

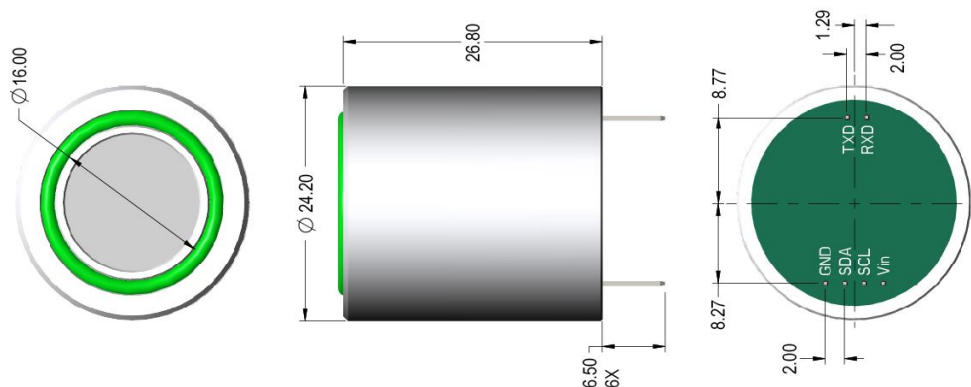
## SM 4LEL-SMART SENSOR MODULE

### Description

This 4LEL-Smart Sensor Module consists of a data collection and processing PCB assembly, a SemeaTech 4-Series Catalytic combustion (LEL) sensor, and a metal enclosure. The PCB assembly in the module collects the data from the gas sensor output, and then processes it with amplification, sampling and filtration through a built-in MCU to deliver stable and accurate digital output reflecting the actual target gas concentration. The 4LEL-Smart Sensor Module delivers the signal output through UART bus, which provides a good user experience for quickly integrating gas sensors into the existing systems for a variety of gas detection applications. Users can visit the website for detailed sensor parameters.



### Product Dimensions



### Pin Definition

Vin	GND	TXD	RXD
Power input positive	Power input Negative	Serial Port Sending	Serial port receiving

### Specifications

Product model	4LEL-Smart	Operating current	≤ 110mA@3.3VDC;
Detectable gas types	Combustible gas	Output mode	UART (+3.3V TTL)
Detection Principle	Catalytic combustion	Operating temperature	0°C ~ +40°C
Gas concentration range	0 ~ 100% LEL	Operating humidity	≤98%RH (25°C)
Resolution	1% LEL	Operating pressure	86 ~ 116KPa
Measurement error	<±5%FS	Storage temperature	-20°C ~ 40°C
Operating voltage	(3.3 ~ 3.6)VDC	Dimensions	Φ24.2x26.8mm

## Communication Settings

Baud rate	9600 bps
Data bits	8
Stop bit	1
Check bit	None

## Communication Command

This module uses serial port (TXD/RXD) and uses question-and-answer mode for data transmission. All data transmission is in hexadecimal format (HEX).

### 1. Command for terminal Read Module Information

**Example:** AA0F01C5 80 EE

Byte1 - AA: Start byte of a command;  
Byte2 - 0F: Information reading command;  
Byte3 - 01: Module address (default at 0x01);  
Byte4 - C5: CRC16 (Modbus) Check high byte;  
Byte5 - 80: CRC16 (Modbus) Check low byte;  
Byte6 - EE: Command end byte;

**Note:** In this command Byte 2 and Byte 3 will be checked with CRC 16 (Modbus)

### Modular response (Sending Information Data to Terminal)

**Example:** AA 0F 01 05 00 64 00 19 00 19 00 0F 00 63 84 EE

Byte1 - AA: Start byte of a command;  
Byte2 - 0F: Information reading command;  
Byte3 - 01: Module address (default at 0x01);  
Byte4 - 05: Sensor type(LEL);  
Byte5/6 - 00/64: Modular measurement range (hexadecimal);  
Byte7/8 - 00/19: Calibration of gas concentration (hexadecimal);  
Byte9/10 - 00/19: High Alarm Point (Hexadecimal);  
Byte11/12 - 00/0F: Low Alarm Point (Hexadecimal);  
Byte13 - 00: Sensor reading units (% LEL);  
Byte14 - 63: CRC16 (Modbus) Check high byte;  
Byte15 - 84: CRC16 (Modbus) Check low byte;  
Byte16 - EE: Command end byte;

**Note:** In this command Byte 2 ~ Byte 13 will be checked with CRC 16 (Modbus)

### 2. Commands for gas concentration request

**Example:** AA01 01 C1 E0 EE

Byte1 - AA: Start byte of a command;  
Byte2 - 01: Command for concentration sending request;  
Byte3 - 01: Module address(default at 0x01);  
Byte4 - C1: CRC16 (Modbus) Check high byte;

Byte5 - E0: CRC16 (Modbus) Check low byte;

Byte6 - EE: Command end byte;

**Note:** In this command Byte2 and Byte3 will be checked with CRC 16 (Modbus);

**Modular response (sending concentration data to the terminal)**

**Example:** AA 0101 80 00 0000 15 CA EE

Byte1 - AA: Start byte of a command;

Byte2 - 01: Command for concentration sending request;

Byte3 - 01: Module address (default at 0x01);

Byte4 - 80: Data symbol bit (0x80: negative; 0x00: positive);

Byte5 - 00: Fixed to zero;

Byte6 - 00: Data (%LEL), Hex format;

Byte7 - 00: Fixed to zero;

Byte8 - 15: CRC16 (Modbus) Check high byte;

Byte9 - CA: CRC16 (Modbus) Check low byte;

Byte10 - EE: Command end byte;

**Note:** In this command Byte 2 ~ Byte 7 will be checked with CRC 16 (Modbus);

### **3. Command for terminal sending Module Zero-setting**

**Example:** AA 02 01C1 10 EE

Byte1 - AA: Start byte of a command;

Byte2 - 02: Command for Zero-setting;

Byte3 - 01: Module address (default at 0x01);

Byte4 - C1: CRC16 (Modbus) Check high byte;

Byte5 - 10: CRC16 (Modbus) Check low byte;

Byte6 - EE: Command end byte;

**Note:** 1) In this command Byte 2 and Byte 3 will be checked with CRC 16 (Modbus);

2) During zero-setting, the LED flickers at a frequency of 1 second per time, lasting for 30 seconds;

**Zero-setting success, module sending:**

**AA 02 0110 D0 5C EE**

**Zero-setting failure, module sending:**

**AA02 01 20 D0 48 EE**

Byte1 - AA: Start byte of a command;

Byte2 - 02: Command for Zero-setting;

Byte3 - 01: Module address (fixed at 0x01);

Byte4 - 10/20 : Signs of success/failure;

Byte5 - D0/D0: CRC16 (Modbus) Check high byte;

Byte6 - 5C/48: CRC16 (Modbus) Check low byte;

Byte7 - EE: Command end byte;

**Note:** In this command Byte 2 ~ Byte 4 will be checked with CRC 16 (Modbus).

**4. Command for terminal sending Module Calibration****Example: AA03 01C0 80 EE**

Byte1 - AA: Start byte of a command;  
Byte2 - 03: Command for Calibration;  
Byte3 - 01: Module address (default at 0x01);  
Byte4 - C0: CRC16 (Modbus) Check high byte;  
Byte5 - 80: CRC16 (Modbus) Check low byte;  
Byte6 - EE: Command end byte;

**Note:** 1) In this command Byte 2 and Byte 3 will be checked with CRC 16 (Modbus);  
2) During calibration, the LED flickers at a frequency of 1 second per time, lasting for 120 seconds.

**Calibration success, module sending:****AA03 01 10 81 9C EE****Calibration failure, module sending:****AA 03 0120 81 88 EE**

Byte1 - AA: Start byte of a command;  
Byte2 - 03: Command for Calibration;  
Byte3 - 01: Module address (default at 0x01);  
Byte4 - 10/20 : Signs of success/failure;  
Byte5 - 81/81: CRC16 (Modbus) Check high byte;  
Byte6 - 9C/88: CRC16 (Modbus) Check low byte;  
Byte7 - EE: Command end byte;

**Note:** In this command Byte 2 ~ Byte 4 will be checked with CRC 16 (Modbus).

**5. Command for Module Address Modification****Example: AA 04 02 82 B1 EE**

Byte1 - AA: Start byte of a command;  
Byte2 - 04: Command for Address Modification;  
Byte3 - 02: Module new address;  
Byte4 - 82: CRC16 (Modbus) Check high byte;  
Byte5 - B1: CRC16 (Modbus) Check low byte;  
Byte6 - EE: Command end byte;

**Note:** In this command Byte 2 and Byte 3 will be checked with CRC 16 (Modbus).

**Address Modification success, module sending:****AA04 02 10 30 AD EE**

Byte1 - AA: Start byte of a command;  
Byte2 - 04: Command for Address Modification;  
Byte3 - 02: Module new address;  
Byte4 - 10 : Signs of success;  
Byte5 - 30: CRC16 (Modbus) Check high byte;  
Byte6 - AD: CRC16 (Modbus) Check low byte;

Byte7 - EE: Command end byte;

**Note:** In this command Byte 2 ~ Byte 4 will be checked with CRC 16 (Modbus);

## **6. Command for Adjustment of Calibration Gas Concentration**

**Example:** AA 05 0100 32 D0 FD EE

Byte1 - AA: Start byte of a command;

Byte2 - 05: Command for concentration adjustment

Byte3 - 01: Module address (default at 0x01);

Byte4 - 00: Fixed to zero;

Byte5 - 32: Concentration to be modified (%LEL, Hex format);

Byte6 - D0: CRC16 (Modbus) Check high byte;

Byte7 - FD: CRC16 (Modbus) Check low byte;

Byte8 - EE: Command end byte;

**Note:** In this command Byte 2 ~ Byte 5 will be checked with CRC 16 (Modbus);

**Adjustment success, module sending:**

AA 0501 10003269 EC EE

**Adjustment failure, module sending:**

AA 05 01 20 00 32 69E3 EE

Byte1 - AA: Start byte of a command;

Byte2 - 05: Command for Adjustment;

Byte3 - 01: Module address (default at 0x01);

Byte4 - 10/20 : Signs of success/failure;

Byte5 - 00: Fixed to zero;

Byte6 - 32: Concentration to be modified(%LEL, Hex format);

Byte7 - 69/69: CRC16 (Modbus) Check high byte;

Byte8 - EC/E3: CRC16 (Modbus) Check low byte;

Byte9 - EE: Command end byte;

**Note:** In this command Byte 2 ~ Byte 6 will be checked with CRC 16 (Modbus).

## **Warning!**

- 1) This product does not have any intrinsic safety certification or explosion proof certification. Please do NOT use this product in any hazardous locations.
- 2) This product does not have reverse power protection and Electrostatic Discharge (ESD) protection. Please carefully verify the electrical polarity and make the ESD protection before each use or installation.
- 3) Please use a stable DC power supply for this gas sensor module. It is highly recommended to use a power supply with the output voltage fluctuation less than 1%