

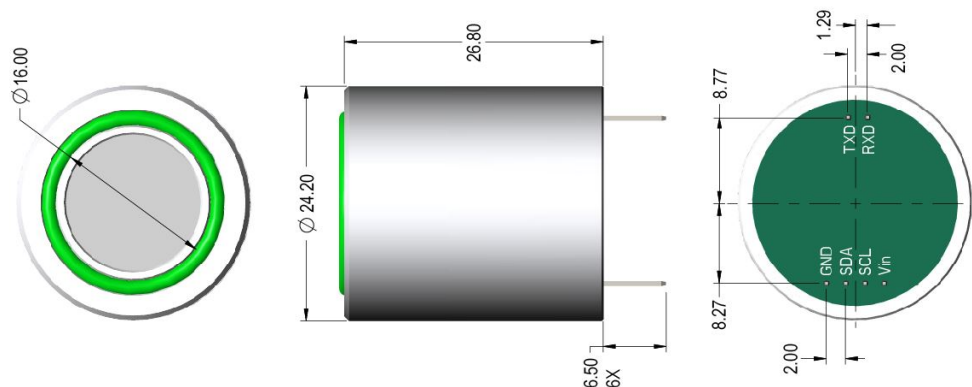
SM 4LEL-SMART SENSOR MODULE

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-Out

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

Specifications

Product model	4LEL-Smart	Operating current	$\leq 110\text{mA}@3.3\text{VDC}$;
Detectable gas types	Combustible gas	Output mode	UART (+3.3V TTL)
Detection Principle	Catalytic combustion	Operating temperature	$0^{\circ}\text{C} \sim +40^{\circ}\text{C}$
Gas concentration range	$0 \sim 100\%$ LEL	Operating humidity	$\leq 98\%\text{RH}$ (25°C)
Resolution	1% LEL	Operating pressure	$86 \sim 116\text{KPa}$
Measurement error	$< \pm 5\%\text{FS}$	Storage temperature	$-20^{\circ}\text{C} \sim 40^{\circ}\text{C}$
Operating voltage	$(3.3 \sim 3.6)\text{VDC}$	Dimensions	$\varnothing 24.2 \times 26.8\text{mm}$

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%