IO Scale Factor Guidance

This topic can be complex and sometimes frustrating. I am glad that you reached out to us so that we can help with your project.

Below is a tutorial for an Analog In as an example:

The scale factor is different on AI1/2 compared with AI3/4. So, for example:

- register value of 28407 would be 1.2 V on Al1 and Al2.
- register value of 28407 would be 4.3 V on AI3 and AI4 (red and purple highlighting in the second screen shot below).

Al1/2 Analog Input Register

To convert the register value to Volts multiply by the scale factor of 0.000152587 (purple highlighting in the two screen shots below).

Al3/4 Analog Input Register

To convert the register value to Volts multiply by the scale factor of 0.000053406 (purple highlighting in the two screen shots below).

Attached:

IO Unit Scale Factor Calculator:

The attached Excel Spreadsheet will assist in being able to report what the anticipated AI and AO output will be for the FGR-IO, **I2-IO**, and IOE/IOEX units (including when attached to ZumEdge Z9-IO-PE-ZE). The Excel sheet has the conversion factor for the AI and AO readings and will assist in reporting what the actual Modbus readings would be.

AI1/2

INPUT REG 30000 30001 Al1 MSW 16 Upper 16 bits; msb=5V, Isb=152.587uV INPUT REG 30001 30002 A1 LSW 16 Lower bits, Isb=2.3283nV

AI3/4 INPUT REG 30015 30016 AI(DI1) 16 0-3.5Vin; Isb=53.406uV Excerpt from section 7. Modbus Register Map Page 99 of the Modbus IO User Reference Manual:

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M	00	b	10	41	\cap
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Read Only, RO		Read/Write, RW		Non-Volatile on PWR cycle, 10,000-write lifetime limit				
Туре	ADDRESS		ENTITY BITS		NOTES			
	PROTOCOL	PLC			All addresses described are "PLC" numbers			
REG								
INPUT REG	30011	30012	ALL COILS 16:1	16	PLC Addresses 16:1, but Read-Only			
INPUT REG	30012	30013	ALL COILS 32:17	16	PLC Addresses 32:17, but Read-Onl			
INPUT REG	30013	30014	Al1 MSW Offset Result	16	AI1 MSW - AI1 USER OFFSET			
INPUT REG	30014	30015	AI2 MSW Offset Result	16	AI2 MSW - AI2 USER OFFSET			
INPUT REG	30015	30016	AI(D11)	16	0-3.5Vin; lsb=53.406uV			
INPUT REG	30016	30017	A1(D12)	16	0-3.5Vin; lsb=53.406uV			
INPUT REG	30017	30018	Alt	32FP	IEEE754 Short Float in unscaled Volts			
INPUT REG	30019	30020	Al2	32FP	IEEE754 Short Float in unscaled Volts			
INPUT REG	30021	30022	AI(DH)	32FP	IEEE754 Short Float in unscaled Volts			
INPUT REG	30023	30024	A1(D12)	32FP	IEEE754 Short Float in unscaled Volts			

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Register Type	Register discription/register	User Inputs		Scale Factor	Unit of measure	16bit Result		20bit Result	
	Analog In-put 1 (30001 msb)	8184	Register value	0.000152587		1.248772008		1.2488	Volts
	Analog In-put 1 (30002 lsb)		VDC Register value	0.00000002320		0 0000000000000	Register Value Volts		
Conversion AI 1	Resistor Value	249	Ohms			5.02	Miliamps		
		i in the second							1
Input	Analog In-put 2 (30003 msb)		Register value	0.000152587		4.334538909		4.3345	Volt
	Analog In-put 2 (30004 Isb)		VDC Register value	0.000152587 0.000000023283		0.00000000000	Register Value Volts		
Conversion AI 2	Resistor Value	249	Ohms			17.41	Miliamps		
	Burning and the second second second								
Input	Analog In-put 3 (30016)		Register value	0.000053406	E SUCCESSION OF THE SUCCESSION		Volts		
			VDC	0.000053406	Volts	0	Register Value		
Conversion AI 3	Resistor Value	124	Ohms		1	12.23	Miliamps		
Input	Analog In-put 4 (30017)		Register value	0.000053406	Volts	0.00	Volts		
	inclugation participation (second)		VDC	0.000053406			Register Value		
Conversion AI 4	Resistor Value	124	Ohms			0.00	Miliamps		
Input	Input Voltage (30009)		Register value	0.03262	Volts	0.00	Volts		
			VDC	0.03262	Volts	0	Register Value		
Holding	Analog Output (40007)	50000	Register value	0.000335693	Amos	16 78	Milli Amps		
in a start B	AnnoB. Sarbar (40007)		Milli Amps	0.000335693			Register Value		
Holding	Analog Output (40007)	-	Register value	0.000335693	Amor		Milli Amps		

Example use of the attached IO Scale Factor Calculator spreadsheet: