WD200
Instruction Manual

January 2021 Edition

Catalogue

Chapter 1 Profile

WD200 strain sensor digital transmitter controller (hereinafter referred to as transmitter), is our company launched can connect to 1~8 load cell module, with RS485 or RS232 communication interface, standard MODBUS-RTU and custom two communication protocols.

Specification:

Power Supply: DC12~24V
Excitation Voltage: DC5V
Temp. Compensated: -10~40℃
Humidity Range: 90%R.H(No Condensation)
Power Consumption: Max 10W
Dimmensions: 122×87mm

Chapter 2 Installation

Notes:

- Distinguish the positive and negative poles, do not reverse them.
- Do not pull the wire hard, in case it falling off.
- Avoid Moisture and Water, Avoid severe shock.

1、Load Cell Connection

The transmitter needs to be connected with an external resistance strain bridge sensor, and the sensor is connected to the module by wiring.

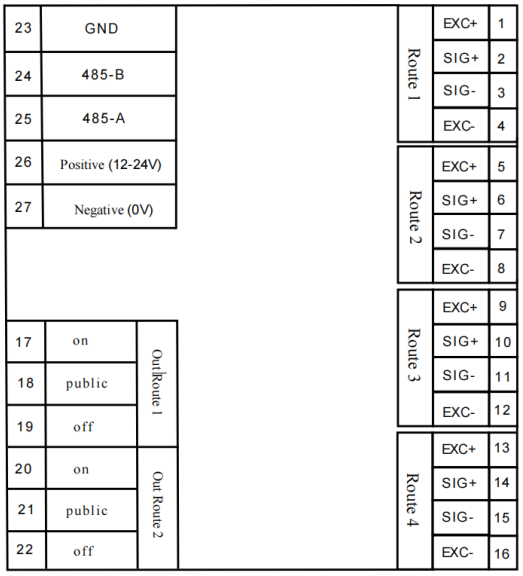
Each port of the sensor connection terminal is assigned to:

Ports	EXC+	EXC-	SIG+	SIG-
4 Wire	Excitation(+)	Excitation(-)	Signal(+)	Signal(-)

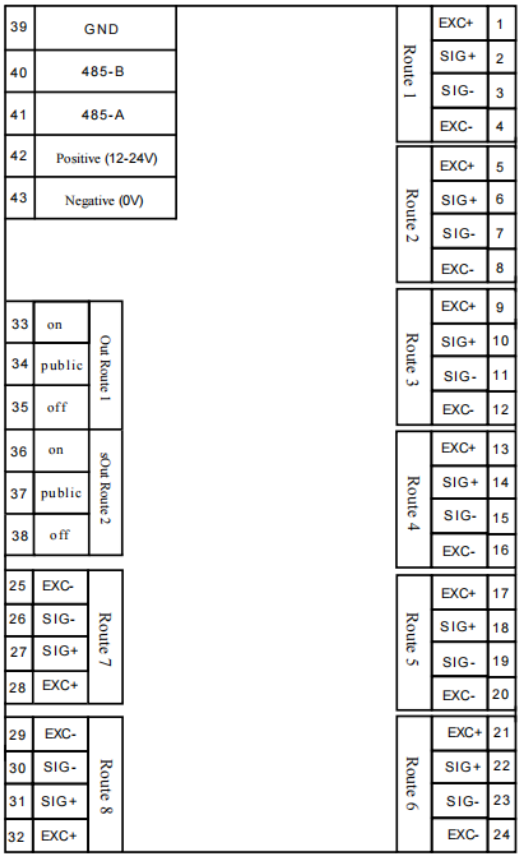
Notes:

- Since the sensor is Analog output, that is sensitive to electronic noise, shielded cables should be used for sensor wiring, and should be laid separately from other cables, especially away from the AC powery
- For short-distance and stable temperature transmission where the accuracy is not high, the 4-wire sensor is good, but for long-distance transmission or high precision requirements, the 6-wire sensor is better.
- For multi-sensor parallel connection, it is necessary to keep the sensitivity(mV/V) of each sensor consistent

2、Wiring



Pic1: WD200-4



Pic2: WD200-8

Chapter 3 Serial Communication

The serial interface communicated with upper computer RS485 or RS232 is optional(specified in advance), self-defined protocol and MODBUS protocol are set.。

I、Self-defined Protocol:

1、 Protocol working mode: command
2、 Data format: 8 data bits, 1 stop bit, no parity (factory default)
3、 Baud rate: 9600 (default)
4、 Encoding standard: hexadecimal
5、 Over one byte data little-endian alignment (16-bit and 32-bit both low-byte first)

Host sends frame format

Address	Order Code	Data Length	Data	CRC Check Code
1 byte	1 byte	2 byte	N byte	2 byte

Notes: Address = Device Address
Data-data cache address (2 bytes)+data length (2 bytes)
Data length: 2 bytes, indicating the length of subsequent data (excluding CRC)
CRC Check Code: 2 bytes

Slave reply frame format

Start	Address	Order Code	Data Length	Data	CRC Check Code
55H	1 byte	1 byte	2 byte	N byte	2 byte

Notes: Address = Device Address
Data length: 2 bytes, indicating the length of subsequent data (excluding CRC)
CRC Check Code: 2 bytes

ORDER:

Code	Instruction	Remark
0*02	Read Device MID	MlD is unique factory identification, 8-digit hexadecimal number
0*03	Read Device MADR	Read communication address, destination is broadcast address, parameter is MID
0*04	Write Device MADR	Write communication address, destination can be broadcast address
0*30	Read switch input status	
0*31	Read switch output status	
0*32	Set the switch output status	
0*3C	Read Data	Read memory variable
0*3D	Write Data	Change memory variable
0*3E	Clear	Seize correction value as current weight

0*41	Save Data Changes	Write memory data to be saved into Flash
0*50	Set New Calibration	Set calibration point with new weight, the past invalidated
0*51	Insert New Calibration	Insert new point into calibration data table
0*54	Set Division	
0*55	Power on auto-clear /zero point tracking	Auto-clear: 1-10 are 1%-10% of full range Tracking: 1-10 are 1-10 limes of set division
0*58	Read switch input status	
0*56	Relay control	
0*3f	Protocol Swrtch	0: Self-defined, 1: MODBUS-RTU
0*fa	Setting the number of AD	Number of enabled AD (less than or equal to the number of hardware AD)
0*fc	Soft Restart	Restarts delay 20s after this order

Memory Variable Address Table:

Address	Instruction	Remark
0*0A	AD	Record Real Time AD
0*0C	Weight	Weight=Original Weight-Zero Correction
0*0D	Net Weight	Net Weight=Weight-Reduction Weight
0*0B	Original Weight	The weight calculated by AD
0*0F	Zero Correction Value	Little value correction, set by clear
0*11	Reduction Weight	
0*12	Unit Weight	Be used to calculate quantity,Not In Use
0*13	Max Capacity	
0*16	Division Value	
0*15	Zero Point AD	Calibration data , to calculate original weight
0*17	Correction Weight	Calibration data, a total of 10 32-digit numbers
0*21	Correction AD	Calibration data, a total of 10 32-digit numbers
Addresses of route 2-8 are increased by 0*21 of the upper route(route2 AD is 0*2B)		

Order Samples:

1、Read device ID: 0x02

The host computer reads ID of the terminal whose address is 0x01（0xFFFFFFFF）

Host computer send: 0x01 0x02 0x00 0x00 crc

Terminal return: 0x55 0x01 0X02 0x04 0x00 0xFF 0xFF 0xFF 0xFF crc

Notes: The ID numbers of current terminals are all 0xFFFFFFFF

2、Read device communication address 0x03(by broadcasting)

The host computer obtains terminal address whose ID is 0xFFFFFFFF (0x01)

Host computer send: 0x00 0x03 0x04 0x00 0xFF 0xFF 0xFF 0xFF crc

Terminal return: 0x55 0x01 0X03 0x01 0x00 0x01 crc

3、Modify the device communication address 0x04

1）、The host computer changes the address of the terminal to 0x02, whose ID is 0*FFFFFFFF, communication address is 0x01

Host computer send: 0x01 0x04 0x01 0x00 0x02 crc

Terminal return: 0x55 0x02 0X04 0x01 0x00 0x02 crc

2）、The frame sent by the host computer can also directly use the broadcast address

Host computer send: 0x00 0x04 0x05 0x00 0xFF 0xFF 0xFF 0xFF 0x02 crc

4、Read data 0x3c

The upper computer reads the weight value of the terminal whose address is 0x01(variable address 0x0C), and the weight value is 0x10000

Host computer send:0x01 0x3C 0x04 0x00 0x0C 0x00 0x01 0x00 crc

Terminal return: 0x55 0x01 0x3C 0x04 0x00 0x00 0x00 0x01 0x00 crc

Notes: The first two bytes are the starting address, the last two bytes are the data length (word), and the two parts form a segment. A frame can contain several such data segments, and the returned frame will be filled with data in order.

5、Write data 0x3D

The upper computer changes the tare value of the terminal with address 0x01 (variable address 0x11) to 0x10000

Host computer send: 0x01 0x3D 0x08 0x00 0x11 0x00 0x01 0x00 0x00 0x00 0x01 0x00 crc

Terminal return: 0x55 0x01 0x3D 0x00 0x00 crc

Notes: The first 2 bytes are the starting address, next 2 bytes are data length (word), followed data to be written, 3 parts form a segment. A frame has several such segments.

6、Clear 0x3E

The upper computer clears the terminal with address 0x01, terminal returns the zero correction value after clearing.

Host computer send: 0x01 0x3E 0x00 0x00 crc

Terminal return: 0x55 0x01 0x3E 0x04 0x00 0x00 0x01 0x00 0x00 crc

7、Save datavariable 0x41

Host computer send: 0x01 0x41 0x00 0x00 crc

Terminal return: 0x55 0x01 0x41 0x00 0x00 crc

Notes: Data saved to Flash includes:

1) Communication Address
2) Zero Point Collection Value
3) Tare Weight
4) Unit Weight
5) Max. Capacity
6) Division
7) Zero Point AD

8) Correction Weight

9) Correction AD

10) Power on Auto-clear / Zero Point Tracking

8、Reset Calibration 0x50

1）、The host computer calibrates the zero point of the terminal with the address 0x01

Host computer send: 0x01 0x50 0x04 0x00 0x00 0x00 0x00 0x00 crc

Terminal return: 0x55 0x01 0x50 0x00 0x00 crc

2)、The host computer calibrates the weight of the terminal with address 0x01 to 1000g (0x186A0)

Host computer send: 0x01 0x50 0x04 0x00 0xA0 0x86 0x01 0x00 crc

Terminal return: 0x55 0x01 0x50 0x00 0x00 crc

Notes: Resetting the calibration point will invalidate all past data (excluding zero point AD), there is only one set of calibration data in the data array.

When the given weight value is 0, only the zero AD value is calibrated.

9、Insert new calibration point 0x51

The host computer pair address is 0x01 Terminal Calibration Weight 1000 (0x186A0)

Host computer send: 0x01 0x51 0x04 0x00 0xA0 0x86 0x01 0x00 crc

Terminal return: 0x55 0x01 0x51 0x00 0x00 crc

Notes:

1、The instruction format for inserting calibration points is identical to the 0x50 instruction except that it does not clear the original calibration data.

2、If the original calibration data is less than 8 sets, insert the new calibration data directly into the appropriate location; If 8 groups are reached, select the group with the closest AD value and replace it.

3、When the given weight value is 0, only the zero point AD value is calibrated

10、Set the Maximum Range

The host computer pair address is 0x01 Terminal Calibration Weight 5000g（0x7A120）

Host computer send: 0x01 0x3D 0x08 0x00 0x13 0x00 0x01 0x00 0x20 0xA1 0x07 0x00 crc

Terminal return: 0x55 0x01 0x3D 0x00 0x00 crc

Explanation: 0x13 0x00 The initial address of the address； 0x01 0x00 Number of registers register number；0x20 0xA1 0x07 0x00 Register value

11、Division Value Setting

Host computer send: 0x01 0x54 0x01 0x00 xx(0x01、0x2、0x5、0x0A、0X14、0X32） crc

Terminal return: 0x55 0x01 0x54 0x00 0x00 crc

Explanation: Division Value: xxcan be set to 0x01、0x2、0x5、0x0A、0X14、0X32. 1、2、5、10、20、50 units in grams

12、Read the switch input status

1）、Read #1 switch status

Host computer send: 0x01 0x30 0x01 0x00 0x01 crc

Terminal return: 0x55 0x01 0x30 0x01 0x00 xx(0x00 quantile、0x1 closed position） crc

2）、Read #2 switch status

Host computer send: 0x01 0x30 0x01 0x00 0x02 crc

Terminal return: 0x55 0x01 0x30 0x01 0x00 xx(0x00 quantile、0x2 closed position） crc

3）、Read #1, #2 switch status

Host computer send: 0x01 0x30 0x01 0x00 0x03 crc

Terminal return: 0x55 0x01 0x30 0x01 0x00 xx(0x00 quantile、0x1#1 closed position、0x02#1 closed position、0x3#1、#2 closed position） crc

13、Relay Control

Host computer send: 0x01 0x30 0x01 0x00 xx(0x00、0x1、0x2、0x03）crc

Terminal return: 0x55 0x01 0x56 0x01 0x00 xx(0x00、0x1、0x2、0x03） crc

Explanation:

xx can be set to 0x00、0x1、0x2、0x03, 0x00: Relays 1 and 2 are in reset state; 0x01: Relay 1 is in the action state, and relay 2 is in the reset state; 0x02: Relay 2 is in the action state, and relay 1 is in the reset state; 0x03: Relays 1 and 2 are in action.

14、 Power-on automatic zero reset/ Zero point tracking Enable Setting

Host computer send: 0x01 0x55 0x02 0x00 xx(Power-on automatic zero reset) xx (Zero point tracking) crc

Terminal return: 0x55 0x01 0x55 0x02 0x00 xx(Power-on automatic zero reset) xx (Zero point tracking) crc

Explanation:

Power-on automatic zero reset: 0x00 means that the power on reset function is turned off, 0x01-0x0A indicates that the power on reset function is turned on (the reset range is 1% to10% of full scale).

Zero point tracking: Within 2 seconds of startup, if the weight value is within the zero point tracking range, the weight value will return to zero. 0x00 means that the zero point tracking function is off, 0x01-0x0A means that the zero point function is on (the zero point tracking range is 1-10 times the set division value)

If the power-on reset/zero tracking value is not within 0x00-0x0A, it will not take effect and return to the original set value. (can be used to read the value saved in the device)

15、Protocol Switch

Host computer send: 0x01 0x3f 0x01 0x00 0x01 crc

Terminal return: None

16、Read Version Number

Host computer send: 0x01 0x01 0x00 0x00 CRC

Terminal return: 0x55 0x01 0x01 0x04 0x00 xx xx xx xx crc

17、Modify the baud rate

The host computer pair address is 0x01. Terminal calibration Baud 19200(0x4B00).

Host computer send: 0x01 0x0C 0x04 0x00 0x00 0x4B 0x00 0x00 0x3C 0x55

Terminal return: the reply data is meaningless because the baud rate changes.

18、Modify check digit

The Host computer sends a message to modify the even parity (0: no parity; 1: even parity; 2: odd parity)

Host computer send: 0x01 0x0D 0x01 0x00 0x01 0x8B 0x6C

Terminal return: 0x55 0x01 0x0D 0x01 0x00 0x01 0x8B 0x6C

19、Remote Reboot

The host computer remotely restarts the terminal with address 0x01

Host computer send: 0x01 0xfc 0x00 0x00 0xC1 0xE8

II、MODBUS Protocol:

PLC110 Modbus protocol is RTU communication mode.

Data format (factory setting): Baud rate: 9600
Data bit: 8
Stop bit: 1
Check bit: No check

Function code: 0x03: Holding register (readable and writable)
0x02: Read (switch) input status
0x04: Input Register (read only)
0x05: Write a single coil (write only)
0x06: Write a single function register (write only)
0x10: Continuously write multiple function registers (write only)

Modbus Communication Parameter List

Table 1: Input Register

Address code	Data Field	Remark
0	AD value high 16 bits	
1	AD value low 16 bits	
2	Gross weight high 16 bits	
3	Gross weight low 16 bits	

4	Net weight high 16 bits	
5	Net weight low 16 bits	
6	Software version number high 16 bits	
7	Software version number low 16 bits	
8	Hardware ID high 16 bits	
9	Hardware ID low 16 bits	
Continuous read input register address		
50	#1 AD value high 16 bits	
51	#1 AD value low 16 bits	
52	#2 AD value high 16 bits	
53	#2 AD value low 16 bits	
54	#3 AD value high 16 bits	
55	#3 AD value low 16 bits	
56	#4 AD value high 16 bits	
57	#4 AD value low 16 bits	
58	#5 AD value high 16 bits	
59	#5 AD value low 16 bits	
60	#6 AD value high 16 bits	
61	#6 AD value low 16 bits	
62	#7 AD value high 16 bits	
63	#7 AD value low 16 bits	
64	#8 AD value high 16 bits	
65	#8 AD value low 16 bits	
66	#1 Gross weight high 16 bits	
67	#1 Gross weight low 16 bits	
78	#2 Gross weight high 16 bits	
69	#2 Gross weight low 16 bits	
70	#3 Gross weight high 16 bits	
71	#3 Gross weight low 16 bits	
72	#4 Gross weight high 16 bits	
73	#4 Gross weight low 16 bits	
74	#5 Gross weight high 16 bits	
75	#5 Gross weight low 16 bits	
76	#6 Gross weight high 16 bits	
77	#6 Gross weight low 16 bits	
78	#7 Gross weight high 16 bits	
79	#7 Gross weight low 16 bits	
80	#8 Gross weight high 16 bits	
81	#8 Gross weight low 16 bits	
82	#1 Net weight high 16 bits	
83	#1 Net weight low 16 bits	
84	#2 Net weight high 16 bits	
85	#2 Net weight low 16 bits	

86	#3 Net weight high 16 bits	
87	#3 Net weight low 16 bits	
88	#4 Net weight high 16 bits	
89	#4 Net weight low 16 bits	
90	#5 Net weight high 16 bits	
91	#5 Net weight low 16 bits	
92	#6 Net weight high 16 bits	
93	#6 Net weight low 16 bits	
94	#7 Net weight high 16 bits	
95	#7 Net weight low 16 bits	
96	#8 Net weight high 16 bits	
97	#8 Net weight low 16 bits	

Table 2: Hold Register

Address code	Data Field	Remark
10	Maximum range high 16 bits	write continuously
11	Maximum range low 16 bits	
12	Division value, taken from 0/1/2/5/10/20/50	
13	Number of enabled AD (less than or equal to the number of hardware AD)	
14	Zero point tracking, value range 0-10	
15	Start up and reset, with a value range of 0-10	

Table 3: Function Register(0x10)

Address code	Data Field	Remark
16	Calibrate zero point, can only write 0xAA55	
17	Clear to zero, can only write 0xAA55	
18	Calibration point weight value high 16 bits	write continuously
19	Calibration point weight value low 16 bits, calibrated after writing	
20	Insert the high 16 bits of the weight value of the calibration point	write continuously
21	Insert the low 16 bits of the weight value at the calibration point, and calibrate after writing it	
22	PWM calibration point PWM value, value 1 means 0x1fff, and so on	write continuously
23	PWM calibration point current value, unit 0.001mA, perform calibration operation after writing	
24	ModBus protocol communication address	
25	Serial port parity (0: none 01: odd 02: even)	
26	16 bit high baud rate	write continuously
27	The baud rate is low 16 bits, change the baud rate after writing	
28	Weight deduction, can only write 0xAA55	
29	Save data, can only write to 0xAA55	
30	To restore the factory settings of some data, only 0xAA55 can be	

	written	
31	Switch communication protocol (0: custom protocol; 1: MODBUS-RTU protocol)	
32	Device restart command, can only write 0xAA55	
33	Number of enabled AD (less than or equal to the number of hardware AD)	

Note: When reading 2-8 channels, you only need to change the communication address.

Table 4: Write a Single Coil, function code 0x05

Address code	Data Field	Remark
0	Relay 1, write 0xFF00 relay action, write 0x0000 relay reset	
1	Relay 2, write 0xFF00 relay action, write 0x0000 relay reset	

Table 5: Read the (switch) input status, function code 0x02

Address code	Data Field	Remark
0	01: high level，00 low level	
1	01:high level，00 low level	

Command Example

1. Function code 0X04 read input register (read net weight value)

Request		Reply	
Data(hex)	Explanation	Data(hex)	Explanation
01	Address	01	Address
04	Function Code	04	Function Code
00	Input register start address high byte	04	Byte count
04	Input register start address low byte	00	Register (0X04) data high byte
00	Read register count high byte	01	Register (0X04) data low byte
02	Read register count low byte	66	Register (0X05) data high byte
30	CRC check	FC	Register (0X05)data low byte
0A		81	CRC check
		A5	

2、Function code 0X03 read hold register (Read division value)

Request		Reply	
Data(hex)	Explanation	Data(hex)	Explanation
01	Address	01	Address
03	Function Code	03	Function Code
00	Hold register start address high byte	02	Byte count
0C	Hold register start address low byte	00	Register (0X0C) data high byte

00	Write hold register number high byte	02	Register (0X0C) data low byte
01	Write hold register number low byte	39	CRC check
44	CRC check	85	
09			

3、Function code 0X06 write holding register (write division value)

Request		Reply	
Data(hex)	Explanation	Data(hex)	Explanation
01	Address	01	Address
06	Function Code	06	Function Code
00	Hold register start address high byte	00	Hold register start address high byte
0C	Hold register start address low byte	0C	Hold register start address low byte
00	Write hold register data high byte	00	Register (0X0C) data high byte
02	Write hold register data low byte	02	Register (0X0C) data low byte
C8	CRC check	C8	CRC check
08		**08**	

4、Function code 0X10 continuous write register (write maximum range)

Request		Reply	
Data(hex)	Explanation	Data(hex)	Explanation
01	Address	01	Address
10	Function Code	10	Function Code
00	Register start address high byte	00	Hold register start address high byte
0A	Register start address low byte	0A	Hold register start address low byte
00	Write register number high byte	00	Write register number high byte
02	Write register number low byte	02	Write register number low byte
04	Byte count	61	CRC check
00	Register (0X0A) data high byte	CA	
4C	Register (0X0A) data low byte		
4B	Register (0X0B) data high byte		
40	Register (0X0B) data low byte		
85	CRC check		
07			

5、Function code 0X06 Write function register (calibration zero)

Request		Reply	
Data(hex)	Explanation	Data(hex)	Explanation
01	Address	01	Address
06	Function Code	06	Function Code
00	Hold register start address high byte	00	Hold register start address high byte
10	Hold register start address low byte	10	Hold register start address low byte
AA	Write hold register data high byte	AA	Data high byte
55	Write hold register data low byte	55	Data low byte
36	CRC check	**36**	CRC check
90		**90**	

6、Function code 0X10 write function register (calibration)

Request		Reply	
Data(hex)	Explanation	Data(hex)	Explanation
01	Address	01	Address
10	Function Code	10	Function Code
00	Hold register start address high byte	00	Hold register start address high byte
12	Hold register start address low byte	12	Hold register start address low byte
00	register number	00	Register number
02	register number	02	Register number
04	Byte number	E1	CRC check
00	Data	CD	
01	Data		
86	Data		
A0	Data		
40	CRC check		
A2			

7、Function code 0X06 Write function register (save)

Request		Reply	
Data(hex)	Explanation	Data(hex)	Explanation
01	Address	01	Address
06	Function Code	06	Function Code
00	Hold register start address high byte	00	Hold register start address high byte
2D	Hold register start address low	16	Hold register start address low

	byte		byte
AA	Write hold register data high byte	AA	Data high byte
55	Write hold register data low byte	55	Data low byte
	CRC check		CRC check

8、Function code 0X06 Write function register (save)

Request		Reply	
Data(hex)	Explanation	Data(hex)	Explanation
01	Address	01	Address
05	Function Code	05	Function Code
00	Register address high byte	00	Register address high byte
00	Register address low byte	00	Register address low byte
FF	Write register value high byte	FF	Write register number high byte
00	Write register value low byte	00	Write register number low byte
8C	CRC check	8C	CRC check
3A		3A	

9、Function code 0X02 read switch status

Request		Reply	
Data(hex)	Explanation	Data(hex)	Explanation
01	Address	01	Address
02	Function Code	02	Function Code
00	Register address high byte	01	Byte count
00	Register address low byte	00	Switch status (on)
00	register number high byte	A1	CRC check
01	register number low byte	88	
89	CRC check		
CA			

Meaning of indicator lights
Green light: Operation indicator
White light: Correct message received (Modbus protocol)
Blue light: Correct message received (Custom protocol)
Red light: Unstable sampling data
Yellow light: Calibration indication

1-ON custom protocol; 1-OFF MODBUS-RTU；2-ON Factory parameters run；2-OFFSet the parameter operation;