SenseAir AB

GENERAL:

All data and parameters are written MSB first.
All reserved data and parameters are written as 0.
All values without prefix “0x” are decimal.

If current Record less then LogRecSize, empty bytes are filled by 0.
Timestamp is written by external command or together with events.
When Log becomes “wrapped”, Meter writes “Timestamp” at first Record.

Logger Configuration parameters:

offset	name	contents
0-1	LogAddrStart	Start Address of EEPROM
2-3	LogAddrEnd	End Address of EEPROM
4	LogRecSize	Record Size (bytes). Must be 6, 8, 10, 12, 14 or 16 bytes. If LogRecSize== 0x00 – Logger is Off.
5	LogPeriod	Number of Measurement cycles without logging. If LogPeriod=0, then do logging every Measurement cycle.
6	StartupSleep	Startup Sleep Duration, [seconds]
7	reserved	0x00
8	OffsetData0	Offset of Data0 in RAM
9	SizeData0	Size of Data0 (bytes)
10	OffsetData1	Offset of Data1 in RAM
11	SizeData1	Size of Data1 (bytes)
12	OffsetData2	Offset of Data2 in RAM
13	SizeData2	Size of Data2 (bytes)
14	OffsetData3	Offset of Data3 in RAM
15	SizeData3	Size of Data3 (bytes)

If any SizeDataN field == 0, this data is not written to Logger.

Logger Record types:

0 – Data
1 – Timestamp
2 – Meter Power ON
3 – Start of Measurements (set of jumper)
4 – End of Measurements (removing of jumper)
5 – *reserved*
6 – *reserved*
7 – *reserved*
8 – ABC Completed
9 – Zero Calibration Completed
10 – Background Calibration Completed
11 – *reserved*
12 – *reserved*
13 – *reserved*
14 – *reserved*
15 – Marker of last record in Logging

Sensor Status:

Mask	Purpose
0x80	Production(1) or Non-Production(0) Mode
0x40	ErrorStatus>0 (1) or ErrorStatus==0 (0)
0x20	Battery Low Alarm (1) or not (0)
0x10	Battery Low Warning (1) or not (0)
0x08	*reserved for future use*
0x04	*reserved for future use*
0x02	*reserved for future use*
0x01	*reserved for future use*

Common Logger Record structure

RecordType (high nibble)	Record Mask or Record Subtype (low nibble)	Sensor Status (1 byte)	Data or Service Information

Data

RecordType = **0** (high nibble)	*reserved = 0* (low nibble)	Sensor Status (1 byte)	Data0 (SizeData0 bytes)	Data1 (SizeData1 bytes)	Data2 (SizeData2 bytes)	Data3 (SizeData3 bytes)

Timestamp

total size = 6 bytes

RecordType = **1** (high nibble)	*reserved = 0* (low nibble)	Sensor Status (1 byte)	Timestamp (4 bytes)

Meter Power ON

total size = 4 bytes

RecordType = **2** (high nibble)	*reserved = 0* (low nibble)	Sensor Status (1 byte)	MeterControl	TBD: Startup Status (1 byte) Result of SelfCheck, measurement Vbattery, etc...

Start of Measurements

total size = 6 bytes

RecordType = **3** (high nibble)	*reserved = 0* (low nibble)	Sensor Status (1 byte)	Timestamp (4 bytes)

End of Measurements

total size = 6 bytes

RecordType = **4** (high nibble)	*reserved = 0* (low nibble)	Sensor Status (1 byte)	Timestamp (4 bytes)

ABC completed

total size = 6 bytes

RecordType = **8** (high nibble)	*reserved = 0* (low nibble)	Sensor Status (1 byte)	New Zero_CO2_Trim	CO2_Value *(before calibration)*

Zero Calibration completed

total size = 6 bytes

RecordType = **9** (high nibble)	*reserved = 0* (low nibble)	Sensor Status (1 byte)	New Zero_CO2_Trim	CO2_Value *(before calibration)*

Background Calibration completed

total size = 6 bytes

RecordType = **10** (high nibble)	*reserved = 0* (low nibble)	Sensor Status (1 byte)	New Zero_CO2_Trim	CO2_Value *(before calibration)*

Timestamp record must be before these records

Last Record

total size = 1 byte

RecordType = **15** (high nibble)	*reserved = 0* (low nibble)

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Logger Configuration

Clear Logger Configuration
(write 16 zeroes to EEPROM at 0x0200...0x020F)

Write Logger Configuration parameters to EEPROM:

offset	name	default content for P330–CNT
0–1	LogAddrStart	0x0210 – start address of buffer, MSB first
2–3	LogAddrEnd	0x1FFF – end address of buffer, MSB first
4	LogRecSize	0x00 – keep Logger OFF
5	LogPeriod	0x00 – do logging every measurement cycle
6	StartupSleep	0x3C – Sleep 60 seconds before first measurement
7	*reserved*	0x00
8	OffsetData0	0x08 – CO2_Value address
9	SizeData0	0x02 – CO2_Value size, 2 bytes
10	OffsetData1	0x12 – SpaceTemp address
11	SizeData1	0x02 – SpaceTemp size
12	OffsetData2	0x14 – RelativeHumidity address
13	SizeData2	0x02 – RelativeHumidity size
14	OffsetData3	0x16 – MixingRatio address
15	SizeData3	0x02 – MixingRatio size

Set Timestamp
Write number of seconds since 1 January 2000 to RTC (RAM 0x65, DWORD)

Write parameter:
LogRecSize = 10
(Logger ON)

Send command
ResetLogger
*(Logger sets pointer to LogAddrStart and set flag for writing Timestamp to it. **Old data has lost.**)*

Read data from Logger
(briefly)

Read Logger Configuration
Stop Logger
Read Logger Buffer
Parse Logger Buffer
Start Logger

Read Data and Events from Logger

Read whole Logger Configuration
Write parameter: LogRecSize = 0 *(set Logger OFF)*
Read whole Logger Buffer

Parsing Logger Buffer

Get first record — *Check type of record*
- "Last Record" is absent → Buffer is corrupted
- StartMeas or MeterPowerOn → *Search Record* "Last Record" *(Count next Record as Start of Logging)*
  - "Last Record" has been found → *Search Record* "Start Meas"
    - Record found → Get timestamp → Reset flag TS_unknown
    - Not found → Set flag TS_unknown
- Timestamp → *Search All Records* "Last Record"
  - "Last Record" is absent; or more then 1 entry is present → *Search Record* "Last Record" *(Count next Record as Start of Logging)*
    - Record not found → Buffer is corrupted
    - Record has found → Get Timestamp from Record at the first address of buffer
  - Single "Last Record" has been found → Get Timestamp from Record at the first address of buffer
- Other type of record → Store Event with EventData and Status in EventTable

Calculation of first record's timestamp
Get Timestamp from Record at the first address of buffer
Read **previous** RecordType
Branch by RecordType
- Last Record → Reset flag TS_unknown
- Data → Timestamp = Timestamp – (LogPeriod+1)*MeasurementPeriod
- Timestamp → Update Timestamp
- Start of meas
- End of meas
- Other records

Roll back for following processing of events
Other Record Types → Read **previous** RecordType
- Start of buffer (first record) → Store Event with EventData and Status in EventTable
- Data → Timestamp = Timestamp – (LogPeriod+1)*MeasurementPeriod

Read **next** RecordType
Branch by RecordType
- Timestamp → Update Timestamp → Reset flag TS_unknown → Store Event, EventData and Status with **actual** Timestamp to the end of EventTable
- Data → Check flag TS_unknown
  - reset → Store Data and Status with **actual** Timestamp to the end of DataTable → Timestamp = Timestamp + (LogPeriod+1)*MeasurementPeriod
  - set → Store Data and Status with Timestamp=**0** to the end of DataTable
- End of buffer, Last Record has not found → Buffer is corrupted
- Last Record
- MeterPowerOn → Store Event with EventData and Status in end of EventTable → Set flag TS_unknown
- Start of meas → End of meas → Update timestamp → Reset flag TS_unknown → Store Event, EventData and Status with **actual** Timestamp to the end of EventTable
- ABC
- Zero Calibration
- Background Calibration → Check flag TS_unknown
  - reset → Store Event, EventData and Status with **actual** Timestamp to the end of EventTable
  - set → Store Event with EventData, Status and Timestamp=**0** to the end of EventTable

Write parameter: LogRecSize = old LogRecSize *(restore parameter, set Logger ON)*

Success

Optional action:
Re-Init Logger
(write 0x33 into SCR RAM 0x60)

NOTES:
1. Flag "TS_unknown" is used for management of a validity of timestamps. If flag is set (TRUE), then record has valid timestamp. Otherwise timestamp is not actual and written as 0.
2. MeasurementPeriod is 3-byte period of measurements, expressed in seconds. It is stored in EEPROM. See g:\Utveck\PROJEKT\Platforms\P330\MemoryAllocation\P330 RAM and EEPROM mapping rev1_08.xls
The difference is following:
- MeasurementPeriod defines period of start of measurements;
- SleepPeriod defines time interval between end of previous and start of next measurement.

SCR commands for P330BLG:

0x32	Restart Logger (erase old Logger data)
0x33	Reinitialize Logger (keep old Logger data)
0x34	Actualize RTC in Logger (writes Timestamp in Logger)

Example of DataTable

Timestamp	Status	CO2_Value	SpaceTemp	RH	MixingRatio
270054000 *(22 July 2008, 15:00)*	0x00	500	3000	50	800
270054300 *(22 July 2008, 15:05)*	0x00	700	3000	50	800
270054600 *(22 July 2008, 15:10)*	0x00	900	3000	50	800
270054900 *(22 July 2008, 15:15)*	0x00	1100	3000	50	800
270055200 *(22 July 2008, 15:20)*	0x00	1300	3000	50	800
…					

Example of EventTable

Timestamp	Status	Event	EventData
270054000 *(22 July 2008, 15:00)*	0	StartMeas	
270055200 *(22 July 2008, 15:20)*	0	EndMeas	
270055260 *(22 July 2008, 15:21)*	0	ZeroCal.	51(1), 1300(2)
…			

There are:
(1) – Zero_CO2_Trim after calibration
(2) – CO2_Value before calibration

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