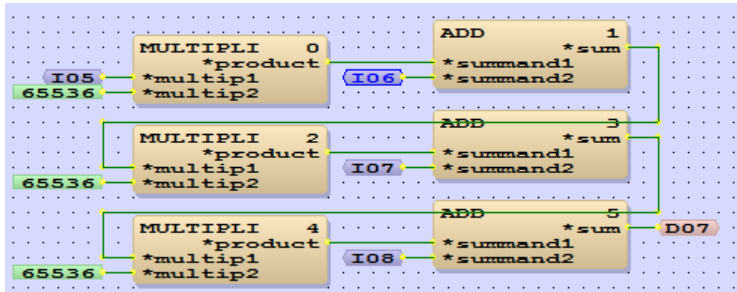


TT190902 – FUP - Modbus 64 Bit Register

1. Sometimes we need to read 64-bit register from a Modbus device, most likely it is the kWh reading from a power meter. But currently in FUP we can only read up to 32-bit Modbus register using type UI and FL
2. What we can do is to read the 64-bit register as four 16-bit registers using UI format, and then calculate the correct reading in FUP using the calculation below for 64-bit unsigned integer



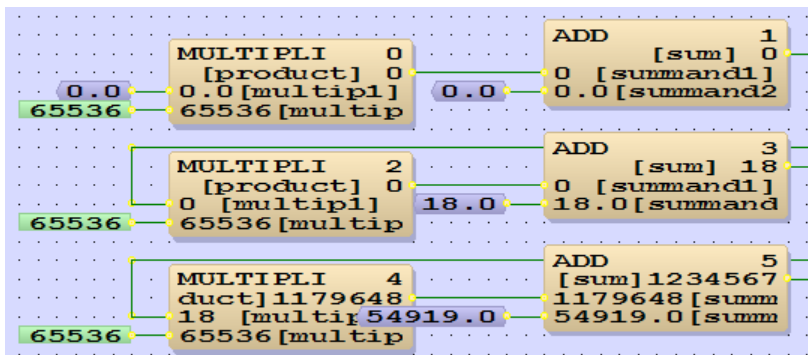
Iden	Desc	Label	consistency	M_SLAVE	M_memory_type	M_VAR_ADR	M_VARTYP	M_FACTOR
A		M64.F:I05	not verified	1	HoldingRegister	1	UI	1
B		M64.F:I06	not verified	1	HoldingRegister	2	UI	1
C		M64.F:I07	not verified	1	HoldingRegister	3	UI	1
D		M64.F:I08	not verified	1	HoldingRegister	4	UI	1

3. To test it, we can use the Modbus testing software we use in TT190801 and TT190803. Set the format in Modbus Poll as “64 Bit Unsigned, Big-endian”

Alias	00000
0	0
1	1234567
2	--
3	--
4	--

Address	+0	+1	+2	+3	+4
40001-40010	0	0	0	18	54919
40011-40020	0	0	0	0	0
40021-40030	0	0	0	0	0
40031-40040	0	0	0	0	0
40041-40050	0	0	0	0	0
40051-40060	0	0	0	0	0
40061-40070	0	0	0	0	0

4. For small value, we can show exactly the same number in FUP (like below). But for bigger number, the value will be a bit different, because we use 32-bit floating point format in FUP

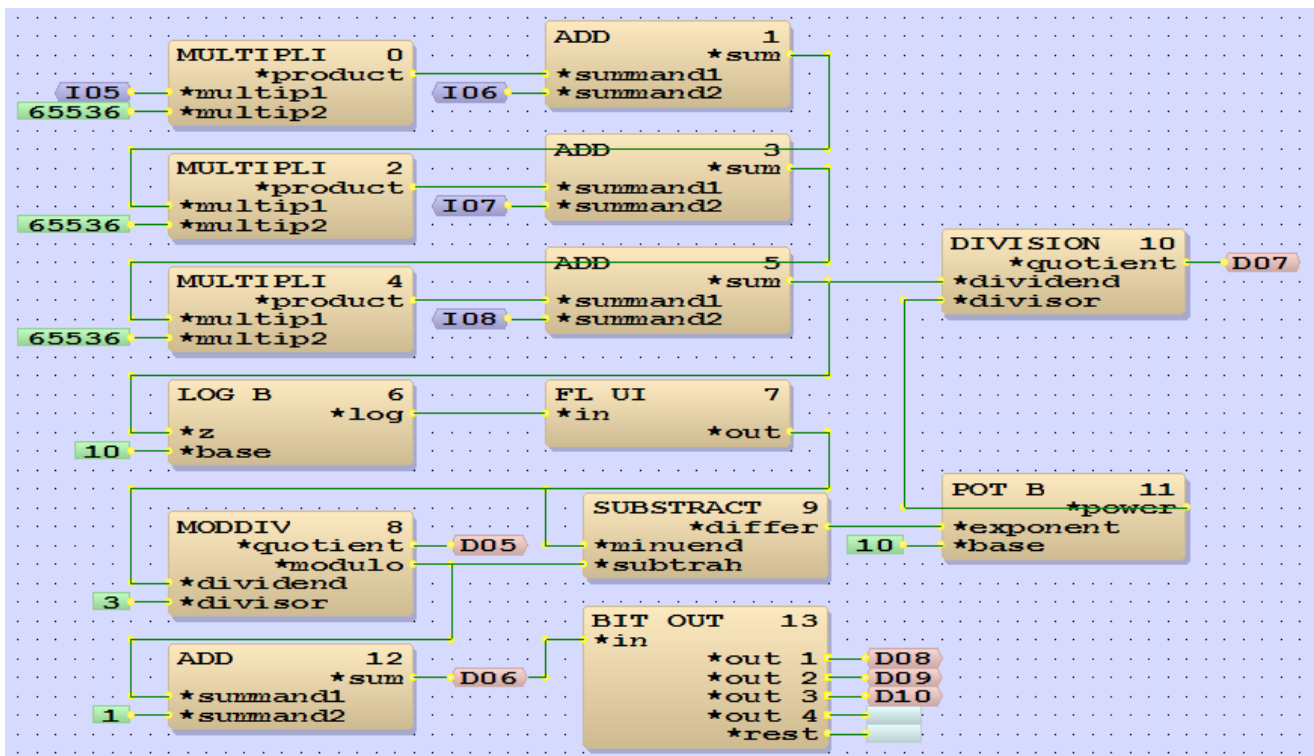


5. To avoid this problem, we have to limit the number of digits (and decimal places) to show in the graphic, like this

Modbus 64

64 bits Integer 23.4568 MWh

6. We convert the integer number to a floating point number, by using the “log based 10 (LOG_B)” module and divide it by 3, to get the correct unit (e.g. kWh, MWh, etc.). We then restrict the number of digits to 6 by the “BIT_OUT” module together with “Display Element” option in graphic



7. In the graphic, we use the “TextOption00” element, link it to “D05”, and assign the corresponding unit to the value in the “Expanded” tab

Properties	Value	Preview
Foreground color	-16777216	
Background color	-1	
Text 0	Wh	Wh
Text 1	KWh	KWh
Text 2	MWh	MWh
Text 3	GWh	GWh
Text 4	TWh	TWh
Text 5	PWh	PWh

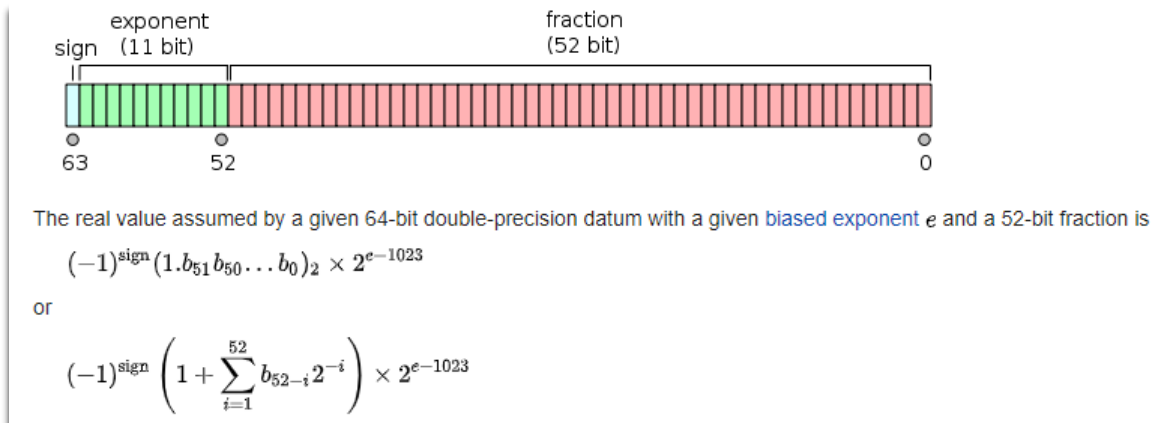
8. For the value, we use multiple elements (link to D07), each showing different number of decimal places, and use D8-D10 to display the correct element using “Display element”

Properties	Val
Maximum limit value	100
Foreground color if the max value was exceeded	-16'
Background color if the max value was exceeded	-1
Number of places before the decimal point	3
Number of the decimal places	3
Leading zeros	0
Illustration	Dec:

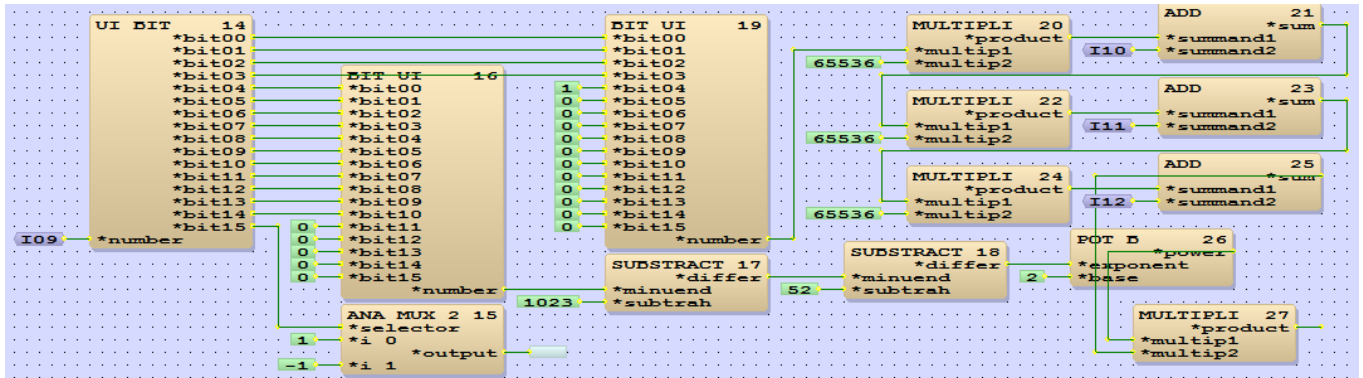
9. Finally, this is the value we show in our graphic with such a big number



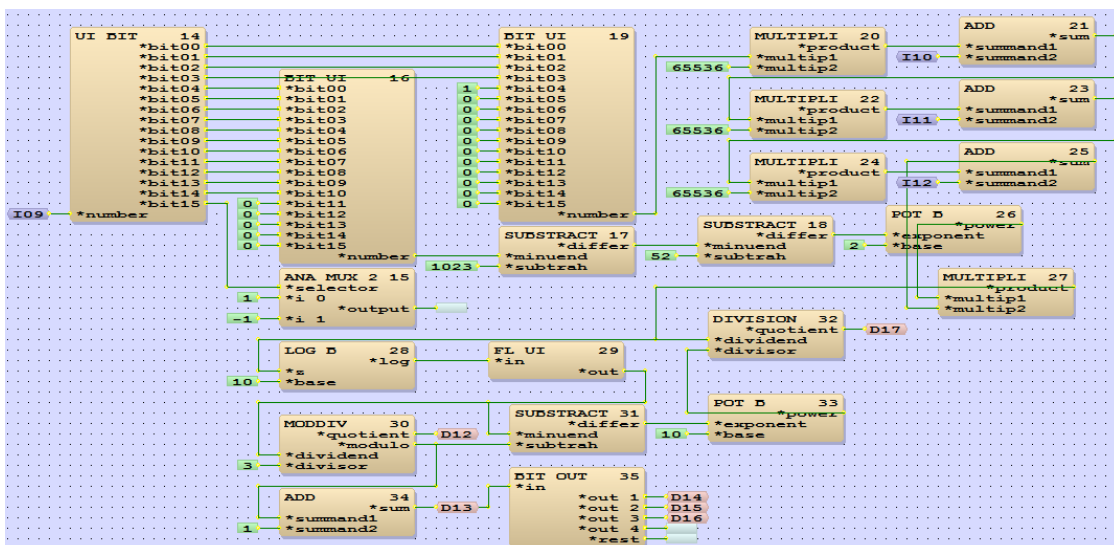
10. For 64-bit floating point number, the calculation is a bit complicate. Here is the formula from Wiki for your reference



11. In FUP, we have to extract the bits from the UI and then recalculate it based on the above formula. Assuming the kWh value are all positive, so just ignore the sign here to make it simple



12. Here is the final program



13. Here is the Modbus Integration table

Iden	Desc	Label	consistency	M_SLAVE	M_memory_type	M_VAR_ADR	M_VARTYP	M_FACTOR
A		M64.F:I09	not verified	1	HoldingRegister	5	UI	1
B		M64.F:I10	not verified	1	HoldingRegister	6	UI	1
C		M64.F:I11	not verified	1	HoldingRegister	7	UI	1
D		M64.F:I12	not verified	1	HoldingRegister	8	UI	1
A		M64.F:I05	not verified	1	HoldingRegister	1	UI	1
B		M64.F:I06	not verified	1	HoldingRegister	2	UI	1
C		M64.F:I07	not verified	1	HoldingRegister	3	UI	1
D		M64.F:I08	not verified	1	HoldingRegister	4	UI	1

14. Compile and upload it to the controller. Now test it with the simulation software. Set address 5 to format "64 Bit Double, Big-endian"

	Alias	Value
0		00000
1		0
2		123456789
3		--
4		--
5		12.3456789

Connected (2/10) : (received/sent) (3806/3806) Serv. write data.

Address: ☐ Hex ☒ Dec I/O Fmt: Prot:

Address	+0	+1	+2	+3	+4	+5	+6	+7	+8
40001-40010	0	0	0	1883	-13035	16424	-20228	-11484	-10846
40011-40020	0	0	0	0	0	0	0	0	0
40021-40030	0	0	0	0	0	0	0	0	0
40031-40040	0	0	0	0	0	0	0	0	0
40041-40050	0	0	0	0	0	0	0	0	0

15. In the graphic, the values are displayed like this

64 bits Integer	123.457	MWh
Double Float	12.3457	Wh