Load Cell Input Module

MBs-1LC / MBs-2LC is one of the analog input modules of MERITEK MBs series PLC. It supports one / two channel of load cell input for weight measurement.

The conversion result is represented by a signed 16 bit integer value. In order to filter out the field noise imposed on the signal, it also provides the average of sample input function.

Note: 1. The supporting of I/O configuration for MBs-1LC/2LC module is available only for PLC OS V4.71 and Winproladder V3.22 or later version.

2. For those early applications which do not use I/O configuration to work with 1LC module can still work properly provided that no additional MBs-2LC module control is required.

1   Specifications of MBs-PLC Load Cell Measurement Modules

MBs-1LC/ MBs-2LC Load Cell Measurement Modules

Specifications	MBs-1LC	MBs-2LC
Total Channels	one channel	two channels
Resolution	16 bits (include signed bit)	
I/O Points Occupied	1 RI(Input Register) and 8 DO	
Conversion Rate	5/ 10/ 25/ 30/ 60/ 80 Hz	1/ 3/ 5/ 8 Hz
Non-Linearity	0.01% F.S. (@25℃)	
Zero Drift	0.2 μV/℃	
Gain Drift	10 ppm/℃	
Excitation Voltage	5V with 100Ω driving capability	
Sensitivity	2mV/V, 5mV/V, 10mV/V,20mV/V	
Software Filter	Moving average	
Average Samples	1~8 configurable	
Isolation	Transformer(Power) and photo-coupler(Signal)	
Indicator(s)	5V PWR LED	
Supply Power	24V-15%/+20%, 2VA	
Internal Power Consumption	5V, 100mA	
Operating Temperature	0 ~ 60 ℃	
Storage Temperature	-20 ~ 80 ℃	
Dimensions	40(W)x90(H)x80(D) mm	

2 The Procedures of Using MBs-PLC Load Cell Module

```
                              ┌──────────┐
                              │  Start   │
                              └────┬─────┘
                                   │
                                   ▼
        ┌──────────────────────────────────────────────────┐
        │ Connects Load Cell Modules to the expansion interface │
        │ on PLC in series and connects an external 24VDC source │
        │ and load cell measure input wires.                │
        └──────────────────────────┬───────────────────────┘
                                   │
                                   ▼
        ┌──────────────────────────────────────────────────┐
        │ Execute the WinProladder and configure the load cell │
        │ configuration table address, the register address, and │
        │ working register in load cell configuration windows, │
        │ then you can read the weight measurement value form │
        │ register directly.                                │
        └──────────────────────────────────────────────────┘
```

3 The Procedures of Configure the Load Cell Measurement

Click the item "I/O Configuration" which in Project Windows:

```
                    ┌──────────┐
                    │ Project  │
                    └────┬─────┘
                         │
                         └──┌──────────────────┐
                            │ I/O Configuration │
                            └──────────────────┘
```

➜ Select〝LC Configuration〞:

Once the setting page displayed, is able to measure the load cell module.

1. 〔Starting register of configuration table〕：

      Assign a starting register value to store the load cell configuration table, there will allow the following inputs:

          RXXXX or DXXXX

      The configuration table only occupies 4+N of registers, where N is the number of load cell modules.

      As shown in the above example, R5000~ R5005 stores the load cell configuration table.

2. 〔Starting register of reading/control register〕：

      Please input the starting register number of a block register that were allocated for receiving the measurement value and control parameters for load cell

      There will allow the following inputs, RXXXX or DXXXX

      one channel occupies 16 register.

      As shown in the above example, channel 1 used R0 ~ R15.

3. 〔Starting register of working register〕：

      Assign a starting registers to reserve the working registers, there will allow the following inputs RXXXX or DXXXX.

      The load cell measurement register occupies (Nx4)+5 registers, where N is the number of load cell modules.

      As shown in the above example, D0~D12 are the working registers.

      Notes: The above three settings can be used in all Load Cell modules.

【Load cell module installation information and setup】

4. 〔Module #1 ~ #16〕：

      Display the name of the installed module and the analog starting address of its own, there are the following modules.

     ① MBs-1LC (1 channel of load cell module)

     ② MBs-2LC (2 channels of load cell module)

5. 〔Span Ch0# / Ch1#〕：Assign the following selection of the measurement range:

          0~10mV(2mV/V), 0~25mV(5mV/V), 0~50mV(10mV/V), 0~100mV(20mV/V)

6. 〔Scan Rate〕：Assign the scan rate of reading value, there are two selections:

① MBs-1LC has 5 / 10 / 25 / 30 / 60 / 80 Hz can be assigned

MBs-2LC has 1 / 3 / 5 / 8 Hz can be assigned

7.〔Times of Average〕：Assign the times of average for load cell measure, unbalanced average, 2 times the average, 4 times the average, and 8 times of the average can be assigned.

4　Load cell reading / control register

In following table, let's assume the starting register of reading/control register is R

Register Offset	Description	R/W
R+0	Engineering weight value	R
R+1	Raw weight value	R
R+2	High reference engineering value. Max. 32767	W
R+3	Command register- Bit 0 – set zero/tare reference Bit 1 – set high(full scale) reference	W
R+4	Auto zero threshold 0~255	W
R+5	Status register Bit 0 – Error indication Bit 1 – Over range or sensor broke indication	R
R+6	SPAN value(high reference –zero reference)	R
R+7	Zero value set by performing set zero reference	R
R+8	Current compensated zero value	R
R+9	Register for internal process usage	R
R+10~R+15	Reserved	

Each channel occupies 16 registers.

Note：

1. Only the R+2、R+3、R+4 register are set by user, the other register are set by system
2. R+3：

Bit 0 = 1, set current measurement value as zero reference

Bit 1 = 1, for SPAN. set current measurement value minus zero reference value as high reference value which corresponding to the weight value set in R+2

3. User can convert the engineering value on their own with reference the value in R+2,R+6 register if necessary.

4. Error indication includes

　high reference engineering value(R+2) or SPAN(R+6) is zero or negative

5. Auto zeroing threshold -

This value confines the zero value drift tolerance region. If the zero drift value falls in this region, the zero drift will be compensated.

Set this value to zero will disable the auto zeroing function.

6. D4052 – delay time for auto zeroing activation , range from 1000 ~ 5000 (mS), default is 3000 (mS).

5   Description of Related Registers for Load Cell Measurement
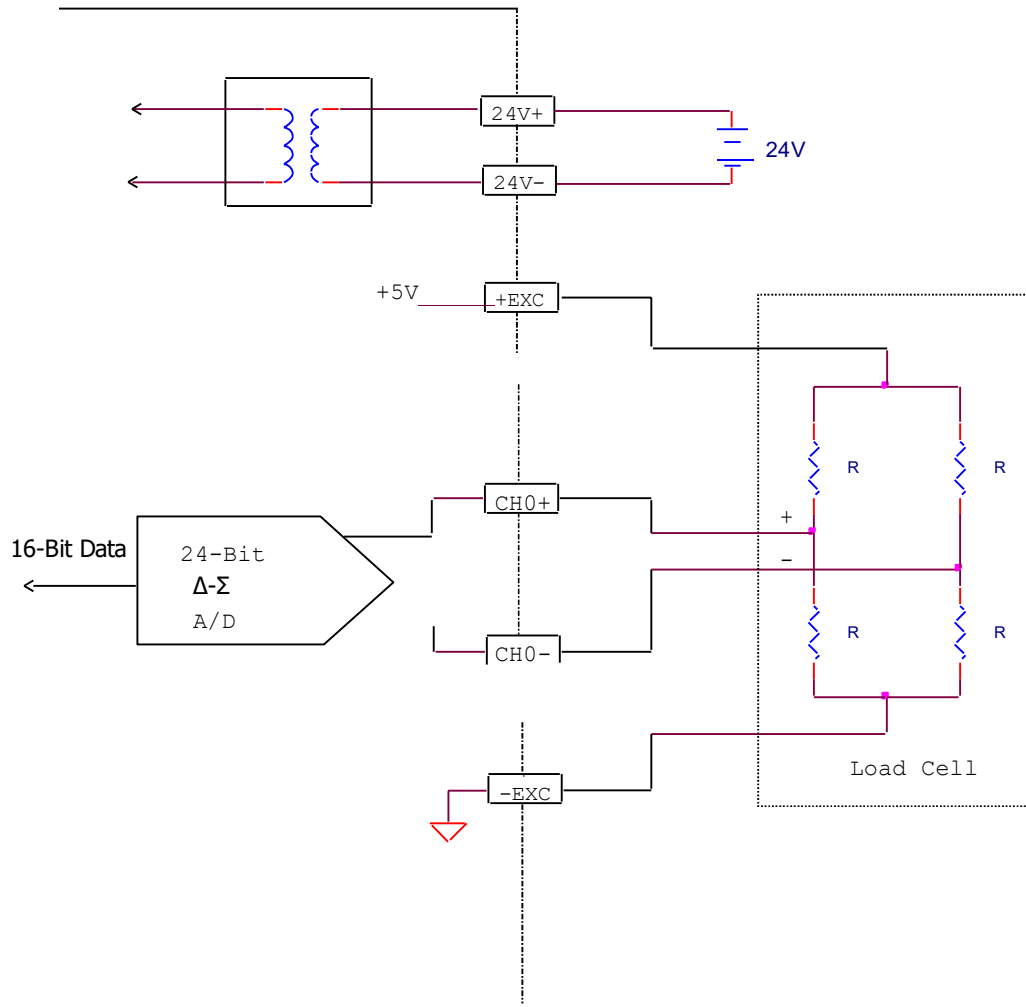
Installation Status of Load Cell

- R4016 ： B0=1 means that the 1st channel is installed

  .

  .

    B15=1 means that the 15th channel is installed

    (the default of R4016 is FFFFH)

- R4017 ： B0=1 means that the 16th channel is installed

  .

  .

    B15=1 means that the 31th channel is installed

    (the default of R4017 is FFFFH)

- When the load cell is installed (the corresponding bit must be 1), the system will perform the line broken detection.   If there is line broken happened, the broken value -32760 will be displayed.

- When the load cell is not installed (the corresponding bit must be 0), the system will not perform the line broken detection.   The broken value will be 0.

- Depends on the user's installation, the ladder program may control the corresponding bit of R4016 and R4017 to perform or not perform the line broken detection.

6   I/O Addressing of Load Cell Module

By the time domain multiplexing design method, each load cell module occupies 1 point of input register and 8 points of digital output for I/O addressing.   For correct I/O access, the I/O addressing of extension modules following the load cell module must be added the I/O quantity which the corresponding module should have.   The WinProladder provides an easy and convenient way to calculate the I/O address for the extension modules through the on-line "I/O Numbering" operation.

7 Wiring of Load Cell Modules

Wiring of MBs-1LC

Wiring of MBs-2LC

24V+

24V-

24V

+5V   +EXC

16 Bit Data

24 Bit
Δ-Σ
A/D

CH0+

CH0-

R   R

+
-

R   R

-EXC

Load Cell #0

+5V   +EXC

16 Bit Data

24 Bit
Δ-Σ
A/D

CH1+

CH1-

Load Cell #1

-EXC