

I²C on S12 CO₂

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1. I²C interface

The S12 CO₂ supports standard mode and fast mode defined in the I²C bus specification version 2.1.

1.1. Target address

The default target address is 0x68.

1.2. Write Operation

When the host sends 1-byte data containing the target address of the S12 CO₂ following the start condition, the S12 CO₂ sends an acknowledge signal and performs a specified command. The LSB of the first byte is a data direction bit (R/W bit). When the R/W bit is “0”, a write command is performed.

The second byte is a register address to be written. When the S12 CO₂ receives a valid register address, an acknowledge signal is sent by the A S12 CO₂.

The 3rd byte is a value written to the specified address. The S12 CO₂ sends an acknowledge signal when the writing value process is successfully completed. Following the acknowledge, the host can generate a stop condition to terminate the transfer and also can continue sending other values to write to the S12 CO₂'s registers. The S12 CO₂ supports auto increment of the register address. If the host sends the 4th byte without generating the stop condition, the S12 CO₂'s internal register address pointer is incremented and the sent byte is written to the next address.

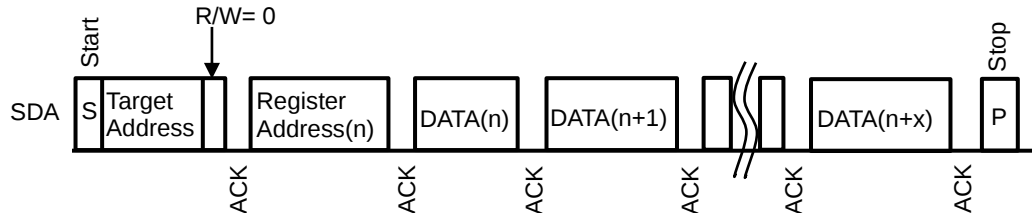


Figure 1.1 Write Operation

1.3. Read Operation

When the host sends 1-byte data containing the target address of the S12 CO₂ following the start condition, the S12 CO₂ sends an acknowledge signal and performs a specified command. The LSB of the first byte is a data direction bit (R/W bit). When the R/W bit in the first byte is “1”, a read command is performed. The S12 CO₂ supports current address read and random address read.

1.3.1. Current Address Read

In a read operation, the S12 CO₂ sends a register value at an address which is specified by the internal register address pointer of the S12 CO₂ following the first byte.

Because of the auto increment mentioned above, the internal register address pointer holds the next address of the last accessed address. For example, if the last transfer was finished with an access to address "n-1" regardless of its command (read or write), a register value at address "n" is sent next. After the S12 CO₂ sends register values, the read operation ends when the host sends a not acknowledge signal instead of an acknowledge signal and generate a stop condition.

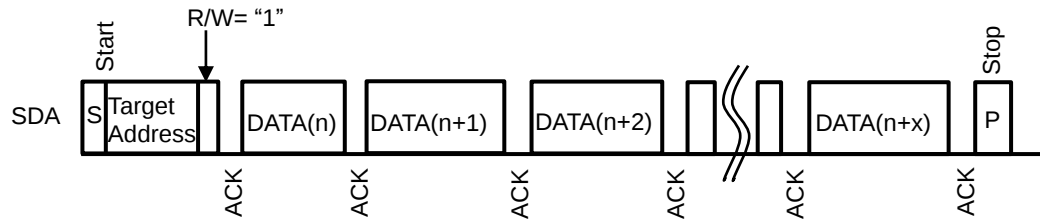


Figure 1.2 Current Address Read

1.3.2. Random Read

The host can specify the register address in the same way as the write operation. And following it, the host can begin a new read operation by generating a start condition again and sending the new first byte which includes the target address of the S12 CO₂ with R/W bit = "1". When the S12 CO₂ sends a register value at the specified address, the internal address pointer is automatically incremented by one. After the S12 CO₂ sends register values, the read operation ends when the host sends a not acknowledge signal and generate a stop condition.

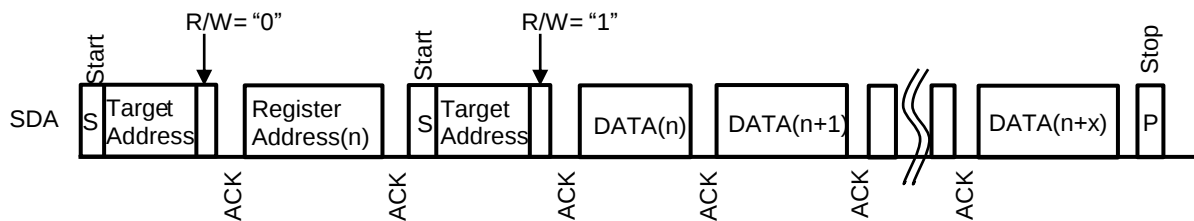


Figure 1.3 Random Read

2. I²C on S12 CO₂

2.1. I²C settings

The sensor acts as a target device on the I²C bus.

2.1.1. AC Characteristics

Table 2.1 AC Characteristics of I²C (Standard Mode: fSCL ≤ 100 kHz)

(Unless otherwise specified, AVDD = 2.7 ~ 5.5 V, IOVDD = 1.65 ~ 5.5 V, Ta = -40 ~ 90 °C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
SCL clock frequency	fSCL			100	kHz
SCL clock high period	tHIGH	4.0			μs
SCL clock low period	tLOW	4.7			μs
SDA and SCL rise time ¹	tR			1.0	μs
SDA and SCL fall time ¹	tF			0.3	μs
Start condition hold time	tHD: STA	4.0			μs
Start condition setup time	tSU: STA	4.7			μs
SDA hold time (vs. SCL falling edge)	tHD: DAT	0			μs
SDA setup time (vs. SCL rising edge)	tSU: DAT	250			ns
Stop condition setup time	tSU: STO	4.0			μs
Bus free time	tBUF	4.7			μs

1. Values of these parameters are not guaranteed and not tested in production.

Table 2.2 AC Characteristics of I²C (Fast Mode: 100 kHz < fSCL ≤ 400 kHz)

(Unless otherwise specified, AVDD = 2.7 ~ 5.5 V, IOVDD = 1.65 ~ 5.5 V, Ta = -40 ~ 90 °C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
SCL clock frequency	fSCL			400	kHz
SCL clock high period	tHIGH	0.6			μs
SCL clock low period	tLOW	1.3			μs
SDA and SCL rise time ²	tR			0.3	μs
SDA and SCL fall time ²	tF			0.3	μs
Start condition hold time	tHD: STA	0.6			μs
Start condition setup time	tSU: STA	0.6			μs
SDA hold time (vs. SCL falling edge)	tHD: DAT	0			μs
SDA setup time (vs. SCL rising edge)	tSU: DAT	100			ns
Stop condition setup time	tSU: STO	0.6			μs
Bus free time	tBUF	1.3			μs
Noise suppression pulse width	tSP			50	ns

2. Values of these parameters are not guaranteed and not tested in production.

[I²C bus interface timing]

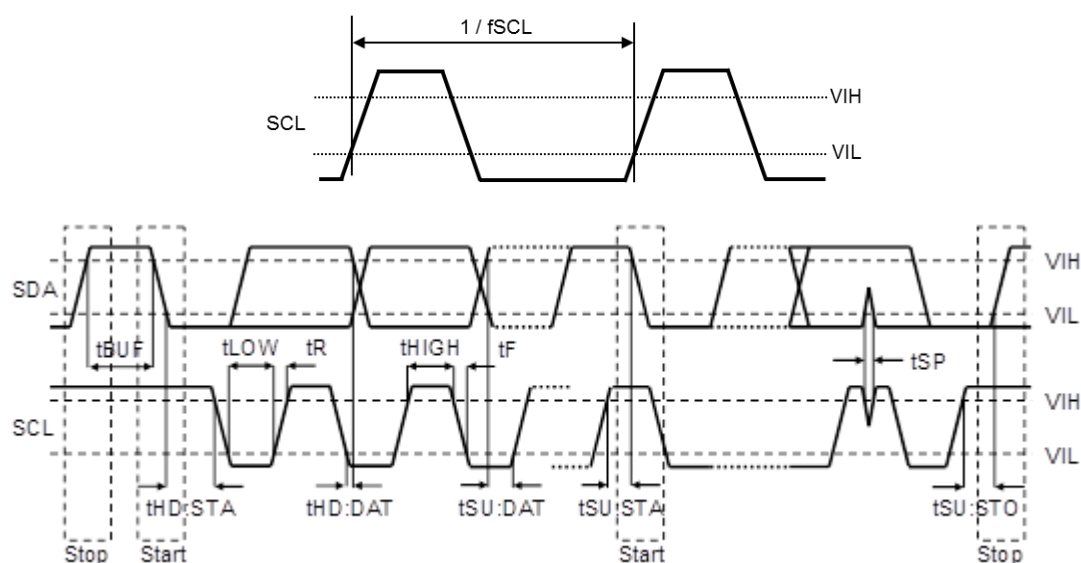


Figure 2.1 I²C Bus Timing

2.1.2. I²C read only registers

Table 2.3 I²C Register table, read only registers

Name	Address	R/W
ErrorStatus	0x00	R
ErrorStatus	0x01	R
Reserved	0x02	R
Reserved	0x03	R
Reserved	0x04	R
Reserved	0x05	R
Measured concentration Filtered Pressure Compensated	0x06	R
Measured concentration Filtered Pressure Compensated	0x07	R
Temperature	0x08	R
Temperature	0x09	R
Reserved	0x0A	R
Reserved	0x0B	R
Reserved	0x0C	R
Measurement count	0x0D	R
Measurement cycle time	0x0E	R
Measurement cycle time	0x0F	R
Measured concentration Unfiltered pressure compensated	0x10	R
Measured concentration Unfiltered pressure compensated	0x11	R
Measured concentration Filtered	0x12	R
Measured concentration Filtered	0x13	R
Measured concentration Unfiltered	0x14	R
Measured concentration Unfiltered	0x15	R
Reserved	0x16	R
Reserved	0x17	R
Reserved	0x18	R
Reserved	0x19	R
Reserved	0x1A	R
Reserved	0x1B	R
Reserved	0x1C	R
Reserved	0x1D	R

Name	Address	R/W
Reserved	0x1E	R
Reserved	0x1F	R
Reserved	0x20	R
Reserved	0x21	R
Reserved	0x22	R
Reserved	0x23	R
Reserved	0x24	R
Reserved	0x25	R
Reserved	0x26	R
Reserved	0x27	R
Reserved	0x28	R
Reserved	0x29	R
Reserved	0x2A	R
Reserved	0x2B	R
Reserved	0x2C	R
Reserved	0x2D	R
Reserved	0x2E	R
Firmware type	0x2F	R
Reserved	0x30	R
Reserved	0x31	R
Reserved	0x32	R
Reserved	0x33	R
Reserved	0x34	R
Reserved	0x35	R
Reserved	0x36	R
Reserved	0x37	R
Firmware rev.	0x38	R
Firmware rev.	0x39	R
Sensor ID	0x3A	R
Sensor ID	0x3B	R
Sensor ID	0x3C	R
Sensor ID	0x3D	R
Reserved	0x3E	R
Reserved	0x3F	R
Undefined	0x52	R
Undefined	0x53	R
⋮	⋮	R
Undefined	0x7E	R
Undefined	0x7F	R
Reserved	0x80	R
Calibration Status	0x81	R/W
Calibration Command	0x82	R/W
Calibration Command	0x83	R/W
Calibration Target	0x84	R/W
Calibration Target	0x85	R/W
Measured concentration Override	0x86	R/W
Measured concentration Override	0x87	R/W
ABC Time	0x88	R/W
ABC Time	0x89	R/W
ABC Par0	0x8A	R/W
ABC Par0	0x8B	R/W
ABC Par1	0x8C	R/W
ABC Par1	0x8D	R/W
ABC Par2	0x8E	R/W
ABC Par2	0x8F	R/W
ABC Par3	0x90	R/W
ABC Par3	0x91	R/W
Reserved	0x92	R/W
Start Single Measurement	0x93	R/W

Name	Address	R/W
Reserved	0x94	R/W
Measurement Mode (EE)	0x95	R/W
Measurement Period (EE)	0x96	R/W
Measurement Period (EE)	0x97	R/W
Number of samples (EE)	0x98	R/W
Number of samples (EE)	0x99	R/W
ABC period (EE)	0x9A	R/W
ABC period (EE)	0x9B	R/W
Reserved	0x9C	R/W
Clear ErrorStatus	0x9D	R/W
ABC Target (EE)	0x9E	R/W
ABC Target (EE)	0x9F	R/W
Reserved	0xA0	R/W
Static IIR filter parameter (EE)	0xA1	R/W
Reserved	0xA2	R/W
SCR	0xA3	R/W
Reserved	0xA4	R/W
Meter control (EE)	0xA5	R/W
Reserved	0xA6	R/W
MB / I ² C address (EE)	0xA7	R/W
Reserved	0xA8	R
Reserved	0xA9	R
Reserved	0xAA	R
Reserved	0xAB	R
Reserved	0xAC	R
Reserved	0xAD	R
Reserved	0xAE	R
Reserved	0xAF	R
Reserved	0xB0	R
Reserved	0xB1	R
Reserved	0xB2	R
Reserved	0xB3	R
Reserved	0xB4	R
Reserved	0xB5	R
Reserved	0xB6	R
Reserved	0xB7	R
Reserved	0xB8	R
Reserved	0xB9	R
Reserved	0xBA	R
Reserved	0xBB	R
Reserved	0xBC	R
Reserved	0xBD	R
Reserved	0xBE	R
Reserved	0xBF	R

Note:

Access to Undefined will report I²C Error.

The following eight "Reserved" registers can be read and written;

- 0x80
- 0x92
- 0x94
- 0x9C
- 0xA0
- 0xA2
- 0xA4
- 0xA6

Registers marked as EE are EEPROM mapped, see section 1.7 EEPROM Characteristics in PSP15871 S12 CO₂.

Table 2.4 I²C Register Map

Name	Address	D7	D6	D5	D4	D3	D2	D1	D0
ErrorStatus	0x00	ErrorStatus[15:8]							
ErrorStatus	0x01	ErrorStatus[7:0]							
Reserved	0x02	0	0	0	0	0	0	0	0
Reserved	0x03	0	0	0	0	0	0	0	0
Reserved	0x04	0	0	0	0	0	0	0	0
Reserved	0x05	0	0	0	0	0	0	0	0
Measured concentration Filtered Pressure Compensated	0x06	Measured concentration Filtered Pressure Compensated [15:8]							
Measured concentration Filtered Pressure Compensated	0x07	Measured concentration Filtered Pressure Compensated [7:0]							
Temperature	0x08	Temperature [15:8]							
Temperature	0x09	Temperature [7:0]							
Reserved	0x0A	0	0	0	0	0	0	0	0
Reserved	0x0B	0	0	0	0	0	0	0	0
Reserved	0x0C	0	0	0	0	0	0	0	0
Measurement count	0x0D	Measurement count [7:0]							
Measurement cycle time	0x0E	0	0	0	0	0	Measurement cycle time [10:8]		
Measurement cycle time	0x0F	Measurement cycle time [7:0]							
Measured concentration Unfiltered pressure compensated	0x10	Measured concentration Unfiltered pressure compensated [15:8]							
Measured concentration Unfiltered pressure compensated	0x11	Measured concentration Unfiltered pressure compensated [7:0]							
Measured concentration Filtered	0x12	Measured concentration Filtered [15:8]							
Measured concentration Filtered	0x13	Measured concentration Filtered [7:0]							
Measured concentration Unfiltered	0x14	Measured concentration Unfiltered [15:8]							
Measured concentration Unfiltered	0x15	Measured concentration Unfiltered [7:0]							
Reserved	0x16	0	0	0	0	0	0	0	0
Reserved	0x17	0	0	0	0	0	0	0	0
Reserved	0x18	0	0	0	0	0	0	0	0
Reserved	0x19	0	0	0	0	0	0	0	0
Reserved	0x1A	0	0	0	0	0	0	0	0

Name	Address	D7	D6	D5	D4	D3	D2	D1	D0
Reserved	0x1B	0	0	0	0	0	0	0	0
Reserved	0x1C	0	0	0	0	0	0	0	0
Reserved	0x1D	0	0	0	0	0	0	0	0
Reserved	0x1E	0	0	0	0	0	0	0	0
Reserved	0x1F	0	0	0	0	0	0	0	0
Reserved	0x20	0	0	0	0	0	0	0	0
Reserved	0x21	0	0	0	0	0	0	0	0
Reserved	0x22	0	0	0	0	0	0	0	0
Reserved	0x23	0	0	0	0	0	0	0	0
Reserved	0x24	0	0	0	0	0	0	0	0
Reserved	0x25	0	0	0	0	0	0	0	0
Reserved	0x26	0	0	0	0	0	0	0	0
Reserved	0x27	0	0	0	0	0	0	0	0
Reserved	0x28	0	0	0	0	0	0	0	0
Reserved	0x29	0	0	0	0	0	0	0	0
Reserved	0x2A	0	0	0	0	0	0	0	0
Reserved	0x2B	0	0	0	0	0	0	0	0
Reserved	0x2C	0	0	0	0	0	0	0	0
Reserved	0x2D	0	0	0	0	0	0	0	0
Reserved	0x2E	0	0	0	0	0	0	0	0
Firmware type	0x2F	1	1	0	0	0	0	1	0
Reserved	0x30	0	0	0	0	0	0	0	0
Reserved	0x31	0	0	0	0	0	0	0	0
Reserved	0x32	0	0	0	0	0	0	0	0
Reserved	0x33	0	0	0	0	0	0	0	0
Reserved	0x34	0	0	0	0	0	0	0	0
Reserved	0x35	0	0	0	0	0	0	0	0
Reserved	0x36	0	0	0	0	0	0	0	0
Reserved	0x37	0	0	0	0	0	0	0	0
Firmware rev.	0x38	Firmware main revision [7:0]							
Firmware rev.	0x39	Firmware sub revision [7:0]							
Sensor ID	0x3A	Sensor ID [31:24]							
Sensor ID	0x3B	Sensor ID [23:16]							
Sensor ID	0x3C	Sensor ID [15:8]							
Sensor ID	0x3D	Sensor ID [7:0]							
Reserved	0x3E	0	0	0	0	0	0	0	0
Reserved	0x3F	0	0	0	0	0	0	0	0
Undefined	0x52	1	0	0	0	1	0	0	0
Undefined	0x53	1	0	0	0	1	0	0	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
Undefined	0x7E	1	0	0	0	1	0	0	0
Undefined	0x7F	1	0	0	0	1	0	0	0

Note:

Access to “Undefined” register causes 0x88 to be read and I²C Error to be reported.

Register descriptions:

■ ErrorStatus

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x00	0	0	0	0	0	Abnormal signal level	Measurement timeout	0
0x01	No measurement completed	Memory	Out of range	Self-diagnostics	Calibration	Algorithm	Communication	Fatal

- Communication error: A read or write to a non-existent address / register was detected.
- Algorithm error: Corrupt parameter was detected.
- Calibration error: Calibration failure detected (ABC, zero, background or target calibration).
- Self-diagnostics error: Internal interface failure detected.
- Out of range: Out of range measurement was detected.
- Memory error: Abnormal memory operation detected.
- No measurement completed: First measurement incomplete detected. This error cleared after first measurement.
- Abnormal signal level: Invalid measurement sample was detected. This flag is set in combination with the Self-diagnostic flag.

■ Measured concentration Filtered Pressure Compensated

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x06	CFP_15	CFP_14	CFP_13	CFP_12	CFP_11	CFP_10	CFP_9	CFP_8
0x07	CFP_7	CFP_6	CFP_5	CFP_4	CFP_3	CFP_2	CFP_1	CFP_0

Filtered pressure compensated gas concentration. Signed 16bit value. This register equals the Measured concentration Filtered register if pressure compensation is disabled.
Pressure compensation can be set in the Meter control register

■ Temperature

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x08	TMP_15	TMP_14	TMP_13	TMP_12	TMP_11	TMP_10	TMP_9	TMP_8
0x09	TMP_7	TMP_6	TMP_5	TMP_4	TMP_3	TMP_2	TMP_1	TMP_0

Chip temperature. Signed 16bit value, unit °C x100. For example, register value = 2223 means 22.23°C

■ Measurement count

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x0D	MEAS_CNT_7	MEAS_CNT_6	MEAS_CNT_5	MEAS_CNT_4	MEAS_CNT_3	MEAS_CNT_2	MEAS_CNT_1	MEAS_CNT_0

Counter incremented after each measurement, range 0–255. The counter wraps around after the maximum value is reached. Counter value can for example be used by the host system to ensure that the sensor has done a measurement since last time measurement concentration was read.

■ Measurement cycle time

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x0E						MCT_10	MCT_9	MCT_8
0x0F	MCT_7	MCT_6	MCT_5	MCT_4	MCT_3	MCT_2	MCT_1	MCT_0

Measurement cycle time shows current time in present measurement cycle, incremented every 2 seconds. For example, Measurement cycle time = 3 means 6 seconds have passed in current measurement cycle. Value is set to 0 when sensor starts a new measurement. This value can be used by the host system to synchronise readings with sensor measurements

■ Measured concentration Unfiltered Pressure Compensated

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x10	CUFP_15	CUFP_14	CUFP_13	CUFP_12	CUFP_11	CUFP_10	CUFP_9	CUFP_8
0x11	CUFP_7	CUFP_6	CUFP_5	CUFP_4	CUFP_3	CUFP_2	CUFP_1	CUFP_0

Unfiltered pressure compensated gas concentration. Signed 16-bit value. This register equals the Measured concentration Unfiltered register if pressure compensation is disabled. Pressure compensation can be set in the Meter control register.

■ Measured concentration Filtered

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x12	CF_15	CF_14	CF_13	CF_12	CF_11	CF_10	CF_9	CF_8
0x13	CF_7	CF_6	CF_5	CF_4	CF_3	CF_2	CF_1	CF_0

Filtered gas concentration. Signed 16-bit value.

■ Measured concentration Unfiltered

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x14	CUF_15	CUF_14	CUF_13	CUF_12	CUF_11	CUF_10	CUF_9	CUF_8
0x15	CUF_7	CUF_6	CUF_5	CUF_4	CUF_3	CUF_2	CUF_1	CUF_0

Unfiltered gas concentration. Signed 16-bit value.

■ Firmware type

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x2F	1	1	0	0	0	0	1	0

Firmware type. Unsigned 8-bit value.
For S12 CO₂, fixed at 0xC2.

■ Firmware rev.

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x38	FW_R_15	FW_R_14	FW_R_13	FW_R_12	FW_R_11	FW_R_10	FW_R_9	FW_R_8
0x39	FW_R_7	FW_R_6	FW_R_5	FW_R_4	FW_R_3	FW_R_2	FW_R_1	FW_R_0

Firmware revision. Unsigned 16-bit value.
Bit 15 – 8: Main
Bit 7 – 0: Sub For S12 CO₂, fixed at 0x00.

■ Sensor ID

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x3A	ID_31	ID_30	ID_29	ID_28	ID_27	ID_26	ID_25	ID_24
0x3B	ID_23	ID_22	ID_21	ID_20	ID_19	ID_18	ID_17	ID_16
0x3C	ID_15	ID_14	ID_13	ID_12	ID_11	ID_10	ID_9	ID_8
0x3D	ID_7	ID_6	ID_5	ID_4	ID_3	ID_2	ID_1	ID_0

Sensor ID. Unsigned 32-bit value.

2.1.3. I²C read/write registers

Table 2.5 I²C Register table, read/write registers

Name	Address	R/W	Content
Reserved	0x80	R	
Calibration Status	0x81	R/W	
Calibration Command	0x82	R/W	
Calibration Command	0x83	R/W	
Calibration Target	0x84	R/W	
Calibration Target	0x85	R/W	
Measured concentration Override	0x86	R/W	
Measured concentration Override	0x87	R/W	
ABC Time	0x88	R/W	
ABC Time	0x89	R/W	
ABC Par0	0x8A	R/W	
ABC Par0	0x8B	R/W	
ABC Par1	0x8C	R/W	
ABC Par1	0x8D	R/W	
ABC Par2	0x8E	R/W	
ABC Par2	0x8F	R/W	
ABC Par3	0x90	R/W	
ABC Par3	0x91	R/W	
Reserved	0x92	R/W	
Start Single Measurement	0x93	R/W	
Reserved	0x94	R/W	
Measurement Mode (EE)	0x95	R/W	
Measurement Period (EE)	0x96	R/W	
Measurement Period (EE)	0x97	R/W	
Number of samples (EE)	0x98	R/W	
Number of samples (EE)	0x99	R/W	
ABC period (EE)	0x9A	R/W	
ABC period (EE)	0x9B	R/W	
Reserved	0x9C	R/W	
Clear ErrorStatus	0x9D	R/W	
ABC Target (EE)	0x9E	R/W	
ABC Target (EE)	0x9F	R/W	
Reserved	0xA0	R/W	
Static IIR filter parameter (EE)	0xA1	R/W	
Reserved	0xA2	R/W	
SCR	0xA3	R/W	
Reserved	0xA4	R/W	
Meter control (EE)	0xA5	R/W	
Reserved	0xA6	R/W	
MB / PC address (EE)	0xA7	R/W	
Reserved	0xA8	R	
Reserved	0xA9	R	
Reserved	0xAA	R	
Reserved	0xAB	R	
Reserved	0xAC	R	
Reserved	0xAD	R	
Reserved	0xAE	R	
Reserved	0xAF	R	
Reserved	0xB0	R	
Reserved	0xB1	R	
Reserved	0xB2	R	
Reserved	0xB3	R	
Reserved	0xB4	R	
Reserved	0xB5	R	
Reserved	0xB6	R	
Reserved	0xB7	R	

Name	Address	R/W	Content
Reserved	0xB8	R	
Reserved	0xB9	R	
Reserved	0xBA	R	
Reserved	0xBB	R	
Reserved	0xBC	R	
Reserved	0xBD	R	
Reserved	0xBE	R	
Reserved	0xBF	R	
Reserved Mirror of 0x80	0xC0	R/W	
Calibration Status Mirror of 0x81	0xC1	R/W	
Reserved Mirror of 0x92	0xC2	R/W	
Start Single Measurement Mirror of 0x93	0xC3	R/W	
ABC Time Mirror of 0x88	0xC4	R/W	
ABC Time Mirror of 0x89	0xC5	R/W	
ABC Par0 Mirror of 0x8A	0xC6	R/W	
ABC Par0 Mirror of 0x8B	0xC7	R/W	
ABC Par1 Mirror of 0x8C	0xC8	R/W	
ABC Par1 Mirror of 0x8D	0xC9	R/W	
ABC Par2 Mirror of 0x8E	0xCA	R/W	
ABC Par2 Mirror of 0x8F	0xCB	R/W	
ABC Par3 Mirror of 0x90	0xCC	R/W	
ABC Par3 Mirror of 0x91	0xCD	R/W	
Filter Par0	0xCE	R	
Filter Par0	0xCF	R/W	
Filter Par1	0xD0	R	
Filter Par1	0xD1	R/W	
Filter Par2	0xD2	R	
Filter Par2	0xD3	R/W	
Filter Par3	0xD4	R/W	
Filter Par3	0xD5	R/W	
Filter Par4	0xD6	R	
Filter Par4	0xD7	R/W	
Filter Par5	0xD8	R/W	
Filter Par5	0xD9	R/W	
Filter Par6	0xDA	R	
Filter Par6	0xDB	R/W	
Barometric air pressure value	0xDC	R/W	
Barometric air pressure value	0xDD	R/W	
ABC barometric pressure value	0xDE	R/W	
ABC barometric pressure value	0xDF	R/W	
Undefined	0xE6	R	
Undefined	0xE7	R	
⋮	⋮	R	
Undefined	0xFE	R	
Undefined	0xFF	R	

Note: Access to Undefined will report I²C Error.

Table 2.6 I²C Register Map

Name	Address	D7	D6	D5	D4	D3	D2	D1	D0
Reserved	0x80	Reserved [7:0]							
Calibration Status	0x81	Calibration Status [7:0]							
Calibration Command	0x82	Calibration Command [15:8]							
Calibration Command	0x83	Calibration Command [7:0]							
Calibration Target	0x84	Calibration Target [15:8]							
Calibration Target	0x85	Calibration Target [7:0]							
Measured concentration Override	0x86	Measured concentration Override [15:8]							
Measured concentration Override	0x87	Measured concentration Override [7:0]							
ABC Time	0x88	ABC Time [15:8]							
ABC Time	0x89	ABC Time [7:0]							
ABC Par0	0x8A	ABC Par0 [15:8]							
ABC Par0	0x8B	ABC Par0 [7:0]							
ABC Par1	0x8C	ABC Par1 [15:8]							
ABC Par1	0x8D	ABC Par1 [7:0]							
ABC Par2	0x8E	ABC Par2 [15:8]							
ABC Par2	0x8F	ABC Par2 [7:0]							
ABC Par3	0x90	ABC Par3 [15:8]							
ABC Par3	0x91	ABC Par3 [7:0]							
Reserved	0x92	Reserved [7:0]							
Start Single Measurement	0x93	Start Single Measurement [7:0]							
Reserved	0x94	Reserved [7:0]							
Measurement Mode (EE)	0x95	Measurement Mode [7:0]							
Measurement Period (EE)	0x96	0	0	0	0	0	Measurement Period [10:8]		
Measurement Period (EE)	0x97	Measurement Period [7:0]							
Number of samples (EE)	0x98	0	0	0	0	0	0	Number of samples [9:8]	
Number of samples (EE)	0x99	Number of samples [7:0]							
ABC period (EE)	0x9A	ABC period [15:8]							
ABC period (EE)	0x9B	ABC period [7:0]							
Reserved	0x9C	Reserved [7:0]							
Clear ErrorStatus	0x9D	Clear ErrorStatus [7:0]							

Name	Address	D7	D6	D5	D4	D3	D2	D1	D0
ABC Target (EE)	0x9E	ABC Target [15:8]							
ABC Target (EE)	0x9F	ABC Target [7:0]							
Reserved	0xA0	Reserved [7:0]							
Static IIR filter parameter (EE)	0xA1	Static IIR filter parameter [7:0]							
Reserved	0xA2	Reserved [7:0]							
SCR	0xA3	SCR [7:0]							
Reserved	0xA4	Reserved [7:0]							
Meter control (EE)	0xA5	Meter control [7:0]							
Reserved	0xA6	Reserved [7:0]							
MB / I ² C address (EE)	0xA7	MB / I ² C address [7:0]							
Reserved	0xA8	0	0	0	0	0	0	0	0
Reserved	0xA9	0	0	0	0	0	0	0	0
Reserved	0xAA	0	0	0	0	0	0	0	0
Reserved	0xAB	0	0	0	0	0	0	0	0
Reserved	0xAC	0	0	0	0	0	0	0	0
Reserved	0xAD	0	0	0	0	0	0	0	0
Reserved	0xAE	0	0	0	0	0	0	0	0
Reserved	0xAF	0	0	0	0	0	0	0	0
Reserved	0xB0	0	0	0	0	0	0	0	0
Reserved	0xB1	0	0	0	0	0	0	0	0
Reserved	0xB2	0	0	0	0	0	0	0	0
Reserved	0xB3	0	0	0	0	0	0	0	0
Reserved	0xB4	0	0	0	0	0	0	0	0
Reserved	0xB5	0	0	0	0	0	0	0	0
Reserved	0xB6	0	0	0	0	0	0	0	0
Reserved	0xB7	0	0	0	0	0	0	0	0
Reserved	0xB8	0	0	0	0	0	0	0	0
Reserved	0xB9	0	0	0	0	0	0	0	0
Reserved	0xBA	0	0	0	0	0	0	0	0
Reserved	0xBB	0	0	0	0	0	0	0	0
Reserved	0xBC	0	0	0	0	0	0	0	0
Reserved	0xBD	0	0	0	0	0	0	0	0
Reserved	0xBE	0	0	0	0	0	0	0	0
Reserved	0xBF	0	0	0	0	0	0	0	0
Reserved Mirror of 0x80	0xC0	Reserved [7:0]							
Calibration Status Mirror of 0x81	0xC1	Calibration Status [7:0]							
Reserved Mirror of 0x92	0xC2	Reserved [7:0]							

Name	Address	D7	D6	D5	D4	D3	D2	D1	D0
Start Single Measurement Mirror of 0x93	0xC3	Start Single Measurement [7:0]							
ABC Time Mirror of 0x88	0xC4	ABC Time [15:8]							
ABC Time Mirror of 0x89	0xC5	ABC Time [7:0]							
ABC Par0 Mirror of 0x8A	0xC6	ABC Par0 [15:8]							
ABC Par0 Mirror of 0x8B	0xC7	ABC Par0 [7:0]							
ABC Par1 Mirror of 0x8C	0xC8	ABC Par1 [15:8]							
ABC Par1 Mirror of 0x8D	0xC9	ABC Par1 [7:0]							
ABC Par2 Mirror of 0x8E	0xCA	ABC Par2 [15:8]							
ABC Par2 Mirror of 0x8F	0xCB	ABC Par2 [7:0]							
ABC Par3 Mirror of 0x90	0xCC	ABC Par3 [15:8]							
ABC Par3 Mirror of 0x91	0xCD	ABC Par3 [7:0]							
Filter Par0	0xCE	0	0	0	0	0	0	0	0
Filter Par0	0xCF	Filter Par0 [7:0]							
Filter Par1	0xD0	0	0	0	0	0	0	0	0
Filter Par1	0xD1	Filter Par1 [7:0]							
Filter Par2	0xD2	0	0	0	0	0	0	0	0
Filter Par2	0xD3	Filter Par2 [7:0]							
Filter Par3	0xD4	Filter Par3 [15:8]							
Filter Par3	0xD5	Filter Par3 [7:0]							
Filter Par4	0xD6	0	0	0	0	0	0	0	0
Filter Par4	0xD7	Filter Par4 [7:0]							
Filter Par5	0xD8	Filter Par5 [15:8]							
Filter Par5	0xD9	Filter Par5 [7:0]							
Filter Par6	0xDA	0	0	0	0	0	0	0	0
Filter Par6	0xDB	Filter Par6 [7:0]							
Barometric air pressure value	0xDC	Barometric air pressure value [15:8]							
Barometric air pressure value	0xDD	Barometric air pressure value [7:0]							
ABC barometric	0xDE	ABC barometric pressure value [15:8]							

Name	Address	D7	D6	D5	D4	D3	D2	D1	D0
pressure value									
ABC barometric pressure value	0xDF	ABC barometric pressure value [7:0]							
Undefined	0xE6	1	0	0	0	1	0	0	0
Undefined	0xE7	1	0	0	0	1	0	0	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
Undefined	0xFE	1	0	0	0	1	0	0	0
Undefined	0xFF	0	0	0	0	0	0	0	0

Register descriptions:

■ Calibration Status

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x81	0	Zero calibration	Background calibration	Target calibration	ABC calibration	Factory calibration restored	0	0

These bits are set after successful calibrations. The bits need to be cleared / reset by host system; it is recommended to do this before starting a calibration.

The register is reset by writing 0b00000 to D[6:2]. Note that it is not possible to reset each bit individually.

■ Calibration Command

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x82	CAL_COM_15	CAL_COM_14	CAL_COM_13	CAL_COM_12	CAL_COM_11	CAL_COM_10	CAL_COM_9	CAL_COM_8
0x83	CAL_COM_7	CAL_COM_6	CAL_COM_5	CAL_COM_4	CAL_COM_3	CAL_COM_2	CAL_COM_1	CAL_COM_0

Calibration is initiated by the commands in the table below.

The sensor will perform a calibration based on the first measurement immediately after the calibration command was received. Host system should trig a measurement after writing the calibration command in single measurement mode. After having performed the calibration, all following measurements will use the adjusted calibration parameters.

It is recommended that Calibration status is cleared before initiating a calibration.

Command	Name and description
0x7C02	Restore factory calibration. Restores calibration parameters to factory calibration values.
0x7C03	Forced ABC calibration. Sensor will perform an ABC calibration after receiving this command if sensor has valid ABC data. The command can be used if one for some reason wants to do an ABC adjustment before one ABC period has passed (when a normal ABC calibration is done). This command only works if ABC is enabled, see ABC period register and Meter control register.
0x7C05	Target calibration. Calibration using Calibration target register value as calibration target.
0x7C06	Background calibration. Calibration using ABC target register value as calibration target.
0x7C07	Zero calibration. Calibration using 0ppm gas as calibration target.

■ Calibration Target

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x84	CAL _TGT_15	CAL _TGT_14	CAL _TGT_13	CAL _TGT_12	CAL _TGT_11	CAL _TGT_10	CAL _TGT_9	CAL _TGT_8
0x85	CAL _TGT_7	CAL _TGT_6	CAL _TGT_5	CAL _TGT_4	CAL _TGT_3	CAL _TGT_2	CA _TGT_1	CAL _TGT_0

This register used by target calibration.

■ Measured concentration Override

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x86	CO_15	CO_14	CO_13	CO_12	CO_11	CO_10	CO_9	CO_8
0x87	CO_7	CO_6	CO_5	CO_4	CO_3	CO_2	CO_1	CO_0

Default value = 32767(no override).

If a value lower than default is written to the register, both the gas filtered and unfiltered registers will be set to this value.

■ ABC Time

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x88	ABC_T _15	ABC_T _14	ABC_T _13	ABC_T _12	ABC_T _11	ABC_T _10	ABC_T_9	ABC_T_8
0x89	ABC_T_7	ABC_T_6	ABC_T_5	ABC_T_4	ABC_T_3	ABC_T_2	ABC_T_1	ABC_T_0

Time passed since last ABC calibration in hours.

If ABC is enabled when sensor is used in single measurement mode and powered down between measurements, the host system must increment this value every hour.

■ ABC Par0, 1, 2, 3

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x8A	ABC _P0_15	ABC _P0_14	ABC _P0_13	ABC _P0_12	ABC _P0_11	ABC _P0_10	ABC _P0_9	ABC _P0_8
0x8B	ABC _P0_7	ABC _P0_6	ABC _P0_5	ABC _P0_4	ABC _P0_3	ABC _P0_2	ABC _P0_1	ABC _P0_0
0x8C	ABC _P1_15	ABC _P1_14	ABC _P1_13	ABC _P1_12	ABC _P1_11	ABC _P1_10	ABC _P1_9	ABC _P1_8
0x8D	ABC _P1_7	ABC _P1_6	ABC _P1_5	ABC _P1_4	ABC _P1_3	ABC _P1_2	ABC _P1_1	ABC _P1_0
0x8E	ABC _P2_15	ABC _P2_14	ABC _P2_13	ABC _P2_12	ABC _P2_11	ABC _P2_10	ABC _P2_9	ABC _P2_8
0x8F	ABC _P2_7	ABC _P2_6	ABC _P2_5	ABC _P2_4	ABC _P2_3	ABC _P2_2	ABC _P2_1	ABC _P2_0
0x90	ABC _P3_15	ABC _P3_14	ABC _P3_13	ABC _P3_12	ABC _P3_11	ABC _P3_10	ABC _P3_9	ABC _P3_8
0x91	ABC _P3_7	ABC _P3_6	ABC _P3_5	ABC _P3_4	ABC _P3_3	ABC _P3_2	ABC _P3_1	ABC _P3_0

If ABC is enabled when the Senseair CO₂ is used in single measurement mode and powered down between measurements, these registers must be read from the Senseair CO₂ after each measurement and written back to the Senseair CO₂ after each power on (enable) before a new measurement is started.

ABC Para3: Counts the number of luminescence.

■ Start Single Measurement

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x93	ST_SMEA S_7	ST_SMEA S_6	ST_SMEA S_5	ST_SMEA S_4	ST_SMEA S_3	ST_SMEA S_2	ST_SMEA S_1	ST_SMEA S_0

Initial value: 0x00

Writing 1(0x01) initiates a measurement if the sensor is configured for single measurement mode.

■ Measurement Mode (EE)

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x93	ST_SMEA S_7	ST_SMEA S_6	ST_SMEA S_5	ST_SMEA S_4	ST_SMEA S_3	ST_SMEA S_2	ST_SMEA S_1	ST_SMEA S_0

Initial value: 0x00

There are two measurement modes to choose between.

Value = 0(0x00) continuous measurement mode (default)

Value = 1(0x01) single measurement mode.

A system reset is required after changing measurement mode.

■ Measurement Period (EE)

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x96	0	0	0	0	0	MEAS _PRD_10	MEAS _PRD_9	MEAS _PRD_8
0x97	MEAS _PRD_7	MEAS _PRD_6	MEAS _PRD_5	MEAS _PRD_4	MEAS _PRD_3	MEAS _PRD_2	MEAS _PRD_1	MEAS _PRD_0

Measurement period in seconds (range from 1 to 2047). A system reset is required after changing configuration.

Note:

Measurement period is only used in continuous measurement mode.

Table 2.7 Measurement Period

MEAS_PRD[10:0]		Measurement Period[s]
Hex	Decimal	
7FF	2047	2047
7FE	2046	2046
7FD	2045	2045
⋮	⋮	⋮
708	1800	1800
⋮	⋮	⋮
11	17	17
10	16	16
0F	15	15
⋮	⋮	⋮
6	6	6
5	5	5
4	4	4
3	3	3
2	2	2
1	1	1
0	0	1

■ Number of samples (EE)

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x98	0	0	0	0	0	0	NOS_9	NOS_8
0x99	NOS_7	NOS_6	NOS_5	NOS_4	NOS_3	NOS_2	NOS_1	NOS_0

Number of samples in one measurement (range from 1 to 999). A higher number leads to better accuracy but also higher power consumption.

A system reset is required after changing the configuration.

If time for executing all samples in a measurement is longer than time between measurements, the S12 CO₂ will execute all samples and after that start a new measurement. This means that actual time between measurements will be longer than expected.

The valid values for NOS[9:0] are as follows:

- From 0 to 20: All integer values (e.g., 0, 1, 2, ..., 20)
- From 29 to 79: Values in steps of 10, starting from 29 (e.g., 29, 39, 49, ..., 79)
- From 99 to 999: Values in steps of 50, starting from 99 (e.g., 99, 149, 199, ..., 999)

Any other values will result in undefined behaviour.

Table 2.8 Number of samples

NOS[9:0]		Number of samples[times]
Hex	Decimal	
3E7	999	999
⋮	⋮	⋮
C7	199	199
95	149	149
63	99	99
4F	79	79
⋮	⋮	⋮
31	49	49
27	39	39
1D	29	29
14	20	20
⋮	⋮	⋮
2	2	2
1	1	1
0	0	1

■ ABC period (EE)

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x9A	ABC_PRD_15	ABC_PRD_14	ABC_PRD_13	ABC_PRD_12	ABC_PRD_11	ABC_PRD_10	ABC_PRD_9	ABC_PRD_8
0x9B	ABC_PRD_7	ABC_PRD_6	ABC_PRD_5	ABC_PRD_4	ABC_PRD_3	ABC_PRD_2	ABC_PRD_1	ABC_PRD_0

Period for ABC cycle in hours (range from 1 to 65534).

ABC is enabled by writing 1 to 65534 to the ABC period register and setting bit 1 = 0 in the Meter control register.

ABC is disabled by writing 0 or 65535 to the ABC period register or setting bit 1 = 1 in the Meter control register.

■ Clear ErrorStatus

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x9D	CLR_ES _7	CLR_ES _6	CLR_ES _5	CLR_ES _4	CLR_ES _3	CLR_ES _2	CLR_ES _1	CLR_ES _0

Initial value: 0x00

Write any values to this register to clear the ErrorStatus

■ ABC Target (EE)

Address	D7	D6	D5	D4	D3	D2	D1	D0
0x9E	ABC_TGT _15	ABC_TGT _14	ABC_TGT _13	ABC_TGT _12	ABC_TGT _11	ABC_TGT _10	ABC_TGT _9	ABC_TGT _8
0x9F	ABC_TGT _7	ABC_TGT _6	ABC_TGT _5	ABC_TGT _4	ABC_TGT _3	ABC_TGT _2	ABC_TGT _1	ABC_TGT _0

Target value for background and ABC calibrations.

■ Static IIR filter parameter (EE)

Address	D7	D6	D5	D4	D3	D2	D1	D0
0xA1	SIIR_PAR AM_7	SIIR_PAR AM_6	SIIR_PAR AM_5	SIIR_PAR AM_4	SIIR_PAR AM_3	SIIR_PAR AM_2	SIIR_PAR AM_1	SIIR_PAR AM_0

Initial value 0x00

Parameter for static IIR filter, recommended range from 2–10 and 1–16 is the allowable range. Use within the recommended range.

A higher value corresponds to a harder filtration.

If a value other than 1–16 is set when using the Dynamic IIR filter, an Algorithm error is reported.

■ SCR

Address	D7	D6	D5	D4	D3	D2	D1	D0
0xA3	SCR_7	SCR_6	SCR_5	SCR_4	SCR_3	SCR_2	SCR_1	SCR_0

Initial value: 0x00

The SCR register can be used to reset the sensor

Register value = 0xFF, sensor will reset/restart itself.

Communication becomes possible 30 ms after SCR.

■ Meter control (EE)

Address	D7	D6	D5	D4	D3	D2	D1	D0
0xA5	1	RDYN pin output	RDYN pin invert	Pressure compensation	Dynamic IIR filter	Static IIR filter	ABC	RDYN enable

Initial value: 0xFE

Bit field used to enable/disable the S12 CO₂ functions

Bit	Description
0	0 - RDYN enabled (default) 1 - RDYN disabled
1	0 - ABC enabled 1 - ABC disabled(default)
2	0 - Static IIR filter enabled 1 - Static IIR filter disabled(default)
3	0 - Dynamic IIR filter enabled 1 - Dynamic IIR filter disabled(default) To enable dynamic IIR filter both static IIR filter (bit2) and dynamic IIR filter (bit3) must be enabled
4	0 - Pressure compensation enabled 1 - Pressure compensation disabled (default)
5	0 - RDYN pin invert enabled, low during measurement 1 - RDYN pin invert (default), high during measurement
6	0 - RDYN pin push-pull output 1 - RDYN pin open drain output(default)

■ MB / I²C address (EE)

Address	D7	D6	D5	D4	D3	D2	D1	D0
0xA7	ADD_7	ADD_6	ADD_5	ADD_4	ADD_3	ADD_2	ADD_1	ADD_0

I²C: Sensor address, range 0–127 (0x00–0x7F).

A sensor reset is needed to activate the new address.

■ Calibration Status

Address	D7	D6	D5	D4	D3	D2	D1	D0
0xC1	0	Zero calibration	Background calibration	Target calibration	ABC calibration	Factory calibration restored	0	0

These bits are set after successful calibrations. The bits need to be cleared/reset by host system; it is recommended to do this before starting a calibration.

■ Start Single Measurement

Address	D7	D6	D5	D4	D3	D2	D1	D0
0xC3	ST_SMEA S_7	ST_SMEA S_6	ST_SMEA S_5	ST_SMEA S_4	ST_SMEA S_3	ST_SMEA S_2	ST_SMEA S_1	ST_SMEA S_0

Initial value 0x00

Writing 1(0x01) initiates a measurement if the sensor is configured for single measurement mode.

■ ABC Time

Mirror registers of 0x88, 0x89

Address	D7	D6	D5	D4	D3	D2	D1	D0
0xC4	ABC_T_1 5	ABC_T_1 4	ABC_T_1 3	ABC_T_1 2	ABC_T_1 1	ABC_T_1 0	ABC_T_9	ABC_T_8
0xC5	ABC_T_7	ABC_T_6	ABC_T_5	ABC_T_4	ABC_T_3	ABC_T_2	ABC_T_1	ABC_T_0

Time passed since last ABC calibration in hours.

If ABC is enabled when the S12 CO₂ is used in single measurement mode and powered down between measurements, the host system must increment this value every hour.

- ABC Par0, 1, 2, 3
Mirror registers of 0x8A – 0x91

Address	D7	D6	D5	D4	D3	D2	D1	D0
0xC6	ABC_P0_15	ABC_P0_14	ABC_P0_13	ABC_P0_12	ABC_P0_11	ABC_P0_10	ABC_P0_9	ABC_P0_8
0xC7	ABC_P0_7	ABC_P0_6	ABC_P0_5	ABC_P0_4	ABC_P0_3	ABC_P0_2	ABC_P0_1	ABC_P0_0
0xC8	ABC_P1_15	ABC_P1_14	ABC_P1_13	ABC_P1_12	ABC_P1_11	ABC_P1_10	ABC_P1_9	ABC_P1_8
0xC9	ABC_P1_7	ABC_P1_6	ABC_P1_5	ABC_P1_4	ABC_P1_3	ABC_P1_2	ABC_P1_1	ABC_P1_0
0xCA	ABC_P2_15	ABC_P2_14	ABC_P2_13	ABC_P2_12	ABC_P2_11	ABC_P2_10	ABC_P2_9	ABC_P2_8
0xCB	ABC_P2_7	ABC_P2_6	ABC_P2_5	ABC_P2_4	ABC_P2_3	ABC_P2_2	ABC_P2_1	ABC_P2_0
0xCC	ABC_P3_15	ABC_P3_14	ABC_P3_13	ABC_P3_12	ABC_P3_11	ABC_P3_10	ABC_P3_9	ABC_P3_8
0xCD	ABC_P3_7	ABC_P3_6	ABC_P3_5	ABC_P3_4	ABC_P3_3	ABC_P3_2	ABC_P3_1	ABC_P3_0

- Filter Par0, 1, 2, 3, 4, 5, 6

Address	D7	D6	D5	D4	D3	D2	D1	D0
0xCE	0	0	0	0	0	0	0	0
0xCF	FIL_P0_7	FIL_P0_6	FIL_P0_5	FIL_P0_4	FIL_P0_3	FIL_P0_2	FIL_P0_1	FIL_P0_0
0xD0	0	0	0	0	0	0	0	0
0xD1	FIL_P1_7	FIL_P1_6	FIL_P1_5	FIL_P1_4	FIL_P1_3	FIL_P1_2	FIL_P1_1	FIL_P1_0
0xD2	0	0	0	0	0	0	0	0
0xD3	FIL_P2_7	FIL_P2_6	FIL_P2_5	FIL_P2_4	FIL_P2_3	FIL_P2_2	FIL_P2_1	FIL_P2_0
0xD4	FIL_P3_15	FIL_P3_14	FIL_P3_13	FIL_P3_12	FIL_P3_11	FIL_P3_10	FIL_P3_9	FIL_P3_8
0xD5	FIL_P3_7	FIL_P3_6	FIL_P3_5	FIL_P3_4	FIL_P3_3	FIL_P3_2	FIL_P3_1	FIL_P3_0
0xD6	0	0	0	0	0	0	0	0
0xD7	FIL_P4_7	FIL_P4_6	FIL_P4_5	FIL_P4_4	FIL_P4_3	FIL_P4_2	FIL_P4_1	FIL_P4_0
0xD8	FIL_P5_15	FIL_P5_14	FIL_P5_13	FIL_P5_12	FIL_P5_11	FIL_P5_10	FIL_P5_9	FIL_P5_8
0xD9	FIL_P5_7	FIL_P5_6	FIL_P5_5	FIL_P5_4	FIL_P5_3	FIL_P5_2	FIL_P5_1	FIL_P5_0
0xDA	0	0	0	0	0	0	0	0
0xDB	FIL_P6_7	FIL_P6_6	FIL_P6_5	FIL_P6_4	FIL_P6_3	FIL_P6_2	FIL_P6_1	FIL_P6_0

If the S12 CO₂ is used in single measurement mode with IIR filter enabled and powered down between measurements, these registers must be read from the S12 CO₂ after each measurement and written back to the S12 CO₂ after each power on (enable) before a new measurement is started.

- Barometric air pressure value

Address	D7	D6	D5	D4	D3	D2	D1	D0
0xDC	BP_15	BP_14	BP_13	BP_12	BP_11	BP_10	BP_9	BP_8
0xDD	BP_7	BP_6	BP_5	BP_4	BP_3	BP_2	BP_1	BP_0

Barometric air pressure value. Signed 16bit, unit 0.1 hPa. Range from 3000–13000 (300–1300 hPa). For values outside pressure range, error flag “out of range” will be set and compensation will be done with min or max pressure value.

■ ABC barometric pressure value

Address	D7	D6	D5	D4	D3	D2	D1	D0
0xDE	ABC_BP_ 15	ABC_BP_ 14	ABC_BP_ 13	ABC_BP_ 12	ABC_BP_ 11	ABC_BP_ 10	ABC_BP_ 9	ABC_BP_ 8
0xDF	ABC_BP_ 7	ABC_BP_ 6	ABC_BP_ 5	ABC_BP_ 4	ABC_BP_ 3	ABC_BP_ 2	ABC_BP_ 1	ABC_BP_ 0

If pressure compensation and ABC are both enabled when the S12 CO₂ is used in single measurement mode and powered down between measurements, this register must be read from the S12 CO₂ after each measurement and written back to the S12 CO₂ after each power on(enable) before a new measurement is started.

3. Revision history

Date	Revision	Page (s)	Description
2025-09-23	1	All	First release of document
2025-01-12	2	All	Removal of "Micro" from sensor name. Alignment of table indents.

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