LX3V-1WT User Manual v2

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1. Weighing module principle

Metal material subtle changes, when the metal material by tension, the electrical impedance increases. Conversely, when compressed, the metal impedance decreases, strain gages made by this method are called weighing modules. This type of device converts the pressure in a physical phenomenon into electrical signal output, so it often used in the occasion of load, tension and pressure conversion.

2. Introduction

1) Thanks for your purchasing WECON LX3V-1WT expansion module, the maximum resolution is 24-bit, using 4 or 6 wires weighting sensor;
2) Please read this manual carefully before attempting to operate, this manual is only written for LX3V-1WT;
3) Using FROM/TO command to read/write data by LX3X main unit;

2.1 Specification

Table 2-1

Item	Description
Channel	Signal channel
A/D converter	24 bitΔ¯∑ A/D
Resolution	24bit (signed)
Speed	7.5/10/25/50/60/150/300Hz available
Polarity	Unipolar and bipolar
Non-linearity	≤0.01% full scale(25℃)
Zero drift	≤0.2μV/℃
Gain drift	≤10ppm/℃
Excitation current	5V,load impedance≥200Ω
Sensor sensitivity	1mV/V-15mV/V
Isolation	Transformer (power supply) and the optical coupler (signal)
Lamp	Power supply lamp, communication lamp
Power supply	24V±20% 2VA
Operating temperature	0~60℃
Storage temperature	-20~80℃
Dimension	90(L)x58(W)x80(H) mm

2.2 Valid bits

For details, refer to sampling frequency in Chapter 5, Section 5.2 of this manual.

3. Dimensions

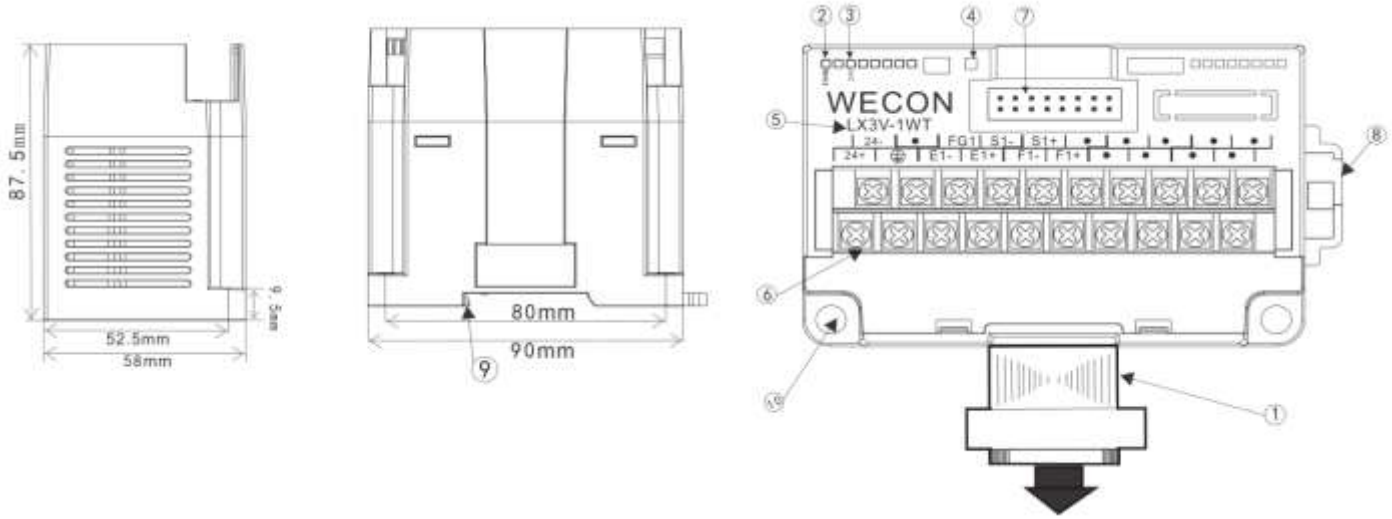


Figure 3-1

① Extension cable and connector
② Com LED: Light when communicating
③ Power LED: Light when getting power
④ State LED: Light when normal condition
⑤ Module name
⑥ Analog signal output terminal
⑦ Extension module interface
⑧ DIN rail mounting slot
⑨ DIN rail hook
⑩ Mounting holes (ϕ4.5)

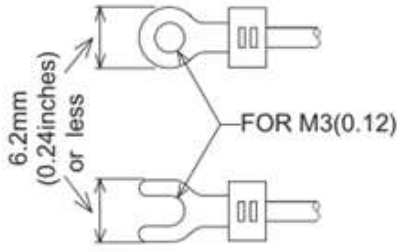


Figure 3-2

- Be sure to use the crimp-style terminals that satisfy the dimensional requirements shows in the left figure.
- Apply 0.5 to 0.8 N.m (5 to 8 kgf.cm) torque to tighten the terminals to prevent abnormal operation.

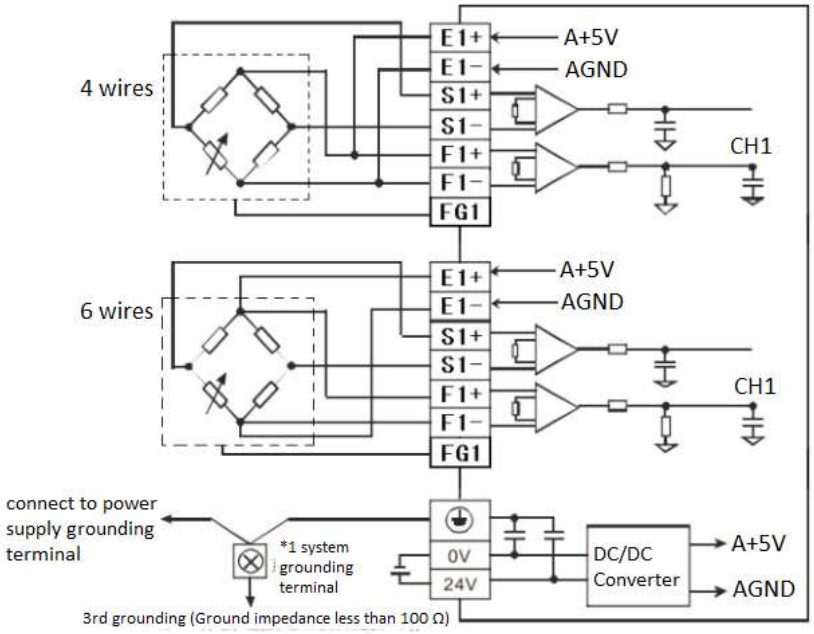
3.1 Terminals instruction

Table 3-1

Terminals	Instruction

24V+	Power supply+
24V-	Power supply-
GND	Grounding
FG1	Sensor grounding
E1-	Power supply- (5V) for sensor
E1+	Power supply+ (5V) for sensor
S1-	Signal output – of sensor
S1+	Signal output + of sensor
F1-	Feedback – of sensor
F1+	Feedback + of sensor
●	

4. Wiring



Note:

1) The impedance of the weighing sensor is greater than 50 Ω
2) The sensor with 4 wires requires E1+ connecting with F1+, E1 connecting with F1.

5. BFM instruction

5.1 BFM list

Table 5-1

BFM	Latched	Read/Write	Function	Default	Range	Description
0	O	R	Model	5011		LX3V-1WT model number
1	O	R	System version	116		Software & hardware version

2	O	R/W	Unipolar/Bipolar	0	0-1	0: bipolar 1: unipolar
3	O	R/W	Frequency	1	0-9	0: 7.55 Hz; 5: 150 Hz; 1: 10 HZ; 6: 300 Hz; 2: 25 Hz; 7: 600 Hz; 3: 50 Hz; 8: 960 Hz; 4: 60 Hz; 9: 2400 Hz;
4	X	R	State	0		b0: CH1 no-load; b1: Reserved; b2: CH1 overload; b3: Reserved; b4: CH1 measured value is stable; b5-b15: Reserved;
5	X	R	Error	0		0: No error; 1: Error; b0: Power supply error b1: Hardware error b2: CH1 conversion error b3-b15: Reserved
6	X	R/W	Tare weight	0		Save tare weight by current weight: 0: Disable; 1: Enable, reset to 0;
7	O	R/W	Gross/Net weight	0		Display gross weight or net weight by current weight 0: CH1 gross weight; 1: CH1 new weight; 0xF: CH1 closed;
8	X	R/W	Calibrating weight	0		0 by default。 0x0001:CH1 return to 0 0x0002:CH1 calibrating: Step1: Remove all load ; Step2: BFM #8 shows 0x0001； Step3: Add known weight; Step4: Write known weight to BFM#23, Step5: BFM #8 shows0x0002
9	X	R/W	Reset to default	0	1	Reset all BFM values to default

10	O	R/W	Filtering mode	0	0-1	
11	O	R/W	Filtering strength	3	0-7	
12	O	R/W	Zero tracking intensity	0	0-200	The value of zero tracking intensity (0: disable zero tracking)
13	O	R/W	Zero tracking range	0	0-300	The value of zero tracking range (0: no limit)
14	O	R/W	Automatically zeroing	0	0-4	0: Disable auto zeroing; 1: ±2%MAX; 2: ±5%MAX; 3: ±10%MAX; 4: ±20%MAX;
15	X	R	Reserved	0		
16	X	R	CH1 average L	0		Average weight of CH1 (Low)
17			CH1 average H			Average weight of CH1 (High)
18	O	R/W	CH1 sliding average	5	1-50	Setting range:K1~K50; Default value: K12;
19	O	R/W	CH1 tare weight	0		Range: K-8388608~K8388607 Default value: K0
20						
21	O	R/W	CH1 standstill checking times	10	1-500	CH1 standstill checking times (5.3-2)
22	O	R/W	CH1 checking range	10	1-10000	Example: checking time: 10ms, standstill checking times: 10, checking range: 1000, when variation is greater than 1000, this measured value is not stable, BMF#4-b4 will be 0. If not BMF#4-b4 will be 1.
23	O	R/W	CH1 calibration weight value	1000	-8388608~ 8388607	#8
24	O					
25	O	R/W	CH1 maximum	32767	-8388608~ 8388607	Show error when exceeds Max. weight value
26	O	R/W				
27	O	R/W	CH1 zero limit (High limit)	10	-8388608~ 8388607	Bit of zero weight equals to 1 when all of load removed
28	O	R/W				
29	O	R/W	CH1 zero limit (Low limit)	-10	-8388608~ 8388607	
30	O	R/W				

Note:

1) O: yes;
2) X: no;
3) R: read;
4) W: write;

5.2 Buffer (BFM) description

1) BFM0: Module code

LX3V-1WT code: 5011

2) BFM1: module version

Module version (decimal)

Example

BFM1=116, means V1.1.6

3) BFM2: Polarity

Due to the singed integer (from analog to digital, so value for Bipolar will be minus

4) BFM3: Sampling frequency

The frequency of input signal collection, lower frequency, more stable; higher precision, lower speed relationship between set value and the sampling frequency:

Table 5-2

Setting	Sample frequency (HZ)	Sample precision (Bits)	Setting	Sample frequency (HZ)	Sample precision (Bits)
0	7.5	23.5	5	150	21.5
1	10	23.5	6	300	21
2	25	23	7	600	20.5
3	50	22	8	960	20
4	60	22	9	2400	17.5

5) BFM4: State code

Table 5-3

Bit No.		Description
Bit 0	H0001	CH1 no-load
Bit 2	H0004	CH1 over-load
Bit 4	H0010	CH1 stable
bit 1, bit 3, bit 5-bit 15	Reserved	

6) BFM5: Error code

Table 5-4

bit No.	Value	Error	bit No.	Value	Error
bit 0	K1 (H0001)	Power failure	bit 1	K1 (H0001)	Hardware failure
bit 2	K2 (H0004)	CH1 conversion error	bit 3- bit 15	Reserved	
Note: Save all error state of data registers, each error status is determined by the corresponding bit, there are May generate more than two states at same time, 0: no error, 1: error.					

7) BFM6: Tare setting

Select the current weight value (BFM16-17) as a tare (BFM19-20) weight value. Each channel occupies one bit, available when 1, reset to zero automatically.

For example

The current weight is 100, after setting tare weight:

If it displays gross weight (BFM7 = 0) currently, the tare weight (BFM19-20) will become 100, the current weight is still 100;

If it displays net weight (BFM7 = 1), the tare weight (BFM19-20) will be original value + current weight value, the current weight value becomes zero.

8) BFM11: filtering strength

The higher filter strength, the more stable and accurate weight value.

9) BFM12: zero tracking strength

Zero-tracking is to make stable when no-load, Zero tracking is alleged intensity values within this range, used to reduce the influence of temperature.

Table 5-5

Setting	Description	Note
0	Zero tracking OFF	Default
1-200	Range of weight value	10 means ± 10
Others	Reserved	
Note: when lower precision required, user could disable this function.		

10) BFM13:Range of Zero tracking

Accumulated range of zero tracking, stop tracking when out of range

Table 5-6

Setting	Description	Note
0	No limit for zero tracking	Default
1-300	Range of weight value	10 means ±10

Others	Reserved	
Note: when lower precision required, user could disable this function.		

Example

Setting value is 100, when the position within ± 100, it will be read as no-load.

5.3 Function Instruction

1) Weight measurement

Normally, users can choose to measure the net weight or gross weight of an object. The net weight means the weight of the product itself, that is, the actual weight of the product without its external packaging.

The weight of the packaging is called the tare weight. The gross weight is the total weight, namely the net weight plus the tare weight.

- Tare weight: weight of the packaging
- Net weight: the weight of the product, excluding the packaging.
- Gross weight: the net weight plus the tare of the product.
- Gross weight= net weight + tare weight.

Example 1

A product weighs 10kg and the carton contains it weighs 0.2kg, then its gross weight is 10.2 kg (net weight=10kg, tare weight=0.2kg, gross weight=10.2kg)

Example 2

Use the measured value at CH1 as the net weight and disable CH2. If you know the weight of the packaging already, you can skip the step of reading the tare weight.

- Read the tare weight
  Step 1: Write H'0000 into CR#7.
  Step 2: Place the packaging on the CH1 load cell.
  Step 3: Write H0001 into CR#6 to take the weight of the packaging as the tare weight.
- Set CR#7 = H00F1.

2) Standstill check

When an object is placed on the load cell to measure its weight, you can use the standstill check to know that the measured value has been stable.

- If the measured value shifts within the range for standstill check set up by the user, bit4 will be set to "1".
- If the measured value shifts beyond the range for standstill check set up by the user, bit4 will be

set to “0”. They will be set to “1” again when the range is returned to the set range.

Example

The measuring time is 10ms, the times of standstill check is 10, and the range for standstill check is 1,000. When the range for standstill check exceeds 1,000, the measured value will be regarded unstable, i.e. bit4 will be set to 0. When the measuring time is within 100ms (10 × 10ms) and the range returns to be within 1,000, bit4 will be set to 1 again. We recommend you check if the measured value is stable enough before operating it.

3) Zero detection

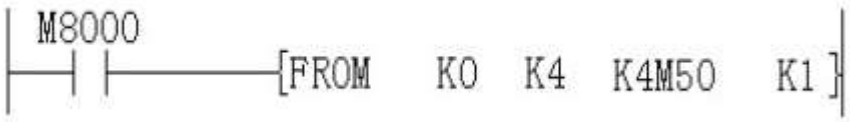
Users can use this function to know if the object has been removed from the load cell. If the bit4 is 1, and the bit0 and bit1 are 1 as well, the object has been removed from the load cell already, and you will be able to perform the next step of the control.

4) Filtering

The average value is a steady value obtained from the sum of the read values. However, due to unavoidable external factors, the read values may be an acute pulse, resulting in fierce changes in the average value. The filtering function thus exclude the read value that is an acute pulse from the sum-up and equalization, so the average value obtained will not be affected by the acute read value.

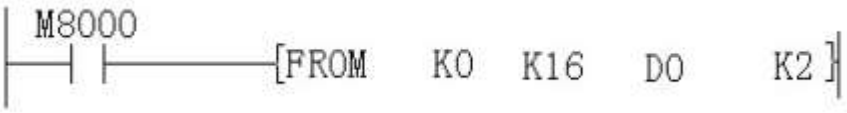
6. Example

1) Current state of weight



Read the current state BFM4, judge by bit. More information, please refer to 5.2.

2) Get current weight value

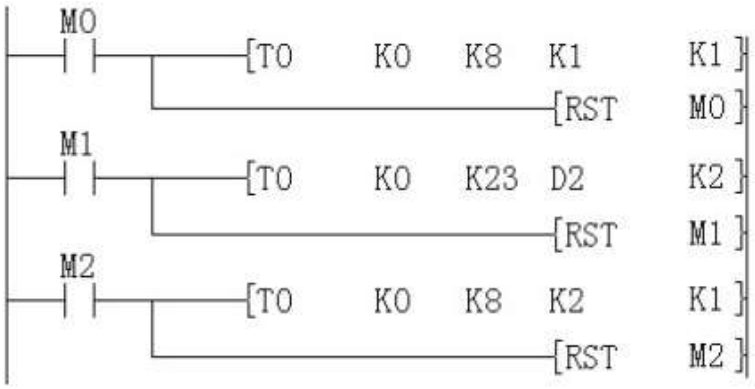


Read average weight value (BFM16) to D0

3) Calibrating weight

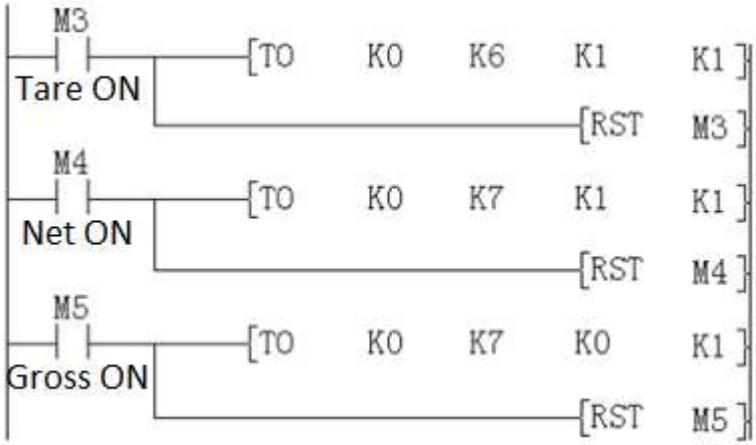
*In the new version, the step 1 can be used for manual reset.

Adjustment and calibration are to make the weight values of module and the module of heavy load units is consistent.



Step 1: Remove all weights;
Step 2: Write 0x0001 to #8;
Step 3: Add known weights;
Step 4: Write known weights (D2) to #23;
Step 5: Write 0x0002 to #8

4) Tare weight and gross weight



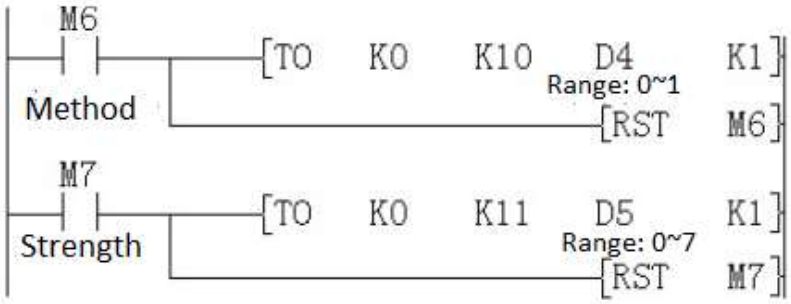
Set value as tare weight by writing K1 to BFM6

Set the value as Net weight by writing K1 to BFM7

Set the value as gross weight by writing K0 to BFM7

5) Filter method and strength

After setting the filtering method and filtering strength, need to recalibrate



Set filtering by writing value to BFM10

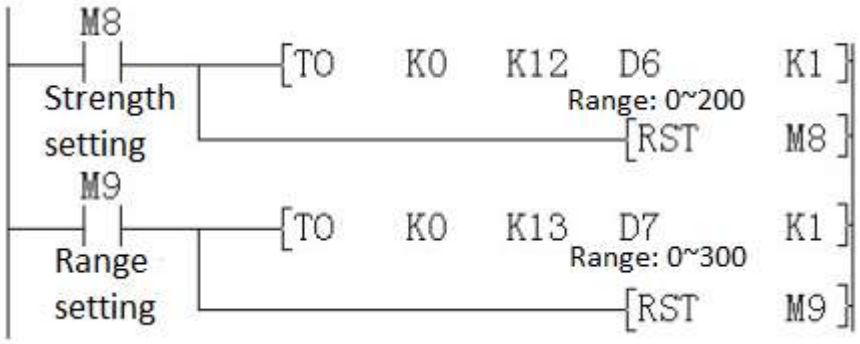
Set filtering by writing value to BFM11

6) Zero tracking

Zero tracking is used to reduce the temperature drift interference;

Zero follow the strength is 0; it means disable zero tracking;

The zero tracking range is 0, which indicates that the cumulative range is not limited.



7. Diagnosis

7.1 Check

1) Make sure all cables placed in right position;
2) Make sure the number of special function modules cannot be greater than 8, and the total I / O points does not exceed 256 points;
3) Make sure select the correct operating range in application;
4) Make sure power supply is working properly;
5) LX3V CPU unit is in RUN mode;

7.2 Check the error

Check the following items, if LX3V-1WT cannot work properly:

1) Check the LED state of power supply
   ON: Check the module connection cable
   OFF: Check the module connection cable
2) Check the wiring
3) Check status of the 24 V power indicator lamps (LED) of the LX3V-4DA.
   On: 24 VDC is supplied.
   Off: Supply 24 VDC (+10%) to the LX3V-1WT or check power supply
4) Check the state of LED“COM”(on the right top corner of LX3V-1WT)
   ON: communicating
   OFF: Check the state of #5(error), any bit (b0 b1 b2) in #5 is ON, means communication failure, refer to 5.2 to find out the reason

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