

AMC X-Ray Thickness Gauge Operating Instructions



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System Composition Introduction

Chapter One Measuring Principle

1 X-Ray Thickness Gauge System Overview

X-Ray thickness gauge is an on-line high-precision metal strip thickness measuring instrument that can quickly and accurately reflect the actual thickness or deviation thickness of strip in the production process of metal strip. It will not release any radiation after power off. The safe thickness gauge is easy to use and reliable.

Xi'an Ai Mengxi Technology Co., Ltd. has been engaged in the research of thickness measurement technology such as cold rolling (copper, copper alloy, composite strip, stainless steel). In practice, it has accumulated rich experience in measurement technology and mastered the key technology of imported similar thickness gauges. Through the independent innovation and research and development of our company, we have successfully developed a new generation of X-Ray thickness gauges, and its performance and reliability have reached the international advanced level.

2 Measuring Principle

The X-Ray thickness gauge is used to attenuate the intensity of X-Ray as they pass through the material, and the amount of attenuation is used to measure the thickness of the material.

The working principle of the X-Ray thickness gauge and the AGC interface is: the actual value of the strip detected by the thickness gauge is compared with a preset value. If the difference is zero, the amplifier also displays zero, and is sent to the AGC through the signal line. The deviation signal of the system is zero, the roll gap remains unchanged; if the difference is positive, that is, when the strip detection value is greater than the setting, the deviation signal is positive (1 μ m is equivalent to 100mV voltage), and the cylinder is controlled by the AGC system. The servo valve closes the roll to the thickness of the strip as the set value; when the deviation signal is negative, the roll gap is opened instead.

3 Technical Indicators

Thickness gauge specifications: 1930x200x611.5mm (excluding the drag chain)

C-frame opening: 723x150mm;

Dynamic measurement accuracy: ± 0.001 mm;

Measuring range: 0-1mm;

Measuring frame travel: 475mm;

Stroke cylinder working pressure: 16Mpa;

Resolution: sensor 0.001mm, digital display 0.0001mm;

Output signal: deviation ± 10 V (direct reading signal) 232 communication / parallel BCD (AGC thickness control);

Followability: 500m/min;

Maximum measuring depth of the sensor: 100mm (distance from the edge of the strip to be tested).

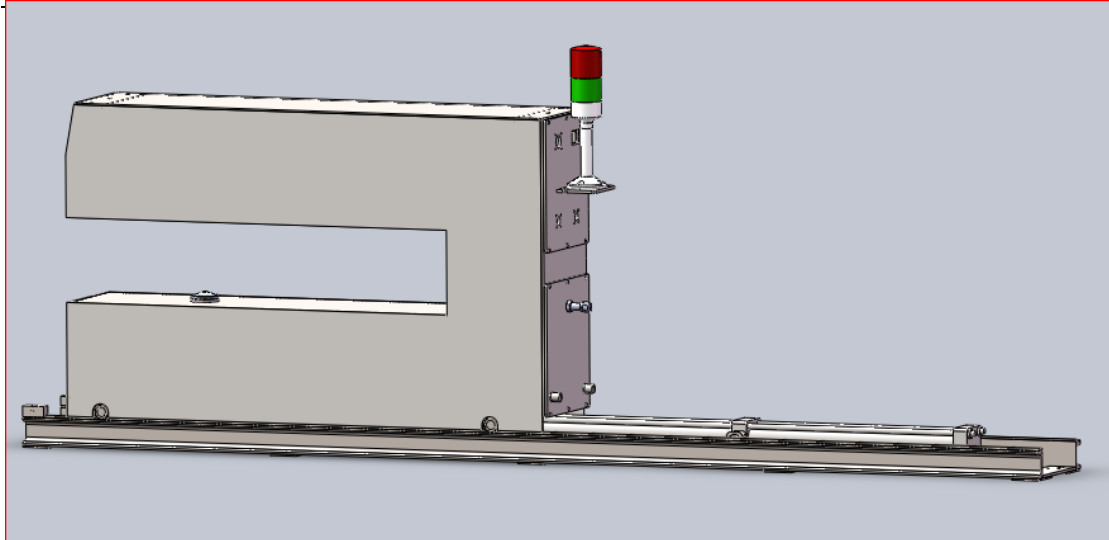
4 Equipment Hardware Components

The configuration of this type of thickness gauge consists of C-frame, operation panel, control cabinet and industrial computer. The C-frame is a mechanical component, including: C-frame, X-Ray machine, ionization chamber, travel drive and base.

The travel drive mounted on the C-frame is divided into hydraulic drive or motor drive. This model is hydraulically driven. It can move the c-frame on the track of the base, which is convenient for equipment maintenance and equipment calibration.

The upper arm of the C-frame is equipped with an ionization chamber, electrical components and cables, and the lower arm is equipped with an X-Ray machine and a cooling water pipe.

When the X-Ray machine is powered on, the red light in the C-frame warning light is always on; when the X-Ray machine stops working, the red light in the warning light is off and the green light is always on; when the total power of the thickness gauge is off, the green light is off.



Chapter Two X-Ray Thickness Gauge Software Operation

5 Start On

Close the circuit breaker of the gage control cabinet to supply power to the system. When the main power is turned on, turn on the left and right cooling relays in the control cabinet to keep the cooling system running. Start the Windows system by clicking the Power button on the back of the thickness gauge computer controller. When the system is loaded, run the “X-Ray Thickness Gauge” icon on the desktop and double-click to enter the following screen:



Figure 1 Screen Login Window

Enter the password "Amc2005", select the appropriate resolution, click the login button to enter the main screen of the thickness gauge system, as shown below:

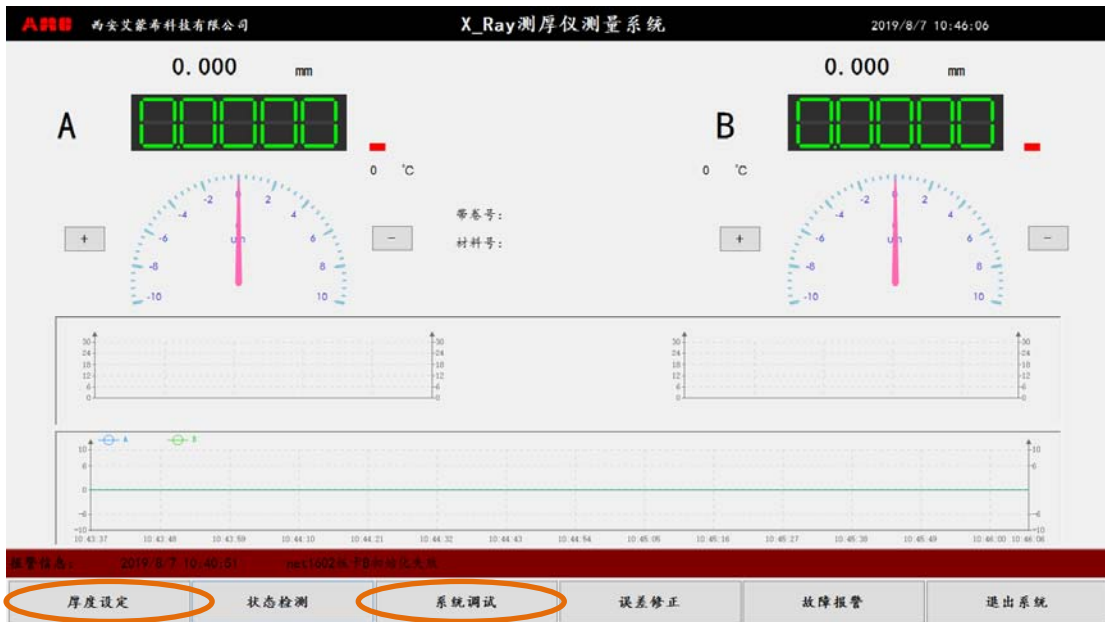


Figure 2 Main Screen

Select the material type in "Thickness setting", then open the ray in the "System Parameters" screen in the system debugging, you can start running the measurement. The detailed function usage is explained below.

6 Thickness Setting Interface

There are two modes for thickness setting: PLCRS232 serial communication and HMI manual. It is necessary to set whether the setting data source is local setting or remote communication setting in the system parameter interface.



Figure 3 System Parameters

If the local mode is selected, the target thickness value is set in the thickness setting menu (labeled in Figure 2).

7 Status Detection

When the thickness gauge is being debugged and overhauled, the engineer can intuitively judge whether the input/output of the switch point is correct or not on the HMI screen. It can also judge whether the input/output of the probe and the thickness deviation is correct or not.



Figure 4 Thickness Gauge Status Screen

- (1) Digital input test Used to test the on/off state of the digital input signal;
- (2) The digital output test is used to test the status of the digital output signal.

You need to click the digital output enable. Click the test button again to observe the digital output status. After the test is completed, click the digital output to cancel. Cancel the test;

- (3) Analog quantity The test method is similar to the digital test;
- (4) If the communication fails, you can click the network port reset button, click the start button again to restart; you can also exit the software to restart the software.

8 System Debugging

Mainly used to modify some system parameters, the most commonly used are the first three menu buttons, as shown in Figure 5.

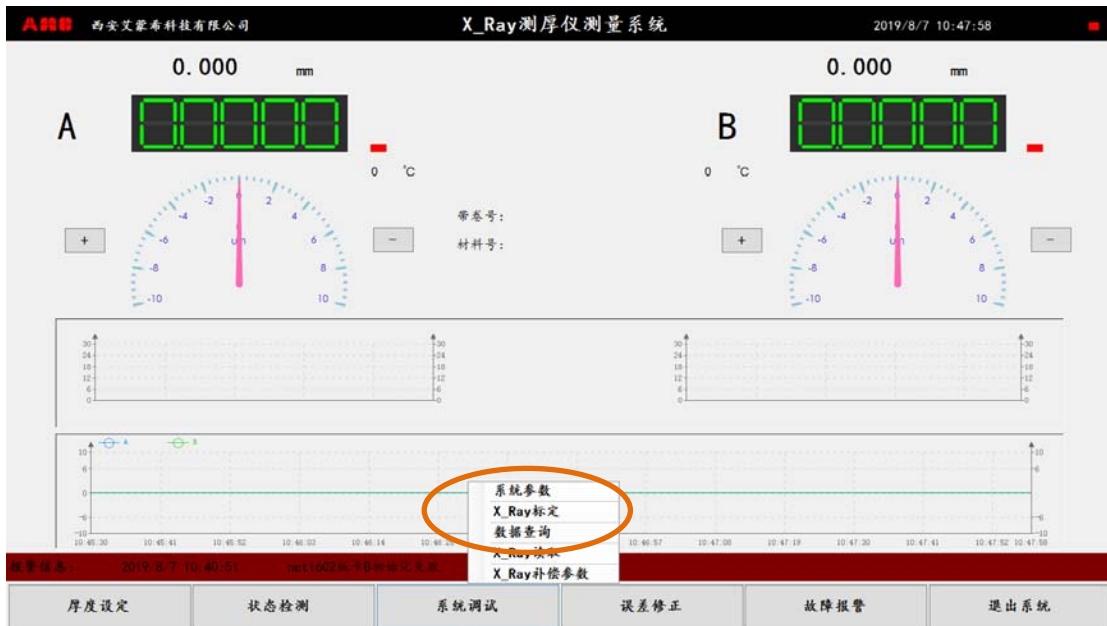


Figure 5 System Debug Menu

(1) The serial port communication setting in the system parameter is used to configure the communication parameters with the external link. The thickness gauge controls the system parameters of the main configuration software. After the parameters are modified, you must click the save button to use the new parameters. These parameters do not need to be modified. After the system is running, you need to turn on the ray on this screen before it can run normally.



Figure 6 System Parameter Setting

(2)The ray calibration screen is used to configure the running coefficients required for measuring some materials. Let's take the A group configuration as an

example:

First select the material in the "Material type:" drop-down box, or you can enter the material name directly by hand.

A_X coefficient calibration group

A_X No-load calibration: The initial voltage obtained when the source is turned on when there is no material on the thickness gauge.

A_X coefficient calibration: material material is similar, when the error is small, the actual thickness can be filled in the set thickness, and the overall correction factor can be verified.

A_X coefficient reset: Resets the overall correction factor and is 1 after reset.

A_X calibration group:

The last two columns in the A_X calibration group are filled with the signal value and the actual thickness value, and the first column is automatically calculated by the system. If G1 is filled with the actual thickness of 0.01mm, the corresponding S1 fills in the signal value obtained by placing the 0.01-thick material after the ray is turned on (the "signal" value in the A_X coefficient calibration is the current signal value). Finally fill in several groups, select the number of groups to fill in the number of groups, click the Save button to save the changes, otherwise the modification is invalid.



Figure 7 Ray Calibration Screen

(3) Ray Calibration Screen

Data queries are used to query historical data for archiving. It mainly includes rolling data information such as "deviation", "thickness", "with volume number", and "rolling date".

Select the query condition query according to the requirements, for example, query by the volume number, select the small box after the volume number (tick), and then click the downward triangle below the volume number input box to select the corresponding volume number, again Click the Query button to perform a database query.

The “Y-axis zoom” and “Y-axis zoom” buttons respectively enlarge or reduce the range of the Y-axis of the curve. The “0.25”, “0.5”, and “1.0” in the curve settings correspond to the X-axis scaling ratios of 0.25, 0.5, and 1.0, respectively.

The Save Picture button converts the curve to a picture format for saving or printing. When the data is queried, you can click on the red box in the figure to export data or print data.



Figure 8 Data Query

(4) "X-Ray read" and "X-Ray compensation parameters" are mainly used for system debugging. The screen is as follows

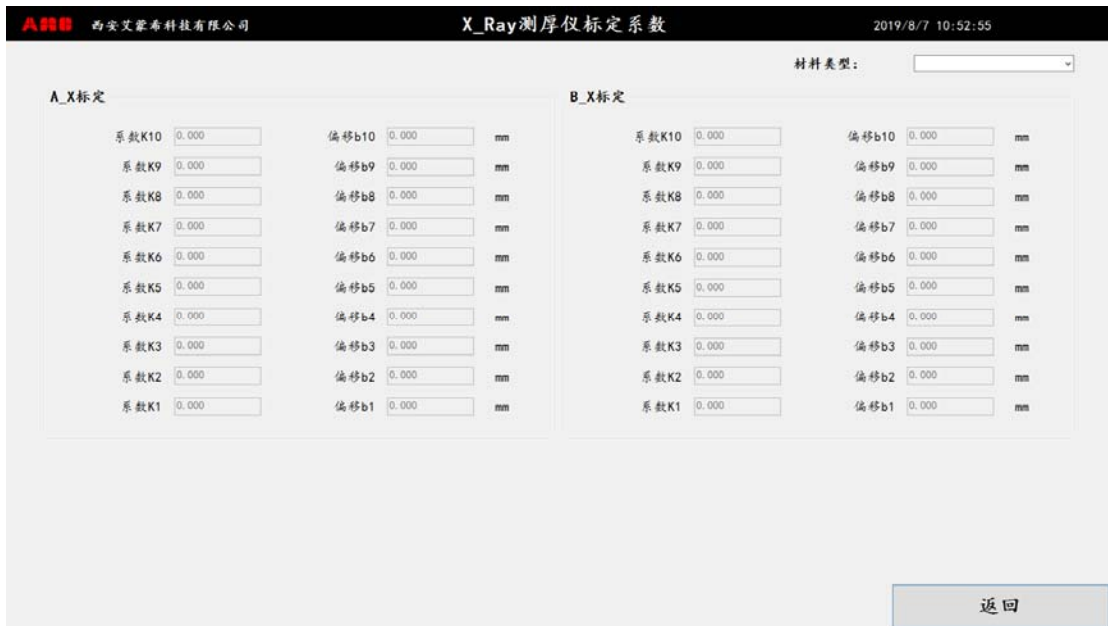


Figure 9 X-Ray after Reading the Parameters

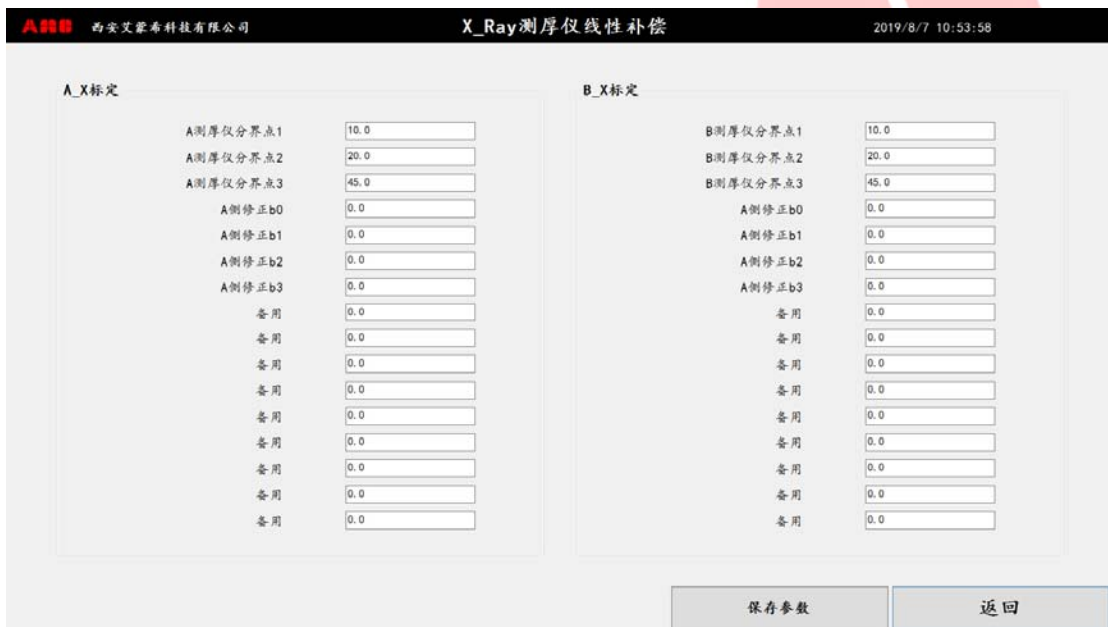


Figure 10 X-Ray Compensation Parameter

9 Fault Alarm

It is used to display general fault information generated by the operation of the system after operation.



Figure 11 Fault Alarm

10 System Exit

Click "Exit System" on the "Main Screen", confirm and exit the system.

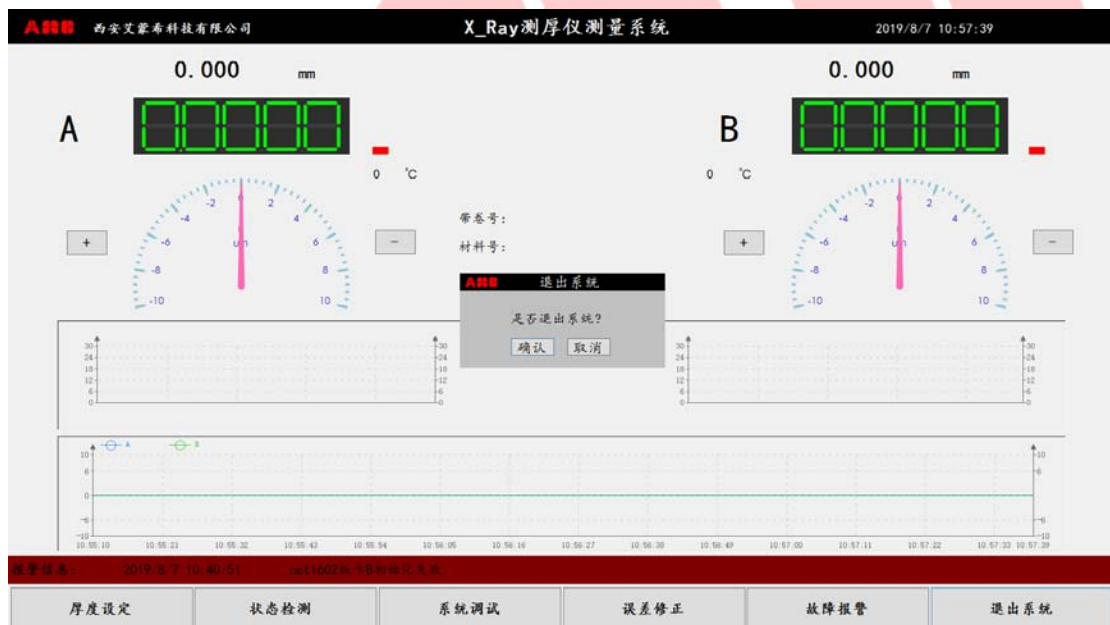


Figure 12 System Exit

Chapter Three Daily Maintenance and Troubleshooting

11 Daily maintenance instructions

1. Equipment regularly check the project list

number	inspection cycle	Check item	Check content
1	Week	X-Ray machine window	Check if the X-Ray machine window is damaged and there is no accumulation of oily impurities.
2	Week	Ionization chamber window	Check if the ionization chamber window is damaged and if the aluminum foil is cracked.
3	Week	Thickness gauge warning light	Check if the warning light on the C-frame is working properly and the cable connection on the C-frame is normal.
4	Week	Precision check	Check the accuracy one by one with the calibration plate,especially the thickness of the finished pass
5	Month	Electrical connections	Check if the connection between the control cabinet and each function board in the C-frame is loose.
6	Month	C-frame drive	Check if the oil circuit and oil pressure are normal
7	Month	Drift test	Continuously measure with a calibration plate for more than 5 minutes to see if there is any significant thickness change.
8	Month	C-frame roller bearing	Check if the C-frame roller bearing is normal

2. Check Project Guidance

(1) X-Ray Machine Window

Under the condition of taking safety measures, visually check whether the filter cover of the X-Ray machine window is damaged, and whether there is accumulation of oily impurities around the filter cover.

(2) Ionization Chamber Window

Similar to item (2), the condition of the ionization chamber was visually inspected for the possibility of damage or water in production.

(3) Thickness Gauge Warning Light

At the end of the C-frame warning light, observe whether the warning light is red when the X-Ray machine is turned on, and whether the green light is on when it is closed. If there is a fault, it will be processed in time.

(4) Precision Check

The user needs a sample rack with a height of the rolling line. The model rack is placed in the center of the X-Ray machine window. The calibration plates of known thickness are placed one by one on the rack to check the measurement accuracy, especially the thickness of the finished pass. , after the record is compared with the previous one.

(5) Electrical Connection

In the daily maintenance and use of the user, it is inevitable to do some inspection work in the tail of the C-frame and in the field junction box, which may cause some internal cables to loosen, so it is necessary to periodically control the function boards in the control cabinet and the C-frame. Check whether the connection on the line is loose, and check each terminal including the junction box for looseness or rust.

(6) C-Frame Drive

Check the port connections to prevent unintentional damage to the port connections during routine maintenance.

(7) Drift Test

Drift is an important indicator of whether the equipment is stable. If the equipment is faulty, it can be clearly reflected. Use a calibration plate to continuously measure for more than 5 minutes to observe whether there is obvious thickness change. General field condition measurements should not exceed 0.15% of the change.

(8) C-Frame Roller Bearing

C-frame roller bearings are not easy to see at ordinary times, and they are subject to regular inspection due to wear and tear during long-term use.

12 Troubleshooting -System Cannot Start

First check whether the 24V power supply of the system is normal. If the system is powered normally and still cannot be turned on normally, you need to repair the system or redo the system. This situation is usually caused by abnormal shutdown of the system, so you must follow the normal shutdown. Shut down the program to avoid system software damage and can not start.

13 Troubleshooting -Communication Failure

The red light on the upper right corner of the main screen (communication indicator) flashes, and the red light flashes to indicate a communication failure. If this happens, first exit the program and reload to see if the red light is still flashing. If the red light is still flashing, you need to check the network cable connection and the network configuration is correct.

14 Troubleshooting - The Source Cannot Be Turned On

Check if the source serial port configuration is correct, and then check if the serial port plug is connected correctly.

15 Troubleshooting - Ray No-Load Voltage Is Too Low

After confirming that the source is turned on, check if something is blocking the source.

Chapter Four Consulting Method

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