

Digital load cell communication protocol (custom)

One start bit, 8 data bits, one stop bit, no parity check bit.

RS485 defaults to 115200 baud rate (please refer to page 5 to modify the baud rate).

Data is transmitted in units of frames, and no data state $>0.5 \sim 2.0\text{ms}$, which is the separation of frame and frame.

The data format is hexadecimal.

One frame data format: (Hexadecimal data, high order first)

Verification code adopts vertical code: add all data (excluding vertical verification code), and take the last byte.

Address code	Function code	Register address	Data field	Vertical verification code
1 byte	1 byte	1 byte	n bytes	1 byte

Address code: 1 ~ 99. Only the digital sensor corresponding to the address code can respond and return data.

Address code = 0, used for broadcast commands, the digital sensor returns data in order according to the address size.

Broadcast return description: RS232 defaults to 19200 baud rate, and each address interval is 10ms;

RS485 defaults to 115200 baud rate, and each address has an interval of 3ms.

The data returned by the digital sensor also starts with the address code.。

Address code	Function code	Register address	Data field	Vertical verification code
1 byte	Original function code +1	1 byte	n bytes	1 byte

Function code table :

function code	Description
05	Read data R
63	Write data W

Read data R command, no special operation, fixed value (05) at the back.

Address code	Function code	Register Address	Information code	Vertical verification code
1 byte	05	1 byte	05	1 byte

Write data W command, if received correctly, the following information will be returned:

Address code	Function code	Register Address	Information code	Vertical verification code
1 byte	64	1 byte	05	1 byte

If write data W command is incorrectly received, the following information will be returned:

Address code	Function code	Register Address	Information code	Vertical verification code
1 byte	64	1 byte	0A	1 byte

Note: Sensor address 1 byte (n), sensor manufacturer number 1 byte (m1), Customer No. 2 bytes, (k2, k1), ID number 4 bytes, (i4, i3, i2, i1), vertical verification code (LCR)

Digital sensor register address table and communication data format

Register Address	Address content	Data content and format	Attributes
01	Digital sensor A/D value	Returns the status information of the first byte of 4 bytes of data, and the last 3 bytes of data	R
02	Number of divisions of digital sensor	Return 5 bytes of data, the first byte of status information, the second byte of indexing value code (the most significant bit is negative) and the last 3 bytes of data.	R
05	Digital sensor ID information	This command can only be used by the broadcast command to return the encryption status (1), sensor manufacturer number (1), customer number (2), ID number (4), and 8 bytes of data.	R
06	Zero	1 byte, 1 key set to zero, 2 boot to zero, 3 zero calibration.	W
09	Set the acceleration of gravity	3 bytes, take 4 decimal places of gravitational acceleration, without decimal point (9.7946 => 97946).	W
10	Address Setting	1 byte (1-127) This command can only be used for broadcast commands, and only one digital sensor is connected.	W
11	Address allocation	5 bytes This command can only be used for broadcast commands. The first 4 bytes are the ID number, and the last byte is the new address.	W
23	Digital sensor parameter	5 bytes 1st byte indexing value code/digital filter parameter, 2nd byte power-on zero-setting range/key-press zero-setting range, last 3 bytes maximum indexing number.	R/W
24	Filtering and zeroing range	2 bytes, the first byte, filter parameters, and the second byte zero-setting range at power-on/zero-setting range by pressing keys.	W
25	Weight calibration	3 bytes, load the number of divisions.	W
27	Non-linear correction value	6 bytes, the first byte is the deviation negative sign, the next 2 bytes are the non-linear deviation division number, and the last 3 bytes are the non-linear extreme point division number.	W

The 2 most commonly used commands

Reading force value n 05 02 05 LCR (Broadcast read 00 05 02 05 0C)	Return Data n 06 02 St X4 X3 X2 X1 LCR	St is the state (Attached Table 1) X3 X2 X1 is the number of divisions, and the low bit of X4 is the code of the division value (the high bit 7=1 is a negative sign) (Attached Table 2). Weight = number of divisions * division value
Zero calibration (write) 00 63 06 03 6C	Return Data n 64 06 05 LCR	Write slope zero shift

Example of force value return data: :

01 06 02 02 64 00 00 a7 96 What do you think about this?

01 is the address, 06 is the function code, 02 is the register, 02 is the status byte (see Appendix 1 on the next page), 84 is "8" is the negative sign, "4" is the index code (see Appendix 2 on the next page), 00 00 a7 is the number of divisions (directly converted to decimal), 96 is the validation code, division number * division value = weight (unit is kg)

The positive and negative force value reads bit7 of this byte, bit7=1, it is a negative number.

The division value X3 X2 X1 is the hexadecimal system directly converted to the decimal system, and the force value is multiplied by the index number of the look-up table, and the unit is kg.

Status information and index correspondence

Attached Table 1, State Information St:

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Calibration allowed	1	0	Fault	Range overflow	Abnormal zero position	boot Stablize	Zero position

Example: St is C2=1100 0010, which means calibration is allowed and stable

For example, the return value is 06 02 42 06 00 00 5F B1

02 is 0000 0010 and corresponds to the ST status word. Bit1=1 means that this is a stable value.

Attached Table 2. Corresponding table of graduation value code and representation of graduation value and decimal point

X = 0 means d = 0.0001	X = 4 means d = 0.002	X = 8 means d = 0.05	X = C means d = 1
X = 1 means d = 0.0002	X = 5 means d = 0.005	X = 9 means d = 0.1	X = D means d = 2

X = 2 means d = 0.0005	X = 6 means d = 0.01	X = A means d = 0.2	X = E means d = 5
X = 3 means d = 0.001	X = 7 means d = 0.02	X = B means d = 0.5	

The detailed data format of each command

1. Read the serial number of the digital sensor: 00 05 05 05 0F

Return Data: n 06 05 j m1 k2 k1 i4 i3 i2 i1 LCR

j Encrypted state, m1 is the manufacturer code, k2 k1 is the customer number, i4 i3 i2 i1 is the serial number.

2. Read sensor parameter: 00 05 23 05 2D

Return Data: n 06 23 di Zi X3 X2 X1 V LCR

The high nibble of di is the index value, and the low nibble of di is the filter parameter.

The upper nibble of Zi is the range of zero-setting at power-on, and the lower nibble of Zi is the range of zero-setting by keys.

X3 X2 X1 is the maximum number of weighing divisions, and V is the software version number.

3. Tare to zero (write): 00 63 06 01 6A

Return Data: n 64 06 05 LCR

It will not be saved when the power is off.

4. Set the acceleration of gravity (write): 00 63 09 X3 X2 X1 LCR

Return Data: n 64 09 05 LCR

X3 X2 X1 is the acceleration of gravity, take the four digits after the decimal point, and then remove the integer value after the decimal point.

E.g: Set the use of gravity acceleration (9.7946) :

Send 00 63 09 01 7E 9A 85 Return: n 64 09 05 LCR

Note: The decimal point of gravitational acceleration is reserved 4 digits, after removing the decimal point, it will be converted to hexadecimal number (97946=0x017E9A)

5. Set address (write): 00 63 10 n 75 (n is address)

Return Data: n 64 10 05 LCR

Only 1 to 1 connection write address

6. Address Allocation (Write) 00 63 11 i4 i3 i2 i1 n LCR

Return Data n 64 11 05 LCR

i4 i3 i2 i1 is the serial number, n is the address.

7. Set sensor parameters (write) 00 63 23 di Zi x3 x2 x1 LCR

Return Data n 64 23 05 LCR

The high nibble of di is the division value, the low nibble of di is the filter parameter, the high nibble of Zi is the zero-setting range at power-on, the low nibble of Zi is the zero-setting range of the button, and X3 X2 X1 is the maximum weighing.

8. Set filter and zero zone parameters (write) 00 63 24 di Zi LCR

Return Data: n 64 24 05 LCR

fi is the filtering parameter 00 the fastest and 03 the slowest.

The high nibble of Zi is the zero-setting range when starting up: 0-9 corresponds to 0-90% of the maximum range.

The lower nibble of Zi is the zero setting range of the button: 0-9 corresponds to 1-10% of the maximum range.

9. Set non-linear correction (write): 00 63 27 N3 N2 N1 P3 P2 P1 LCR

Return Data: n 64 27 05 LCR

N3 N2 N1 absolute difference, P3 P2 P1 error maximum point force value.

10. Identification rate setting command: send 00 63 2E X1 LCR

Return Data: n 64 2E 05 LCR

X1=0~99: Corresponding identification rate=(0~99) multiple division value d.

Identification rate=0, stop compensation tracking.

When the weight change is less than the Identification rate within 2.4 seconds, the tracking weight value remains unchanged.

When the weight change is greater than the Identification rate within 2.4 seconds, the tracking is stopped.

Until the weight change is less than the Identification rate, after 8 seconds, track again.

11. Read identification rate: Send 00 05 2E 05 38

Return: n 06 2E x1 LCR

E.g: The weight of the single product is 10g (not less than the identification rate), and the graduation value is 1g;

If the identification rate is set to 5, the sensor's intelligent tracking compensation will be calculated as $1g \times 5 = 5g$, which can effectively compensate for temperature and other interference effects. ◦

Switch to set the communication baud rate and communication protocol:

Send 00 63 95 6A 93 X1 LCR (This command must be sent at 19200 baud rate within 2 seconds after power-on)

X1 low nibble (corresponding to 5 baud rates):

X1_L=3 corresponds to the baud rate: 9600

X1_L=4 corresponds to the baud rate: 19200

X1_L=5 corresponds to the baud rate: 38400

X1_L=6 corresponds to the baud rate: 57600

X1_L=7 corresponds to the baud rate: 115200