

## **BST106-N59[B] Wheel Loader Weigher**

### **Operation Manual V7.1**



## Preface

Thank you very much for your purchase!

This manual covers safety precaution, brief introduction, technical specifications, user interfaces, installation& connection, functions& operation, fault treatments, working specifications and so on. In order to make the product running at its best, please read this manual in advance, and reserve it for the future reading.

The continuous technology update, performance perfection and quality improvement may lead to some differences between this manual and the physical product, please understand.

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### Main Features:

- ❖ EMC design with high anti-jamming capability, suitable for industrial environment.
- ❖ DC24V power input circuit with reverse polarity protection function.
- ❖ 32-bit ARM CPU with 72MHz & high arithmetic speed.
- ❖ Dust-proof stainless steel shell with protection level IP65.
- ❖ 640×480 TFT color display screen for English character display.
- ❖ The display informations of Bucket Lifting/Declining state, Single-bucket-loading-weight, Totalized Loading Weight, Positive/Negative Deviation Value, Alarm state, Date/Time and other auxiliary data are used for judging if Single-bucket-loading-weight is valid and the loading process should be stopped.
- ❖ 20-key English keypad with controllable backlight.
- ❖ Number and English Alphabet can be inputted.
- ❖ The informations of User Name, Truck No., Goods No. and Operator No. can be inputted.
- ❖ Upper/Lower Limit of Single-bucket-loading-weight, Setpoint of Totalized Loading Weight and Date/Time can be set.
- ❖ Operating Time, Single-bucket-loading-weight, Totalized Loading Weight and Alarm Information can be recorded automatically.
- ❖ Using two oil pressure sensors for higher weighing accuracy than using one.
- ❖ 24-bit  $\Sigma - \Delta$  ADC with internal resolution 1/ 1,000,000 and sampling frequency 400Hz.
- ❖ High sampling frequency, anti-vibration digital filter and acceleration compensation algorithm for ensuring high weighing accuracy in the lifting process of the bucket.
- ❖ 10000 Loading Records can be saved, queried and printed, and each record can contain 50 Single-bucket-loading-weight value.

<p style="text-align: center;"><b>High-Frequency Sampling    Anti-Vibration Digital Filter</b> <b>Acceleration Compensation    High Accuracy&amp; Stability</b></p>
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## 1. Safety Precaution

### ● Lithium Battery Installation

A Lithium battery should be equipped in the weighing indicator. If it is not allowed to be transported together with the product because of embargo, please make a purchase according to the model offered by us and install it by yourself.

### ● Application environment

Make sure that this product works under the environment where is accord with the technical specifications.

Do not open the shell before power-off.

### ● Installation & Power Supply of Weighing Indicator

Weld the mounting bracket of the weighing indicator firmly on the metal frame of the wheel loader driving cab. The installation position should be convenient for operation.

The power switch of the weighing indicator should be turned off and ensure that the power cables are not charged before DC24V power connection to avoid short circuit fault.

Please make sure that the inputted voltage is correct before power-on .

### ● Installation of Oil Pressure Sensor

Strictly follow the 'Safety Precaution' described in '5. 1.4 Installation of Oil Pressure Sensor' .

Install the oil pressure sensors and plate type three-way joints firmly, and seal them as prescribed to avoid oil leaking.

### ● Installation of Position Sensor

Install the position sensor according to required position and angle, and adjust Detecting Distance to 3~5mm.

### ● Cable Laying

Oil pressure sensor signal cable and position sensor signal cable should be laid in flexible pipe for protection, and fix them with nylon strip.

Try to keep signal cables away from the place with high temperature and possible extrusion, and reserve enough bending length to avoid being pulled apart.

### ● Environmental Protection

Before the Lithium battery equipped in the weighing indicator being discarded, please insulate its positive or negative pole, do not put it into fire.

While being discarded as worthless, the weighing indicator should be processed lawfully as leady industrial waste for environment protection.

### ● Other Notes

The installation, wiring and maintenance should be operated by the engineers with the relevant professional knowledge and safety operation ability. Although being not described in this manual, the relevant safety operating procedures and standards should be followed.

## 2. Brief Introduction

### 2.1 Operating Principle

- Wheel Loader Weigher is a dynamic weighing and auto-totalizing equipment installed on wheel loader without changing the original structure of wheel loader.
- When the lift-arm of wheel loader lifted to a certain height, the position sensor will trigger the weighing process, and the weighing indicator will collect the oil pressure signal from lower and upper oil chambers of arm-lifting oil cylinder. After signal processing and compensating, Single-bucket-loading-weight will be got and totalized to Totalized Loading Weight automatically, and the Deviation Value between Totalized Loading Weight and Setpoint, alarm messages will be displayed. The operator can judge if the present Single-bucket-loading-weight is valid according to the alarm messages, and confirm the loading weight of last bucket according to Negative Deviation Value for avoiding overloading. After Totalized Loading Weight reached setpoint, the operator should stop loading process, save and print Loading Records.

### 2.2 System Configuration

- 1 Weighing Indicator with Thermal Printer.
- 1 Position Sensor.
- 2 Oil Pressure Sensors.
- 2 Plate Type Three-way Joints.
- 1 Mounting Fitting.

### 2.3 Applicable Wheel Loaders

Suitable for the wheel loader series with loading capacity 1~ 12t.



## 3. Technical Specifications

### 3.1 Specifications of Weighing Indicator

- Executing Standards
  - ◇ PRC GB/T 7724-2008 Electronic Weighing Meter National Standard.
  - ◇ PRC JJG 649-2016 Digital Weighing Indicators National Verification Regulation.
  - ◇ OIML R76- 1: 2006 Non-automatic Weighing Instruments International Recommendation.
  - ◇ Accuracy Grade:  $\text{III}$  .
  - ◇ Number of Verification Scale Interval:  $n=3000$ .
- Display
  - ◇  $640 \times 480$  TFT color display screen for English character display.
  - ◇ Weight Display Range of Indicator:  $-99,999 \sim 99,999$ .
  - ◇ System Weighing Range:  $100 \sim 12,000\text{kg}$ .
  - ◇ Scale Division: Optional 1, 2, 5, 10, 20, 50kg.
  - ◇ Display Resolution:  $1/100,000$ .
  - ◇ Scale Unit: Fixed kg.
  - ◇ Weight Unit: Optional kg, t.
  - ◇ Ton Decimal Point: Optional 0, 0.0, 0.00, 0.000.
  - ◇ Display Refreshing Time: Setting Range 0.1~2.0s.
- Keypad
  - ◇ 20-key English keypad with controllable backlight.
  - ◇ Menu&Shortcut mode operation with key tone.
  - ◇ Number and English Alphabet can be inputted.
- Position Sensor Input Interface
  - ◇ 2 Switch signal Input.
  - ◇ Output Voltage: DC12V.
  - ◇ Max. Output Current: 100mA.
- Oil Pressure Sensor Interface
  - ◇ Excitation Voltage/Max.Current : DC12V/ 100mA & DC5V/ 100mA.
  - ◇ 2 Oil Pressure signal inputs.
  - ◇ Signal Input Range: Optional  $0 \sim 20\text{mV}$ ,  $0 \sim 5\text{V}$ [Factory Set Value].
  - ◇  $\Sigma - \Delta$ ADC: 24-bit, 1,000,000 internal code used.
  - ◇ Sampling Frequency: 400Hz.
  - ◇ Special anti-vibration digital filtering algorithm.
  - ◇ Zero Drift:  $\pm 0.1 \mu\text{V}/\text{C}$  RTI (Relative to Input).
  - ◇ Gain Drift:  $\pm 5\text{ppm}/\text{C}$ .
  - ◇ Non-linearity: 0.005%FS.

- Digital Communication Interface
  - ◇ COM1: RS232.
  - ◇ Internal COM2: Optional wireless serial communication module.
  - ◇ Internal COM3: Connected Thermal Serial Printer, Baud Rate 9600bps, No Parity Check Bit.
- Report Print
  - ◇ 10000 Loading Records can be saved, queried and printed, and each record can contain 50 pcs Single-bucket-loading-weight value.
- Operating Specification
  - ◇ Operating Voltage: DC24V±20%.
  - ◇ Max. Power Consumption: 10W.
  - ◇ Outline Size: 168×213×50mm [W×H×D].
  - ◇ Operating Temperature: -25C to +45C.
  - ◇ Storage Temperature: -30C to +60C.
  - ◇ Relative Humidity: Max. 85%RH.
  - ◇ Protection Level: IP65.
  - ◇ Weight: Approx. 2.0kg.

### 3.2 Specifications of Position Sensor

- HALL Type Proximity Switches
  - ◇ Operating Voltage: DC5~24V.
  - ◇ Detecting Distance: 1~8mm.
  - ◇ Response Frequency: 5KHz.
  - ◇ Quiescent Current: Max. 2mA.
  - ◇ Thread Size: M8×1mm.
  - ◇ Service Temperature: -25C~+70C.
  - ◇ Protection Level : IP67.
- Standard Detecting Target
  - ◇ Permanent magnet.
  - ◇ Outline Size: 30×10×5mm [L×W×T].

### 3.3 Specifications of Oil Pressure Sensor

- ◇ Operating Voltage: DC5V.
- ◇ Capacity: 0~25MPa.
- ◇ Accuracy: ±0.1%FS.
- ◇ Output Sensitivity: 2mV/V.
- ◇ Zero Drift: ±0.015%FS/C.
- ◇ Safe Overload: 120%FS.



- ❖ Thread Size: M10×1mm.
- ❖ Service Temperature: -40C~+ 125C.
- ❖ Protection Level : IP67.

### 3.4 System Accuracy

- ❖ Accuracy Grade: III.
- ❖ Verification Accuracy of Weighing Indicator: 0.02%.
- ❖ Accuracy of Single-Bucket-Weight: 0.5%~ 1.0%.
- ❖ Accuracy of Totalized Loading Weight: 1.0%.

## 4. User Interface

### 4.1 Main Display Interface



No.	Sign	Description
[1]	Working State	[Record No.0000~9999] TRUCK MODE.
		[Material No.01~20] MIX MODE.
		Working Mode: TRUCK MODE / MIX MODE.
		[LOC/LOCK]: Keypad is locked.
[903] Date Format	Hour : Minute : Second	
[2]	TRUCK	Truck No.
[3]	GOODS	Goods Name.
[4]	OP.	Operator Name.
[5]		Bucket Count of Current Shift.
[6]		Totalized Weight of Current Shift.
[7]	Blue ▲	It's allowed to lift the lift-arm and bucket for weighing.
	Blue ▼	It's allowed to put the lift-arm down so that the bucket goes down to the lowest position.
	Red ■	Pause State.

No.	Sign	Description
[8]	DOWN	The bucket of wheel loader is below the position sensor.
	UP	The bucket of wheel loader is above the position sensor.
[9]	OK	Weighing Normal.
	STALL	Stall Alarm [ The operator has released the accelerator of wheel loader in weighing process] : Acceleration Value < [400] Stall Alarm Point.
	LOW	Lower Limit Alarm of Single-bucket-loading-weight: Loading Weight < [401] Load Lower Limit.
	HIGH	Upper Limit Alarm of Single-bucket-loading-weight: Loading Weight > [402] Load Upper Limit.
	UND-T	Undertime Alarm: Weighing Time < [403] Min. Weighing Time.
	OV-T	Overtime Alarm: Weighing Time > [404] Max. Weighing Time.
[10]	USUER	User Name.
[11]	Bucket Count	The display area of 'Bucket Count ' will change to red background if the key <b>【Void】</b> is pressed for 'Cancel Totalizing' .
[12]	Deviation Value	Deviation Value = Totalized Loading Weight – Setpoint Value.
[13]	Totalized Loading Weight	“Last Bucket” Prompt: The display area of 'Totalized Loading Weight' will change to red background if 'Negative Deviation Value<3 t', it means that the next bucket may be the last one, the operator should determine the loading weight of the next bucket according to the actual Negative Deviation Value.
[14]	Single-bucket-loading- weight	The display area of 'Single-bucket-loading-weight' will change to flashing red background while alarming.
		Under the working state of <b>【Deduct】</b> , the realtime weight of the materials in the bucket will be tracked and displayed.
[15]	NO USB	U-disk is not ready.
	USB	U-disk is ready.
	ADD	The present Single-bucket- loading-weight has been totalized to Totalized Loading Weight.
	NO ADD	<ul style="list-style-type: none"> <li>❖ The present Single-bucket-loading-weight has not been totalized to Totalized Loading Weight because of alarming.</li> <li>❖ After totalizing, the present Single-bucket-loading-weight can be deducted from Totalized Loading Weight via the key <b>【Void】</b> .</li> <li>❖ Refer to parameter [406] 'Totalizing Permission While Alarming' .</li> </ul>
	DED	<b>【Deduct】</b> working state indicator.

- Press key **【Disp】** to switch the following display interfaces for checking working state:

R-NET:	0.000t
LC-UP:	0
LC-DN:	0
ΔAD:	0

#### 1. Oil Pressure Sensor Adjustment Interface A

R-NET: Real-time Weight Value.

LC-UP: Oil Pressure Signal Real-time AD Value from Loadcell Port 'LC-UP' .

LC-DN: Oil Pressure Signal Real-time AD Value from Loadcell Port 'LC-DN' .

$\Delta AD = AD_{LC-DN} - AD_{LC-UP}$  .

NET	0.000t
LC-UP:	0
LC-DN:	0
ΔAD:	0

#### 2. Oil Pressure Sensor Adjustment Interface B

NET: Single-Bucket-Loading-Weight without Acceleration Compensation.

LC-UP: Oil Pressure Signal Average AD Value in Weighing Segments from 'LC-UP' .

LC-DN: Oil Pressure Signal Average AD Value in Weighing Segments from 'LC-DN' .

$\Delta AD = AD_{LC-DN} - AD_{LC-UP}$  .

Note: Weighing Segment is the space between Lower Proximity Switch and Upper Proximity Switch. It's divided into Lower Weighing Segment, Medium Weighing Segment and Upper Weighing Segment.

T1:	0.000s
T2:	0.000s
T3:	0.000s
ACC:	0.0000

#### 3. Position Sensor Adjustment Interface A

T1: Time spent in Lower Weighing Segment [s].

T2: Time spent in Medium Weighing Segment [s].

T3: Time spent in Upper Weighing Segment [s].

ACC: Acceleration Value in Weighing Segments [ $dm/s^2$ ].

V1:	0.000
V3:	0.000
A0:	0.0000
LR:	1.000

#### 4. Position Sensor Adjustment Interface B

V1: Average Speed in Lower Weighing Segment [m/s].

V3: Average Speed in Upper Weighing Segment [m/s].

A0: Parameter [208] 'IdleAcc.Value' (Acceleration Value at Idle Speed) [ $dm/s^2$ ].

LR: Parameter [205] 'Run Length Ratio' .

ZERO:	10000
Z.CMP:	1.0000
SPAN:	1000
S.CMP:	1.0000

#### 5. Calibration Parameters display Interface

ZERO: Parameter [200] Zero Value.

Z.CMP: Parameter [201] Zero Compensation Coefficient.

SPAN: Parameter [202] Span Coefficient.

S.CMP: Parameter [203] Span Compensation Coefficient.

## 4.2 Keypad Operation



### 4.2.1 Menu Operation

Key Name	Description
<b>【Menu】</b>	Enter Main Menu / Exit.
<b>【Ent】</b>	Enter / Save.
<b>【◀】</b>	Cursor shifts left. Backspace.
<b>【▶】</b>	Cursor shifts right.
<b>【▲】</b>	Cursor shifts up. Display the previous option.
<b>【▼】</b>	Cursor shifts down. Display the next option.

### 4.2.2 Parameter Setting Operation

Key Name	Description
<b>【Set】</b>	Setpoint Parameters Setting.
<b>【0~9】</b>	Number Input.
<b>【A-Z】</b>	English Alphabet Input.
<b>【Print】 / 【IME】</b>	Input Method Switch: Number / English / Chinese PinYin.

### 4.2.3 System Calibration Operation

Key Name	Description	Authorization
4/ <b>【Zero】</b>	Zero Calibration with unloading and idle speed.	All Users
7/ <b>【Z.cmp】</b>	Zero Compensation with unloading and accelerating.	Administrator
5/ <b>【Cal】</b>	Span Calibration with loading and idle speed.	
8/ <b>【S.cmp】</b>	Span Compensation with loading and accelerating.	
6/ <b>【Mode】</b>	Options: Truck Mode / Mix Mode / Axle Type Mode.	

#### 4.2.4 Operation in Loading Process

Key Name	Description
<b>【Load】</b>	Enter Loading state with blue sign ‘▲’ displaying. Let the bucket of wheel loader stay at the lowest position before pressing <b>【Load】</b> .
<b>【Finish】</b>	Truck Mode: Save the current Loading Record and Clear Screen after the truck-loading process finished. Mix Mode: Save the Loading Record of the current Material No. and Clear Screen.
<b>【No.】</b>	Truck Mode: it's for inputting Truck No.. Mix Mode: It's for changing Material No.. After the new Material No. inputted, the current Material No.'s Loading Record will be saved automatically, and then the new Material No.'s historical Loading Record will be displayed again for material-reloading operation. Axle Type Mode: It's for inputting Truck Axle Number and Truck Tare Weight.
<b>【Pause】</b>	Enter Pause state with red sign ‘■’ displaying.
<b>【Void】</b>	Cancel Totalizing: If the present Single-bucket-loading-weight is not accurate, press the key to deduct it from Totalized Loading Weight.
<b>【Print】</b>	Print Loading Records.
1/ <b>【Disp】</b>	Display Interface Switch.
2/ <b>【Lock】</b>	❖ Key-locking. ❖ Key-unlocking.
3/ <b>【Deduct】</b>	Do <b>【Deduct】</b> operation if the present Single-bucket-loading-weight is excessive. After entering the working state of <b>【Deduct】</b> , the present Single-bucket-loading-weight will be deducted from Totalized Loading Weight, and the realtime weight of the materials in the bucket will be tracked and displayed in the display area [ 14]. After the materials in the bucket reduced according to the actual need, press the key <b>【Ent】</b> to totalize the weight of the remaining materials in the bucket to Totalized Loading Weight.
9/ <b>【Rec】</b>	F3 Record Management [Query/Clear/USB Copy].
0/ <b>【Cls】</b>	Clear Screen without Saving Present Loading Record.
<b>【Ent】</b>	Backlight Switch of Keypad. Auto-on time of keypad backlight: 17:00~8:00. Auto-off time of keypad backlight: 8:00~ 17:00. Check if the U-disk is ready.
<b>【On/Off】</b>	❖ Press it to turn the power on. ❖ Keep it pressed for 2 seconds to turn the power off.

## 5. Installation&Connection

### 5.1 Installation

#### 5.1.1 Structure of Wheel loader



1: Bucket; 2: Lift-arm; 3: Arm-lifting Oil Cylinder; 4: Oil Connecting Port of Upper Oil Chamber;  
5: Oil Connecting Port of Lower Oil Chamber.

#### Related Operation Terms:

- ❖ Arm-up: Lift the lift-arm so that the bucket rises.
- ❖ Arm-down: Put the lift-arm down so that the bucket goes down to the lowest position.
- ❖ Bucket-up: Flip the bucket upward to the limit position.
- ❖ Bucket-down: Flip the bucket downward.
- ❖ Discharge: Flip the bucket downward for discharging materials.
- ❖ Shovel: Shovel materials into the bucket.

### 5.1.2 Installation of Weighing Indicator



1: Fastening Nut for Lateral Rotation; 2: Fastening Nut for Vertical Rotation; 3: Locating Plate; 4: Printer

Weld the mounting bracket of the weighing indicator firmly on the metal frame of the wheel loader driving cab. The installation position should be convenient for operation.  
Suggestion: Install the weighing indicator in the driving cab of wheel loader and on the side the door which will not be opened frequently.

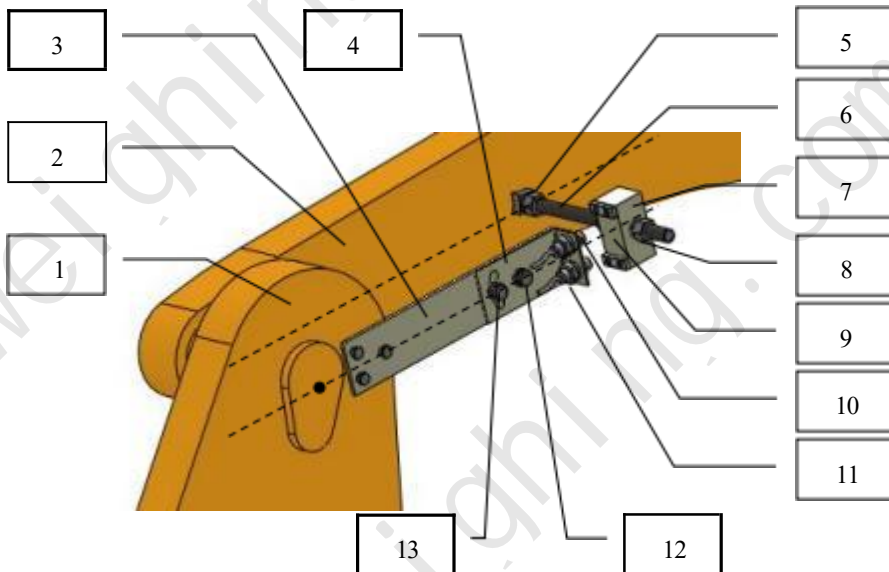




### 5.1.3 Installation of Position Sensor

Position sensor includes two modules:

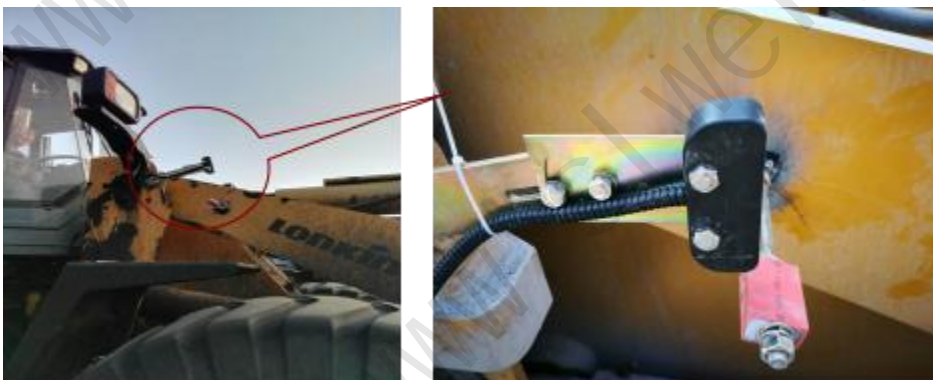
- ❖ Proximity Switch Module: Main Mounting Plate with a chute for length adjustment, Sub-mounting Plate with a chute for angle adjustment, Upper Proximity Switch and Lower Proximity Switch [Detecting Distance: 1~8mm].
- ❖ Magnet Module: Thread Pole, Weld-nut, Tight-nut, Nylon Block, Magnet Block.



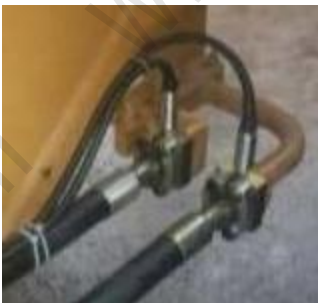
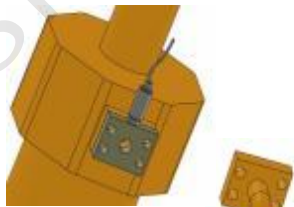
1: Lift-arm Seat; 2: Lift-arm; 3: Main Mounting Plate; 4: Sub-mounting Plate; 5: Weld-nut; 6: Thread Pole; 7: Nylon Block; 8: Fastening Nut for Position Adjustment; 9: Magnet Block; 10: Upper Proximity Switch; 11: Upper Proximity Switch; 12: Fastening Nut for Length Adjustment; 13: Fastening Nut for Angle Adjustment.

Sensing Distance Adjustment: Adjust the sensing distance between the Magnet Block and the Proximity Switch to 3~5mm.

Suggestion: Install the position sensor on the lift-arm seat and lift-arm which are at the same side that the weighing indicator installed on.



## 5.1.4 Installation of Oil Pressure Sensor



### 1. Installation Position

- ❖ The upper oil connecting port and lower oil connecting port of arm-lifting oil cylinder are the installation positions of oil pressure sensors.
- ❖ Suggestion: Install the oil pressure sensors on the arm-lifting oil cylinder which is at the same side that the weighing indicator installed on.

### 2. Safety Precaution

- ❖ Using a stable and strong base to support the bucket of the loader for avoiding accidental injury.
- ❖ In the process of dismounting and mounting, the wheel loader should be kept at flameout state.
- ❖ Put a bucket under the oil connecting ports that will be dismantled for oil collecting.
- ❖ If the wheel loader has worked for a long time, the oil temperature in the bucket-lifting cylinder will be very high. Please let the wheel loader at flameout state for some time before dismantling to avoid scalding.
- ❖ Before dismantling the oil connecting port of the upper oil chamber, let the bucket-lifting action bar stay at the position of 'LIFT' for making the upper oil chamber connect with main oil tank and relief pressure.
- ❖ Before dismantling the oil connecting port of the lower oil chamber, let the bucket-lifting action bar stay at the position of 'FALL' for making the lower oil chamber connect with main oil tank and relief pressure.
- ❖ When somebody stays in driving cab, do not stay under the wheel loader for avoiding accidental injury.

### 3. Installation

- ❖ Wrap some sealing ribbons on the screw of oil pressure sensor avoid oil leakage, and install it on the three-way joint firmly.
- ❖ Fix the three-way joint [thickness: 24mm] and the oil tube connector on the arm-lifting oil cylinder by the lengthened screw rods which is about 24 mm longer than original screw rods.

### 4. Check Oil Passage

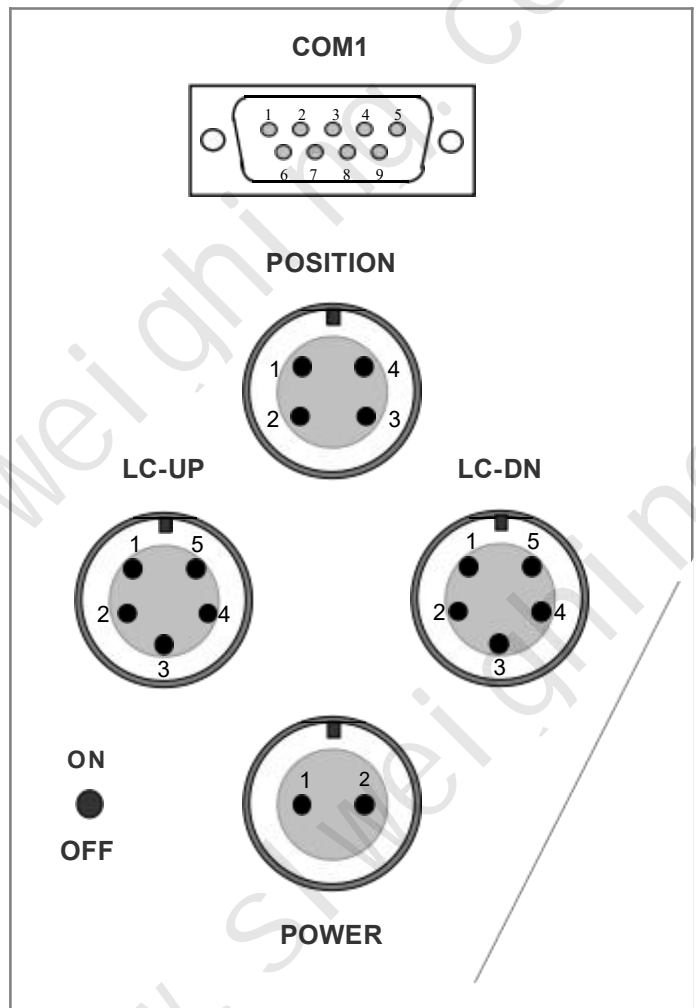
- ❖ Start wheel loader, and lift the lift-arm and bucket with accelerating for several times.
- ❖ Check if there is the phenomenon of oil leakage at the oil connecting ports.

**Only after the welding work finished, it's allowed to install Oil Pressure Sensors and Proximity Switch for avoiding damage.**

### 5.1.5 Cable Laying

- ✧ Oil pressure sensor signal cable and position sensor signal cable should be laid in flexible pipe for protection, and fix them with nylon strip.
- ✧ Try to keep signal cables away from the place with high temperature and possible extrusion, and reserve their bending length enough to avoid being pulled apart.

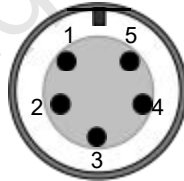
### 5.2 Terminal



## 5.3 Connection

### 5.3.1 Oil Pressure Sensor Connector (LC-DN/LC-UP)

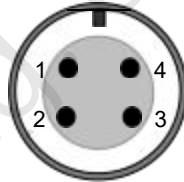
LC-DN/LC-UP



No.	Pin	Description
1	SIG-	0~5V & 0~20mV Oil Pressure Signal Input -.
2	SIG+	0~5V & 0~20mV Oil Pressure Signal Input +.
		4~20mA Oil Pressure Signal Input. Weld a 200Ω precision resistance between the plug's Pin2 and Pin3 for converting 4~20mA to 0.8~4V.
3	EXC-	Excitation Voltage - for Oil Pressure Sensor.
4	EXC+5	Excitation Voltage + for Oil Pressure Sensor (DC5V).
5	EXC+ 12	Excitation Voltage + for Oil Pressure Sensor (DC12V).
<p>Note:</p> <p>Parameter [ 105] 'Signal Range' options: '0: 0-20mV'; '1: 0-5V' .</p> <p>Parameter [ 107] 'Loadcell Channel [Selection]' with Factory Value '2: LC-DN-UP':</p> <ul style="list-style-type: none"> <li>❖ LC-DN: Connect the oil pressure sensor installed in the lower oil chamber of arm-lifting oil cylinder.</li> <li>❖ LC-UP: Connect the oil pressure sensor installed in the upper oil chamber of arm-lifting oil cylinder.</li> </ul>		

### 5.3.2 Position Sensor Connector (POSITION)

**POSITION**



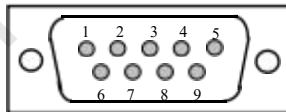
No.	Pin	Description
1	VS+	Output Voltage + for Position Sensor ( DC12V).
2	SIN-A	Position Sensor A Signal Input.
3	SIN-B	Position Sensor B Signal Input.
4	VS-	Output Voltage - for Position Sensor.

### 5.3.3 Digital Communication Port Connector (COM1/COM2)

COM1: RS232.

Internal COM2: Optional wireless serial communication port.

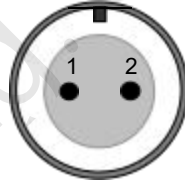
**COM1**



COM1		
No.	Pin	Description
1-4		Unused.
5	GND	Ground.
6	TXD	RS232 Send.
7	RXD	RS232 Receive.
8-9		Unused.

### 5.3.4 Power Supply Connector (POWER)

Operating Voltage: DC24V±20%.



**POWER**

No.	Pin	Wire Color	Description
4	GND	Black.	DC Input -.
5	+24V	Red.	DC Input +.

Note: Reverse polarity protection function available.

The power switch of the weighing indicator should be turned off and ensure that the power cables are not charged before DC24V power connection to avoid short circuit fault.

Find the DC24V terminal with relative stable voltage in the driving cab, then connect the terminal '+24V' of the weighing indicator to the FUSE, and connect 'GND' to the metal frame of the driving cab.

Please make sure that the inputted voltage is correct before power-on.

## 6. Menu Operation

### 6.1 Main Menu

Main Menu	Second Menu	Description	Authorization
F1: SET [F1 Parameter Setting]	1 Weighing	Weighing parameters setting.	Administrator
	2 Calibration	Calibration parameters setting.	
	3 Setpoint	Setpoint parameters setting.	All Users
	4 Alarm	Alarm parameters setting.	Administrator
	5 Communication	Communication parameters setting.	
	6 Display	User interface parameters setting.	All Users
	7 Time	Time parameter setting. <ul style="list-style-type: none"> <li>❖ Date [Parameter [903] Date Format]</li> <li>❖ Time [Hour: Minute: Second]</li> <li>❖ Week [ Monday ~ Sunday]</li> </ul>	
F2: CAL [F2 System Calibration]	1 Zero Cal. [Unload&Idle]	Zero Calibration. Lift the lift-arm and bucket of wheel loader with unloading and idle speed for correcting Zero Value, Run Length Ratio or IdleAcc.Value (Acceleration Value at Idle Speed).	All Users
	2 Zero Comp. [Unload&ACC]	Zero Compensation. Lift the lift-arm and bucket wheel loader with unloading and accelerating for correcting Zero Compensation Coefficient.	Administrator
	3 Span Cal. [Load&Idle]	Span Calibration. Lift the lift-arm and bucket wheel loader with loading and idle speed for correcting Span Coefficient.	
	4 Span Comp. [Load&ACC]	Span Compensation. Lift the lift-arm and bucket wheel loader with loading and accelerating for correcting Span Compensation Coefficient.	
F3: REC [F3 Record Management]	1 Query Truck Records	Query Truck Loading Records.	All Users
	2 Query Mixing Records	Query Mixing Records.	
	3 Query Shift Records	Query Shift Records.	
	4 Clear Truck Records	Clear Truck Loading Records.	
	5 Clear Mixing Records	Clear Mixing Records.	
	6 Clear Shift Records	Clear Shift Records.	
	7 USB-Copy Truck Records	Copy Loading Records without Single-bucket-loading -weight to U-disk.	
	8 USB-Copy Detail Records	Copy Loading Records with Single-bucket-loading-weight to U-disk.	
	9 USB-Copy Detail Records	Copy the Shift Records to U-disk.	

Main Menu	Second Menu	Description	Authorization
F4: LOC [F4 Key-locker]	1 Key-unlocking	Unlocking keypad.	All Users
	2 Key-locking	Locking keypad.	
	3 Password Set	Exfactory Passwords: ❖ Operator Password: 000000. ❖ Administrator Password: 000001.	
F5: FAC [F5 Factory Adjustment]	1 Hardware Test	AD Value of Oil Pressure Signal Linearity Test and Position Signal Test.	Factory
	2 Simplified Chinese	Download Simplified Chinese.	
	3 Complex Chinese	Download Complex Chinese.	
	4 Parameter Backup	Parameter Backup.	Administrator
	5 Parameter Recovery	Parameter Recovery.	
	6 Reset Defaults	Reset to factory defaults.	
F6: INF [F6 Product Information]	1 Version No.	1 Version No.	Factory
	2 Serial No.	2 Serial No.	
	3 Exfactory Date	3 Exfactory Date.	
	4 ID Code	ID Code.	Supplier
	5 Company Info. 1	Company Information 1 .	
	6 Company Info.2	Company Information 2 .	
	7 Company Info.3	Company Information 3 .	
	8 Company Info.4	Company Information 4 .	



## 6.2 Parameter Setting

### 6.2.1 Weighing Parameters

No.	Range	Default	Description	Set		
100	0~1	1	<b>Load Weight Unit</b> Display Unit of Loading Weight. 0: kg; 1: t [Internal Scale Unit is kg] 2: lb; 3: kp [Internal Scale Unit is lb]			
101	0~1	1	<b>TOT Weight Unit</b> Display Unit of Totalized Loading Weight. If Internal Scale Unit is kg, the options are: 0: kg; 1: t If Internal Scale Unit is lb, the options are: 0: lb; 1: kp			
102	0~3	3	<b>Ton&amp; kp Decimal</b> 0: o; 1: o.o; 2: o.oo; 3: o.ooo			
103	1~50	10	<b>Display Division [kg]</b> 1, 2, 5, 10, 20, 50 If the Weight Variance is less than Display Division value, the display value will not change.			
104	0~200	50	<b>Zero Range [kg]</b>			
105	0~1	0 [*]	<b>Signal Range</b> 0: 0-20mV 1: 0-5V Operating Authorization: Administrator.			
106	0~19	2	<b>[Anti-Vibration] Digital Filter</b>			
			Set Value	Cutoff Frequency	Set Value	Cutoff Frequency
			0	None	10	None
			1	11.2Hz	11	112Hz
			2	8.0Hz	12	80Hz
			3	5.6Hz	13	56Hz
			4	4.0Hz	14	40Hz
			5	2.8Hz	15	28Hz
			6	2.0Hz	16	20Hz
			7	1.4Hz	17	14Hz
8	1.0Hz	18	10Hz			
9	0.7Hz	19	7Hz			

[\*] : 'Reset Defaults' operation has no effect on the parameter.

No.	Range	Default	Description	Set
107	0~2	2 [*]	<b>Loadcell Channel [Selection]</b> <i>0: LC-DN [LC-DN to Lower Sensor; LC-UP Unused]</i> <i>1: LC- UP [LC-UP to Lower Sensor; LC-DN Unused]</i> <i>2: LC-DN- UP [LC-DN to Lower Sensor; LC-UP to Upper Sensor]</i> Operating Authorization: Administrator.	
			Note: Lower Sensor is the oil pressure sensor installed in the lower oil chamber of arm-lifting oil cylinder. Upper Sensor is the oil pressure sensor installed in the upper oil chamber of arm-lifting oil cylinder.	
108	0~2	0	<b>Working Mode</b> <i>0: Truck Mode</i> <i>1: Mix Mode</i> <i>2: Axle Type Mode</i>	
109	0~1	0 [*]	<b>Position [Switch] Channel [Selection]</b> <i>0: Double</i> <i>1: Single</i>	

[\*] : 'Reset Defaults' operation has no effect on the parameter.

## 6.2.2 Calibration Parameters

No.	Range	Default	Description	Set
200	0~ 130000	10000 [*]	<b>Zero Value</b> [AD Value] Zero Value at Idle Speed. Only for query.	
201	0.0000 ~99.9999	1.0000 [*]	<b>Zero Comp. Coeff.</b> Zero Compensation Coefficient at Accelerated Speed. Only for query.	
202	1~999999	1000 [*]	<b>Span Coefficient</b> Span Coefficient at Idle Speed. Only for query.	
203	0.0000 ~99.9999	1.0000 [*]	<b>Span Comp. Coeff.</b> Span Compensation Coefficient at Accelerated Speed. Only for query.	
204	5.0~ 100.0	10.0 [*]	<b>Mag.Block Width</b> [mm] Width of Magnet Block fixed on the Nylon Block of the Position Sensor.	
205	0.001~9.999	1.000 [*]	<b>Run Length Ratio</b> [LR] Running Length Ratio $LR=L1/L3$ . L1: The actual running length of Magnet Block passing by the Lower Proximity Switch [Lower Weighing Segment]. L3: The actual running length of Magnet Block passing by the Upper Proximity Switch [Upper Weighing Segment].	
206	0	0	<b>Unused</b>	
207	0~ 1000	500 [*]	<b>Max. Comp.Weight</b> [kg] Max. Compensation Weight.	
208	-0.0500 ~+0.0500	0.0000 [*]	<b>IdleAcc.Value A0</b> [dm/s <sup>2</sup> ] Acceleration Value at Idle Speed. Key <b>【Print】</b> : '+'/'-' switch.	
209	0~50	2	<b>Comp. Rate</b> Weight Compensation Rate.	
210	0~99999	100	<b>Comp. Limit</b> Weight Compensation Limit.	

No.	Range	Default	Description	Set
211	0~5	0	<b>Comp. Points</b> Number of Compensation Points.	
212	-99.9999 ~99.9999	0.0000	<b>Comp. Acc1</b> Acceleration Value of Compensation Point 1.	
213			<b>Comp. Acc2</b> Acceleration Value of Compensation Point 2.	
214			<b>Comp. Acc 3</b> Acceleration Value of Compensation Point 3.	
215			<b>Comp. Acc 4</b> Acceleration Value of Compensation Point 4.	
216			<b>Comp. Acc 5</b> Acceleration Value of Compensation Point 5.	
217	0.0000 ~99.9999	1.0000	<b>Comp. Coeff1</b> Compensation Coefficient of Point 1.	
218			<b>Comp. Coeff 2</b> Compensation Coefficient of Point 2.	
219			<b>Comp. Coeff3</b> Compensation Coefficient of Point 3.	
220			<b>Comp. Coeff 4</b> Compensation Coefficient of Point 4.	
221			<b>Comp. Coeff 5</b> Compensation Coefficient of Point 5.	

[\*] : 'Reset Defaults' operation has no effect on the parameter.

### 6.2.3 Setpoint Parameters

No.	Range	Default	Description	Set
300	8 Characters	TRUCK1	<b>Truck No.</b>	
301	8 Characters	GOODS1	<b>Goods Name</b>	
302	8 Characters	OP. 1	<b>Operator</b>	
303	20 Characters	USER1	<b>User Name</b>	
304	0~99999	60000	<b>Setpoint [kg]</b>	

## 6.2.4 Alarm Parameters

No.	Range	Default	Description	Set
400	- 1.0000 ~0.0000	-0. 1000	<b>Stall AlarmPoint</b> [dm/s <sup>2</sup> ] If 'Acceleration Value < Stall Alarm Point', the alarm message 'STALL' will be displayed. Key <b>【Print】</b> : '+'/'-' switch.	
401	0~99999	5000	<b>Load Lower Limit</b> [kg] Lower Limit of Single-bucket-loading-weight. If 'Loading Weight < Load Lower Limit', the alarm message 'LOW' will be displayed.	
402	0~99999	30000	<b>Load Upper Limit</b> [kg] Upper Limit of Single-bucket-loading-weight. If 'Loading Weight > Load Upper Limit', the alarm message 'HIGH' will be displayed.	
403	0.000~99.999	0. 100	<b>Min. Weigh Time</b> [s] If 'Weighing Time < Min. Weighing Time', the alarm message 'UND-T' [undertime] will be displayed..	
404	0.000~99.999	30.000	<b>Max. Weigh Time</b> [s] If 'Weighing Time > Max. Weighing Time', the alarm message 'OV-T' [overtime] will be displayed.	
405	0~ 1	1	<b>Alarm Sound</b> 0: OFF; 1: ON	
406	0~ 1	0	<b>TOT withAlarm</b> Totalizing Permission While Alarming. 0: OFF; 1: ON	
407	0~99999	17000	<b>2-Axle Gross Limit</b> [kg] 2-Axle Truck Gross Weight Limit.	
408	0~99999	25000	<b>3-Axle Gross Limit</b> [kg] 3-Axle Truck Gross Weight Limit.	
409	0~99999	35000	<b>4-Axle Gross Limit</b> [kg] 4-Axle Truck Gross Weight Limit.	
410	0~99999	43000	<b>5-Axle Gross Limit</b> [kg] 5-Axle Truck Gross Weight Limit.	
411	0~99999	49000	<b>6-Axle Gross Limit</b> [kg] 6-Axle Truck Gross Weight Limit.	
412	0~99999	56000	<b>7-Axle Gross Limit</b> [kg] 7-Axle Truck Gross Weight Limit.	
413	0~99999	100000	<b>8-Axle Gross Limit</b> [kg] 8-Axle Truck Gross Weight Limit.	

## 6.2.5 Communication Parameters

No.	Range	Default	Description	Set
800	0~99	01	<b>Comm. Address</b> Communication Address.	
801 802	0~2	2 0	<b>COM1 Baud Rate / COM2 Baud Rate</b> <i>0: 9600bps</i> <i>1: 19200bp</i> <i>2 :115200bps</i>	
803 804	0~2	0 0	<b>COM1 ParityCheck / COM2 ParityCheck</b> <i>0: None</i> <i>1: Even</i> <i>2: Odd</i>	
805	0~3	0	<b>COM1 Comm. Mode</b> <i>0: Host-slave ASC</i> [Modbus ASCII] <i>1: Continuous ASC</i> [Continuous Sending ASCII] <i>2: Cont.[Weight]</i> [Continuous Sending ASCII] <i>3: USB</i>	
806	0~2	0	<b>COM2 Comm. Mode</b> <i>0: Host-slave ASC</i> [Modbus ASCII] <i>1: Continuous ASC</i> [Continuous Sending ASCII] <i>2: Cont.[Weight]</i> [Continuous Sending ASCII]	
807	1~2	1	<b>Print Format</b> <i>1: Format 1</i> <i>2: Format 2</i> See 'Appendix A. Print Formats' .	

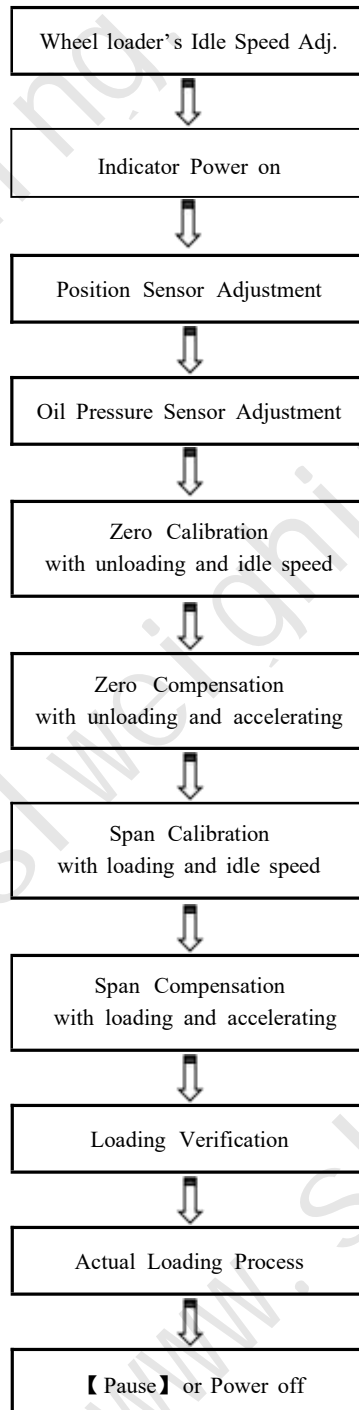
## 6.2.6 Display Parameters

No.	Range	Default	Description	Set
900	0~1	0 [*]	<b>Language</b> 0: Chinese 1: English	
901	0.1~2.0	0.5	<b>Disp.RefreshTime</b> [s] Display Refreshing Time.	
902	0~1	0	<b>Auto- Locking</b> 0: OFF 1: ON [If there is not any keypad operation in one minute and it's not in the processes of 'F2 Calibration' & 'F7 Factory Adj.', the weighing indicator will lock the keypad and return to 'Main Display Interface' automatically]	
903	0~2	0 [*]	<b>Date Format</b> 0: YYYY. MM. DD [Year. Month. Day] 1: MM. DD. YYYY [Month. Day. Year] 2: DD. MM. YYYY [Day. Month. Year]	
904	00.00~23.59	7.59	<b>Shift1 End Time</b>	
905	00.00~23.59	15.59	<b>Shift2 End Time</b>	
906	00.00~23.59	23.59	<b>Shift3 End Time</b>	

[\*] : 'Reset Defaults' operation has no effect on the parameter.

## 7. Equipment Adjustment & System Calibration

### 7.1 Adjustment&Calibration Procedure





## 7.2 Equipment Adjustment

### 7.2.1 Wheel loader's Idle Speed Adjustment

- ❖ Check if the bucket lifting process with unloading and idle speed is smooth.
- ❖ Check if the bucket lifting process with full loading and idle speed is smooth.
- ❖ If not smooth, it will affect seriously the calibrating and weighing accuracy of the weigher. If it's caused by power lackage, it's need to adjust the lift-arm's power at idle speed by professionals.

### 7.2.2 Position Sensor Adjustment

- ❖ Press key **【Pause】** to enter Pause state with red sign '■' displaying.
- ❖ Make sure the bucket of wheel loader is empty.
- ❖ BUCKET-UP: Flip the bucket upward to the limit position.
- ❖ ARM-DOWN: Put the lift-arm down so that the bucket goes down to the lowest position.
- ❖ Press key **【Load】** to display the blue sign '▲'.
- ❖ Press key **【Disp】** to display 'Position Sensor Adjusting Interface A':



T1: Time spent in Lower Weighing Segment [s].

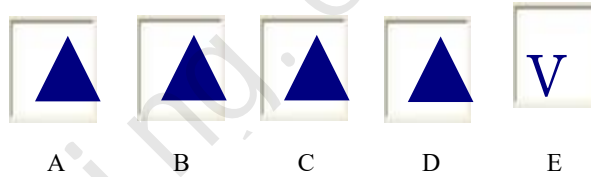
T2: Time spent in Medium Weighing Segment [s].

T3: Time spent in Upper Weighing Segment [s].

ACC: Acceleration Value in Weighing Segments [dm/s<sup>2</sup>].

Note: Weighing Segment is the space between Lower Proximity Switch and Upper Proximity Switch. It's divided into Lower Weighing Segment, Medium Weighing Segment and Upper Weighing Segment.

- ❖ Lift the lift-arm and bucket with idle speed.
- ❖ If the sensing distance between the Magnet Block and the Proximity Switch and is normal, the buzzer will beep twice and the following arrow signs will be displayed one by one in the process the Magnet Block passing by the Weighing Segment :



- ✓ A: It's allowed to lift the lift-arm and bucket for weighing.
- ✓ B: The Magnet Block is passing by the Lower Proximity Switch [Lower Weighing Segment].
- ✓ C: The Magnet Block is between the two Proximity Switches [Medium Weighing Segment].
- ✓ D: The Magnet Block is passing by the Upper Proximity Switch [Upper Weighing Segment].
- ✓ E: It's allowed to put the lift-arm down so that the bucket goes down to the lowest position..
- ❖ After the Magnet Block passed by the Weighing Segment, display T1, T2, T3 and ACC value.
- ❖ If T1 value and T3 value are near, it means that the parallelism degree in the center region of the Magnet Block and the sensing surface of Proximity Switch is good.
- ❖ Optional Adjusting Item: Adjust manually the parameter [205] 'Run Length Ratio' .
  - ✓ **After lifting the lift-arm and bucket with unloading and idle speed, if ACC display value is in the range 0.0030~0.0080dm/s<sup>2</sup>, it's not need to modify the set value of 'Run Length Ratio'; otherwise, try to modify it for ACC display value of the next lifting in the range of empirical value 0.0050~0.0060dm/s<sup>2</sup>.**
  - ✓ **Increasing the set value of 'Run Length Ratio' will make the ACC display value smaller.**
- ❖ Repeat the above steps for three times, if ACC Value is stable, the adjustment process will be completed.
- ❖ Press key **【Pause】** to enter Pause state with red sign '■' displaying.

Fault	Description	Solution
Abnormal Arrow Signs Display		Check if the actual operation process is correct.
		Adjust the sensing distance between the Magnet Block and the Proximity Switch to 3~5mm.
Big Difference between T1 and T3		Adjust the parallelism degree in the center region of the Magnet Block and the sensing surface of Proximity Switch.
ACC Unstable		Do 'Wheel loader's Idle Speed Adjustment' again.

### 7.2.3 Oil Pressure Sensor Adjustment

- ❖ Only after position sensor adjustment passed, it's allowed to do 'Oil Pressure Sensor Adjustment'.
- ❖ Press key **【Pause】** to enter Pause state with red sign '■' displaying.
- ❖ Make sure the bucket of wheel loader is empty.
- ❖ BUCKET-UP: Flip the bucket upward to the limit position.
- ❖ ARM-DOWN: Put the lift-arm down so that the bucket goes down to the lowest position.
- ❖ Press key **【Load】** to display the blue sign '▲'.
- ❖ Press key **【Disp】** to display 'Oil Pressure Sensor Adjustment Interface B':



NET: Single-Bucket-Loading-Weight without Acceleration Compensation.

LC-UP: Oil Pressure Signal Average AD Value in Weighing Segments from 'LC-UP'.

LC-DN: Oil Pressure Signal Average AD Value in Weighing Segments from 'LC-DN'.

$\Delta AD = AD_{LC-DN} - AD_{LC-UP}$ .

Note: Weighing Segment is the space between Lower Proximity Switch and Upper Proximity Switch. It's divided into Lower Weighing Segment, Medium Weighing Segment and Upper Weighing Segment.

- ❖ Lift the lift-arm and bucket with idle speed.
- ❖ After the Magnet Block passed by the Weighing Segment, display NET,  $AD_{LC-UP}$ ,  $AD_{LC-DN}$  and  $\Delta AD$  value.
- ❖ If  $AD_2$  Value is far greater than  $AD_1$  Value, then it means that the oil pressure sensors are connected correctly.
- ❖ Repeat the above steps for three times, if  $\Delta AD$  Value is stable, the adjustment process will be completed.

❖ Press key **【Pause】** to enter Pause state with red sign ‘■’ displaying.

Fault	Description	Solution
$\Delta AD \text{ Value} < 0$	$AD_{LC-DN} - AD_{LC-UP} < 0$	Check if the actual operation process is correct. Check if the oil pressure sensors are connected correctly. Refer to ‘5.3. 1 Oil Pressure Sensor Connector’, Parameter [ 107] ‘Loadcell Channel [Selection] ’ and [105] ‘Signal Range’
$\Delta AD \text{ Value Unstable}$	The variation of AD Value has exceeded 100.	Do ‘Wheel loader’s Idle Speed Adjustment ’ again.

## 7.3 System Calibration

Before System Calibration, lift the lift-arm and bucket for 5~ 10 times to preheating the hydraulic oil.

Let the wheel loader stay on the relatively flat ground in the process of System Calibration.

### 7.3.1 Zero Calibration 【Zero】

- ❖ Press key 【Pause】 to enter Pause state with red sign ‘■’ displaying.
- ❖ Make sure the bucket of wheel loader is empty.
- ❖ BUCKET-UP: Flip the bucket upward to the limit position.
- ❖ ARM-DOWN: Put the lift-arm down so that the bucket goes down to the lowest position.
- ❖ Press key 【Load】 to display the blue sign ‘▲’.
- ❖ Press key 【Zero】 to display interface ‘Zero Calibration’:



- ❖ Lift the lift-arm and bucket with idle speed.
- ❖ After the Magnet Block passed by the Weighing Segment, display:
  - ✓ Blue sign ‘▼’.
  - ✓ New Zero Value.
  - ✓ New Run Length Ratio.
  - ✓ New IdleAcc.Value A0 [Acceleration Value at Idle Speed,  $\text{dm/s}^2$ ].
  - ✓ Message ‘Save’: It’s allowed to save the detection results.
  - ✓ Alarm Message: It’s not allowed to save the detection results.

- ❖ Press key **【Ent】** to display the dialogue box ‘Save A0 or LR? ’.
- ✓ **If it’s the first time to do Zero Calibration or IdleAcc.Value A0 is not in the range 0.0030~0.0080dm/s<sup>2</sup>, please press key **【◀】 / **【▶】** to select the button ‘Save LR’, then press key **【Ent】** to save the new Zero Value and Run Length Ratio.****
- ✓ **If IdleAcc.Value A0 is in the range 0.0030~0.0080dm/s<sup>2</sup>, please press key **【◀】 / **【▶】** to select the button ‘Save A0’, then press key **【 Ent 】** to save the new Zero Value and IdleAcc.Value A0, and Run Length Ratio will not be changed.****
- ✓ **【 Menu 】** : Exit without saving.
- ❖ Repeat the above steps for three times, if the variations of Zero Value and IdleAcc.Value A0 are in the allowable range, Zero Calibration process will be completed.
- ❖ Press key **【Pause】** to enter Pause state with red sign ‘■’ displaying.

Alarm / Fault	Description	Solution
<b>【 Zero Limit 】</b>	Zero Value is not in the allowed range [0~ 130000].	Do ‘Oil Pressure Sensor Adjustment ’ again.
<b>【 LR Limit 】</b>	Run Length Ratio is not in the allowed range [0.001~9.999].	Do ‘Position Sensor Adjustment ’ again.
<b>【 A0 Limit 】</b>	IdleAcc.Value A0 is not in the allowed range [-0.0500~+0.0500 dm/s <sup>2</sup> ].	Do ‘Position Sensor Adjustment ’ again.
Zero Value Unstable	The variation of Zero Value has exceeded 100.	Do ‘Oil Pressure Sensor Adjustment ’ again.
		Do ‘Wheel loader’s Idle Speed Adjustment ’ again.
IdleAcc.Value A0 Unstable		Do ‘Position Sensor Adjustment ’ again.
		Do ‘Wheel loader’s Idle Speed Adjustment ’ again.

### 7.3.2 Zero Compensation 【Z.cmp】

- ❖ Press key 【Pause】 to enter Pause state with red sign ‘■’ displaying.
- ❖ Make sure the bucket of wheel loader is empty.
- ❖ BUCKET-UP: Flip the bucket upward to the limit position.
- ❖ ARM-DOWN: Put the lift-arm down so that the bucket goes down to the lowest position.
- ❖ Press key 【Load】 to display the blue sign ‘▲’.
- ❖ Press key 【Z.cmp】 to display interface ‘Zero Compensation’:



- ❖ Lift the lift-arm and bucket with the accelerator at the actual loading operation state and do the best to keep the accelerator stable.
- ❖ After the Magnet Block passed by the Weighing Segment, display:
  - ✓ Blue sign ‘▼’.
  - ✓ New Zero Compensation Coefficient.
  - ✓ Compensation Difference [C.ER = New Zero Compensation Coefficient – Old Zero Compensation Coefficient].
  - ✓ AD: AD Value at Weighing Segment.
  - ✓ ACC: Acceleration Value at Weighing Segment [dm/s<sup>2</sup>].
  - ✓ R-AD: Real-time AD Value.
  - ✓ Message ‘Save’: It’s allowed to save the detection results.
  - ✓ Alarm Message: It’s not allowed to save the detection results.

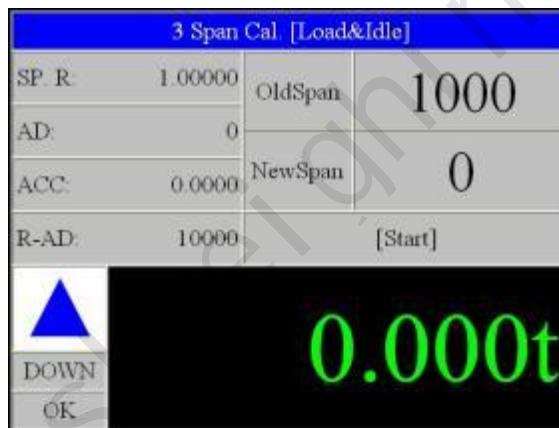
- ❖ **【Ent】** : Save; **【Menu】** : Exit without saving.
- ❖ Repeat the above steps for three times, if the variation of Zero Compensation Coefficient is in the allowable range, Zero Compensation process will be completed.
- ❖ Press key **【Pause】** to enter Pause state with red sign ‘■’ displaying.

Alarm	Description	Solution
<b>【Too Small Signal】</b>	AD Value < [Zero Value × 99%].	Do ‘Wheel loader’s Idle Speed Adjustment ’ again.
<b>【Z.CMP Limit】</b>	Zero Compensation Coefficient is not in the allowed range [0.0000~99.9999].	Do ‘Oil Pressure Sensor Adjustment ’ again.



### 7.3.3 Span Calibration 【Cal】

- ❖ Press key **【Pause】** to enter Pause state with red sign ‘■’ displaying.
- ❖ Use truck scale to get the seft-weight [Tare Weight] of the wheel loader.
- ❖ Load a bucket of materials, and use truck scale to get the gross weight of the wheel loader and the materials.
- ❖ Calculate Calibrating Weight [Calibrating Weight = Net Weight of Materials = Gross Weight – Tare Weight]
- ❖ BUCKET-UP: Flip the bucket upward to the limit position.
- ❖ ARM-DOWN: Put the lift-arm down so that the bucket goes down to the lowest position.
- ❖ Press key **【Load】** to display the blue sign ‘▲’.
- ❖ Press key **【Cal】** to display interface ‘Span Calibration’:



- ❖ Lift the lift-arm and bucket with idle speed.
- ❖ After the Magnet Block passed by the Weighing Segment, display:
  - ✓ Blue sign ‘▼’.
  - ✓ Weighing Result.
  - ✓ Message ‘ **【Ent】** : Input Cal. Weight’ .
- ❖ Press key **【Ent】** to display the interface ‘Input Calibrating Weight’ .
- ❖ After inputting the value of Calibrating Weight, press key **【Ent】** to display:
  - ✓ New Span Coefficient.

- ✓ Correction Ratio [SP.R = New Span Coefficient / Old New Span Coefficient].
  - ✓ AD: AD Value at Weighing Segment.
  - ✓ ACC: Acceleration Value at Weighing Segment [dm/s<sup>2</sup>].
  - ✓ R-AD: Real-time AD Value.
  - ✓ Message 'Save': It's allowed to save the detection results.
  - ✓ Alarm Message: It's not allowed to save the detection results.
- ❖ **【Ent】** : Save; **【Menu】** : Exit without saving.
  - ❖ Repeat the above steps for three times, if the variation of Span Coefficient is in the allowable range, Span Calibration process will be completed.
  - ❖ Press key **【Pause】** to enter Pause state with red sign '■' displaying.

Alarm	Description	Solution
<b>【Too Small Signal】</b>	AD Value < [Zero Value × 110%]	Check if there are enough materials loaded in the wheel loader's bucket.
		Do 'Oil Pressure Sensor Adjustment ' again.
<b>【SPAN Limit】</b>	Span Coefficient is not in the allowed range [ 1~999999].	Do 'Oil Pressure Sensor Adjustment ' again.

### 7.3.4 Span Compensation 【S.cmp】

- ❖ Press key 【Pause】 to enter Pause state with red sign ‘■’ displaying.
- ❖ Keep Calibrating Weight [the materials weight in the bucket for Span Calibration] unchanged.
- ❖ BUCKET-UP: Flip the bucket upward to the limit position.
- ❖ ARM-DOWN: Put the lift-arm down so that the bucket goes down to the lowest position.
- ❖ Press key 【Load】 to display the blue sign ‘▲’.
- ❖ Press key 【S.cmp】 to display the interface ‘Span Compensation’:



- ❖ Lift the lift-arm and bucket with the accelerator at the actual loading operation state and do the best to keep the accelerator stable.
- ❖ After the Magnet Block passed by the Weighing Segment, display:
  - ✓ Blue sign ‘▼’.
  - ✓ Weighing Result.
  - ✓ Message ‘【Ent】: Input Cal. Weight’.
- ❖ Press key 【Ent】 to display the interface ‘Input Calibrating Weight’.
- ❖ After inputting the value of Calibrating Weight, press key 【Ent】 to display:
  - ✓ New Span Compensation Coefficient.
  - ✓ Compensation Difference [C.ER = New Span Compensation Coefficient – Old Span Compensation Coefficient].
  - ✓ AD: AD Value at Weighing Segment.
  - ✓ ACC: Acceleration Value at Weighing Segment [dm/s<sup>2</sup>].

- ✓ R-AD: Real-time AD Value.
- ✓ Message ‘Save’: It’s allowed to save the detection results.
- ✓ Alarm Message: It’s not allowed to save the detection results.
- ❖ **【Ent】** : Save; **【Menu】** : Exit without saving.
- ❖ Repeat the above steps for three times, if the variation of Span Compensation Coefficient is in the allowable range, Span Compensation process will be completed.
- ❖ Press key **【Pause】** to enter Pause state with red sign ‘■’ displaying.

Alarm	Description	Solution
<b>【Too Small Signal】</b>	Weighing Result < [Calibrating Weight × 99%].	Check if the actual weight of the materials in the wheel loader’s bucket is consistent with the inputted Calibrating Weight.
		Do ‘Oil Pressure Sensor Adjustment ’ again.
		Do ‘Wheel loader’s Idle Speed Adjustment ’ again.
<b>【S.CMP Limit】</b>	Span Compensation Coefficient is not in the allowed range [0.0000~99.9999].	Do ‘Oil Pressure Sensor Adjustment ’ again.

### 7.3.5 Loading Verification

- ❖ Keep Calibrating Weight [the materials weight in the bucket for Span Calibration] unchanged.
- ❖ BUCKET-UP: Flip the bucket upward to the limit position.
- ❖ ARM-DOWN: Put the lift-arm down so that the bucket goes down to the lowest position.
- ❖ Press key **【Load】** to enter loading state with the blue sign ‘▲’ displaying.
- ❖ Lift the lift-arm and bucket with the accelerator at the actual loading operation state and do the best to keep the accelerator stable.
- ❖ After the Magnet Block passed by the Weighing Segment, display blue sign ‘▼’ and record weighing result.
- ❖ Repeat the above steps, if the weighing errors are in the allowable range, the preliminary Loading Verification process is completed.
- ❖ Do Loading Verification with empty bucket, 1/2 bucket materials and a full bucket of materials, and use truck scale for checking weighing error.
- ❖ If the weighing errors are in the allowable range, the last Loading Verification process will be completed.
- ❖ Press key **【Pause】** to enter Pause state with red sign ‘■’ displaying.
- ❖ Press key **【Cls】** to Clear Screen without saving Loading Record.

## 8. Fault Treatments

- Power Faults
  - ❖ Check if the power switch turns on.
  - ❖ Check if the power polarity is reversed.
  - ❖ Check if the power voltage is correct.
  - ❖ Check if the fuse in the weighing indicator has blown.
  - ❖ Check if the storage battery of wheel loader works well.
  
- Position Sensor Faults
  - ❖ Check if the signal connection of proximity switch is correct.
  - ❖ Check the tight-nut on nylon block has loosed.
  - ❖ Check the magnet blocks on nylon block has loosed or falled off.
  - ❖ Check the distance between the proximity switch and the magnet block is beyond the detecting range of 1~8mm.
  - ❖ Check the relevant parameter value are correct.
  - ❖ Check if the proximity switch is damaged.
  
- Oil Pressure Sensor Faults
  - ❖ Check if the signal connection of oil pressure sensor is correct.
  - ❖ Check if there is the phenomenon of oil leakage at the oil connecting ports.
  - ❖ Check the relevant parameter value are correct.
  - ❖ Check if the oil pressure sensor is damaged.
  
- Printer Faults
  - ❖ Check if the signal connection of printer is correct.
  - ❖ Check if the printer is damaged.
  
- Keypad Faults
  - ❖ Check if the keypad connector has loosed or falled off.
  - ❖ Check if the keypad is damaged, and replace it when necessary.

## 9. Working Specifications

### 9.1 Brief Description

- Check oil pressure sensors and position sensor before starting the wheel loader.
- Start the wheel loader, then lift the lift-arm and bucket for 5~ 10 times to preheating the hydraulic oil.
- BUCKET-UP: Flip the bucket upward to the limit position.
- ARM-DOWN: Put the lift-arm down so that the bucket goes down to the lowest position.
- Turn the power switch of weighing indicator on.
- Press key **【Zero】** for Zero Calibration.
- Confirm if there is a need to do System Calibration and Loading Verification.
- After Loading Verification, press key **【Cls】** to Clear Screen without saving Loading Record.
- Press key **【Pause】** to enter Pause state with red sign ‘■’ displaying, and then let the bucket go down to the lowest position.
- Set Setpoint Parameters.
- Press key **【Load】** to enter loading state with the blue sign ‘▲’ displaying.
- After shoveling materials into the bucket, flip the bucket upward to the limit position.
- After the wheel loader reached the loading position with relatively flat ground, lift the lift-arm and bucket with accelerating for weighing.
- Once alarm occurs, press key **【Void】** to Cancel Totalizing, then lift the lift-arm and bucket for weighing again.
- After weighing finished, flip the bucket downward for discharging materials.
- After Totalized Loading Weight reached setpoint, press key **【Finish】** to save and print Loading Record, and Clear Screen automatically after Loading process finished.
- Before going off work, turn the power switch of weighing indicator off at first, then turn the power switch of wheel loader off.

## 9.2 Detailed Description

- **Checking Before Starting the wheel loader**
  - ❖ Check if there is a phenomenon of oil leakage at the oil connecting ports.
  - ❖ Check if the detecting distance of position sensor is in the range of 5~8mm.
  - ❖ Check if there are some iron filings stick on the magnet blocks of position sensor.
  - ❖ Check if the rotation shafts of lift-arm and bucket are with good lubrication to reduce the friction influence on weighing accuracy.
- **System Calibration [Zero Calibration& Compensation, Span Calibration& Compensation]**
  - ❖ Start the wheel loader, then lift the lift-arm and bucket for 5~ 10 times to preheating the hydraulic oil and oil pressure sensors to the temperature in normal working condition.
  - ❖ BUCKET-UP: Flip the bucket upward to the limit position.
  - ❖ ARM-DOWN: Put the lift-arm down so that the bucket goes down to the lowest position.
  - ❖ Turn the power switch of weighing indicator on.
  - ❖ Press key **【Zero】** to do Zero Calibration with unloading and idle speed for correcting Zero Value, Run Length Ratio or IdleAcc.Value (Acceleration Value at Idle Speed).
  - ❖ After doing Zero Calibration, keep the bucket at the limit position, and put the lift-arm down so that the bucket goes down to the lowest position.
  - ❖ Lift the lift-arm and bucket with the accelerator at the actual loading operation state and do the best to keep the accelerator stable. If the display weight exceeds 30kg, then it's need to do System Calibration again.
  - ❖ It's need to do System Calibration again on the following conditions:
    - ✓ After replaced the oil pressure sensors.
    - ✓ After the installation position, angle or detecting distance of the position sensor has been changed.
    - ✓ The hydraulic system of wheel loader has been changed.
    - ✓ After replaced the bucket of wheel loader.
    - ✓ The weigher has not been used for a long time.
  - ❖ After re-done System Calibration, it's need to do Loading Verification again.
  - ❖ After Loading Verification finished, Press key **【Cls】** to Clear Screen without saving Loading Record.
- **Working Procedure of Loading**
  - ❖ Set Setpoint Parameters.
  - ❖ If the bucket is not on the lowest position when the weighing indicator display the blue sign '▲', please press key **【Pause】** to enter Pause state with red sign '■' displaying, then let the bucket go down to the lowest position.



- ❖ Press key **【Load】** to enter loading state with the blue sign ‘ ▲ ’ displaying.
  - ❖ After shoveling materials into the bucket, flip the bucket upward to the limit position. Then the magnet blocks on the lift-arm should be under the proximity switch.
  - ❖ After the wheel loader reached the loading position with relatively flat ground, lift the lift-arm and bucket with the accelerator at the actual loading operation state and do the best to keep the accelerator stable.
  - ❖ After the Magnet Block passed by the Weighing Segment, display the blue sign ‘ ▼ ’ and the present Single-bucket-loading-weight.
  - ❖ If there is no sound-light alarm and the prompt message is ‘ADD’, it means that the present Single-bucket-loading-weight has been added to Totalized Loading Weight automatically and it’s allowed to discharge materials from the bucket.
  - ❖ If there is a sound-light alarm and the prompt message is ‘ADD’, it means that the present Single-bucket-loading-weight has been added to Totalized Loading Weight automatically. If you press key **【Void】** to Cancel Totalizing, then the prompt message will be ‘NO ADD’, then it’s not allowed to discharge materials from the bucket, and It’s need to lift the lift-arm and bucket for weighing again.
  - ❖ If there is a sound-light alarm and the prompt message is ‘NO ADD’, it means that the present Single-bucket-loading-weight has not been added to Totalized Loading Weight and it’s not allowed to discharge materials from the bucket. It’s need to lift the lift-arm for weighing again.
  - ❖ After weighing finished, flip the bucket downward for discharging materials.
  - ❖ After the bucket going down to the lowest position, the weighing indicator will display the blue sign ‘ ▲ ’ again, and enter the working process of the next bucket.
  - ❖ “Last Bucket” Prompt: The display area of ‘Totalized Loading Weight’ will change to red background if ‘Negative Deviation Value<3 t ’, it means that the next bucket may be the last one, the operator should determine the loading weight of the next bucket according to the actual Negative Deviation Value.
  - ❖ After Totalized Loading Weight reached setpoint, press key **【 Finish 】** to save and print Loading Record, and Clear Screen automatically after Loading process finished.
- **When you need to pause, please press key **【Pause】** to display the red sign ‘■’.**
  - **Before going off work, turn the power switch of weighing indicator off at first, then turn the power switch of wheel loader off.**
  - **Other Attentions**
    - ❖ Try to choose a level ground or a ground with the angle less than 15 degrees for weighing and System Calibration.
    - ❖ Try to avoid weighing in the wheel loader moving process. If you need to do it, the moving speed should be controlled under 10km/h.
    - ❖ To avoid the water splashing on the weighing indicator when cleaning the wheel loader.

## Appendix A. Print Formats

### □ Print Format 1

#### LOADING RECORD

NO.:	#200	
DATE:	05-20-2009	
TIME:	23:59:45	
OP.:	01	
GOODS:	00	
TRUCK:	00000010	#: Weighing Normal
SET:	60.00t	S: Stall Alarm
TOT:	59.90t	L: Lower Limit Alarm of Single-bucket-loading-weight
PCS:	12	H: Upper Limit Alarm of Single-bucket-loading-weight
23:25 01#	4.80t	D: Undertime Alarm
...	...	V: Overtime Alarm
23:59 12#	2.60	

### □ Print Format 2

#### LOADING RECORD

NO.:	#200
DATE:	05-20-2009
TIME:	23:59:45
OP.:	01
GOODS:	00
TRUCK:	00000010
SET:	60.00t
TOT:	59.90t
PCS:	12

## Appendix B. Register Table of Host-Slave MODBUS[ASCII]

Data Name	Type	Address	Attribute	Command [HEX]	Description
Totalized Loading Weight	Long	40001	R	03	
Single-bucket-loading- weight	Long	40003	R	03	
Bucket Count	Long	40005	R	03	
Present Record No.	Long	40007	R	03	
Alarm State	Long	40009.0	R	03	1: Stall Alarm.
		40009.1			
		40009.2			1: Undertime Alarm.
		40009.3			1: Overtime Alarm.
		40009.4			1: Upper Limit Alarm of Single-bucket-loading- weight.
		40009.5			1: Lower Limit Alarm of Single-bucket-loading- weight.
		40009.6			
		40009.7			
		40009.8			
		40009.9			
		40009.10			
		40009.11			
		40009.12			
		40009.13			
		40009.14			
		40009.15			
.....					
40009.31					
Real-time Weight Value	Long	40011	R	03	
Display Unit of Loading Weight	Short	40013	R	03	
Display Unit of Totalized Loading Weight	Short	40014	R	03	
Ton-Decimal	Short	40015	R	03	
Bucket State	Short	40016	R	03	0: ▲[Loading]. 1: ▲[1]. 2: ▲[2]. 3: ▲[3]. 4-7: ▼ . 8: ■[Pause].
Setpoint	Long	40017	R	03	

Data Name	Type	Address	Attribute	Command [HEX]	Description
Historical Record No.	Long	40019	W	10	For Record Query.
Historical Record Data Packet	12-Short	40021 ~40032	R	03	Char 1~8: 1: Second. 2: Minute. 3: Hour. 4: Day. 5: Month. 6: Week. 7: Year. 8: 14H [20D]  Char 9~ 12: Totalized Loading Weight [Long]  Char 13~ 14: Bucket Count [Short]  Char 15~24: Goods [ASCII]  Note: 'Char1=2DH' means 'No Record'.

Record Query: Write the 'Record No. ' for query into the register [40019] at first, then read the whole data packet of the registers [40021~40032].



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