

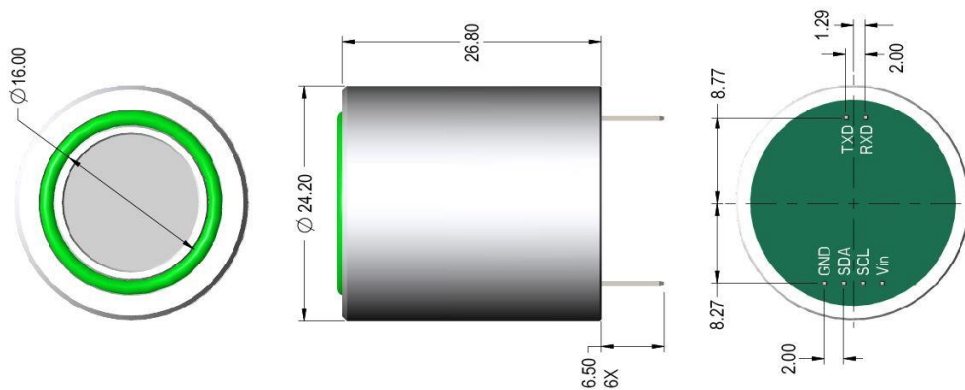
SM 4LEL-SMART SENSOR MODULE

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	≤ 110 mA @ 3.3 VDC
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 ~ 116 KPa
Measurement error	< ±5% FS	Storage temperature	-20°C ~ 40°C
Operating voltage	(3.3 ~ 3.6) VDC	Dimensions	Φ 24.2 x 26.8 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: AA 0F 01 C5 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: AA 01 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:

AA 02 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: AA 03 01 C0 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:

AA 03 01 10 81 9C EE

Calibration failure, module sending:

AA 03 01 20 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:

AA 04 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 01 00 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 05 01 10 00 32 69 EC EE

Adjustment failure, module sending:

AA 05 01 20 00 32 69 E3 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%.