tidal elevation of 1715 mm at hour 1500, minute 00
 02043 Tide elevation of 2043 mm at hour 1400, minute 30
 1717 Meteorological residual tidal elevation of 1717 mm at hour 1400, minute 30
 02124 Tide elevation of 2124 mm at hour 1400, minute 00
 1728 Meteorological residual tidal elevation of 1728 mm at hour 1400, minute 00
 02177 Tide elevation of 2177 mm at hour 1300, minute 30
 1716 Meteorological residual tidal elevation of 1716 mm at hour 1300, minute 30
 ///// Tide elevation missing at hour 1300, minute 30
 /// Meteorological residual tidal elevation missing at hour 1300, minute 00
 02259 Tide elevation of 2259 mm at hour 1200, minute 30
 1670 Meteorological residual tidal elevation of 1670 mm at hour 1200, minute 30
 ++ End of report for station CT010; also, end of Data Section

7 7777 End of CREX message

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*** TOTAL OZONE MEASUREMENT FROM A DOBSON GROUND-BASED SPECTROPHOTOMETER
OBTAINED FROM A SINGLE OBSERVATION ***

CREX++
T000101 A008 D07043++
11 649 Hradec Kralove 5018 01583 00290 1998 03 09 10 03 003 74 00 00 0415 180++
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CREX
T000101
A008
D07043

D01001		
B01001	WMO block number	11
B01002	WMO station number	649
B01015	Station or site name	Hradec Kralove
D01024		
B05002	Latitude	5018
B06002	Longitude	01583
B07001	Height of station	00290
D01011		
B04001	Year (of ozone measurement)	1998
B04002	Month (of ozone measurement)	03
B04003	Day (of ozone measurement)	09
D01012		
B04004	Hour (of ozone measurement)	10
B04005	Minute (of ozone measurement)	03
D01071		
B02143	Ozone instrument type	003
B02142	Ozone instrument serial number	74
B02145	Wave length setting for Dobson instruments	00
B02146	Source conditions for Dobson instruments	00
D07030		
B15001	Value of ozone measurement	0415
B15002	Value of the air-mass	180

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EXAMPLE OF AN OZONE SOUNDING COUPLED TO A BREWER SPECTROPHOTOMETER

Note : ^ means space in the definitions below

```

CREX++
T000101
A008
D01001      : WMO block number          71
              WMO station number in block 913
B01015      : station or site name      Churchill^^^^^^^^^^
D01024      : latitude                  5875
              longitude                 -09400
              elevation                 00029
D01011      : year                    1998
              month                    04
              day                      29
D01012      : hours                   13
              minutes                   46
B08021      : time significance = 8 = ensemble mean 08
B04025      : time period (minutes)    0550

D01070      : ozone instrument type     001
              ozone instrument serial number (Brewer) 26^
              light source type for Brewer (Direct Sun) 00
B08022      : number of measurements   00010
B08023      : first order statistic = 4 = mean value 04
B15001      : value of ozone measurement 0399
B08023      : first order statistic = 9 = best estimate of std deviation 09
B15001      : best estimate of std deviation 0010
B08023      : first order statistic = harmonic mean 11
B15002      : harmonic mean of the air mass 202

D01001      : WMO block and station numbers 71
              913
B01015      : station or site name      Churchill^^^^^^^^^^
D01024      : latitude                  5875
              longitude                 -09400
              elevation                 00029
B08021      : 18 = launch time follows  18
D01011      : year                    1998
              month                    04
              day                      29
D01012      : hours                   11
              minutes                   22
B02011      : radiosonde type          061
B02143      : ozone instrument type    019
B02142      : ozone sonde serial number ////
D15004      : ozone sounding correction factor 0893
D15005      : ozone p                  373
R04000      : delayed replication factor = number of levels 0093
              The next four descriptors are repeated 93 times
B04025      : time displacement since launch time (minutes) see below
B08006      : ozone VSS                see below
B07004      : pressure                 see below
B15003      : measured ozone partial pressure see below
++
7777      end of message

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KULA01 CWAO 051800
CREX++
T000101 A008 D09047++
71 913 CHURCHILL 5875 -09400 00029 1998 04 29 13 46
08 0550 001 26 00 00010 04 0399 09 0010 11 202
71 913 CHURCHILL 5875 -09400 00029 18 1998 04 29 11 22
061 019 //// 0893 373 0093
0000 400 10041 029 0000 200 10000 029 0000 002 09915 031
0001 002 09735 036 0001 002 09678 038 0002 002 09273 038
0003 002 09111 039 0004 200 08500 039 0009 200 07000 037
0011 002 06450 037 0012 002 06279 036 0012 002 06159 031
0014 002 05847 034 0016 002 05347 030 0016 002 05269 029
0017 002 05100 040 0018 200 05000 034 0019 002 04821 030
0023 200 04000 030 0027 002 03400 026 0029 002 03000 028
0031 002 02857 029 0031 002 02818 024 0032 002 02743 017
0034 200 02500 015 0036 002 02225 014 0038 002 02078 029
0038 002 02049 036 0039 200 02000 066 0039 002 01992 066
0039 002 01952 093 0040 002 01909 105 0040 002 01866 105
0041 002 01800 115 0042 002 01765 103 0042 002 01741 100
0043 002 01693 112 0043 002 01656 112 0044 002 01612 109
0044 002 01590 092 0044 002 01580 066 0045 002 01559 052
0045 002 01517 049 0046 002 01500 059 0046 002 01488 070
0046 002 01469 098 0047 002 01440 107 0047 002 01391 107
0048 002 01335 117 0049 002 01291 162 0050 002 01257 153
0051 002 01206 155 0051 002 01190 141 0051 002 01182 141
0052 002 01142 156 0053 002 01103 154 0054 002 01059 177
0055 002 01005 170 0056 200 01000 178 0056 002 00978 197
0057 002 00951 187 0058 002 00914 183 0058 002 00889 171
0059 002 00866 182 0059 002 00855 195 0060 002 00837 198
0061 002 00808 175 0061 002 00797 172 0064 200 00700 160
0065 002 00671 157 0067 002 00630 142 0068 002 00592 153
0068 002 00583 162 0070 002 00531 157 0072 002 00501 164
0072 200 00500 161 0073 002 00479 162 0073 002 00462 151
0075 002 00435 156 0076 002 00418 153 0078 002 00378 161
0081 002 00319 132 0082 002 00311 136 0083 200 00300 130
0086 002 00258 111 0091 200 00200 095 0097 002 00143 079
0099 002 00126 078 0103 200 00100 071 0110 200 00070 058
0115 002 00054 044 0116 200 00050 039 0120 002 00043 032++
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EXAMPLE OF AN OZONE SOUNDING NOT COUPLED TO A BREWER SPECTROPHOTOMETER

```

CREX++
T000101
A008
D01001      :   WMO block and station number           71
                                                    917
B01015      :   station or site name                   Eureka~~~~~
D01024      :   latitude                               7598
              :   longitude                            -08593
              :   elevation                            00010
B08021      :   18 = launch time follows               18
D01011      :   year                                   1998
              :   month                                04
              :   day                                  29
D01012      :   hours                                  23
              :   minutes                             18
B02011      :   radiosonde type                        061
B02143      :   ozone instrument type                  019
B02142      :   ozone sonde serial number             ////
D15004      :   ozone sounding correction factor       ////
D15005      :   ozone p                               375
R04000      :   delayed replication factor = number of levels 0082
              :   The next four descriptors are repeated 82 times
B04025      :   time displacement since launch time (minutes) see below
B08006      :   ozone VSS                             see below
B07004      :   pressure                             see below
B15003      :   measured ozone partial pressure       see below
++
7777      end of message

```

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KULA01 CWAO 051800
CREX++
T000101 A008 D09045++
71 917 EUREKA 7598 -08593 00010 18 1998 04 29 23 18
061 019 //// //// 375 0082
0000 400 10137 030 0000 200 10000 030 0001 002 09687 037
0002 002 09366 033 0004 002 08831 037 0005 200 08500 036
0007 002 08013 043 0007 002 07881 047 0008 002 07646 037
0009 002 07442 042 0011 200 07000 031 0012 002 06849 027
0013 002 06710 036 0015 002 06291 029 0022 200 05000 028
0025 002 04557 027 0029 002 04065 024 0029 200 04000 020
0032 002 03626 025 0038 002 03000 020 0040 002 02890 021
0040 002 02829 065 0041 002 02726 105 0043 002 02576 118
0044 200 02500 135 0048 002 02218 165 0049 002 02147 161
0050 002 02104 171 0051 002 02031 153 0051 002 02010 159
0051 200 02000 171 0052 002 01941 188 0054 002 01854 198
0056 002 01744 187 0056 002 01717 194 0057 002 01683 191
0058 002 01640 161 0058 002 01623 159 0059 002 01585 168
0059 002 01576 185 0060 002 01545 197 0061 002 01500 202
0063 002 01414 221 0064 002 01370 220 0065 002 01335 230
0066 002 01269 219 0067 002 01232 227 0067 002 01226 235
0068 002 01208 241 0072 002 01055 242 0074 200 01000 236
0075 002 00960 228 0076 002 00936 192 0077 002 00912 180
0078 002 00897 187 0078 002 00883 210 0079 002 00868 221
0079 002 00850 202 0080 002 00841 199 0081 002 00815 208
0081 002 00807 189 0081 002 00803 171 0082 002 00790 152
0082 002 00777 157 0083 002 00764 172 0084 002 00741 156
0084 002 00722 156 0085 002 00715 162 0085 200 00700 188
0085 200 00700 193 0086 002 00682 203 0088 002 00639 212
0090 002 00608 206 0091 002 00588 190 0091 002 00582 192
0092 002 00570 209 0092 002 00557 215 0096 200 00500 197
0099 002 00437 171 0108 002 00316 139 0110 200 00300 128
0115 002 00242 108++
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SAMPLE DATA WITH CREX SEQUENCE FOR EXCHANGE OF FORECAST RESULT ON TROPICAL CYCLONES

Descriptor	Order No.	Sample data	Corresponding meaning	Unit	Scale	Data width
B 01 033	1	034	Originating Centre = RSMC Tokyo	Code table	0	3
B 01 025	2	21W	Storm identifier	Character	0	3
B 01 027	3	ZANE____	WMO storm name	Character	0	10
D 01 011		(sequence descriptor)				
B 04 001	4	1996	Year	Year	0	4
B 04 002	5	10	October	Month	0	2
B 04 003	6	01	1st	Day	0	2
D 01 012		(sequence descriptor)				
B 04 004	7	06	6 O'clock (UTC)	Hour	0	2
B 04 005	8	00	0 minute (UTC)	Minute	0	2
B 01 032	9	XXX	(to be defined)			
		Identification of NWP model		Code table	0	3
B 02 041	0	01	Based on computer analysis	Code table	0	2
B 19 001	1	02	Tropical storm	Code table	0	2
B 19 010	2	01	Minimum value of sea level pressure	Code table	0	2
R 18 000	3	0003	(**delayed replication descriptor** Data for 3 forecast times of 18 descriptors follow	Numeric	0	4
B 08 021	4	04	Forecast data follow	Code table	0	2
B 04 014	5	0012	12 hour forecast data follow	Hour	0	4
B 08 005	6	01	Data of Storm centre follow	Code table	0	2
D 01 023		(sequence descriptor)				
B 05 002	7	3010	Lat. of the storm centre is 30.1N	Degree	2	4
B 06 002	8	14200	Lon. of the storm centre is 142.0E	Degree	2	5
B 19 005	9	270	Direction of motion of storm is 270_	Degree true	0	3
B 19 006	0	00500	Speed of motion of storm is 5m s ⁻¹	m s ⁻¹	2	5
B 10 004	1	09750	Pressure of storm centre is 975hPa	Pa	-1	5
B 11 041	2	0576	Gust wind speed is 57.6 m s ⁻¹	m s ⁻¹	1	4
B 08 021	3	06	Forecast time averaged follow	Code table	0	2
B 04 075	4	10	10 minutes mean value follow	Minute	0	2
B 11 040	5	0360	Max.wind speed is 36.0 m s ⁻¹	m s ⁻¹	1	4
B 19 008	6	2	Storm depth is medium	Code table	0	1
R 05 004		(replication descriptor)				
		4 times replication of following 5 descriptors				
B 05 021	7	31500	sector 1 (from 315 degree	Degree true	2	5
B 05 021	8	04500	to 45 degree)	Degree true	2	5
R 02 002		(replication descriptor)				
		2 times replication of following 2 descriptors				
B 19 003	9	025	Wind speed threshold is 25m s ⁻¹	m s ⁻¹	0	3
B 19 004	0	1950	Effective radius is 195 km	m	-2	4
	1	015	Wind speed threshold is 15m s ⁻¹			
	2	4000	Effective radius is 400 km			
	3	04500	sector 2 (from 45 degree			
	4	13500	to 135 degree)			
	5	025	Wind speed threshold is 25m s ⁻¹			
	6	1950	Effective radius is 195 km			
	7	015	Wind speed threshold is 15m s ⁻¹			
	8	4300	Effective radius is 430 km			
	9	13500	sector 3 (from 135 degree			
	0	22500	to 225 degree)			
	1	025	Wind speed threshold is 25m s ⁻¹			
	2	1950	Effective radius is 195 km			
	3	015	Wind speed threshold is 15m s ⁻¹			
	4	6090	Effective radius is 609 km			
	5	22500	sector 4 (from 225 degree			
	6	31500	to 315 degree)			

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7	025	Wind speed threshold is 25m s ⁻¹
8	1950	Effective radius is 195 km
9	015	Wind speed threshold is 15m s ⁻¹
0	4700	Effective radius is 470 km
1	04	(24 and 36 hour forecast data follow as same as
.....		the second fourth order above)

CREX MESSAGE COMPOSED OF ABOVE DATA ELEMENTS:

CREX++
T000101 A007 B01033 B01025 B01026 D01011 D01012 B01032 B02041 B19001 B19010 R18000
B08021 B04014 B08005 D01023 B19005 B19006 B10004 B11041 B08021 B04075 B11040 B19008
R05004 B05021 B05021 R02002 B19003 B19004 E++
0034 121W 2ZANE 31996 410 501 606 700 8XXX 901 002 101 20003 304 40012 501 63010 714200
8270 900500 009750 10576 206 310 40360 52 631500 704500 8025 91950 0015 14000 204500 313500
4025 51950 6015 74300 813500 922500 0025 11950 2015 36090 422500 531500 6025 71950 8015
94700 004++
7777

or (with big common sequence definition)

CREX++
T000101 A007 D16027E++
0034 121W 2ZANE 31996 410 501 606 700 8XXX 901 002 101 20003 304 40012 501 63010 714200
8270 900500 009750 10576 206 310 40360 52 631500 704500 8025 91950 0015 14000 204500 313500
4025 51950 6015 74300 813500 922500 0025 11950 2015 36090 422500 531500 6025 71950 8015
94700 004++
7777

or without check digit:

CREX++
T000101 A007 D16027++
034 21W ZANE 1996 10 01 06 00 XXX 01 02 01 0003 04 0012 01 3010 14200 270 00500 09750 0576
06 10 0360 2 31500 04500 025 1950 015 4000 04500 13500 025 1950 015 4300 13500 22500 025 1950
015 6090 22500 31500 025 1950 015 4700 04++
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MONITORING INFORMATION SAMPLE MESSAGE

CREX++ (indicator section)
T000101 A020 D35010++ (description section)
1 2 4 014 23 1996 10 01 00 15 24 06 25 00 012 63 0003 740 0360 894 353
792 0125++ (data section)
7777 (end section)

1 regional exercise
2 non-real time
4 RTH
014 Nairobi
23 Monitoring period follows
1996 YYYY
10 MM
01 DD
00 HH
15 Days duration
24 data cut off follows
06 hours
25 report time follows
00 hours
012 SYNOP
63 Block number
0003 stations
740 Nairobi
0360 Well done
894 Dar es Salam
0353 Very good
792 A station
0125 Must do better!
++
7777