Advantech AE Technical Share Document

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Category	■FAQ □SOP	**Related OS**	N/A
Abstract	WISE-40XX, How to use scaling function and physical scaling function?		
Keyword	WISE, Low scaling value, High scaling value, Physical Min Scaling Value, Physical Max Scaling Value		
Related Product	WISE-40XX series		

■ Problem Description:

This documentation explains the detail information about the scaling function of WISE AI module.

When using the AI with different types of sensor, the scaling function can help to convert the raw data into meaningful engineer unit so that HMI (Human Machine Interface) or database can read these data directly to enhance computational time complexity.

■ Brief Solution - Step by Step:

The scaling function can be found in the configuration of analog input of WISE utility. The scaling setting explanation can be found in “System Configuration” section in WISE-4000 series user manual.

Scenario

Here, WISE-4012 is used for demonstration. Scenario is that mapping 0 ~ 50℃ to 0.5 ~ $3V_{DC}$. The setting is shown as in figure 1.

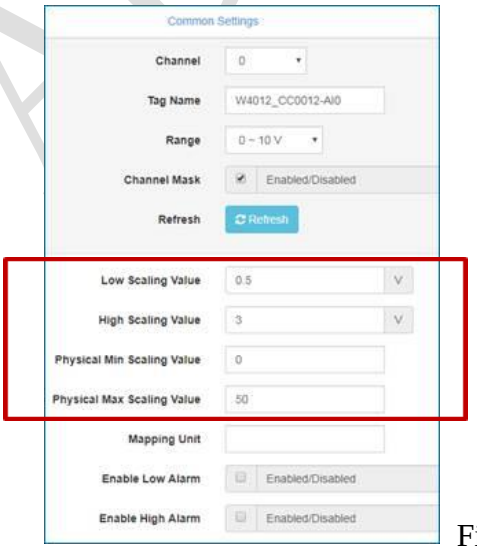


Figure 1. Configuration in WISE utility

Experiment

Use power supply to supply $2V_{DC}$ to WISE-4012 channel 0, which is set as AI mode.

In "Status", as shown in figure 2, column Value[Eg] shows current voltage received from power supply, column Value[Hex] and Value[Dec] show corresponding raw data in Modbus address, which is shown in figure 3 and 4. User can check these address location from "I/O Modbus Mapping Table" section in user manual.

User can calculate by equation (1) to transform raw data to human readable data format. For example, $\frac{13052}{65535} * 10 + 0 = 1.99$.

Ch	Range	Value[Eg]	Value[Hex]	Value[Dec]
0	0 ~ 10 V	1.9916 V	32FC	13052

Figure 2. WISE utility I/O Status

40001	0	AI Value	Read
40002	1		Read
40003	2		Read
40004	3		Read
40005	Average Channel 0~1		Read

Figure 3. Modbus AI raw data correspond address.

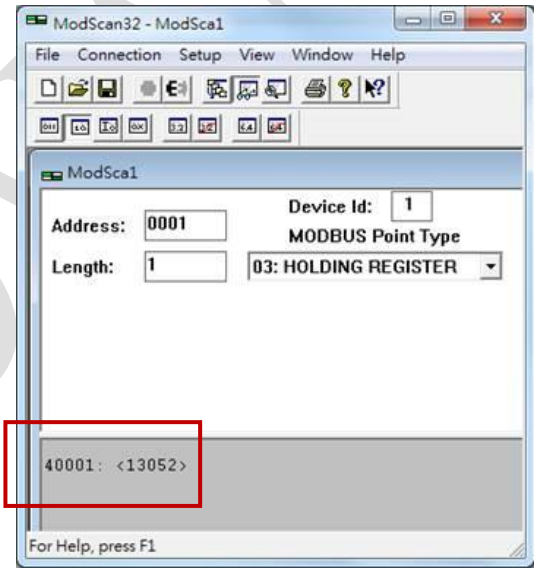


Figure 4. Modbus AI raw data.

$$\frac{\text{Value[Dec]}}{65535} \times \text{inputRange} + \text{offset} = \text{Value[Eg]} \quad (1)$$

After Low/High scaling value, data is registered in different Modbus address, and will not display on utility. Different WISE module has different corresponding Modbus address, which user

can check in user manual as in figure 5. The extracted data is shown in figure 6 and can be transformed into human readable value by formula (1) as well, $\frac{39085}{65535} * 2.5 + 0.5 = 1.99$.

40191	0	AI Value After Scaling	Read
40192	1		Read
40193	2		Read
40194	3		Read
40195	Average Channel 0~3		Read

Figure 5. AI value after scaling in corresponding Modbus address.

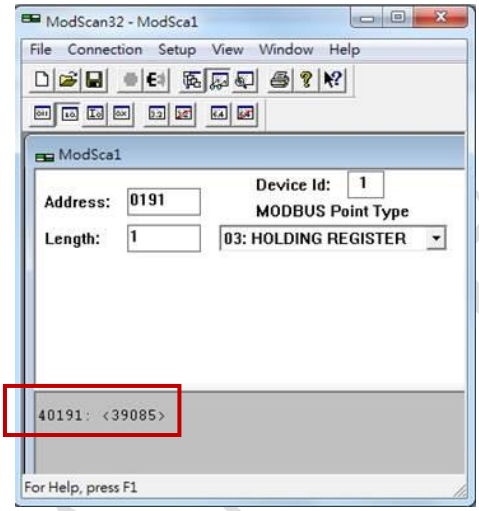


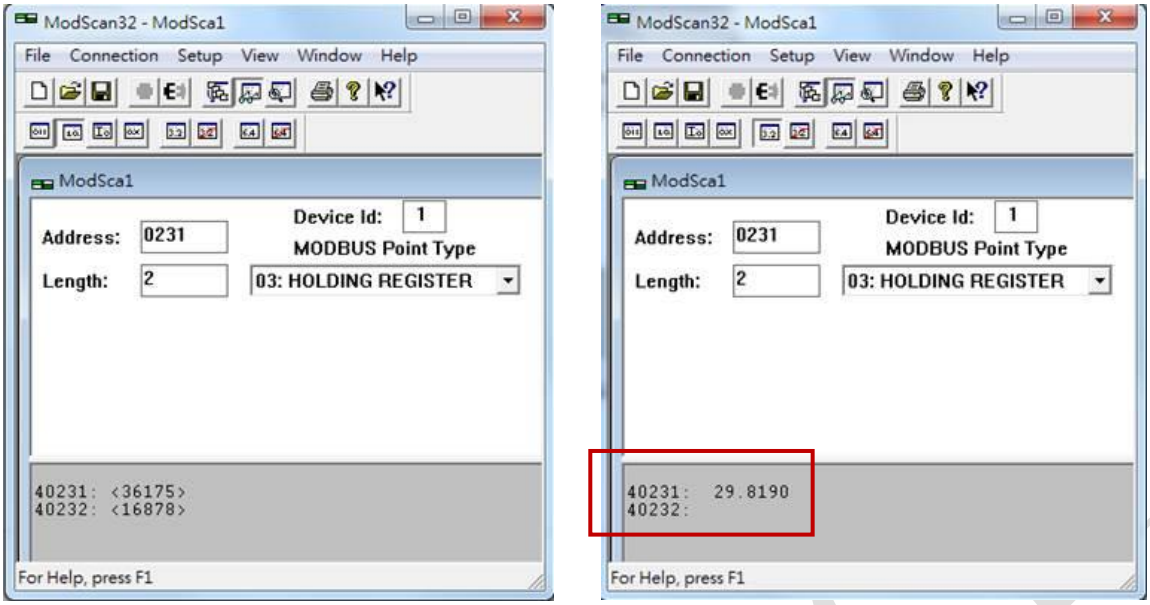
Figure 6. AI value after scaling.

Physical Low/High scaling value, which will not be shown in utility, will mapping 0 ~ 50℃ to Low/High scaling range 0.5 ~ 3V. In this case, if supply WISE-4012 ≦ 0.5V, data 0.000 is registered in Modbus address [40231-40232]; if supply WISE-4012 ≧ 3V, data 50.000 is registered in these addresses.

Note that in these addresses, data format is set as IEEE 754 floating value, which is shown in figure 7 and 8.

40231~40232	0	Physical AI Floating Value (IEEE754)	Read
40233~40234	1		Read
40235~40236	2		Read
40237~40238	3		Read
40239~40240	Average Channel 0~3		Read

Figure 7. AI value after physical scaling corresponding Modbus address.



(a) (b)

Figure 8. (a) AI decimal value after scaling. (b) AI **floating value** after scaling.

In figure 8 (b), the result shows that the voltage value 2V supplied by the power supply, refers to temperature 29.8190℃.

WISE-4012E is an exception. This model is a demo piece. The purpose is to let a user easy to receive the data they need. According to the user manual, the AI value is not raw data like WISE-4012, but **an engineering value with unit mV.**

40001	0	AI Value (Value Range: 0~10000, Value Unit: mV)	Read
40002	1		Read
40003	Average Channel 0~1		Read

(a)

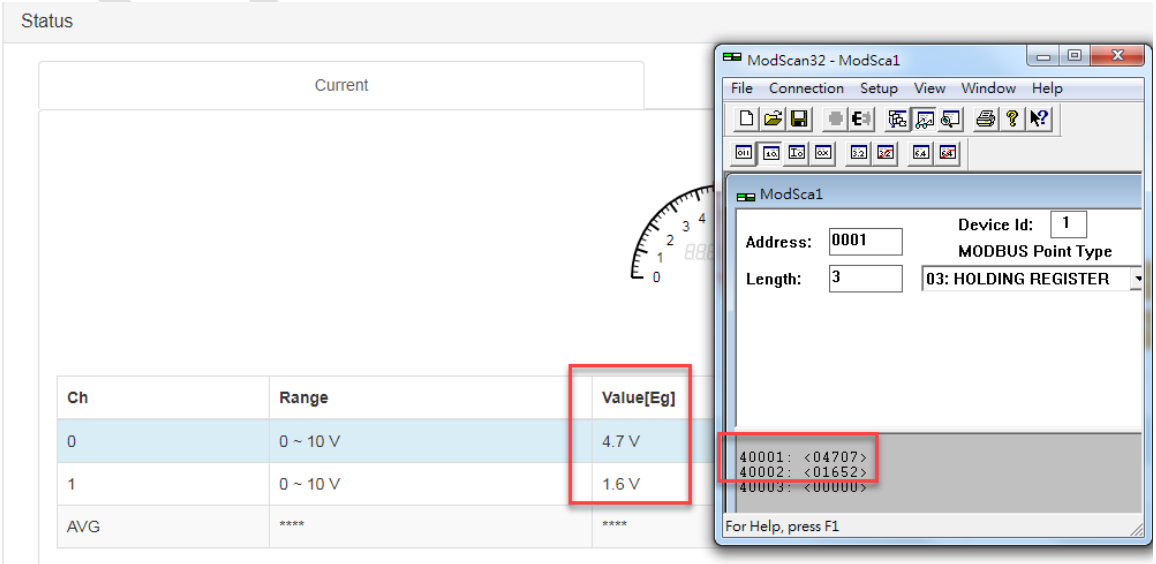
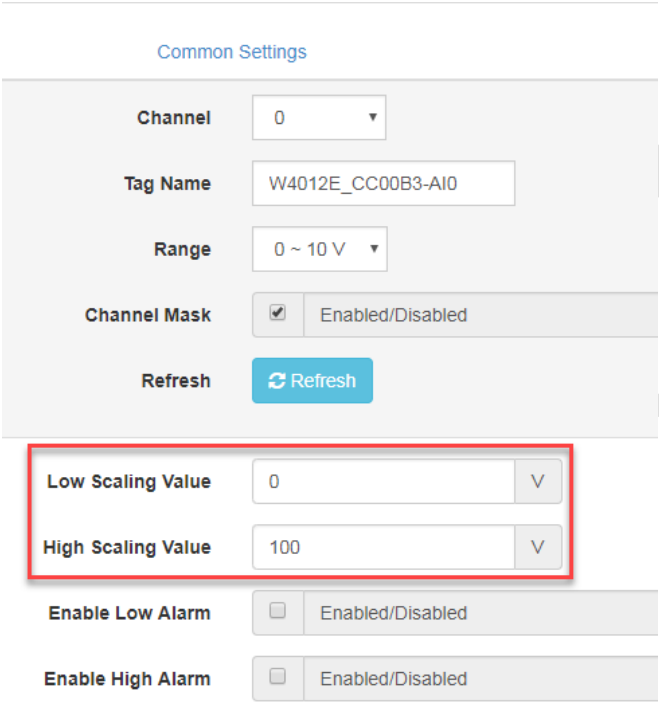


Figure 9. (a) AI value definition in user manual. (b) The value on web page and Modbus addr.

As shown in figure 9, there is a comparison between the I/O status web page and the ModScan reading results. The range of the value is 0~10000 in Modbus address. According to the equation (1), it would be $\frac{4707}{10000} * (10 - 0) + 0 = 4.707\text{V}$.

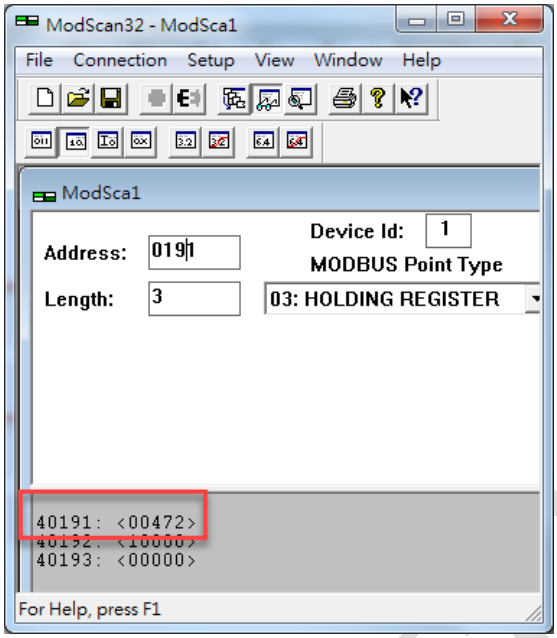
In figure 10 (a), the input range is set as 0-10V, and the scaling value is set as 0~100V.



(a)

40191	0	AI Value After Scaling	Read
40192	1		Read
40193	Average Channel 0~1		Read

(b)



(c)

Figure 10. (a) Input range and scaling range. (b) AI value after scaling definition in user manual. (c) The result of Modbus address.

As shown in figure 10, there is a result of after scaling value of AI channel. The range of the value is still within 0~10000 in Modbus address. According to the equation (1), it would be $\frac{472}{10000} * (100 - 0) + 0 = 4.72\text{V}$.