

76-81GHz Continuous Frequency Modulated Wave Radar Level Gauge
Installation Commissioning and Operation Manual



Appendix A Communication Protocol

A.1 Communication protocol hardware interface parameters

The radar level gauge communicates externally via RS485 (4-wire system) or UART (2-wire system) serial ports.
The default parameters are as follows:

Communication parameters	Serial port level	Baud rate (bps)	Parity check	Data length (bit)	Stop bit (bit)
Serial port	RS485	9600	None	8	1

A.2 Communication protocol format

The level gauge adopts the Modbus RTU communication protocol for external communication. Each complete data frame includes: address code, function code, data and check. Among them, the check is the CRC16 check data of the data frame, with the low byte first and the high byte last. The default address of the level gauge radar at factory shipment is 1.

The format of the request command and the format of the radar reply data are described as follows:

(1) Query parameter format: Function code 0x03.

Request:

Device address	Function code	Start address	Number of registers	CRC
(1 byte)	(1 byte)	(2 bytes)	(2 bytes)	(2 bytes)

Reply:

Device address	Function code	Data length	Register value	CRC
(1 byte)	(1 byte)	(1 byte)	(2xN byte)	(2 byte)

N: Number of registers

(2) Query parameter format: Function code 0x04.

Request:

Device address	Function code	Start address	Register value	CRC
(1 byte)	(1 byte)	(2 byte)	(2 byte)	(2 byte)

Reply:

Device address	Function code	Data length	Register value	CRC
(1 byte)	(1 byte)	(1 byte)	(2xN byte)	(2 byte)

N: Number of registers

(2) Set parameter format: Code 0x10

Request:

Device address	Function code	Start address	Number of registers	Data length	Register value	CRC
(1 byte)	(1 byte)	(2 byte)	(2 byte N)	(1 byte)	(2N byte)	(2 byte)

Reply:

Device address	Function code	Start address	Register value	CRC
(1 byte)	(1 byte)	(2 byte)	(2 byte)	(2 byte)

A.3 Communication Protocol Format A.3 Communication Protocol Command Description

The following provides a detailed description of each command:

Set Instruction: Function code 0x10

Read command : Function code 0x03

Starting address: 0x200

Table 10 Register Addresses

Name	Register Address	Number of Registers	Function Code	Data Type	Access Type	Setting Range
Low adjustment		2	0x03/ 0x10	USIGN32	W/R	0~85000mm
High adjustment		2	0x03/ 0x10	USIGN32	W/R	0~85000mm
Range setting		2	0x03/ 0x10	USIGN32	W/R	0~85000mm
Blind zone setting		2	0x03/ 0x10	USIGN32	W/R	0~85000mm
Damping time		1	0x03/ 0x10	USIGN16	W/R	0~100s
Medium type		1	0x03/ 0x10	USIGN16	W/R	0: Liquid; 1: Solid
Medium parameters		1	0x03/ 0x10	USIGN16	W/R	0--Small container; 1-- Medium container; 2-- Large container; 3-Stirring;
Container type		1	0x03/ 0x10	USIGN16	W/R	0:Large bin; 1:Small bin; 2:Fast; 3:Test
False echo start		2	0x03/ 0x10	USIGN32	W/R	0~85000mm
False echo end		2	0x03/ 0x10	USIGN32	W/R	0~85000mm
False echo intensity		2	0x03/ 0x10	USIGN32	W/R	0-200db
Distance offset		1	0x03/ 0x10	USIGN16	W/R	-1000~1000mm
HART address		1	0x03/ 0x10	USIGN16	W/R	0-32
MODBUS address		1	0x03/ 0x10	USIGN16	W/R	1-127
MODBUS baud rate		1	0x03/ 0x10	USIGN16	W/R	0-9600 1-38400 2- 115200
Output setting		1	0x03/ 0x10	USIGN16	W/R	0:4-20mA 1:20-4mA
Current simulation		1	0x03/ 0x10	USIGN16	W/R	4000--20000
Current function		1	0x03/ 0x10	USIGN16	W/R	0: No change;; 1:22mA 2:3.6mA
Measurement mode		1	0x03/	USIGN16	W/R	0: Level; 1: Empty height

Name	Register Address	Number of Registers	Function Code	Data Type	Access Type	Access Type
			0x10			
Distance Unit	45	1	0x03/ 0x10	USIGN16	W/R	0:m; 1:cm; 1:mm
Language	46	1	0x03/ 0x10	USIGN16	W/R	0: Chinese; 1: English
LCD Contrast	47	1	0x03/ 0x10	USIGN16	W/R	40-100
Empty Height mm	0	2	0x03	USIGN32	R	Read Empty Height, Unit mm
Material Height mm	2	2	0x03	USIGN32	R	Read Liquid Level Height, Unit mm
Callback Index	61	1	0x03/ 0x10	USIGN16	W/R	1-99
Echo Radius	62	1	0x03/ 0x10	USIGN16	W/R	0-100
Window Radius	63	1	0x03/ 0x10	USIGN16	W/R	0—10000
Window Time	64	1	0x03/ 0x10	USIGN16	W/R	0-600
Callback Lock	65	1	0x03/ 0x10	USIGN16	W/R	0-Lock, 2-Unlock
First Level Filter	66	1	0x03/ 0x10	USIGN16	W/R	0-Close, 1-Open
Second Level Filter	67	1	0x03/ 0x10	USIGN16	W/R	0-Close, 1-Open
Response Rate	68	1	0x03/ 0x10	USIGN16	W/R	0—30000
Threshold Width	69	1	0x03/ 0x10	USIGN16	W/R	0-200
Threshold Strength	70	1	0x03/ 0x10	USIGN16	W/R	0-100
Factory Reset	71	1	0x03/ 0x10	USIGN16	W/R	0-Yes, 1-No

A.4 Communication example

Read low bit adjustment command is as follows:

Device address	Function code	Starting address	Number of registers	CRC
01	03	0020	0002	C5C1

The write low bit adjustment command is as follows (data value parsing order CDAB):

Device address	Function code	Start address	Number of registers	Data length	Data value	CRC
01	10	0020	0002	04	88 B8 00 00	5A32