

OMD-507

Bidirectional MODBUS RS485 ASCII

Communication Guide

Document Control

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Technical Reference - 6-Wire & 3-Wire MODBUS Configuration

Purpose. This guide summarizes the Bidirectional MODBUS RS485 ASCII communication functions documented for the OMD-507 with MODBUS configuration. It is intended for PLC, DCS, PC, and other serial-interface integration.

1. Communication Settings

Parameter	Setting
Protocol	Bidirectional MODBUS ASCII over RS485
Baud Rate	19200
Data Bits	8
Stop Bits	1
Parity	Even
Device ID	User selectable, 1-99

Device ID. The MODBUS ID can be changed from the analyzer menu. Select MODBUS ID, use the UP/DOWN keys to select an address from 1 through 99, and press ENTER to save. The legacy documentation also states that holding ESC during boot displays the MODBUS ID.

2. RS485 Connections

Terminal	Function
B	MODBUS RS485 B
A	MODBUS RS485 A
GND	MODBUS communication ground

Wiring note. Use appropriate shielded cable and follow plant grounding and RS485 network practices.

3. MODBUS ASCII Message Structure

Field	Length	Description
Start Frame	1 character	Colon ":"
Address Field	2 characters	Device address
Function Code	2 characters	Read/write function
Data	Variable	Register address, quantity, and/or data
Error Check	2 characters	Longitudinal Redundancy Check (LRC)
End Frame	2 characters	CR LF

LRC Calculation

The protocol defines the LRC as follows: add all message bytes except the starting colon and ending CR/LF, take the one's complement of the result, then add 1 to obtain the two's-complement LRC.

Example - Function 06 command for Device ID 1:

```
:010600000001F8
```

LRC calculation: $01 + 06 + 00 + 00 + 00 + 01 = 08$ hex. One's complement = F7; add 1 = F8.

4. Supported Functions

Function	Purpose	Legacy Behavior
04	Read Input Registers	Primary function used to read gas concentration.
06	Write Single Register	Used for manual/auto range control.
16	Write Multiple Registers	Used for remote span calibration.
03 / 05	Communications test	These commands are echoed back for communications testing.

5. Reading Oxygen Concentration - Function 04

Gas concentration format. The legacy documentation states that gas concentration is communicated in PPM and represented as XX XX XX.XX. For example, 19.34 PPM is represented as 000019.34 and transmitted as 00001934.

Read command example for Device ID 1:

:010400000004F7		
Field	Value	Meaning
Start	:	Start character
Device ID	01	Device 1
Function	04	Read Input Registers
Start Register	0000	First register
Register Count	0004	Four registers
LRC	F7	Longitudinal Redundancy Check

Example Response - 87.52 PPM

:010404000087526C		
Field	Value	Meaning
Device ID	01	Device 1
Function	04	Read Input Registers
Byte Count	04	Four data bytes
Data	00 00 87 52	87.52 PPM
LRC	6C	Longitudinal Redundancy Check

Second example. For Device ID 2, the command ":020400000004F6" is shown with response ":0204040019529352", representing 1952.93 PPM.

6. Manual / Auto Range Control - Function 06

Legacy command example: ":010600000001F8" sets Device ID 1 to the highest manual range according to the 2020 protocol documentation. The analyzer echoes the command after a successful write.

:010600000001F8	
Field	Value
Device ID	01
Function	06
Register	0000
Data	0001
LRC	F8

7. Remote Span Calibration - Function 16

Example. The following command performs a remote span calibration of 52.93 PPM on Device ID 1. The analyzer is documented to echo the command after execution.

:011600010002040000529357		
Field	Value	Meaning
Device ID	01	Device 1
Function	16	Write Multiple Registers
Start Address	0001	Starting register
Register Count	0002	Two registers
Byte Count	04	Four data bytes
Data	00 00 52 93	52.93 PPM span value
LRC	57	Longitudinal Redundancy Check

8. Integration Notes

- Function 04 returns gas concentration in PPM regardless of the analyzer's manual range setting, according to the legacy documentation.
- The communication settings are documented as fixed; only the Device ID is user-selectable.
- Southland Sensing has preconfigured MODBUS polling software available for troubleshooting if needed.
- Confirm RS485 polarity, grounding, termination, and network topology for the specific installation.
- Verify current firmware behavior before using write functions for range control or remote calibration.