Version 1.0 _ feb.2020

Modbus frame description with STAC2

DESCRIPTION OF THE MODBUS FUNCTIONS

The Modbus master must check all the following MODBUS memory to read STAC2 configuration:

How many channels are configured on the STAC2

Channel N Enabled/Disabled → 0x2110 + (0x10 * N) MODBUS memory (1 int length)
With N value from 0 to 3.

How many parameters are measured for each sample channel

Parameter N Enabled/Disabled Channel Z → 0x2210 + (0x30 * N) + (0x1E0 *Z) MODBUS memory (1 int length)
With N value from 0 to 9 and Z value from 0 to 3.

The name of each parameter

Parameter N name channel Z → 0x2220 + (0x30 * N) + (0x1E0 *Z) MODBUS memory (5 int length for 10 ascii characters)
With N value from 0 to 9 and Z value from 0 to 3.

The unit of each parameters

Parameter N name channel Z → 0x2225 + (0x30 * N) + (0x1E0 *Z) MODBUS memory (5 int length for 10 ascii characters)
With N value from 0 to 9 and Z value from 0 to 3.
Note: All spaces characters must be removed in “names” and “units”

In order to correctly read the last measurement

STAC2 is maintaining only the last measurement occurred in MODBUS memory mapping. This means that the Modbus master must keep in its own memory the last measurement data for each sample channels available (from 1 to 4 channels) to display them.
The Modbus master will know if a measurement is available and from which channel, by reading “Current Channel Status/Number” MODBUS mapping memory @ address 0x3910. This register is coded with the following details:

			Blank NRJ	Restitution Alert	Parameter Over li	Parameter Under	New result	Last Measured Channel Bit7	Last Measured Channel Bit6	Last Measured Channel Bit5	Last Measured Channel Bit4	Last Measured Channel Bit3	Last Measured Channel Bit2	Last Measured Channel Bit1	Last Measured Channel Bit0

New result : A new result is available to be readed

Parameter Under limit Alert: Alert on parameter result level is under limit (see Sensibility level)

Parameter Over limit Alert: Alert on parameter result level is over limit (see alert level)

Restitution Alert: Alert on restitution level (see restitution alert)

Blank NRJ : Alert on Blank measurement system NRJ too low.

Last Measured Channel number is the channel number of the last accessible measurement result bellow.

Note : If channel number is 100, this mean STAC2 measurement cycle just switched ON and no previous measurement is available.

Integer value is composed of several information:

- 8 LSB (0 to 7) → last measured channel number in decimal format
- 8 MSB (8 to 15):
    - Bit 8 → New result available to be read
    - Bit 9 → Parameter Under limit Alert level
    - Bit 10 → Parameter Over limit Alert level
    - Bit 11 → Restitution Over Alert level
    - Bit 12 → Blank NRJ too low

Bit 9 to 12 are available to display last measurement state related to limits and alerts programmed in STAC2 configuration. Once again the master must keep in its own memory the last measurement state and Date/Time for each channel.

To read the last measurement Date and Time

Minute: @0x3911 MODBUS memory (1 int length)
Hour: @0x3912 MODBUS memory (1 int length)
Day: @0x3913 MODBUS memory (1 int length)
Month: @0x3914 MODBUS memory (1 int length)
Year: @0x3915 MODBUS memory (1 int length)

To read the last measured values (Parameters values and Restitution values) can be recall from MODBUS mapped memory to the following addresses:

The Parameters values

Last measurement Parameter N → 0x3916 + (0x02 * N) MODBUS memory (2 int length for float value with ABCD type agency)
With N value from 0 to 9.

The Restitution values

Last measurement Restitution N → 0x392A + (0x02 * N) MODBUS memory (2 int length for float value with ABCD type agency)
With N value from 0 to 9.

FRAME EXAMPLES

Read name of parameter 1: (ASCII)

***Example**: Parameter 1: NO3*

Master : C8 03 22 20 02 20 DE

Time	Type	Address	Code	Memory	Number	Datas	CRC
15:09:40.073	Master	200	0x03 : Read_Holding_Register	0x2220	2		0x20DE

Slave : C8 03 04 **4E 4F 33 20** E8 90

Time	Type	Address	Code	Memory	Number	Datas	CRC
15:09:40.093	Slave	200	0x03 : Read_Holding_Register	0x2220	2	**NO3**	0xE890

Read value of register: (float)

Master: C8 03 39 16 28 15 B9

Time	Type	Address	Code	Memory	Number	Datas	CRC
15:09:44.356	Master	200	0x03 : Read_Holding_Register	0x3916	40		0x15B9

Slave: C8 03 50 **42 02 A7 1D 41 F5 23 59** 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0000 00 00 00 00 00 00 0000 00 00 00 00 00 00 00 40 8C 29 18 40 45 82 0C 00 00 00 00 00 00 00 00 0000 00 00 00 00 00 00 00 0000 00 00 00 00 00 00 0000 00 00 00 00 00 00 00 43 9A

Time	Type	Address	Code	Memory	Number	Datas	CRC
15:09:44.444	Slave	200	0x03 : Read_Holding_Register	0x3916	40	**Value : 32.7 30.6** Restitution : 4.4% 3.1%	0x439A

Read of the unit of the parameter 1 channel 1: (hexa)

Master: C8 03 22 25 02 21 CE

Time	Type	Address	Code	Memory	Number	Datas	CRC
15:09:42.053	Master	200	0x03 : Read_Holding_Register	0x2225	2		0x21CE

Slave: C8 03 04 **6D 67 2D 6C** 31 13

Time	Type	Address	Code	Memory	Number	Datas	CRC
15:09:42.073	Slave	200	0x03 : Read_Holding_Register	0x2225	2	**mg/L**	0x3113

Read current channel status/number : (int)

Master: C8 03 39 10 00 01 CA 98

Time	Type	Address	Code	Memory	Number	Datas	CRC
15:09:44.644	Master	200	0x03 : Read_Holding_Register	0x3910	1		0xCA98

Slave: C8 03 02 0D 00 C4 60

Time	Type	Address	Code	Memory	Number	Datas	CRC
15:09:45.044	Slave	200	0x03 : Read_Holding_Register	0x3910	1	0x0D → 0b00001101 0x00 → Last channel measured is the channel 1	0xC460

			Blank NRJ	Restitution Alert	Parameter Over li	Parameter Under	New result	Last Measured Channel Bit7	Last Measured Channel Bit6	Last Measured Channel Bit5	Last Measured Channel Bit4	Last Measured Channel Bit3	Last Measured Channel Bit2	Last Measured Channel Bit1	Last Measured Channel Bit0

New result : A new result is available to be readed

Parameter Under limit Alert: Alert on parameter result level is under limit (see Sensibility level)

Parameter Over limit Alert: Alert on parameter result level is over limit (see alert level)

Restitution Alert: Alert on restitution level (see restitution alert)

Blank NRJ : Alert on Blank measurement system NRJ too low.

Last Measured Channel number is the channel number of the last accessible measurement result bellow.

Note : If channel number is 100, this mean STAC2 measurement cycle just switched ON and no previous measurement is available.