GENERAL MEASURE

GMC-X3

User's Manual

110612080002

VER01.00.00

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Warnings	The product is powered by DC24V power supply,use AC220V power will cause permanent damage to the transmitter.
	Please keep the controller well grounded.
	The product is an electrostatic sensitive device. Take ESD measures during use and maintenance

Standard & Certification	Product standard: GB/T 7724-2008 Verification Regulation: JJG 669-2016 Safety Certificate：CE

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1. Overview

1.1 Functions and features

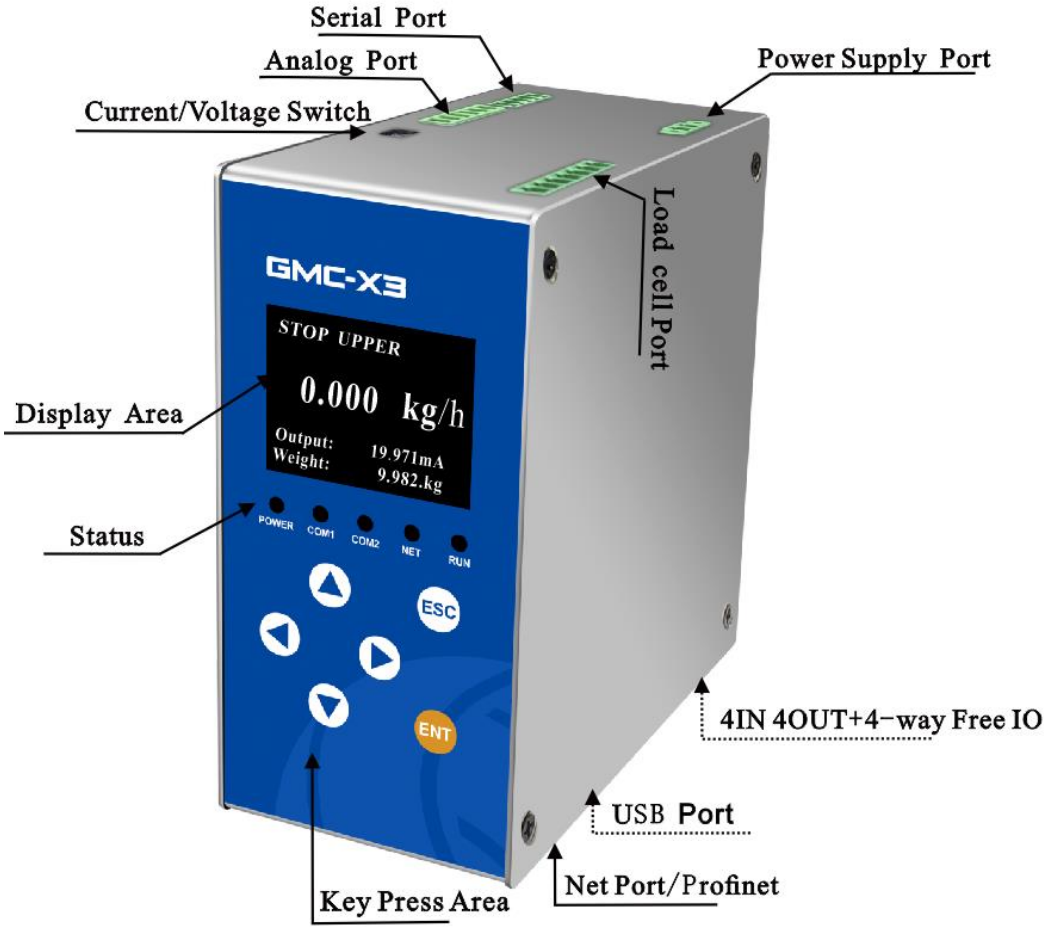
Shell Type	**DIN** rail mounted, stainless steel housing.	
Loadcell interface	1 way 6-wire analog loadcell weighing platform interface, connection only 8 350 Ω load cells at most	
Display	**160 * 128** 1.96 "white light **OLED**	
Language	Support Chinese, English	
port	**1** way **485** interface	
	1 way **232** interface	
	4 in **4** out +**4** freely defined transistor **I/O** interfaces, that is, up to **8** in or 8 out functions can be supported.	
	1 analog output interface	
	Optional port 1	**1** analog input interface (current/voltage optional)+1 analog output interface
	Optional port 2	**Profinet** bus interface
		Common single network port

1.2 Technical Specifications

Power supply	**24VDC (18 to 36VDC)**
Housing size	**62 * 134 * 127.5 (mm)**
Product weight	**886g**
Certified use environment	**-10 ~ 40℃; 90%R.H** without dew
Use environment	**-20 ~ 60℃; 90%R.H** without dew
Storage environment	**-40 to 60°C; 90%R.H** without dew
Maximum power consumption	**15W**
Load cell excitation voltage	**5V 200mA(MAX)**
Load cell requirements	**1** analog loadcell, up to 8 only 350Ω loadcells, support **1mV/V, 2mV/V, 3mV/V** sensitivity
Input sensitivity	**0.1** uV/**d**
Non-linerarity	**0.01% F.S.**
A/D sampling speed	**480 (SPS)**
Maximum display accuracy	**1/1000000**
Keyboard	6-key sound keyboard
Decimal point position	**0, 0.0, 0.00, 0.000, 0.0000;** 5 **optional**
Overload Display	**OFL**

2. Panel and Keys

2.1 Front Panel description



Status:

- **POWER:** Power light, lights up when the indicator is powered on.
- **COM1:** Communication indicator. After the connection of RS485 is successful, the indicator blinks during data communication.
- **COM2:** Communication indicator. After the **RS232** connection is successful, the indicator blinks during data communication.
- **NET:** Communication indicator. This indicator blinks during network port communication/bus communication.
- **RUN:** Running indicator.When the controller is running,the indicator is on.

2.2 Key Description

GMT-X3 has **6** key functions, and the functions of short press and long press are different. The key diagram is shown in the following picture:

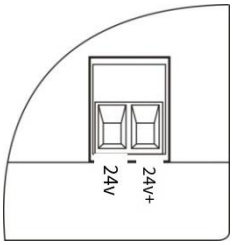
Keys	Interface	Short press	Long press
	Main	Enter the shortcut interface, quickly modify the target flow, feed point, stop	/

		feed point.	
▲	**Menu interface**	Switch to the previous sub parameter	/
	Shortcut interface	Switch to the previous sub parameter	/
	Data input	Number or letter +**1**	/
	Option select	Switch to the previous sub parameter	/
▼	**Main**	Zeroing	/
	Menu interface	Switch to the next sub parameter	/
	Shortcut interface	Switch to the next sub parameter	Customizable setting of numerical parameters as shortcut keys
	Data input	Number or letter -1	/
	Option select	Switch to the next sub parameter	/
◀	**Main**	Start, press again to Stop	/
	Menu interface	Switch left to the main option parameter page	/
	Shortcut interface	Shortcut interface, version information, and device information switching display	/
	Data input	Move the number position to the left	/
	Option select	/	/
▶	**Main**	/	**Print**
	Menu interface	Switch right to the next main option parameters page	/
	Shortcut interface	Shortcut interface, version information, and device information switching display	/
	Data input	The digit position moves to the right	/
	Option select	/	/
ENT	**Main**	Enter the simplify menu interface	Enter the standard menu interface
	Menu interface	Confirm selection	/
	Shortcut interface	Confirm selection	
	Data input	Confirm selection	/
	Option select	Confirm selection	/
ESC	**Main**	Analog output value, weight value, single and total cumulative switching display	/
	Menu interface	Return to previous level	/
	Data input	Exit	/
	Option select	Back to the current option	/

3 . Installation and wiring

3.1 Connect power cables to the controller

The **GMC-X3** weight transmitter uses **24V** power supply. The wiring of the power terminal is shown below:



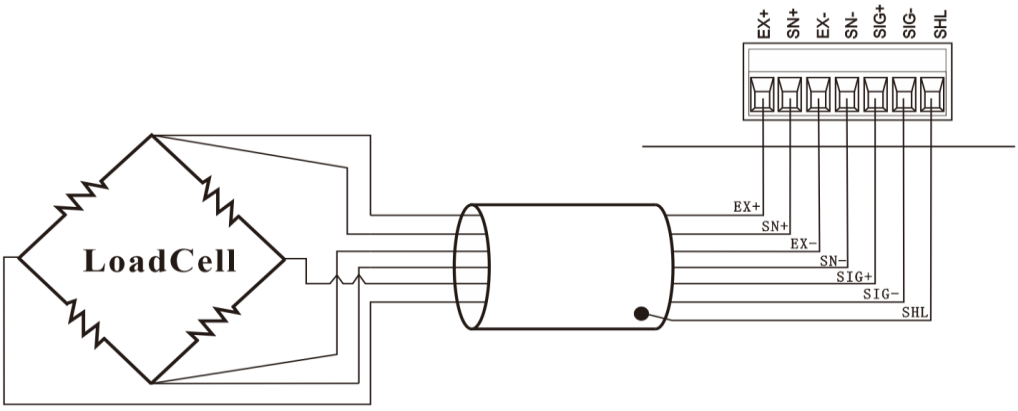
NOTE: THIS PRODUCT USES 24V DC POWER SUPPLY,
USING 220V AC POWER WILL PERMANENTLY DAMAGE THE CONTROLLER.

3.2 Loadcell Connection

GMC-X3 weight transmitter provides four-channel loadcell connection, all of which need to be connected to external resistance strain bridge load cell. Each port of the connection terminal is allocated to:

Ports	EX+	SN+	EX-	SN-	SIG+	SIG-	SHL
Six-wire	Power positive	Induction positive	Power negative	Induction negative	Signal positive	Signal negative	Shielded wire
Four-wire	Power positive		Power negative		Signal positive	Signal negative	Shielded wire

※ When connecting a four-wire loadcell, the **EX**+ and **SN+** ports, **EX- and SN- ports** must be shorted. Otherwise, the weight data of the controller read not normally.



Note:

1. As the output signal of the load cell is an analog signal sensitive to electronic noise, shielded cables should be used for load cell wiring and laid separately from other cables, especially away from AC power supply

2. For the occasions with short transmission distance and little temperature change or low accuracy requirements, four-wire load cell can be selected. However, for applications requiring high transmission distance or accuracy, a six-wire load cell should be selected.

3. For the application of multi-load cell parallel connection, the sensitivity (mV/V) of each load cell should

be consistent

3.3 IO interface connection

GMC-X3 controller IO module for the standard configuration interface, **4** input interface **4** output interface and **4** can freely define the input and output interface, the user can control the weighing equipment through the connection of the IO interface. The input is valid in low level; The output adopts transistor collector open circuit output mode, each drive current up to **200mA**.

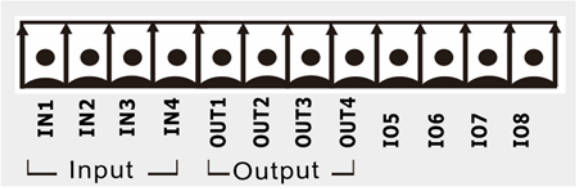
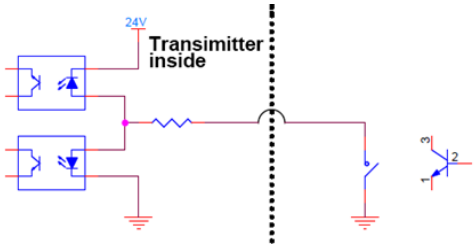


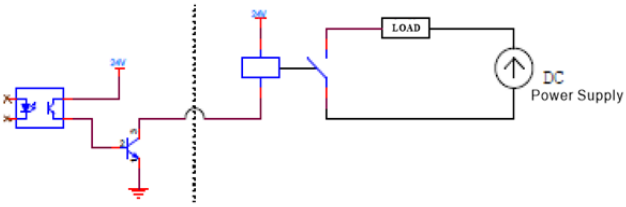
Figure: Standard interface **1**

Input disgram：



Low level mode

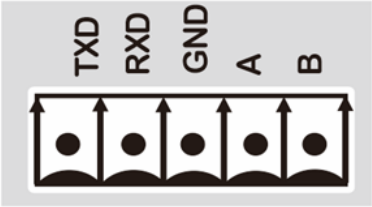
Output disgram：



Low level mode

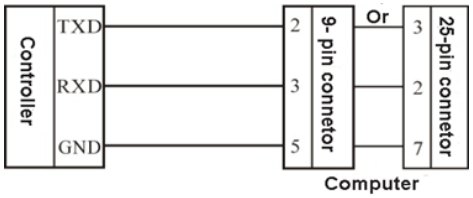
3.4 Serial Port Connection

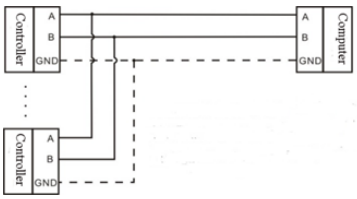
The GMC-X3 indicator is equipped with two serial ports as standard: **one RS485 port and one RS232 port**.



RS232 connection mode:

RS485 connection mode:





※GND is ground of RS485, it can improve communication quality via connecting with GND by low-resistance wire when there is a lot of disturbance in working field.

※ GND must be connected in RS232 mode

3.4.1 Troubleshooting Serial Port

If the serial port cannot communicate, please check:

○ Refer above to check line, make sure connection is corrct.

RS232 must connect 3 lines, **Rx, Tx,GND**

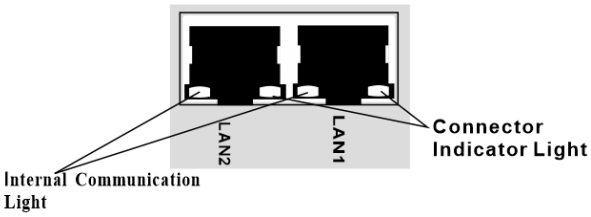
RS485 must connect line **A**, **B**

○ Make sure connecting port parameters are the same to computer.

COM ID,baudrate, data format and communication protocol must consistent with the computer and PLC.

3.5 Network Port Connection

GMC-X3 products support ordinary network port communication and **PN** bus communication mode (optional function, declaration required for ordering). Support **TCP protocol (Modbus/TCP) and Profinet bus protocol**. `



3.5.1 **Troubleshooting Network Port Faults**

If the network port cannot communicate, check:

○ Check network port indicators.

The hardware connection is normal, and the internal indicator of the controller is always on.

If the network cable connect properly, the connection indicator will blink.

○ Check whether the communication protocol is consistent with that of the host computer and **PLC**.

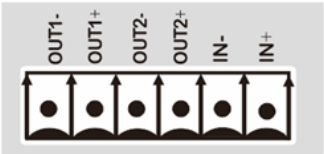
○ Confirm that GMC-X3 can be pinged by the network. If not, check the hardware port section.

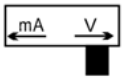
○ Check whether IP conflicts exist.

○ Restart the indicator.

3.6 Analog connection

The product supports 1 analog input and 2 analog output functions (used to drive the motor to adjust the output speed of the material and output the current flow signal). **Among them, 1** analog output is standard factory configuration and can be optionally equipped with one channel of analog output and one channel of analog input function. （make statement when order）.





※**Out1** is analog **1** output interface
Out2 is analog 2 output interface

3.6.1 Analog work Type Selection:

Input/output analog work type can be selected as: **0-20mA, 4-20mA, 0-24mA, 0-5V, 1-5V, 0-10V**.

Switching mode: Enter the detailed menu of the standard version and set the working types of analog input function, analog output 1, and analog output 2 through the [System] Parameters - [Analog Set] parameters; You can also write the type corresponding code through the MODBUS function address, as follows.

Function	PLC address	Work type code
Analog input	**4309~4310**	Initial value: **2** (**4~20mA**)
Analog output 1	**4315~4316**	Parameter range: **0**: **OFF**; **1:0~20mA; 2:4-20mA**; **3:0~24mA**; **4:0~5V; 5:1 ~5V; 6:0 ~10V**
Analog output 2	**4319~4320**	

Note: When switching the work type of analog input function, it is necessary to synchronously toggle the current/voltage mode switching switch. When there is a conflict between the hardware switch type and the function type, the controller panel will beep and output an alarm message of "incorrect dial switch type". If the **4309~4310** address content is **2**, and the switch switch is turned to the voltage direction, the controller buzzer alarm output.

3.6.2 Analog calibration

The product has been calibrated for analog before leaving the factory. When the on-site analog is deviated, it can be calibrated. Input and output analog calibration methods are as follows:

Input analog calibration:

The input analog only supports current calibration, not voltage calibration. The input analog is calibrated as **2mA-4mA-12mA-20mA-22mA**, and is calibrated at **5** points.

Calibration method:

1） Hardware switch select the current mode, select **0-24mA** (write **3** into PLC double address **4309~4310**), in 【 **Analog Set** 】- 【**AI Config**】

2） Enter【**Analog CAL**】-【**AI CAL**】 to turn on the input analog calibration switch (write **1** into PLC address **45081**)

3） Input **2.000mA** to the controller in the calibration point **1**(write **2000** into the actual current address of calibration point 1**),** do the calibration of the **2mA** flow point(the actual

current value indicates the input analog value calculated by the current indicator)

4） Refer calibration point **1** to complete the calibration of the remaining points.

5） When the calibration is complete, turn the calibration switch off (write **0** into PLC address **45081**)

※ If only **1** of the points is calibrated, only the corresponding point can be calibrated. When not entering the analog input calibration interface(when the analog switch is not turned on), the value read by the calibration subordinate address is **0**

Output analog calibration:

Output Analog calibration is divided into current calibration and voltage calibration. The two types of calibration methods are the same. If the **4-20mA** current mode is used, it is necessary to observe that only the calibration points between **4-20mA** are calibrated. This rule applies to other modes as well. The following is an example of current calibration and analog output **1**.

Calibration method:

1） Select the hardware switch as the current mode, select **0-24mA** (write **3 into** PLC double address **4315~431**) in 【 Analog Set 】−【 **AO1 Config**】

2） Enter【AO CAL】−【AO**1** CAL】 and then open the output analog **1** calibration switch (write **1 into** PLC double address **45001~45002**)

3） Enter 【AO**1** CAL】−【CP**1**】 to turn on the calibration point **1** switch (write **1 into** PLC double address **45003~45004**), then the indicator will output the analog value of calibration point **1**. Use the **mA** file of the multicontroller to measure the current value of analog **1**, and write the measured value (**3** decimal points) into the "calibration value" (write the measured value into PLC double address **45005~45006**).

4） Refer calibration point **1** to complete the calibration of the remaining points.

※ If only one point needs to be calibrated, only the corresponding point can be calibrated. When the output analog switch is not turned on, the value read by its calibration subordinate address is **0.**

※ The calibration of output analog **2** is the same as that of output analog **1**.

3.6.3 Analog output function

The GMC-X3 product provides **2** analog output functions, which are used to drive the motor to adjust the output speed of the material, output the current flow or weight information. Enter the 【Device】Parameters –【Working Param】under the detailed menu of the standard version to set the analog output 1/output 2 function.

AO **1** function, AO **2** function setting meaning is:

Range: **0**: Drives the frequency converter(**Ctrl VFD)**

1: Output weight (**Weight)**

2: Output real-time flow (**Flow)**

※**0-2** is **MODBUS** address mode function code, write **2** into PLC double address **40321~40322**, analog output set to " **Flow** ".

4 .Menu overview

4.1Menu Description

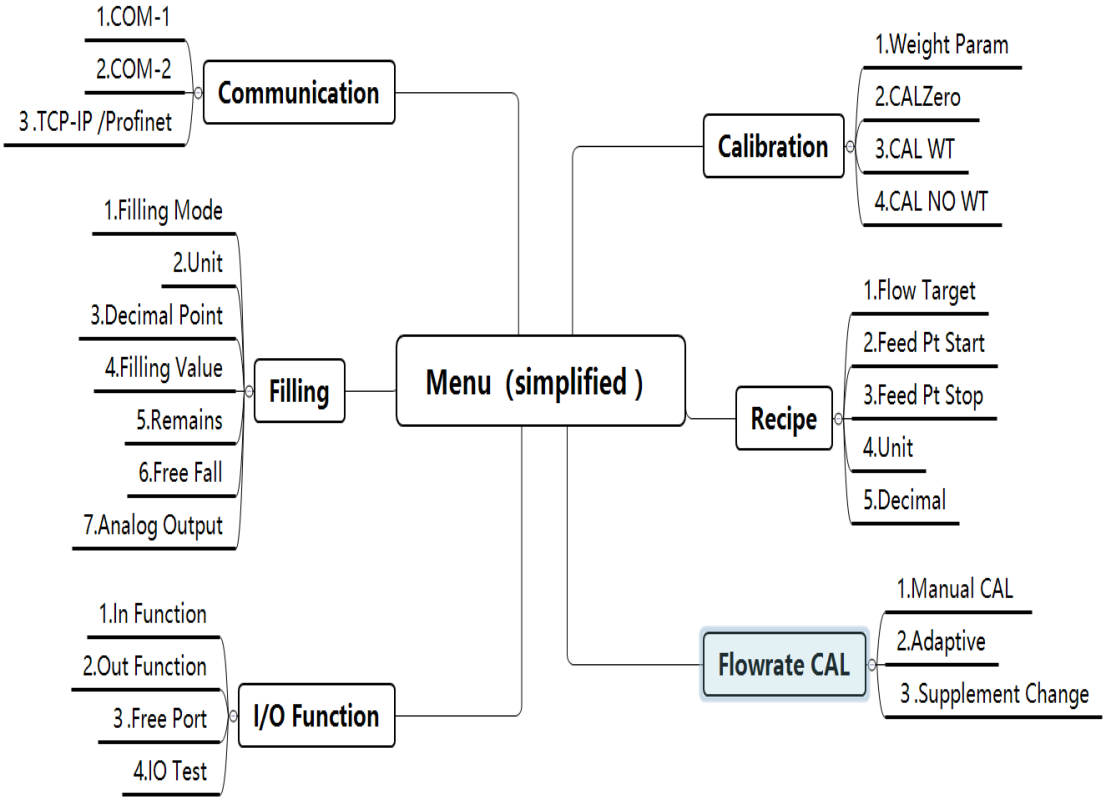
For the convenience of users, this instrument provides two menu options: a simplified menu and a standard detailed menu. According to the user's usage habits, some parameters have been extracted from the standard version menu as a simplified menu. In daily use, only the simplified menu parameters need to be set to meet the usage needs. Please refer to chapters 4.3 to 4.9 for specific parameter description.

Menu Entry Method,

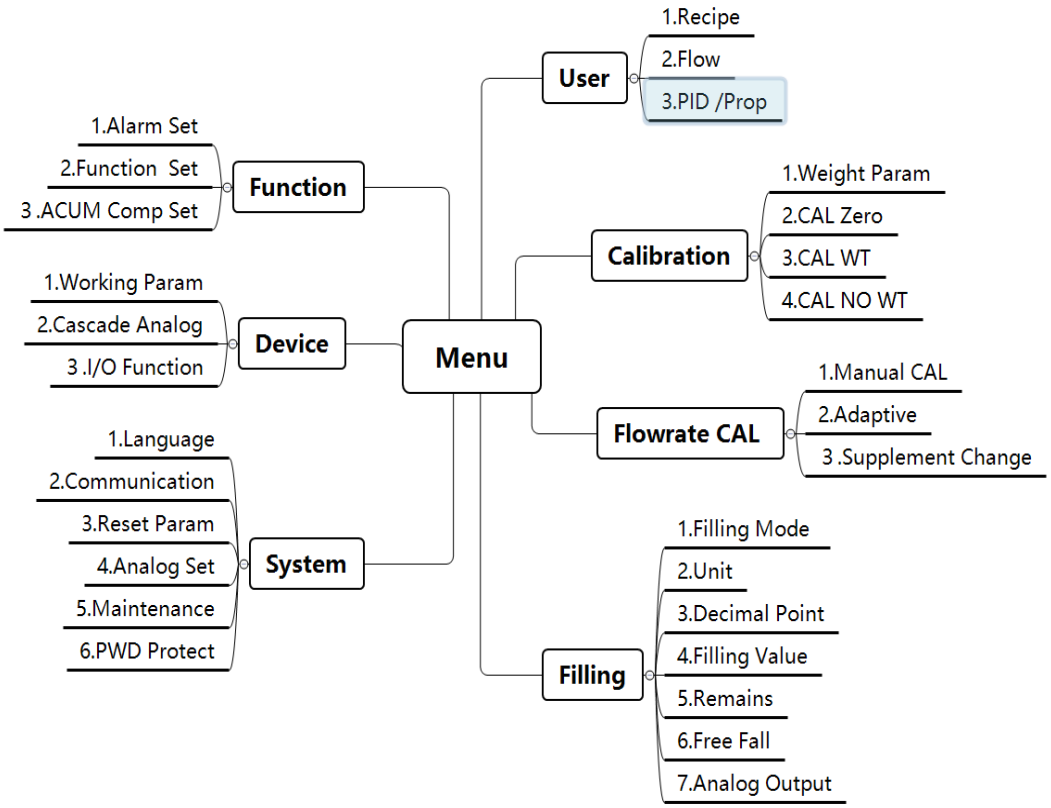
In the normal display interface,short press ENT to the simplified menu.

In the normal display interface,long press ENT to the standard detailed menu.

Simplified menu：

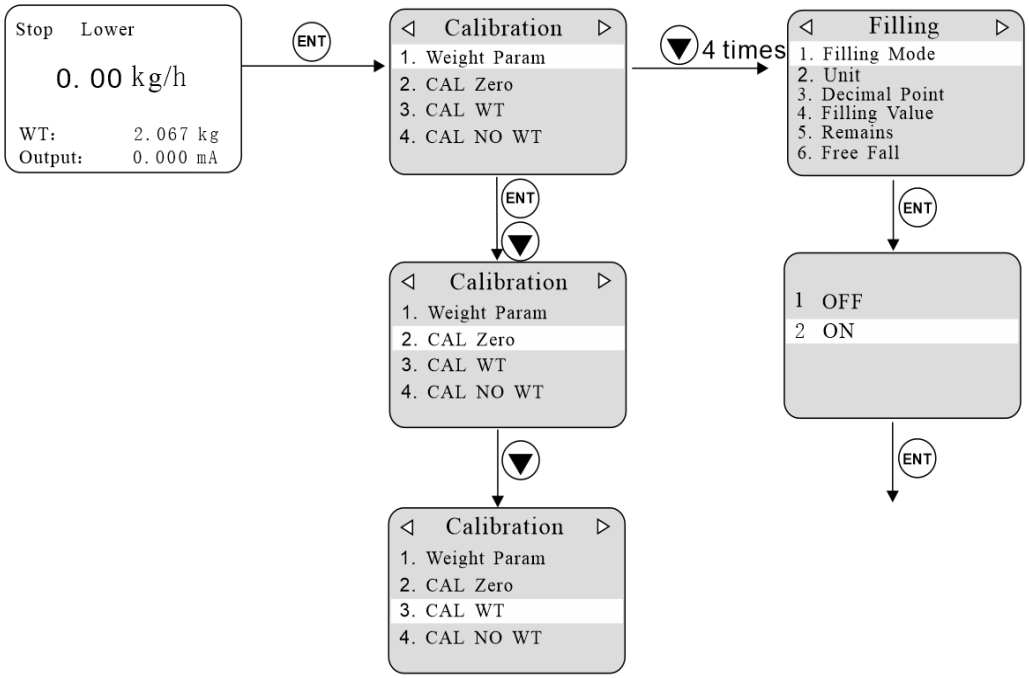


Standard detailed menu：

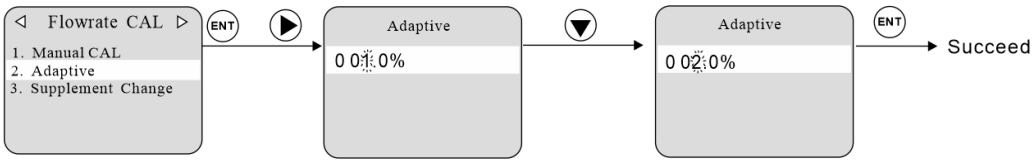


4.2 Parameter selection and setting

Parameter selection: (Select the filling mode switch parameter)



Parameter value setting: (Set the adaptive range from **001.0%** to **002.0%**)



※ When the setting is complete, the number blinks. **Press ENT** to complete the parameter setting.

※ During the setting process, press **ESC** to exit the current parameter.

※ Please refer to the second chapter 【 Key Description 】

4.3 User Parameters

4.3.1 Recipe parameters

Functions	Initial value	Function description
1.Recipe ID	**1**	The serial number corresponding to the current material. When the set value changes, all the subordinate material parameters will be updated simultaneously. Range: **1** to **10**
2 Flow Target	**0**	Range: **0**~**999999**, the unit and decimal point follow the flow parameter set.
3. Feed Pt Start	**0**	When the weight is below this set point, start feeding and feed to the Feed Pt Stop. Range: **0** ~ **999999**, the unit and decimal point follow the weight parameter set.
4. Feed Pt Stop	**0**	Feeding process, after feeding to the set value, stop feeding. Range: **0** ~ **999999**, the unit and decimal point follow the flow parameter set.
5. Init Supply Ratio	**100**	If the starting weight is less than the stop feeding point * set value, enter the feeding process. Range: **0** to **100%**. Note: Feed point > Current weight > Feed Pt Stop * Set value, still need to feed.
6. Drop Delay Timer	**3s**	The feeding process, after feeding to the Feed Pt Stop, and then switch to the batching process after the set point time. Range: **0** ~ **100s**

Note: When the indicator is running, it can modify the preset target flow, feed point and stop feed point.

4.3.2 Flow parameters

Function	Initial value	Function description
1 Unit	**kg/h**	The unit of flow used. Parameter range: g/h, kg/h, t/h.
2 Decimal	**0.000**	Decimal point used for flow. Parameter range: **0/0.0/0.00/0.000/0.0000**
3 Permillage	**1000 ‰**	Actual target flow = Set (input) target flow * Flow Permillage. Parameter range: 0 to 1000‰
4 Sample Interval	**0.1 s**	At every interval of time for this set value, collect the weight. Parameter range: 0.1~100.0s
5 Sampling Window	**100**	Set the number of weights to use for flow calculations. Parameter range: 30 to 100

6 INIT AO PCT	**0%**	When the initial analog maintenance time is not 0, the analog output set value * analog full scale range. Parameter range: 0~100%
7 INIT AO Timer	**10s**	For the set time, output the initial analog. Initial value: 10s, parameter range: 0 ~ 100s
8 A- Filter intensity	**50**	Analog Filter intensity. Range: **0-100**; Takes effect when the analog control mode is selected proportional control. This parameter is the time interval for analog adjustment.
9 F- Filter intensity	**50**	Flow Filter intensity. Range: **0-100**; Flow filtering is not performed when the parameter is **0**, which is suitable for when the on-site interference is large.
10 Upper Filter	**50**	Range: **0-1000** flow filtering intensity is affected only when the ratio of the current flow to the target flow is within the upper limit of filtering intensity.
11 Lower Filter	**50**	Range: **0-100** The ratio of the current flow to the target flow is within the lower limit of the filtering intensity, and will be affected by the "flow filtering intensity".

4.3.3 PID parameter

When "PID control" is selected under [Device] Parameter- [Working Param]-**[**Analog Control**]** under the detailed menu, the following parameters are visible, otherwise the proportional parameters are displayed.

Parameters	Initial values	Function description
1 Prop Coef (F)	**20%**	When the current **PID** control is fine-tuned, the gap between the flow and the target flow is certain, the larger the set value, the greater the adjustment amount. Parameter range: **0** ~ **200%**
2 Integral Time(F)	**5s**	The length of the integral time of the fine-tuned **PID** when the current is a fine-tuned PID control. The value ranges from **0** to **99s**
3 DERIV Time(F)	**0s**	When the current fine-tuned **PID** control, the differential time length of the fine-tuned **PID**. Parameter range: **0** to **99s**
4 Tune Interval(F)	**5s**	When the current is fine-tuned **PID** control, set the value duration at every interval and adjust the analog output once. Initial value: **5s**, parameter range: **1** ~ **25s**
5 Dual PID Range	**0%**	When the current flow rate is above the target flow rate *(**1**+ set point) or below the target flow *(**1**- set point), use a coarse tone, otherwise use a fine tone. Parameter range: **0** to **100%**
6 Fine To Coarse	**3s**	When it is necessary to switch from a fine-tuned **PID** to a coarse-tuned **PID**, the duration outside the switching range must be at least longer than the set value. Parameter range: **0** to **9s**
7 Coarse To Fine	**5s**	When it is necessary to switch from a coarse-tuned **PID** to fine-tuned **PID**, the duration of the out-of-switching range must be at least longer than the set value. Parameter range: **0** to **9s**
8 Prop Coef (C)	**45%**	When the current **PID** control is coarse adjustment, the gap between the flow and the target flow is certain, the larger the set value, the greater the adjustment amount. Parameter range: **0** ~ **500%**
9 Integral Time(C)	**6s**	When the current **PID** control is coarse, the integral time length of the **PID** is fine-tuned. Parameter range: **0** to **99s**

10 Diff Time(C)	**0s**	When the current **PID** control is coarse, fine-adjust the differential time length of the **PID**. Parameter range: **0** to **99s**
11 Tune Interval(C)	**5s**	When the current is coarse **PID** control, adjust the analog output once per interval set value duration. Parameter range: **1** ~ **25s**

4.3.4 Prop parameters

When " Prop Ctrl " is selected under the detailed menu of [[Device] Parameter- [Working Param]-**[**Analog Control**].** the following parameters are visible, otherwise, PID parameters are displayed.

Parameters	Initial values	Function description
1 Single ADJ Coef	**2**	When the analog control mode is selected Prop Ctrl, it takes effect. When the set value is 2, Proportional control adjusts analog at the fastest speed, and when it is set to 10, the speed is slowest. Parameter range: **1~10**
2 Single ADJ Timer	**3s**	This parameter takes effect when the analog control mode is Prop Ctrl. This parameter is the interval for analog adjustment, ranging from **0** to **99**

4.4 Weight calibration parameters

When the **GMC-X3** controller is used for the first time or any part of the weighing system has changed and the current device calibration parameters cannot meet the user's requirements, the display should be calibrated. Calibration can determine the system zero point, gain point and so on of the weighing system.

4.4.1 Weight parameters

Parameters	Initial values	Instructions
1 Weight Uint	**kg**	Range: **g, kg, t**
2 Decimal Point	**0.000**	Range: **0**; **0.0**; **0.00**; **0.000; 0.0000**
3 Division	**1d**	The minimum change in the value of the controller Range: **1d, 2d, 5d, 10d, 20d, 50d**
4 Full Scale	**10.000**	The maximum indicator value of the controller, generally depend on the loadcell range. Range: minimum division *100000 can be set. When out of range, it prompts " data out of range " information, avoid to damage the loadcell by weighing overpressure.
5 Zero Range	**50%**	Set the range of zeroing allowed. Parameter range: **0 to 99%**
6 STAB Range	**3d**	In the stability judgment time, the weight change range is not greater than this set range, considered stable. Parameter range: **0~99d**

4.4.2 CAL Zero

Zero calibration means zero calibration of the scale plateform.

There are two ways to do zero calibration: automatic calibration and manual calibration. When the new equipment or weighing structure is adjusted, the "automatic calibration" method must be used for zero calibration.

Automatic calibration(Auto CAL):

Calibration success condition: the scale platform is stable.

Operation: The indicator interface displays the current millivolts. After emptying the scale platform, press the **ENT** key, which will mark the current weight state to zero point.

Auto CAL	
Cur mV	**0.66**88mV

Manual calibration(Manual CAL):

Operation: Manually input zero corresponding millivolt value, that is, the input value is calibrated to zero.

Manual CAL	
CURmV	**0.66**88mV
Edit mV:	**00.0000**mV

※ Generally used for calibration without weight, use the values recorded during calibration with weights for manual input.

4.4.3 CAL WT (Gain calibration)

Weight calibration means weight calibration with standard weights.

Calibration method:

※ The zero calibration should be completed before the gain calibration.

CAL WT	
Rel mV	**0.0000mV**
WT	**000.000kg**

↓ Load the weights

CAL WT	
Rel mV	**1.2364mV**
WT	**000.000kg**

↓ Enter the weight value corresponding to the weight at this point

CAL WT	
Rel mV	**1.2364mV**
WT	**050.000kg**

↓

Calibrate Successfully

4.4.4 CAL NO WT（Calibration without weights）

For weightless calibration, it is necessary to record the voltage and weight when the weight is calibrated.

CAL NO WT

Cur mV	**0.230**mV
mV	**0.0000mV**
WT	**000.000kg**

CAL NO WT	
Cur mV	**0.230**mV
mV	**1.2350mV**
WT	**000.000kg**

Input the millivolt value recorded at gain calibration.

CAL NO WT	
Cur mV	**0.230**mV
mV	**1.2350mV**
WT	**010.000kg**

Input the weight value recorded at gain calibration.

4.5 Flow Calibration

Function	Initial value	Function description
1 Manual CAL (Calibration point **1~4**)		
C. F.	**0**	When the working mode is selected as flow calibration, the indicator starts, and the system automatically displays the current flow after the input of the corresponding analog.
Anolog	**0**	Analog X calibration point, matched with flow calibration point X. Parameter range: **0** to **24000**
F1	**0**	Flow X calibration point, matched with analog calibration point X. Parameter range: **0** to **999999**
2 Adaptive	**0.0%**	Adaptive switch; Range: **0.0%~100.0%;** Set to **0%,** the adaptive function does not work. For flow calibration self-learning within this range, 1.0% is recommended for the first use.
3 Supplement Change	**OFF**	change the material switch; Range: **OFF, ON**; Set to "**ON**", the controller will delete the flow data except the first flow calibration point, and start the material replacement function; Set to "**OFF**" and the material replacement function will not work.

4.6 Filling Parameters

Parameters	Initial values	Function description
1 Filling Mode	**OFF**	Turn on or off filling work mode. **OFF** or **ON** is optional. When turned on, the single cumulative value will stop when it reaches the filling value.
2 Unit	**kg**	Set the unit of the filling value. Parameters range: **g/kg/t**
3 Decimal point	**0**	Set the decimal point of the filling value. Parameters range :**0/0.0/0.00/0.000/0.0000**
4 Filling value	**0**	Set the filling value. Once the set value is reached in a single cumulative, stop running. Parameter range: **0** to **999999**
5 Remains	**0**	The single cumulative value reaches the filling value - the set value, the analog will be simulated in accordance with the set filling analog output value. Parameter range: 0 to 99999 Note: The Remains setting information, such as decimal point and unit, and the unit and decimal point set with the current weight

6 Free Fall	**0**	After the single cumulative value reaches the filling value - set value, the analog will be gradually reduced to the minimum output value of the analog within the set analog slow change time. Parameter range: 0~99999 Note: Free Fall value setting information, such as decimal points and unit, follows the unit and decimal point of the current weight setting
7 Analog Output	**0.000 mA**	When the single cumulative value reaches the filling value-Remains, the system will make the analog fixed output as the set value at this time. Parameter range: 0-5V (Output range 0-5V set by analog output 1) 1-5V (Output range 1-5V set by analog output 1) 0-10V (Output range 0-10V set by analog output 1) 0-20mA (Output range 0-20mA set by analog output 1) 4-20mA (Output range 4-20mA set by analog output 1) 0-24mA (Output range 0-24mA set for analog output 1) Note: The output range of this parameter depends on the current set frequency converter output range.

4.7 Function Parameters

4.7.1 Alarm Set

Parameter	Initial value	Instructions
Clogging Alarm		
Clogging Time	**0s**	During running process, if the indicator detects that the flow rate continues to be 0 within this time, the clogging alarm is triggered. Parameter range: 0 ~ 999s **Note: Clog detection is not performed within one minute after just starting.**
Clogging Stop	**OFF**	When opened, the clog alarm function is enabled. The flow continues to be 0 within the longest clogging alarm time**,** triggering the clogging alarm and stopping. Parameter range: **ON/ OFF**
Feed Alarm		
Max Feed Time	**0s**	Feeding process, the longest feeding time. If after the feeding time, the weight still does not reach the stop feeding point, triggering the feeding timeout alarm. Parameter range: 0 ~ 999s
Feed OT Stop	**OFF**	When turned on, the clogging alarm function is enabled. During the longest clogging alarm time, the flow rate continues to be 0, triggering the clogging alarm and stop the machine.Parameter range: **ON/ OFF**
Flow Alarm		
Flow Over	**0**	When the current flow exceeds the target flow *(**100**+ set value), the flow overlimit status is valid. The value ranges from **0** to **100%**
Flow Over OT	**0s**	If the flow overlimit state continues for the set time, the flow overlimit alarm is triggered and the machine stops. Parameter range: 0 to 999s
Flow Under	**0**	The flow underlimit status is valid when the current flow exceeds the target flow *(**100**- set value). The value ranges from **0** to **100%**
Flow Under OT	**0s**	If the flow underlimit state continues for the set time, the flow underlimit alarm is triggered and the system stops. The value ranges from **0** to **999s**
O&U Limit Stop	**OFF**	Set to ON, the flow exceeds or underlimits, triggering an alarm and stopping. Set to OFF, only alarm, don't stop system. Parameter range: **ON/ OFF**
Flow OT	**0**	During operation, if the time when the flow does not reach the target

		flow exceeds the timeout period, the flow timeout alarm will be triggered. The value ranges from 0 to 999s
Flow OT Stop	**OFF**	Parameter range: **ON/ OFF**. When on, The duration of the flow not reaching the target flow, exceeding the timeout alarm time, triggers an alarm and stops the system. OFF: Off, alarm only, no stop.
Filling Alarm		
Filling OT	**3s**	When the time is 0, it is necessary to complete the alarm by manually clearing the filling, and when it is not **0**, the filling complete alarm will automatically clear after reaching the time. Note that the IO and communication output filling completion time and alarm are the same. Range: **0-999999s**

4.7.2 Function Set

Parameters	Initial values	Function description
1 Lock Param		
1. Lock Time	**0.000 s**	When the flow lock condition is triggered, the flow and analog are locked, and after this set time, the flow is unlocked. When the set value is **0,** the flow lock function is turned off. If not, it turns on. The value ranges from **0 to 999.999s**. Note: If interference is frequently given during the locking process, the controller will keep locked until there is no interference, the controller starts to execute the locking time, and the time will be automatically unlocked.
2. Lock Range	**0d**	Threshold coefficient used to determine abnormal flow changes when the controller is in stable running process. When the interference value is greater than this set threshold, a lock-in of analog and flow will be generated. The value ranges from **0 to 999999d**
2 Motor Param		
1 Motor Pulse Mode	None	Optional: 0: None; 1: Ctrl Screw(motor control screw); 2: Ctrl Open/Close(motor control opening gate and closing gate). When the pulse mode is "Ctrl Screw", the following parameters **2~4** can be set; For the Ctrl Open/Close, the following parameters 2~**7 can be set**.
2 Motor Pulse Mode	**OFF**	Motor direction signal **.OFF**: turn forward when valid; **ON:** reverse when valid
3 ACC/DEC Time	**0.2 s**	Motor acceleration and deceleration time .When controlling the servo motor output high speed output, adjust the acceleration/deceleration time of the target frequency. Parameter range: **0~99s**
4 Max Motor HZ	**20000 Hz**	Maximum frequency to control the output of the servo motor. **Parameter range: 0-10000Hz**
5 MAX Motor Pulse	**10000**	Range: **0-999999**
6 Motor Start Freq	**5000Hz**	Range: **0-999999Hz**
7 Motor OT Time	**5.000 s**	Range: **0-999.999s**
3 Other		
1 ACUM Delay	**3s**	After shutdown, the cumulative controllering function is valid during the set time of this value. Parameter range: **0~999s** When the value is not 0, the function is valid. When the controller is changed from running to stopping state, it still continues to count the accumulation, and the duration is the accumulation duration.
2 ACUM Pulse Weight	**20.000 kg**	This "cumulative pulse" output is valid whenever the cumulative value increases to the single-pulse cumulative value for **500ms**. Parameter range**: 1~ 100000.** (Note: If the current weight calibration decimal point is **3**, then this parameter range should be: **0.001** ~ **100.000**. If the current weight calibration decimal point is **2**

		, then the value range of this parameter should be **0.01 ~ 1000.00**)
3 Lower Limit	**0.000 kg**	When the weight is lower than the set value, the feed lower limit output is valid. In general, the lower feed limit will be lower than the feeding point. Parameter range: **0 ~ 999999**
4 AO For Discharge	**7.200 mA**	Used to set the analog output value when discharging. Parameter range refers to the range of the maximum analog output.
5 Given AO	**4.000 mA**	When the input of "Manually adjust analog" is valid, the analog will be fixed output value during operation, and the analog output value can be modified, and the subsequent analog adjustment amplitude can be made. If the input of "Manually adjust analog" is invalid, automatic batching will be performed. Parameter range: Refer to the range of the maximum analog output.

4.7.3 ACUM Comp Set

Parameters	Initial value	Function description
1 Comp ON/OFF		
1 ACUM Comp ON/OFF	**OFF**	Volume accumulation compensation switch; Parameter range: **ON/ OFF**
2 ACUM Comp Range	**1.000**	Parameter range: **0 ~ 999999(unit: kg/h or t/h)**
2 Preset point **1 to 9** Settings(PT1-9 Setting)		
1 Comp ON/OFF	**ON**	Corresponding preset point cumulative compensation adjustment switch; Parameter range: **ON/OFF**
2 Flow Comp Value	**1.000**	Corresponding preset point flow compensation value. Range: **0.000-999.999.**
3 Comp Coef	**1.00000**	Flow Comp Value * Comp Coef, to carry out cumulative compensation; Range: **0.00000-2.00000.**

4.8Device Parameters

4.8.1 Working Param

Parameters	Initial values	Function description
1. Working mode	WT1ess Batching	Parameter range: WT1ess Batching, Constant Analog , External given mode. The weightless batching mode is the normal batching working mode, and the flow calibration is the working mode when the flow calibration is carried out.
2. Filling mode	Air Drived	Set the working mode to control the feeding. Parameter range: Air Drived, UD Rotating.
3. Flow Method	Method 1	Parameter range: Method 1, Method 2.
4. Analog Control	PID Ctrl	Parameter range: PID Ctrl, Prop Ctrl
5. AO1 Function	Ctrl VFD	Analog 1 Output function .Parameter range: Ctrl VFD; Weight; Flow(Output real-time flow)
6. AO2 Function	Flow	Analog 2 Output function .Parameter range: Ctrl VFD; Weight; Flow(Output real-time flow) (Optional 1 analog output when the parameter can be set)

4.8.2 Cascade Analog parameters

Parameters	Initial value	Function description

A In	.MAX Given Flow	**0**	The maximum flow value that can be outputted when using the output analog to output the flow. Parameter range: **0** ~ **999999(unit: g/h or kg/h or t/h)**
	MIN Given Flow	**0**	The minimum flow value that can be outputted when using the output analog to output the flow. If both the flow and this set point are **0** when the output analog is maximum, no output flow is output even if the output analog function defines an output flow. **Parameter range: 0** ~ **999999(unit: g/h or kg/h or t/h)**
A Out	MAX Giving Flow	**0**	Set the given target flow at the maximum analog input. When the target flow setting mode is selected as the flow setting mode, the set value is the maximum value of the target flow. Parameter range: **0** ~ **999999**(unit**: g/h or kg/h or t/h)**
	MIN Given Flow	**0**	Set the given target flow with the minimum analog input. When the target flow setting mode is selected as the flow setting mode, the set value is the minimum value of the target flow. When the given flow when the maximum analog input is **0**, and this set value is also 0, the analog input is not enabled. Parameter range: **0** ~ **999999(**unit: **g/h or kg/h or t/h)**

4.8.3 IO Parameter

GMC-X3 controller provides a fixed 4 input, 4 output switching interface and 4 freely definable input and output interface, users can control the weighing equipment through the connection of the IO interface.

When the product leaves the factory, the default definition of each input and output is as follows:

Output			input		
Interface	Functions		Interfaces	Functions	
OUT1	**1**	Run/Stop	**IN1**	**1**	Start
OUT2	**2**	VFD Start	**IN2**	**2**	Stop
OUT3	**3**	Feed	**IN3**	**5**	Clear Alarm
OUT4	**6**	Alarm	**IN4**	**8**	DISC_Pluse
I/O5	#		**I/O5**	**9**	Feed Request
I/O6	#		**I/O6**	**0**	None
I/O7	#		**I/O7**	**0**	Undefined
I/O8	#		**I/O8**	**0**	Undefined

Description: Free I/O port is initially defined as input function, I/O5 is defined as " Feed Request" The rest of the port is undefined.

4.7.3.1 Input setting

Click the corresponding port under Parameter and select the required function. When **IN1~IN4** and **IO1~IO4** set by free port are set as the input port, the following functions can be defined:

Code	Features	Function Description
0	None	If the port number is defined as **0**, the input port is undefined(None).
1	Start	The controller with a valid signal will enter the running state

2	Stop	The controller with a valid signal will enter the stop state.
3	Clear ACUM	The controller with a valid signal will realize the cumulative value to zero.
4	Ready(I)	If a port is defined as a ready signal, it is allowed to run when the signal is valid; If the signal is not valid while running, it returns to the stop state and outputs an alarm signal. If the signal is not defined, then the signal will not be judged. This input is a level input signal.
5	Clear Alarm	Use to clear the alarm output of the controller. This input is the pulse input signal.
6	Zero	This input is valid and can zero the controller (it should be in a stable state and the weight should be within the zero range, otherwise the controller will not zero).
7	VFD Fault(I)	If the input is valid, the inverter fault output is valid.
8	DISC_Pulse	The signal is valid once the controller enters the discharge state, and the signal is valid again once the controller exits the discharge state.
9	Feed Request	In the stop state and the weight is less than the stop feed point, if the signal input validly, then output the feed output signal. The feed output signal is invalid if input again.
10	Start/Stop	Controller runs if low level input valid, and controller stops if the input is invalid.
11	DISC_Level	The signal is valid once the controller enters the discharge state, the signal invalid controller exits the discharge state.
12	Manual/Auto Ctrl	During operation, the input is valid for manual adjustment of analog output; The input is invalid, and the output is adjusted automatically for **PID** analog.
13	Feed Opened	When the feeding mode is selected as one-way rotating motor feeding, when this signal is valid, it indicates that the feeding gate is in the open position.
14	Feed Closed	When the feeding mode is selected as one-way rotating motor feeding, if the signal is valid， which indicates that the feeding gate is in the closed position.
15	Motor Reset	When the feeding mode is selected as one-way rotating motor feeding, the feeding motor will be reset to the closed position when the signal is valid.
16	Manual Release	When the signal is valid, the controller stops controlling the feed bin charging. In the process of manual discharge, when the current weight is higher than the feeding point, the controller automatically adjusts the flow rate. When the current weight is lower than the feeding point, the controller will lock the current flow and analog output until the material in the device controllering bucket is finished with a constant flow. In this process, even if it is lower than the feeding point, it will no longer output the feeding signal. Until the stop signal is given to the controller manually, the controller returns to the stop state.
17	Clear Total ACUM	The signal is valid once controller will perform zero the total cumulative value operation.

18	Gate Closed Pos	When the servo control mode is selected as the motor control opening and closing, When this signal is valid, it indicates that the discharge gate is in the closed position.
19	Gate Open Type	When the signal is valid, the motor gate opening signal output is valid. When the gate is opened, the motor rotation direction signal output is valid. When the gate is closed, the direction signal output is invalid; When the signal is invalid, when the gate is opened, the motor rotation direction signal output is invalid, and the direction signal output is valid when the gate is closed.
20	Mode Switch	When valid, it is the external given mode, and when invalid, it is the weightless batching mode.

4.7.3.2 Output setting

Click the corresponding port under parameter and select the required function. When **OUT1~OUT4** and **IO1~IO4 set by the free port are set** as the output outlet, the following functions can be defined:

CODE	Functions	Function Description
0	None	If a port is defined as **0**, it indicates that the port is undefined(None).
1	Run/Stop	This signal is valid when the controller is in the running state; Not valid when stopped.
2	VFD Start	Valid when running.
3	Feed	The signal is valid when the feed status is active.
4	Ready(O)	When a ready signal input is detected, the signal is valid.
5	Filling Done	The signal is valid when the cumulative value is reached.
6	Alarm	The signal is valid when there is an alarm.
7	VFD Fault(O)	The signal is valid when there is a frequency converter fault input.
8	Upper Limit	the signal is valid at any time when the weight is greater than the stop feeding point.
9	Lower limit	the signal is valid at any time when the weight is less than the feed lower limit.
10	Feed Pt Start	The signal is valid at any time when the weight is less than the feed point.
11	Fill OK	In the stop state, when the hopper weight is greater than the stop feed point * feed percentage, the signal is valid.
12	ACUM Pulse	This output is valid whenever the cumulative value increases the single-pulse cumulative value, and the valid time is **500ms**.
13	High-Speed Pulse	Control the high speed output of the servo motor.
14	Motor Direction	At any time, the servo motor is turning, the signal is valid.

4.7.3.3 Free port setting

GMC-X3 controller provides 4 free defined interfaces, which can be defined as input or output interfaces according to the needs of users.

(1) Select IN under the free port setting parameter, that is, the free port is defined as the input port, and the corresponding input port function can be set. For the specific definition, refer to 4.7.3.1 Setting of the input. (2) Click OUT to define the **free port** as the output port, and set the corresponding output outlet function. For specific definition, refer to 4.7.3.2 Setting of output.

4.7.3.4 IO Test

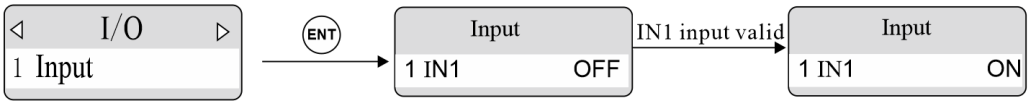
This item tests the input and output and free ports to check whether the external input and output are correctly connected. The product register and coil address can be used for IO test. Test method:

1） **Input test:** After connecting the external cable, when the external signal input is valid, the corresponding input definition port under the interface is **OFF - >ON,** indicating that the input interface is connected correctly. When the external input is valid, the interface does not respond, it indicates that the connection is abnormal. Check the IO power input, wiring, etc.

2） **Output test**: After connecting the external cable, click the corresponding output port from **OFF - >ON**. The corresponding output state of the external connection should be valid. If it is invalid, it indicates that the connection is abnormal.

3） Free port test: First define IO1~IO4 as the input port or output port in the free port setting parameters. If it is the input port, perform the input port test according to test method 1; if it is the output port, test method 2) Perform the output port test.

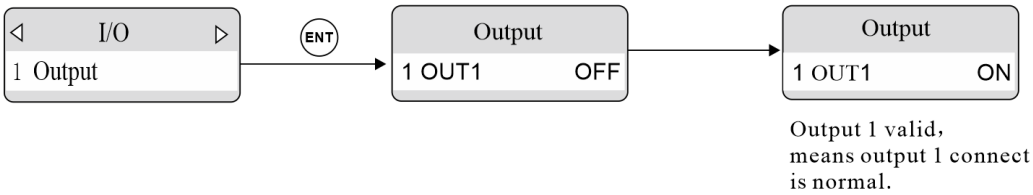
4） Input test:



※ **After IN1** test **OK**, press the button to switch the input port and test

※ After the test is finished, press **ESC key** to exit the input test state

5） Output test:



※ In the output test state, press **ENT** key to switch the external output state.

※ The external state can be changed with the **ENT** key, indicating that the output port is connected properly.

※ After the test is completed, press ESC to exit the output test state

4.9 System Parameters

Parameters	Parameter SubItems	Instructions
1 Language	Initial value: Chinese, Chinese, **English** optional.	

2. Communication	**COM-1 （RS485）**	Set communication port parameters. For details refer to **Chapter 4.8.1 Communication Parameters.** The TCP-IP and Profinet parameters need to be equipped with corresponding expansion board functions in order to be visible. (optional fuction,make statement when order ）
	COM-2 （RS232）	
	TCP-IP	
	Profinet	
3 Reset Param	All	Reset all parameters (except calibration parameters) to factory Settings
	Calibration	Reset the calibration parameters to factory Settings
	Weight Param	Reset the weighing parameters to factory Settings
	I/O Function	Reset the IO Module parameters to factory Settings
	All Material	Reset the formula parameters, flow Parameters, PID parameters of all materials to factory Settings
	User	Reset alarm Settings, function Settings, flow parameters to factory Settings
	Communication	Reset communication parameters to their factory Settings
	ACUM	Reset single and total accumulations to factory Settings
	ACUM Comp	Reset the cumulative compensation setting parameters to factory Settings
4.Analog Set	Analog CAL	This item carries out **5** calibration points for analog output **1**, output **2** and analog input. Refer to Section 3.6.2 Analog Calibration for specific calibration methods.
	AO 1 Config	Set analog output 1 output form. Initial value: 4-20mA, optional OFF, 0-20mA, 4-20mA, 0-24mA, 0-5V, 1-5V, 0-10V.
	AO 2 Config	Set analog output 2 output form. Initial value: 4-20mA, optional OFF, 0-20mA, 4-20mA, 0-24mA, 0-5V, 1-5V, 0-10V.
	AI Config	Set analog input function form. Initial value: 4-20mA, optional OFF, 0-20mA, 4-20mA, 0-24mA, 0-5V,1-5V, 0-10V. When the input analog current and voltage are switched, the function selection switch needs to be flipped synchronously. When the current is used, the dip switch is switched to mA gear, and when the voltage is used, switch to V gear. Otherwise, the "hardware type does not match" alarm message will appear on the main interface.
5. Maintenance	Version Info	View the front-end and back-end version and compile date, can only be viewed but not be modified
	MAC Address	View the MAC address of the controller, which can only be viewed but not modified
	Backlight Time	Initial value :**0s**, parameter range **0-99999s**; Set the screen off time, click any key, the screen set to 0 indicates that it is not off.
	Screen Test	If the screen is white and the indicator light is all on, the screen is normal.

	Edit Logo	Changed the start-up Logo to a maximum of eight characters, including digits, letters, Spaces, and hyphens (-)	
	COM Light Switch	The communication light blinks when the selected communication light communicates. Initial value: COM-1; Optional COM-1, COM-2.	
6 PWD Protect	PWD Param	PWD ON/OFF	**ON** or **OFF** Optional. After it is enabled, enter the parameter password when you need to modify parameter items in each parameter. Otherwise, parameter options cannot be modified.
		PWD Edit	change the parameter password value by inputing a new password twice
	CAL/RST PWD	This parameter could modify the password for entering the calibration and reset parameters	

4.9.1 Communication parameters

GMC-X3 has rich communication interfaces: **COM-1 (RS485), COM-2(RS232),** common network port and bus interface.

Parameter Items	Initial value	Instructions
COM-1/2 parameters		
1 Slave ID	**01**	Range: **01-99**
2 Baudrate	**38400**	Range:**38400,4800,9600,19200,57600,115200**
3 Protocol	**Modbus RTU**	Range: **Modbus RTU, Print** (Refer to Section 5.11 for printing data)
4 Data format	**8-E-1**	Range: 8-e-1, 8-O-1, 8-N-1
5 Dword Format	**AB-CD**	Range: **AB-CD** (high word in front), **CD-AB** (low word in front)
TCP-IP(When the add-on board is equipped with **TCP-IP** board, the following parameters are visible**)**		
1. Protocol	**Modbus-TCP/IP**	The Modbus-TCP/IP protocol is supported
2. Dword Format	**AB-CD**	Range: **AB-CD** (high word in front), **CD-AB** (low word in front)
3 Port	**502**	Range: **0 to 65535**
4 IP address	**192.168.101.246**	Range: **0.0.0.0 to 255.255.255.255**
Profinet (When the add-on board is equipped with **PN** board, the following parameters are visible)		
1.IP Address	**000.000.000.000**	The range **is 000.0.000.000 to 255.255.255.255**
2. Write Switch	**OFF**	**ON, OFF** Optional **ON**: During **PN** communication, controller parameters are controlled by "Module parameters" in the master station configuration, and the parameters set in "Module parameters" are automatically written to the controller by the master station when the controller is powered on. **OFF**: When PN communication, the controller parameters are not controlled by the master station "module parameters"

3. Data Type	Float	Range: float, Int
4. ACUM Switch Show	Single ACUM	Range: Single ACUM , Total ACUM
5. AO Show	AO1	Range: AO1, AO2

5. Function description

5.1 Manual Release

I/O Parameters involved: **Manual release** (I16)

Function Description: Give the controller manual release signal, the controller stops the feeding process, when the current weight is higher than the feeding point, the controller automatically adjusts the flow. In the manual release process, the weight is lower than the feeding point, the controller locks the current flow and analog output until the material in the measuring hopper of the equipment is finished, in this process, it will no longer output the feeding signal. Until the manual stop signal send to the controller, the controller returns to the stop state.

5.2 Manual DISC

I/O Parameters involved: AO For Discharge, DISC_Level (I8/I11)

Function Description: in the stop state, the discharge signal (**I8/I11**) is valid, the analog output1 according to the discharge analog output, when the discharge signal (**I8/I11**) is valid again, the discharge process is stopped and recover to the stop state.

5.3 Flow Over/Under Limit

Related parameters:Flow Over, Flow Under, Flow Over OT, Flow Under OT. （Standard Menu—Function Set --Alarm Set--Flow Alarm）

Function description: During the operation of the controller, the flow exceeds the target flow * (100 + set value), and the duration exceeds the maximum time of the flow exceeds the upper limit, the flow exceeds limit's alarm is valid; The flow is lower than the target flow * (100 - set value), and the duration exceeds the maximum time of the lower limit of the flow, the flow under limit's alarm is valid. When the maximum time of excess flow is 0, the alarm function of flow over limit is closed; When the maximum time of the lower limit of the flow is 0, the flow under limit alarm function is closed.

5.4 Feed Alarm

Related parameters: Max Feed Time, Feed OT Stop（Standard Menu—Function Set --Alarm Set--Feed Alarm）

Function Description: When the feeding is valid during the operation of the controller, the timing starts. When the timing time exceeds the set max. feeding time, the feeding timeout alarm is valid. At this time, if the charging overtime stop switch is opened, then the controller will stop.

5.5 Clogging alarm

Parameters involved: Clogging Time, Clogging Stop（Standard Menu—Function Set --Alarm Set--Clogging Alarm）

Function Description: After 60 seconds of controller startup, the controller detects that the flow rate continues to be 0 in the longest Clogging time, then the clogging alarm is triggered. If the clogging alarm stop switch is turned on, the controller will perform the stop operation after the alarm.

5.6 Set parameters quickly

When the controller is running, it can modify the target flow, feed point and stop feed point in [User] Parameters - [Recipe] parameters.

5.7 Filling mode

Parameters involved: Filling mode switch, Filling value, Remains, Free Fall, Filling analog output.

Function Description: After the filling mode switch is turned on, when the cumulative value of a single time reaches ≥ Filling value - Remains, the analog value will be simulated output according to the set filling analog output value. When the single cumulative value reaches the Filling value – Free Fall, the analog immediately drops to the minimum analog output value, and the controller stops. Filling value, Remains, Free Fall between the need to meet: filling value > Remains> Free Fall.

5.8 Cumulative compensation

Related parameters: Comp ON/OFF, ACUM Comp Range, Preset Point (PT1-PT9), Comp Coef (PT1-PT9), Comp ON/OFF (PT1-PT9). （Standard Menu—Function Set --ACUM Comp Set）

Function Description: The volume cumulative compensation principle is to set the relationship between the flow and the volume cumulative compensation value in advance, the actual flow value is used to calculate the volume cumulative compensation value during the actual operation of the system, and the cumulative compensation is carried out when the volume cumulative compensation is completed.

Compensation principle: First determine whether the target flow is in the [minimum flow compensation preset point - flow compensation range, maximum flow compensation preset point + flow compensation range], and then find the compensation preset point X closest to the target flow, and use this set of compensation parameters to compensate.

5.9 Printing

Select the communication mode of one of the RS485/RS232 ports to print, such as RS232 port select the print mode, and then write 1 (function code 0x05) to the coil word address 00004 through other communication ports, the controller will print information through the RS232 port to send out the specific print content. Data format,Dword format, Baudrate: parameter optional

Code: ASCII code

Print as follows:

- -

Sum: 39305.6 t (Total value)

Flux: 500.43 t/h **（Current flow）**

- -

5.10 Flow Lock function

Related parameters: Flow lock time, Lock Range（Standard Menu --Function Set—Lock Param）
Function Description: When the external interference is greater than the set flow lock range, the flow lock condition will be triggered. At this time, the flow and analog value of the controller will be locked, and the flow will be automatically unlocked after the set flow locking time. If the interference is frequently given during the locking process, the controller will continue to keep the locked state until there is no interference, the controller starts to execute the locking time, and the time will be automatically unlocked.

5.11 Manual Analog

Parameters involved: Given AO（Standard Menu -- Function --Function Set—Other—Given AO） IO: Given AO(I12)
Function Description: When the I12 Given AO input is valid, the analog will be fixed output during operation, and the output value of the analog can be modified through [Function] parameter - [Function Set] – [Other]-[Given AO], and the value is saved after power -off. When the switch input is invalid, the automatic batching will be performed.

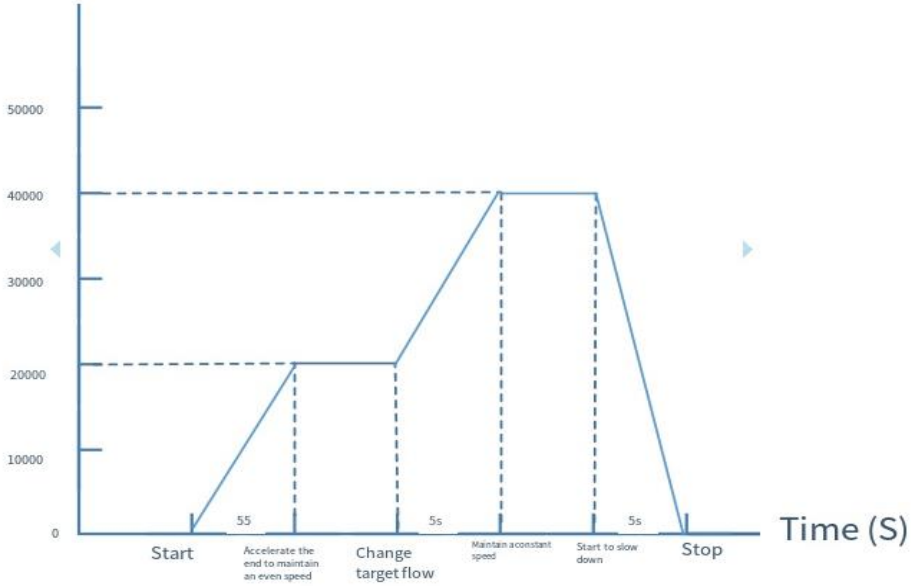
5.12 Supplement Change

Parameters involved: INIT AO PCT, INIT AO Timer（Standard Menu – User--Flow）,
Supplement Change switch（Standard Menu –Flowrate CAL）
Note: This function is designed in accordance with the on-site situation, and the flow data after the on-site material replacement is basically useless. The phase gap between different materials is too large, and the adjustment amplitude of the analog is abnormal. Therefore, the analog is controlled first during startup, and then the analog is controlled by PID parameters after normal operation.

- This function can be used with the adaptive function, that is, after the equipment is stable, the flow data is input, the second startup is started, and the initial analog output runs linearly according to the flow calibration at the initial analog maintenance time;
- The function and the adaptive switch will directly clear the flow data outside the first flow calibration point no matter which one is opened;
- After the function is opened, it will automatically close after two initial analog maintenance times, and open again when the material needs to be replaced.

5.13 Motor control screw

Parameters involved: MAX Motor HZ(PLC double word address **40559-40560**), motor acceleration and deceleration time (PLC double word address **40557-40558**), maximum analog output, minimum analog output (maximum analog and minimum analog do not need to set parameters). （Standard Menu—Function—Function Set—Motor Param）



Basic process description:

First of all, the analog is converted into the output frequency: 0~ the maximum frequency of the motor corresponds to the minimum analog output ~ the maximum analog output.

The formula is: output frequency = (current analog output value - minimum analog output value) * motor maximum frequency/(maximum analog output value - minimum analog output value)

For example: the maximum frequency of the motor is 40000HZ, the analog range is 4~20mA, and the analog output of the controller at this time is 12mA, then the output frequency is (12-4) * 40000 / (20-4) = 20000HZ;

Motor acceleration and deceleration process:

When the target flow after conversion of the target frequency is greater than the current output frequency, trigger acceleration; When the target frequency obtained after conversion of the set target flow is less than the current output frequency, triggering deceleration.

For example, taking the maximum frequency of the motor as 40000 Hz and the acceleration and deceleration time of the motor as 5 seconds, explain the relationship between the various parameters.

As shown in the figure, within 5 seconds of acceleration time, gradually increase the frequency to 40000 Hz and end the acceleration process at a constant speed. After the target flow rate changes (increases), acceleration begins and increases to the corresponding frequency within 5 seconds of acceleration time. After pressing stop, the output frequency gradually decreases and decreases to 0 within 5 seconds of deceleration time and stops.

5.14 Motor opening gate and closing gate mode

1) Involved parameters:

Function setting: Motor Pulse Mode, ACC/DEC Time, MAX Motor HZ, MAX Motor HZ, Motor Start Freq, Motor Timeout Alarm;

Switching parameters: Input: Gate Closed Pos (I18), Gate Closed Pos (I19);
Output: Motor Direction (O14), High-speed Pulse(O13).

2) Control mode:

The corresponding relationship between the pulse number of the controller 4-20mA and the controller: the closing position of the controller is 4mA (0 pulse number), and the maximum opening position of the controller is 20mA (the maximum setting pulse number of the motor); Then the corresponding relationship between the output pulse number and the analog at this time is:

Output pulse number = (current analog output value - minimum analog output value) * motor maximum pulse/(maximum analog output value - minimum analog output value);

3) Working process:

When the target flow changes, through the change of the target flow, change the "motor direction" to output, control the motor to rotate forward or reverse, convert the number of pulses to be adjusted through the "maximum pulse number", and stop the pulse output after the corresponding pulse number is completed through the "motor starting frequency" and "motor maximum frequency".

6. Work mode

GMC-X3 provides three basic operating modes: WTless Batching mode, constant analog batching mode and external given batching mode. It needs to be applied in combination with flow calculation mode and analog control mode. Among them, when the weightless batching mode and the external given mode: the analog is adjusted with the real-time feedback flow; Constant analog mode: the analog remains unchanged according to the calibration data of the flow.

Refer to Chapter 6 for specific batching mode process instructions.

6.1 Working mode

1) **Weightless Batching Mode**: normal Batching work, the target flow is the setted target flow (can be set under the Recipe parameters" of the simplified menu), select the corresponding analog control mode to control the flow to reach the target flow value.
2) **Constant Analog Batching:** output according to the constant analog output value.
3) **External Given Batching mode:** the target flow rate is calculated by input analog, only the way to obtain the target flow rate is different from the weightlessness batching mode, and the subsequent analog adjustment is consistent with the weightlessness batching mode.

6.2 Flow Calculation Methods

Flow calculation methods are divided into "Method 1" and "Method 2".

6.3 Analog Control Mode

Analog control mode is divided into **PID** control mode and proportional control mode（Prop Ctrl）.

6.3.1 PID control mode

Related parameters: analog control mode **PID**, maximum analog output value, minimum analog output value, **PID** parameters

Mode description**:** After the analog control mode is selected as **PID** control mode, the analog output in the working process is firs**t** controlled by **PID** algorithm, and then the output range of the final analog output can be limited by the maximum analog output value and the minimum analog output value.

6.3.2 Proportional control mode

Related parameters: analog control mode

Mode description: After the **analog control mode** is selected as the proportional **control mode**, different proportional adjustments are made according to different situations.

7. Process description

7.1 Weightless batching mode working process

When the basic working mode is selected as the WTless batching mode, the analog control mode is selected as PID control. In weightless batching mode, the target flow rate is set in [Recipe] parameters, refer to the batching mode process in the following figure.

The controller calculates the flow value in real time, when the analog adjustment time arrives (when the analog control is selected as PID, the analog adjustment time refers to "fine PID control period" and "coarse PID control period", when the analog control is selected as proportional control, The analog adjustment time refers to the "single adjustment time"), the controller will compare the real-time flow and the target flow at this time, and calculate the analog value that needs to be adjusted.

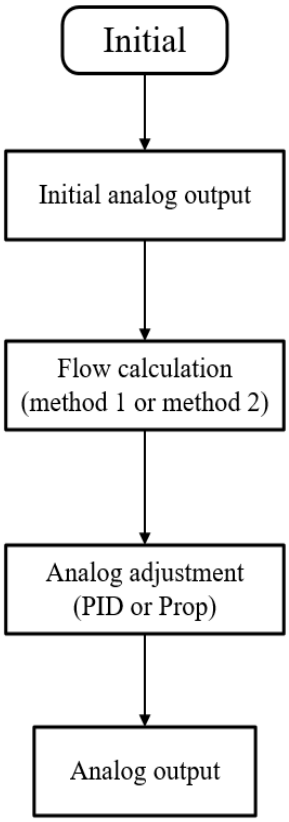
When the weighing hopper material is reduced to less than the **feeding point**, the controller enters the volumetric measurement. The controller maintains the state of operation before entering the volumetric measurement, and the **feeding output** is valid. When the feeding reaches the **stop feeding point**, the controller re-enters the weight loss measurement. In the process of feeding, the controller is a volumetric measurement, should ensure that the feeding time relative to the discharge time to be short enough.

When the **filling working mode** is opened, the **filling value** is not **0**, and the current cumulative value is greater than or equal to the **filling value**, then the controller stops running and outputs the filling completion signal. If the filling value is set to **0**, then the controller can be manually controlled to stop running.

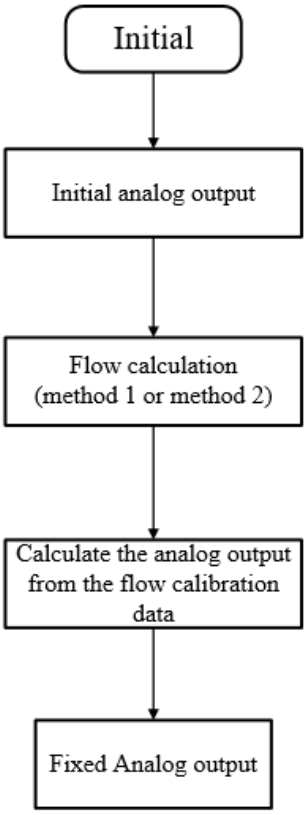
7.2 Constant analog mode to work process

The analog remains unchanged according to the flow calibration data. Refer to the following figure for the constant analog mode process.

WTless Batching



Constant Anglog



7.3 External given mode working process

When the **working mode** selects the **external given mode**, the target flow rate is an analog value given from the outside, and the calculation method is obtained by converting "the given flow rate when the input analog is maximum" and "the given flow rate that the input analog is minimum".

For example:

Select **4-20mA** in [System] Parameters - [Analog Set] setting [AI Config], and then the input analog is **12mA**,

In the【A In】 under 【Device】parameter -【Cascade analog】parameter, set the given flow when the input analog is maximum to 40kg/h, and the given flow when the input analog is minimum to 0kg/h.

At this point:

Target flow = **(40-0)/(20-4) * (12-4)** + **0** = **20kg/h**.

The flow of the rest flow calculation and simulation control mode is the same as that of the weightless batching mode, which is no longer described here. Refer to the process description of the weightless batching mode.

8. Communication protocol and address

8.1 Modbus Protocol

GMC-X3 supports **1 RS232**, **1 RS485** serial communication function and **1** network port communication function.Serial port supports **Modbus-RTU** communication mode and printing mode. The port supports **Modbus-TCP/IP** and has the same communication address as **Modbus-RTU**.

8.1.1 Function Code and Exception Code Description

Function codes supported by the controller

Function code	Name	Instructions
03	Read registers	Read up to **125** registers at a time
06	Write a single register	
16	Write multiple registers	This controller command only supports writing double registers, the address must be aligned when writing, only a part of the double register is not allowed to be written, and a part of the read is allowed when reading.
01	Read coil	Note that this length is in bits.
05	Write coil	

Note: This controller only supports the above MODBUS function codes, the controller will not respond when sending other function codes to the controller.

Exception Code response

Code	Name	Meaning
02	Illegal data address	For this controller, this error code indicates that the received data address is an disallowed address.
03	Illegal data values	The data written does not fit within the allowed range.
04	Slave failure	An unrecoverable error occurs when the controller is attempting to perform the requested operation.
07	Unsuccessful programming request	For the controller, the command received cannot be executed under the current conditions.

8.1.2 Transmission mode

RTU Mode

(1) When communicating in RTU mode, every 8 bits (1 byte) in the message is divided into two 4-bit hexadecimal characters.

(2) Indicates an interval of more than **3.5** characters at the end of a frame. For a more reliable end, it is recommended to use an interval of more than 4.0 characters.

The specific protocol is as follows:

Supported data formats: 8-bit data bit, 1-bit stop bit, parity check (8-E-1)

8-bit data bit, 1-Stop Bit, Odd check (8-O-1)

8 data bits, 1 stop bit, no check (8-N-1)

Code: Binary

8.1.3 Modbus Communication Address Table

PLC address	Data type	R/W	Meaning	Instructions	
40001-40002	**Float**	**R**	Current weight	Floating type	
40003	**Word**	**R**	Weight status flag bit	Bit	Instructions
				D9-15	Reserved
				D8	Millivolt is stable, (millivolt stable sign when calibration)
				D7	Loadcell negative overflow, below the allowable range of loadcell voltage
				D6	Loadcell positive overflow, beyond the allowable range of loadcell voltage
				D5	Weight negative overflow, weight less than "-(Max range +9d)"
				D4	Weight positive overflow, weight greater than "Max range +9d")
				D3	Overflow status, (weight or loadcell is abnormal)
				D2	Display negative sign for weight, display negative weight
				D1	Zero point (weight in the range of 0+/- quarter d)
				D0	Stable (Weight stable sign)
40004	**Word**	**R**	Alarm status at startup (alarm timeout 2000ms)	**D9-D15**	Reserved
				D8	Current hardware type does not match
				D7	The starting feeding point is greater than the stopping feeding point
				D6	Error setting of cumulative compensation parameter at startup
				D5	Weight overflow/loadcell voltage overflow when starting
				D4	When starting, the ready signal is not active
				D3	Start in a discharge position
				D2	AD/DA calibration switch or IO test switch ON when starting
				D1	Unreasonable flow calibration data at startup
				D0	Target flow at startup is 0
40005	**Word**	**R**	Alarm Status 1 (Alarm timeout 2000ms)	**D9-D15**	Reserved
				D8	Too high accuracy beyond controller's resolution
				D7	Weight input exceeds maximum range
				D6	Weight input cannot be zero
				D5	Gain calibration less than zero or the previous calibration point
				D4	Loadcell overflow during calibration
				D3	Millivolts are unstable during calibration
				D2	loadcell anomalies when zeroing

				D1	Unstable when zeroing
				D0	Out of range when zeroing
40006	**Word**	**R**	Alarm Status 2 (Alarm timeout 2000ms)	**D8-D15**	Reserved
				D7	Motor timeout alarm
				D6	Inverter fault
				D5	Analog output to maximum, still not reaching target flow
				D4	Clogging alarm
				D3	Flow underlimit alarm
				D2	Flow overlimit alarm
				D1	Filling complete alarm
				D0	Feeding timeout alarm
40007 ~ 4008	reserve				
40009	**Word**	**R**	Running state	D14-15	Reserved
				D13	Locked state
				D12	Manual feed
				D11	Manual discharging
				D10	Manual releasing
				D9	Fill OK
				D8	Feed Pt Start
				D7	Lower feed limit
				D6	Upper feed limit
				D5	Alarm
				D4	Filling done
				D3	Ready
				D2	Feed
				D1	VFD start
				D0	Run
40010	**Word**	**R**	Program Status Tips	1: Stop 2: Ready state 3: Being feeding 4: Charging timeout 5: Eliminate free fall delay 6: Fill the flow array after feeding 7: Initial analog flow state 8: Being Calibrating flow 9: Target flow is updating 10: PID control in batching mode 11: Constant analog mode 12: Manual release 13: Manual discharge when stopped 14: Feed when stopped 15: Filling mode waiting for remains 16: Filling mode wait for the freefall 17: Flow lock status 18: Manual analog control 19: Slow stop	
40011-40012	Reserved				
40013	**Word**	R	IO status	**D12-15**	Reserved
				D11	Free port 4

				D10	Free port 3
				D9	Free port 2
				D8	Free port 1
				D7	**OUT4**
				D6	**OUT3**
				D5	**OUT2**
				D4	**OUT1**
				D3	**IN4**
				D2	**IN3**
				D1	**IN2**
				D0	**IN1**
40014	Reserved				
40015-40016	**Float**	**R**	Real-time flow		
40017-40018	**Float**	**R**	Real-time Analog Output1		
40019-40020	**Float**	**R**	Analog Output2		
40021-40022	**Float**	**R**	Input analog value		
40023-40024	**Float**	**R**	Single ACUM		
40025-40026	**Float**	**R**	Total ACUM		
40027-40100	Reserve				
Weighing parameters (except zero range and stable range, other parameters are not displayed in the fore-end, using the default value)					
40101-40102	**DWord**	**R/W**	Power on Zero range	Initial value: 0 (the power-on zero function is disabled). Range: 0~99% (full scale percentage)	
40103-40104	**DWord**	**R/W**	Zero range	Initial value: 50; Range: 0 to 99% (full scale percentage)	
40105-40106	**DWord**	**R/W**	Tr-zero range	Initial value: 0; Range: 0 to 99d	
40107-40108	**Float**	**R/W**	Tr-zero time	Initial value: 2.0s; Range: 0.1~9.9s	
40110-40111	**DWord**	**R/W**	STAB range	Initial value: 3d; Range: 0 to 99d	
40112-40113	**Float**	**R/W**	STAB time	Initial value: 0.5s; Range: 0.1~9.9s	
40113-40114	**DWord**	**R/W**	Digital filter Level	Initial value:7; Range: 0 to 9	
40115-40116	**DWord**	**R/W**	Steady-state filter Level	Initial value: 0; Range: 0 to 9	
40117-40118	**DWord**	**R/W**	Tertiary filtering	Initial value: 0; Range: 0 to 10	
40119-40200	Reserved				
Calibration parameters					
40201-40202	**DWord**	**R/W**	Unit	Initial value: 1; Range: 0:g; 1:kg; 2:t	
40203-40204	**DWord**	**R/W**	Decimal point	Initial value: 3 (0.000); Range: **0:**0**; 1:**0.0**; 2:**0.00**; 3:**0.000**; 4:**0.0000	
40205-40206	**DWord**	**R/W**	Division	Initial value: 1; Range: 1/2/5/10/20/50(d)	
40207-40208	**Float**	**R/W**	Full Scale	Initial value: 10; Range: 1~(100000* Division)	
40209-40210	**Float**	**R/W**	CAL Zero With Weight	Write: 1, perform a zero calibration operation Read: the current loadcell millivolts	
40211-40212	**Float**	**R/W**	CAL WT With Weight	Write: Weight's weight as gain calibration Read: Gain millivolt value.	
40213-40214	**Float**	**R/W**	Zero calibration without weight	Write: Numerical calibration zero (fixed 4 decimal points)	
40215-40216	**Float**	R/W	Gain mV without weight	Write: Weightless gain calibration millivolts Read: Gain millivolts value.	
40217-40218	**Float**	**R/W**	Gain weight	Write: Weightless gain Calibration weight Read:	

			without weight	Gain weight value.
40219-40300	Reserved			
Device parameters				
40301-40302	**DWord**	**R/W**	Working mode	Initial value: 0 (weightless batching mode) Range: 0: weightless batching mode; 1: constant analog mode; 2: external given mode.
40303-40304	**DWord**	**R/W**	Filling Mode	Initial value: 0: pneumatic feeding. Range: 0: pneumatic feeding 1: one-way rotary motor feeding.
40305-40306	**DWord**	**R/W**	Flow Method	Initial value: 1: Method 2; Range: 0: Method 1; 1: Method 2.
40307-40308	**DWord**	**R/W**	Analog Control mode	Initial value: 1: proportional control Range: 0: PID control 1: proportional control
40309-40310	**DWord**	**R/W**	Analog Input Function	Initial value: 2:4 ~20mA Range: 0: Off; 1:0 to 20mA; 2:4-20mA; 3:0- 24mA; 4:0 ~5V; 5:1 ~5V; 6:0 ~10V
40311-40312	**Float**	**R/W**	Input analog: maximum given flow value	Initial value: 0; Parameter range: 0 to 999999
40313-40314	**Float**	**R/W**	Input analog: minimum given flow value	
40315-40316	**DWord**	**R/W**	AO 1 Config	Initial value: 2:4 ~20mA Range: 0: Off; 1:0 to 20mA; 2:4-20mA; 3:0 to 24mA; 4:0 ~5V; 5:1 ~5V; 6:0 ~10V
40317-40318	**DWord**	**R/W**	Analog output 1 function	Initial value: 0: control inverter; Range :0: control frequency converter 1: output weight 2: output real-time flow
40319-40320	**DWord**	**R/W**	AO 2 Config	Refer to Analog Output Type 1
40321-40322	**DWord**	**R/W**	Analog output 2 function	Initial value: 2: output flow; Range :0: control frequency converter 1: output weight 2: output flow
40323-40324	**Float**	**R/W**	Output analog: maximum corresponding flow value	Used when analog output 1 function or analog output 2 function selects output flow. Initial value :0; Parameter range: 0 to 999999
40325-40326	**Float**	**R/W**	Output analog: minimum corresponding flow value	
40327-40350	Reserved			
Filling parameters				
40351-40352	**DWord**	**R/W**	Filling working mode	Initial value: 0; Range: 0: Off, 1: on
40353-40354	**DWord**	**R/W**	Filling unit	Initial value: 1: kg; Range: 0: g; 1: kg; 2:t
40355-40356	**DWord**	**R/W**	Filling decimal point	Initial value :0, range: 0:0; 1:0.0; 2:0.00; 3:000; 4:0000
40357-40358	**Float**	**R/W**	Filling value	Initial value: 0, range: 0~999999
40359-40360	**Float**	**R/W**	Remains	Initial value: 0, ranging from 0 to 999999
40361-40362	**Float**	**R/W**	Free Fall	Initial value: 0, range: 0 to 999999
40363-40364	**Float**	**R/W**	Filling analog	This range is determined by the current analog output

			output value	type, initial value: 4; Set analog output 1 type as 4-20mA, so range: 4-20mA
40365-40366	**DWord**	**R/W**	Filling OT	Initial value: 3s; Range: 0-999999s
40369-40400	Reserved			
Recipe parameters				
40401-40402	**DWord**	**R/W**	Recipe ID; Initial value: 1, parameter range: 1 to 10	
40403-40404	**Float**	**R/W**	Target flow; Initial value: 0, parameter range: 0 to 999999	
40405-40406	**Float**	**R/W**	Feed Pt Start; Initial value: 0, parameter range: 0~999999	
40407-40408	**Float**	**R/W**	Feed Pt Stop; Initial value: 0, parameter range: 0~999999	
40409-40410	**DWord**	**R/W**	Init Supply Ratio; Initial value: 100, parameter range: 0~ 100%.	
40411-40412	**DWord**	**R/W**	Drop Delay Timer; Initial value: 3s, parameter range: 0 ~ 100s	
40413-40414	**DWord**	**R/W**	Flow unit; Initial value: 1:kg/h, parameter range: 0:g/h,1:kg/h,2:t/h	
40415-40416	**DWord**	**R/W**	Flow decimal point; Initial value: 3-0.000, parameter range: 0-0; 1-0.0; 2-0.00; 3-0.000; 4-0.0000	
40417-40418	**DWord**	**R/W**	Flow Permillage; Initial value: 1000‰, parameter range: 0~1000‰	
40419-40420	**Float**	**R/W**	Sampling interval time; Initial value: 0.1s, parameter range: 0.1-100.0s	
40421-40422	**DWord**	**R/W**	Number of samples(Sample Window); Initial value: 100, parameter range: 30~100	
40423-40424	**DWord**	**R/W**	Initial analog maintenance time; Initial value :10s; Range: 0-100s	
40425-40426	**DWord**	**R/W**	Percentage of initial analog; Initial value: 0; Range: 0-100%	
40427-40428	**DWord**	**R/W**	Single adjustment factor(INIT AO PCT); Initial value: 2; Range: 1-10	
40429-40430	**DWord**	**R/W**	Single adjustment time(INIT AO Timer); Initial value: 3s; Range: 0-99s	
40431-40432	**DWord**	**R/W**	Analog filter intensity; Initial value: 50%; Range: 0-100%	
40433-40434	**DWord**	**R/W**	Flow filtering intensity(F-Filter Intens); Initial value: 50%; Range: 0-100%	
40435-40436	**DWord**	**R/W**	Upper limit of filtering intensity (Upper Filter); Initial value: 50%; Range: 0-100%	
40437-40438	**DWord**	**R/W**	Lower limit of filtering intensity(Lower Filter); Initial value: 50%; Range: 0-100%	
40439-40450	reserve			
PID parameters				
40451-40452	**DWord**	**R/W**	PID Proportional Coefficient(Fine Tune); Initial value: 20%, parameter range: 0 ~ 200%	
40453-40454	**DWord**	**R/W**	PID integration time(Fine-tune); Initial value: 5s, parameter range: 0 ~ 99s	
40455-40456	**DWord**	**R/W**	PID differential time(Fine-tune); Initial value: 0s, parameter range: 0 ~ 99s	
40457-40458	**DWord**	**R/W**	PID control cycle(Fine tune); Initial value: 5s, parameter range: 1 ~ 25s	
40459-40460	**DWord**	**R/W**	Dual PID switching range; Initial value: 0%, parameter range: 0 ~ 100%	
40461-40462	**DWord**	**R/W**	switch time(Fine to coarse); Initial value: 3s, parameter range: 0 ~ 9s	
40463-40464	**DWord**	**R/W**	switch time(Coarse to fine); Initial value: 5s, parameter range: 0 ~ 9s	
40465-40466	**DWord**	**R/W**	PID Proportional Coefficient(Coarse tune); Initial value: 45%, parameter range: 0 ~ 500%	
40467-40468	**DWord**	**R/W**	PID integration time(Coarse tune); Initial value: 6s, parameter range: 0 ~ 99s	
40469-40470	**DWord**	**R/W**	PID differential time(Coarse tune); Initial value: 0s, parameter range: 0 ~ 99s	
40471-40472	**DWord**	**R/W**	PID control cycle(Coarse tune); Initial value: 5s, parameter range: 1 ~ 99s	
40473-40500	Reserved			
User function parameter				
40501-40502	**DWord**	**R/W**	Clogging time	Initial value: 0s, parameter range: 0 to 999s
40503-40504	**DWord**	**R/W**	Clogging stop	Initial value: 0; Range: 0: OFF; 1: ON

			alarm	
40505-40506	**DWord**	**R/W**	Max Feed Time	Initial value: 0; Parameter range: 0 to 999s
40507-40508	**DWord**	**R/W**	Feed OT Stop	Initial value: 0; Range: 0: OFF; 1: ON
40509-40510	**DWord**	**R/W**	Flow Over	Initial value: 0. Parameter range: 0 to 100%
40511-40512	**DWord**	**R/W**	Flow Over OT	Initial value: 0s, parameter range: 0 ~ 999s
40513-40514	**DWord**	**R/W**	Flow Under	Initial value: 0 Parameter range: 0 to 100%
40515-40516	**DWord**	**R/W**	Flow Under OT	Initial value: 0s, ranging from 0 to 999s
40517-40518	**DWord**	**R/W**	O&U Limit Stop	Initial value: 0; Parameter range: 0: OFF; 1: ON
40519-40520	**DWord**	**R/W**	Flow OT	Initial value: 0s, parameter range: 0 to 999s
40521-40522	**DWord**	**R/W**	Flow OT Stop	Initial value: 0; Parameter range: 0: OFF; 1: ON
40523-40524	**DWord**	**R/W**	ACUM Delay	Initial value: 3s, parameter range: 0 to 999s
40525-40526	**Float**	**R/W**	ACUM Pulse Weight	Initial value: 20.000 kg, parameter range: 1~ 100000
40527-40528	**Float**	**R/W**	Lower Limit	Initial value: 0, parameter range: 0 ~ 999999
40529-40534	Reserved			
40535-40536	**Float**	**R/W**	Lock time	Initial value: 0s; Range: 0 to 999.999s.
40537-40538	**DWord**	**R/W**	Locking range	Initial value: 0; Number range: 0 to 999999
40539-40540	**Float**	**R/W**	Maximum analog output	Used to limit the maximum analog output of a running process. This range is determined by the currently set analog output type, initial value: 4; Set analog output 1 type as 4-20mA, so range: 4-20mA
40541-40542	**Float**	**R/W**	Minimum analog output	
40543-40544	**Float**	**R/W**	AO For Discharge	
40545-40546	**Float**	**R/W**	Given AO	
40547-40548	**Float**	**R/W**	Adaptive range	Initial value: 0.0%; Range :0.0% to 100.0%
40549-40550	**DWord**	**R/W**	Supplement Change switch	Initial value: 0 (off); Range: 0: Off; 1: On
40551-40552	**DWord**	**R/W**	Modbus Old and new address switch	Initial value: 0 (off); Range: 0: Off; 1: On (This parameter is reserved)
40553-40554	**DWord**	**R/W**	Motor pulse mode	0: close 1: pulse control screw 2: pulse control open gate and close gate.Default: 0
40555-40556	**DWord**	**R/W**	Motor start freq	0-999999Hz; Default: 5000Hz
40557-40558	**Float**	**R/W**	ACC/DEC time	Initial value: 0.2s; Range 0 to 10.000s
40559-40560	**DWord**	**R/W**	MAX Motor HZ	Initial value: 20000 Hz; Range 0 to 999999Hz.
40561-40562	**DWord**	**R/W**	MAX Motor Pulse	0-999999, default: 10000
40563-40564	**Float**	**R/W**	Motor timeout time	0-999999s, default: 5.000s
40565-40566	**DWord**	**R/W**	Motor dire signal	0: positive turn when valid; 1: Reverse when invalid; Default: 0
Flow calibration parameters				
40601-40602	**DWord**	**R/W**	Flow calibration switch	Initial value: 0 (OFF); Write 0 to stop flow calibration. Read parameter range: 0-4; Read 0 indicates that automatic flow calibration is not enabled. non-0 value indicates the point currently being calibrated.
40603-40604	**Float**	**R/W**	Analog of Flow calibration Point 1	
40605-40606	**Float**	**R/W**	Flow value of Flow calibration Point 1	
40607-40608	**Float**	**R/W**	Analog of Flow calibration Point 2	
40609-40610	**Float**	**R/W**	Flow value of Flow calibration Point 2	

40611-40612	**Float**	**R/W**	Analog of Flow calibration Point 3	
40613-40614	**Float**	**R/W**	Flow value of Flow calibration Point 3	
40615-40616	**Float**	**R/W**	Analog of Flow calibration Point 4	
40617-40618	**Float**	**R/W**	Flow value Flow calibration Point 4	
40619-40650	Reserved			
Target flow parameter				
40651-40652	**Float**	**R**	Current target flow	
40653-40654	**Float**	**R**	Recipe ID1 Target Flow	
40655-40656	**Float**	**R**	Recipe ID2 Target Flow	
40657-40658	**Float**	**R**	Recipe ID3 Target Flow	
40659-40660	**Float**	**R**	Recipe ID4 Target Flow	
40661-40662	**Float**	**R**	Recipe ID5 Target Flow	
40663-40664	**Float**	**R**	Recipe ID6 Target Flow	
40665-40666	**Float**	**R**	Recipe ID7 Target Flow	
40667-40668	**Float**	**R**	Recipe ID8 Target Flow	
40669-40670	**Float**	**R**	Recipe ID9 Target Flow	
40671-40672	**Float**	**R**	Recipe ID10 Target Flow	
40673-40700	Reserved			
IO function parameters				
40701-40702	**DWord**	**R/W**	IN1 Definition	0 None 1 Start 2 Stop 3 Clear ACUM 4 Ready（I） 5 Clear alarm 6 Zero 7 VFD Fault(I) 8 DISC_Pulse 9 Feed Request 10 Start/stop 11 DISC_Level 12 Given AO 13 Feed Opened 14 Feed Closed 15 Motor Reset 16 Manual Release 17 Clear Total ACUM 18 Gate closed Pos 19 Gate Opened Pos 20 Mode Switch
40703-40704	**DWord**	**R/W**	IN2 Definition	
40705-40706	**DWord**	**R/W**	IN3 definition	
40707-40708	**DWord**	**R/W**	IN4 Definition	
40709-40710	**DWord**	**R/W**	OUT1 Definition	0 None 1 Run/Stop 2 VFD Start 3 Feed 4 Ready(O) 5 Filling Done 6 Alarm 7 VFD Fault(O) 8 Feed Upper limit 9 Feed Lower limit 10 Feed point Start 11 Fill OK 12 ACUM pulse
40711-40712	**DWord**	**R/W**	OUT2 Definitions	
40713-40714	**DWord**	**R/W**	OUT3 Definitions	
40715-40716	**DWord**	**R/W**	OUT4 Definitions	

				13 High-speed Pulse 14 Motor Direction
40717-40718	**DWord**	**R/W**	Free Port 1 Define	Write the corresponding function code, refer to the definition code of input and output. (Note: defined as the input function, write the input interface function code at the corresponding address; Defined as output function, write "output interface function code +100" at the corresponding address)
40719-40720	**DWord**	**R/W**	Free Port 2 Define	
40721-40722	**DWord**	**R/W**	Free port 3 definition	
40723-40724	**DWord**	**R/W**	Free Port 4 Define	
40725-40800	Reserved			
Cumulative compensation parameters				
40801-40802	**DWord**	**R/W**	ACUM Comp ON/OFF	Initial value: 1 (ON); Range: 0: OFF; 1: ON
40803-40804	**Float**	**R/W**	ACUM Comp range	Initial value: 1.000kg/h; Range: 0 to 999999
40805-40806	**DWord**	**R/W**	PT1 Set : Comp ON/OFF	Initial value: 1 (ON); Range: 0: OFF; 1: ON
40807-40808	**Float**	**R/W**	PT1 Set : Flow Comp Value	Initial value: 1.000kg/h; Range: 0 to 999999
40809-40810	**Float**	**R/W**	PT1 Set : Comp Coef	Initial value: 1.00000; Range: 0 to 2.00000
40811-40812	**DWord**	**R/W**	PT2 Set : Comp ON/OFF	Initial value: 1 (ON); Range: 0: OFF; 1: ON
40813-40814	**Float**	**R/W**	PT2 Set : Flow Comp Value	Initial value: 2.000kg/h; Parameter range: 0 to 999999
40815-40816	**Float**	**R/W**	PT2 Set : Comp Coef	Initial value: 1.00000; Range: 0 to 2.00000
40817-40818	**DWord**	**R/W**	PT3 Set : Comp ON/OFF	Initial value: 1 (ON); Range: 0: OFF; 1: ON
40819-40820	**Float**	**R/W**	PT3 Set : Flow Comp Value	Initial value: 3.000kg/h; Parameter range: 0 to 999999
40821-40822	**Float**	**R/W**	PT3 Set : Comp Coef	Initial value: 1.00000; Range: 0 to 2.00000
40823-40824	**DWord**	**R/W**	PT4 Set : Comp ON/OFF	Initial value: 1 (ON); Range: 0: OFF; 1: ON
40825-40826	**Float**	**R/W**	PT4 Set : Flow Comp Value	Initial value: 4.000kg/h; Parameter range: 0 to 999999
40827-40828	**Float**	**R/W**	PT4 Set : Comp Coef	Initial value: 1.00000; Range: 0 to 2.00000
40829-40830	**DWord**	**R/W**	PT5 Set : Comp ON/OFF	Initial value: 1 (ON); Range: 0: OFF; 1: ON
40831-40832	**Float**	**R/W**	PT5 Set : Flow Comp Value	Initial value: 5.000kg/h, the value ranges from 0 to 999999
40833-40834	**Float**	**R/W**	PT5 Set : Comp Coef	Initial value: 1.00000; Range: 0 to 2.00000
40835-40836	**DWord**	**R/W**	PT6 Set : Comp ON/OFF	Initial value: 1 (ON); Range: 0: OFF; 1: ON
40837-40838	**Float**	**R/W**	PT6 Set : Flow Comp Value	Initial value: 6.000kg/h, the value ranges from 0 to 999999
40839-40840	**Float**	**R/W**	PT6Set : Comp Coef	Initial value: 1.00000; Range: 0 to 2.00000
40841-40842	**DWord**	**R/W**	PT7 Set : Comp ON/OFF	Initial value: 1 (ON); Range: 0: OFF; 1: ON

40843-40844	**Float**	**R/W**	PT7 Set : Flow Comp Value	Initial value: 7.000kg/h, the value ranges from 0 to 999999
40845-40846	**Float**	**R/W**	PT7 Set : Comp Coef	Initial value: 1.00000; Range: 0 to 2.00000
40847-40848	**DWord**	**R/W**	PT8 Set : Comp ON/OFF	Initial value: 1 (ON); Range: 0: OFF; 1: ON
40849-40850	**Float**	**R/W**	PT8 Set : Flow Comp Value	Initial value: 8.000kg/h, the value ranges from 0 to 999999
40851-40852	**Float**	**R/W**	PT8 Set : Comp Coef	Initial value: 1.00000; Range: 0 to 2.00000
40853-40854	**DWord**	**R/W**	PT9 Set : Comp ON/OFF	Initial value: 1 (ON); Range: 0: OFF; 1: ON
40855-40856	**Float**	**R/W**	PT9 Set : Flow Comp Value	Initial value: 9.000kg/h, the value ranges from 0 to 999999
40857-40858	**Float**	**R/W**	PT9 Set : Comp Coef	Initial value: 1.00000; Range: 0 to 2.00000
40859-40900	Reserved			
Communication parameters				
40901	**Word**	**R/W**	RS232 Slave ID	Initial value: 1, parameter range: 1 to 99
40902	**Word**	**R/W**	RS232 Baudrate	Initial value 0:38400; **0:**38400/**1:**4800/ **2:**9600/**3:**19200/**4:**57600/**5:**115200
40903	**Word**	**R/W**	RS232 Protocol	Initial value: 0:Modbus RTU 0:Modbus RTU; 1: Print
40904	**Word**	**R/W**	RS232 Data Format	Initial value: 0:8-E-1. Parameter range: **0:**8-E-1; **1:**8-O-1; **2:**8-N-1; **3:**7-E-1;**4:**7-O-1 (meaning: data bit - parity bit - stop bit)
40905	**Word**	**R/W**	RS232 DWord Format	Initial value: H-L. 0:H-L; 1:L-H
40906-40920.	Reserved			
40921	**Word**	**R/W**	RS485 Slave ID	Initial value: 1. Parameter range: 1 to 99
40922	**Word**	**R/W**	RS485 Baudrate	Initial value 0:38400 0:38400/1:4800/2:9600/3:19200/4:57600/5:115200 optional
40923	**Word**	**R/W**	RS485 Protocol	Initial value: 0:Modbus RTU; 0:Modbus RTU; 1: Print
40924	**Word**	**R/W**	RS485 Data Format	Initial value: 0:8-E-1. Parameter range: 0:8-E-1; 1:8-O-1 ; 2:8-N-1 ; 3:7-E-1; 4:7-O-1 (Meaning: data bit-parity bit-stop bit)
40925	**Word**	**R/W**	RS485 DWord Format	Initial value: H-L; Parameter range: 0:H-L; 1:L-H.
40926-40970.	Reserved			
40971	**Word**	**R/W**	Network Protocol	0:MB_TCP/IP (Modbus TCP/IP)
40972	**Word**	**R/W**	Network Dword Format	Initial value: 502, range: 0 to 65535
40973	**Word**	**R/W**	Port	Parameters range: 0:H-L 1:L-H; Initial value: 0
40974 ~ 40977	**Word**	**R/W**	IP address IP1~IP4	IP address. Initial value: 192.168.101.246, Parameter range: 0.0.0.0 to 255.255.255.255
40978	**Word**	**R**	**MAC1**	MAC address, read-only, bc.66.41.9x.xxx.xxx
40979	**Word**	**R**	**MAC2**	
40980	**Word**	**R**	**MAC3**	

40981	**Word**	**R**	**MAC4**	
40982	**Word**	**R**	**MAC5**	
40983	**Word**	**R**	**MAC6**	
Analog calibration parameters				
45001-45002	**DWord**	**R/W**	AO1 CAL	When the interface enters the analog output 1 calibration, it means that the output analog calibration is enabled, and the reading is only 1; It is also possible to directly write 1 to enable output analog quantity 1 calibration.
45003-45004	**DWord**	**R/W**	AO1 Of CP1	AO1 CAL: AO1 Of CP1~CP5: When the interface enters the calibration interface of1-5, it opens calibration points 1-5, reads 1, or directly writes 1 to enable calibration points 1-5. AO1 Of CP1~CP5 Value: Read: Theoretical values of CP1-5; Write: Actual value written
45005-45006	**Float**	**R/W**	CP1 Value	
45007-45008	**DWord**	**R/W**	AO1 Of CP2	
45009-45010	**Float**	**R/W**	CP2 Value	
45011-45012	**DWord**	**R/W**	AO1 Of CP3	
45013-45014	**Float**	**R/W**	CP3 Value	
45015-45016	**DWord**	**R/W**	AO1 Of CP4	
45017-45018	**Float**	**R/W**	CP4 Value	
45019-45020	**DWord**	**R/W**	AO1 Of CP5	
45021-45022	**Float**	**R/W**	CP5 Value	
45023 ~ 45040	reserve			
45041-45042	**DWord**	**R/W**	AO2 CAL	Refer to AO1 CAL .
45043-45044	**DWord**	**R/W**	AO2 Of CP1	
45045-45046	**Float**	**R/W**	CP1 Value	
45047-45048	**DWord**	**R/W**	AO2 Of CP2	
45049-45050	**Float**	**R/W**	CP2 Value	
45051-45052	**DWord**	**R/W**	AO2 Of CP3	
45053-4505	**Float**	**R/W**	CP3 Value	
45055-45056	**DWord**	**R/W**	AO2 Of CP4	
45057-45058	**Float**	**R/W**	CP4 Value	
45059-45060	**DWord**	**R/W**	AO2 Of CP5	
45061-45062	**Float**	**R/W**	CP5 Value	
45063-45080	Reserved			
45081-45082	**DWord**	**R/W**	AI CAL	When entering the analog input calibration interface, it means that the input analog calibration is enabled, and the reading is only 1; You can also directly write 1 to enable output analog quantity calibration.
45083-45084	**Float**	**R/W**	AI Of CP1 Value	AI1 Of CP1~CP5: Value：Theoretical values of CP1-5; Cur: Read the current analog value.
45085-45086	**Float**	**R/W**	AI Of CP1 Cur	
45047-45048	**Float**	**R/W**	AI Of CP2 Value	
45049-45050	**Float**	**R/W**	AI Of CP2 Cur	
45051-45052	**Float**	**R/W**	AI Of CP3 Value	
45053-45054	**Float**	**R/W**	AI Of CP3 Cur	
45055-45056	**Float**	**R/W**	AI Of CP4 Value	
45057-45058	**Float**	**R/W**	AI Of CP4 Cur	
45059-45060	**Float**	**R/W**	AI Of CP5 Value	
45061-45062	**Float**	**R/W**	AI Of CP5Cur	
45063-46000	Reserved			
System information parameters				
46001	**Word**	**R**	Software version high word	Consult the product software version and compile date address area

46002	**Word**	**R**	Software version low word	
46003	**Word**	**R**	Compile date high word	
46004	**Word**	**R**	Compile date low word	
46006-46020	Reserved			
Reset parameters				
46021	**Word**	**W**	All reset (including weight and analog calibration)	Reset parameter address area: Write 1 to the corresponding address to complete the parameter reset. For example, if the address 46021 is written to 1, all parameters are reset.
46022	**Word**	**W**	Analog output 1 Calibration reset	
46023	**Word**	**W**	Analog output 2 Calibration reset	
46024	**Word**	**W**	Reset the input analog	
Profinet communication parameters				
46041	**Word**	**R/W**	Acyclic parameter write switch	Initial value: 0 (OFF); Range: 0: OFF; 1: ON
46042	**Word**	**R/W**	Weight display data type switch	Initial value: 0 (Float); Range: 0: Float; 1: Int
46043	**Word**	**R/W**	ACUM Show	Initial value: 0 (Single ACUM); Range: 0: Single ACUM; 1: Total ACUM
46044	**Word**	**R/W**	AO Show	Initial value: 0 (AO1); Range: 0: AO1; 1: AO2
Boot Logo Settings				
46061 ~ 46068	**Word**	**R/W**	Edit Logo characters 1 to 8	Set to display the boot Logo character
System Parameters				
46081 ~ 46082	**DWord**	**R/W**	Parameter password switch	Initial value: 0 (OFF); Range: 0: OFF; 1: ON
46083 ~ 46084	**DWord**	**R/W**	User password	Read: The current user password; Write: New user password
46085 ~ 46086	**DWord**	**R/W**	Calibration password	Read: The current CAL password; Write: New CAL password
46087 ~ 46088	**DWord**	**R/W**	Backlight Time	Range：0~3600**s,**Default：600s
46089 ~ 46090	**DWord**	**R/W**	Screen test	
46091 ~ 46092	**DWord**	**R/W**	Language	Initial value: 0 (Chinese); Range: 0: Chinese; 1: English
46093 ~ 46094	**DWord**	**R/W**	COM light switch	For selecting the communication blinking light; 0:485; 1:232
Coil address				
00001	**Word**	**R/W**	Run/stop	Write 1 to run, write 0 to stop
00002	**Word**	**W**	Zero	Write 1: Perform the operation Read: 0.
00003	**Word**	**W**	Clear alarm	
00004	**Word**	**W**	Print	
00005	**Word**	**W**	Quickly CAL Zero	
00006	**Word**	**W**	Clear Single ACUM	
00007	**Word**	**W**	Clear All ACUM	
00008	**Word**	**R/W**	Given Analog Output	
00009	**Word**	**R/W**	Manual release	
00010	**Word**	**R/W**	Manual discharge	Write 1 to execute, write 0 to stop
00011	**Word**	**W**	Manual feed/feed input	Write 1 to execute, write 0 to stop

00012	**Word**	**R/W**	Near/far start switch	0: Valid is an external given; 1: Weightless batching mode when invalid	
00013-00050	Reserved				
Reset parameter area					
00051	**Word**	**W**	Reset all (without calibration parameters)		Write 1:perform reset operation, read: 0
00052	**Word**	**W**	Calibration parameter reset	reset address 40201~40218	
00053	**Word**	**W**	Weighing parameters reset	reset address 40101~40118	
00054	**Word**	**W**	I/O parameters reset	reset addresses 40701~ 40724	
00055	**Word**	**W**	Reset all recipe and PID parameters	reset addresses 40401-40438 and 40451-40472	
00056	**Word**	**W**	Reset user parameters	reset addresses 40501~40566	
00057	**Word**	**W**	Reset communication parameters	reset addresses 40901-40905, 40921-40925, and 40971-40977	
00058	**Word**	W	Reset accumulation	reset addresses 40023-40024 and 40025-40026	
00059	**Word**	**W**	Reset cumulative compensation	reset address 40801~40858	
00060 ~ 00080	Reserved				
00081	**Word**	**R/W**	IO test switch	IO status bit, readable and writable, write 1: turn on the IO test	
00082-00085	**Word**	**R/W**	Input status IN1~IN4	Read only, Read: return each input port status bit. 0: invalid; 1 valid	
00086-00089	**Word**	**R/W**	Output status OUT1~OUT4	IO status bit, readable and writable, write 1 : set the output status to valid. 0: invalid; 1 valid	
00090-00093	**Word**	**R/W**	Free port status IO1~IO4	IO status bit, readable and writable 0: invalid; 1 valid	

8.2 PROFINET Communication

The **GMC-X3** display has two **PROFINET-IO** bus connection ports :**NET1** and **NET2**, which can be connected to the **PROFINET** bus as a **PROFINET-IO** slave station.

If the controller is equipped with PN communication, the **IP** address of the controller can be viewed in the standard menu under【**System**】parameters -【**Communication**】parameters -【**Profinet**】; MAC address can be viewed in【**System**】parameters **--**【**Maintenance**】--【**MAC Address**】

8.2.1 **I/O Status**

GMC-X3 provides **52-byte INPUT, 16-byte OUTPUT,** and the master station can read and control the state of the weigh display through these I/ O.

8.2.1.1**PN cycle parameter IO module address**

Offset	Parameter name	Data type	Parameter Description
Weight and status parameters (read register, I address)			

0	Current flow	**DWord**	Current flow value displayed, default: floating type (integer and floating data can be switchd by data type)
4	Current weight	**DWord**	Weight value currently displayed, default: floating type (integer and floating data can be switchd by data type)
8	Total cumulation/single cumulation	**DWord**	Cumulative display inside the controller, according to the controller switch "ACUM Show" ON: total ACUM. OFF: single ACUM(default : OFF)
12	Analog output value	**DWord**	Display analog 1/ Analog 2 output value, according to controller switch "AO Show" ON: analog 2 output value(AO1), OFF: analog 1 output value(AO2) (Default OFF)
16	Flow and weight status bits	**Word**	D13-15: Reserved
			D12: Stable, stable sign for weight judgment
			D11: Zero point, weight in the range of 0+/- 1/4 d
			D10:Overflow status, abnormal weight or overflow status
			D9:The flag bit of millivolt stability during calibration, 0: unstable; 1: stable
			D8: unit of weight, 0:kg; 1:t
			D5-D7: decimal points of weight, 0 to 4 decimal points
			D4: Positive and negative signs of weight, 0: positive flag; 1: negative flag
			D3: unit of flow,0: kg/h; 1:t/h
			D0-D2: decimal point of flow, 0 to 4
18	System status bits	**Word**	D15: Heartbeat packet
			D6-D14: Reserved
			D5: Material Release status
			D3-D4:00: Weight <= feeding point; 01: feed point < real-time weight < stop feed point; 10: weight >= Stop feeding point
			D2: manual discharge, 0: non-discharge status, 1: in discharge state
			D1: Feed status, 0: non-feed status, 1: in feed status.
			D0: running status, 0: stop status, 1: running status
20	Error codes	**Word**	D7-D15 Reserved
			D06:0: write successfully; 1: write data is out of range
			D05: Loadcell overflow when zeroing
			D04: Unstable when zeroing
			D03: Out of range when zeroing
			D02: Unstable when power-on zeroing

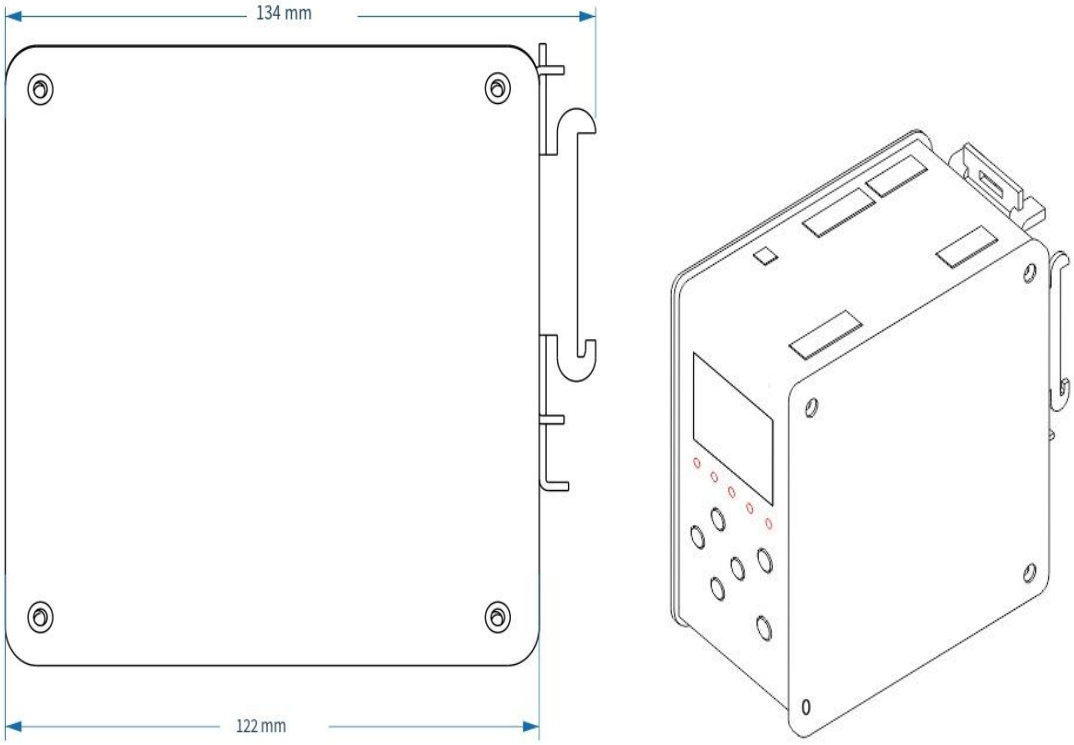
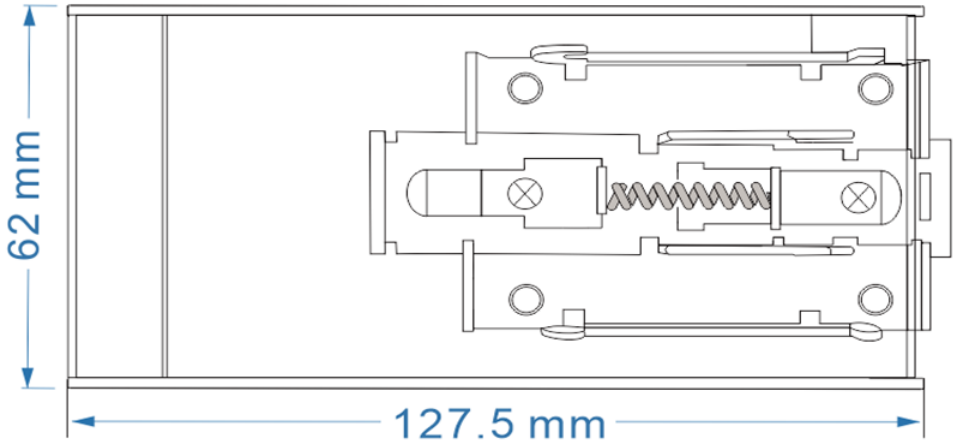
			D01: out of range when power-on zeroing
			D00: Weight calibration error (combining various error status information in the original subdivision calibration)
22	Alarm status	**Word**	D14-D15: reserved
			D13: Filling done
			D12: maximum feeding timeout alarm
			D11: flow over/under alarm
			D10: clogging alarm (material blocking alarm)
			D9: When starting, the maximum analog output does not reach the set target flow
			D8: When starting, the frequency converter fails
			D7: When starting, the target flow rate is 0
			D6: When starting, the flow calibration data is unreasonable
			D5: When starting, the AD/DA calibration switch or IO test switch is turned on
			D4: When starting, the controller is in discharge state
			D3: When starting, the ready signal is not given
			D2: Weight overflow status or loadcell voltage overflow when starting
			D1: The cumulative compensation parameter setting incorrect
			D0: When starting, the feed point is greater than the stop feed point
24	Read value	**DWord**	The master station requests the data returned by the controller, the value obtained according to the "address requested to read"
Function operation and parameter modification (write register, Q address)			
0	Operation Control 1 (1 Valid trigger)	**Byte**	D7: Clear total ACUM
			D6: Clear single ACUM.
			D5: Clear alarm
			D4: Print
			D3: Quickly Calibrate Zero
			D2: Zero
			D1: Stop
			D0: Run
1	Operation Control 2 (1 Valid trigger)	Byte	D3-D7: Reserved
			D2: Manual discharge
			D1: Manual discharge
			D0: feed input
2	The request to write value of the modbus address	DWord	Modbus write operation address (note that it can't write into when the address changes) This parameter modifies the MODBUS address range supported by the interface module to be limited to 100-1289.

6	Input data	DWord	Write this data to the "modbus address of the requested value" (note that it will only be written to the controller if the value changes)
10	The read request of the modbus address	DWord	Modbus read operation address (note that you can't read Dual-word addresses, write an odd address) This parameter modifies the MODBUS address range supported by the interface module to be limited to 0-1289.

8.2.1.2**PN acyclic Parameter list**

Modules	Parameter names	Initial value	Parameter description
Calibration and related parameters	PWR-ON Zero	**0**	Range: 0 to 99(percentage of full scale)
	Tr-Zero Range	**0**	0-99d
	STAB Range	**3**	0-99d
	Zero Range	**50%**	0% - 99%.
	Digital filter Level	**7**	0-9
	Steady-state filter Level	**0**	0-9
	Weight Unit	**kg**	g,kg,t
	Decimal point	**0**	Range: 0; 0.0; 0.00; 0.000; 0.0000
	Division	**d=1**	Controller indicates the minimum change in value Range: 1,2,5,10,20,50
	Full Scale	**10000**	The maximum indicator value of the controller, generally depend on the loadcell range. Range: 1~ minimum index *100000 can be set. When out of range, pop up(" data out of range ") prompt information, avoid to damage the loadcell for weighing overpressure.

8.2.2 Device description file GSD

The device description file and connection method of GMC-X3 can be downloaded from the website of Shenzhen Geman Technology Co., LTD. (www.gmweighing.com).

9. Product Dimensions