

# Modbus Configuration CS8C / CS9

# **Technical documentation**



A "readme.pdf" document may be delivered on the robot's DVD. It contains the documentation addenda and errata.

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### 1 - Preliminary

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# History

Revision	Modification	Date (yyyy-mm-dd)	Ву
A	Initial White Paper release (corresponding to the revision 2 of the previous document Modbus Configuration )	2020-05-29	A.JAFFRE
В			
С			

# Version

That document has been tested with:

- SRC : s8.10.2
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# Keyword

Fieldbus, Modbus, Configuration, Client, Server, Input, Output, CS9, CS8C, Word, Bit, Address, Registers

# 1 Preliminary

#### DANGER



Instructions drawing the reader's attention to the risks of accidents that could lead to serious bodily harm if the steps shown are not complied with. In general, this type of indication describes the potential danger, its possible effects and the necessary steps to reduce the danger.

It is essential to comply with the instructions to ensure personal safety..



#### SAFETY

Instructions drawing the reader's attention that its responsibility is engaged if the steps shown are not complied with.

It is essential to comply with the instructions to maintain the robot safety level.



#### Caution

Instructions directing the reader's attention to the risks of material damage or failure if the steps shown are not complied with. It is essential to comply with these instructions to ensure equipment reliability and performance levels.



#### ELECTRICAL risk

Instructions drawing the reader's attention to the risks of electrical shock. It is essential to comply with the instructions to ensure personal safety..



#### Information

Supplies further information, or underlines a point or an important procedure. This information must be memorized to make it easier to apply and ensure correct sequencing of the operations described.



### 2 Modbus simplified

Below explanation are very simplified.

In Modbus, we have 4 databases, depending on element type:



Status coil         0         0 00001 to 0 65536         Input (R)         Output (R/W)         1, 5, 15	
Input coil 1 00001 to 1 65536 Output (R/W) Input (R) 2	
Input register         3         3 00001 to 3 65536         Output (R/W)         Input (R)         4	
Holding register         4         4 00001 to 4 65536         Input (R)         Output (R/W)         3, 6, 16	23

Sometimes, address evolve from 0 to 65535 instead of 1 to 65536.

Coils are single bits (0 or 1), digital inputs/outputs while registers are 16 bits unsigned integer (0 to 65535), analog inputs/outputs.

FC are the function codes used to query the server.

Each equipment can choose what he wants to support and in which quantity. This is where the fun start.

# 3 Exchange table

Before starting to make a modbus configuration, you have to write your exchange table in order to know the mapping you need between server input/output and client input/output.

In order clarify; we will always speak the same way regarding input and output.

In the following explanation, we will always express them from the master point of view (client in Modbus terminology)

Ideally, if equipment's are organized the same way, it looks like that:

			Digital input			
	Clie	ent (master)	Serv	er (slave)		
Word	Bit	Input name	Output name	Address	Bit	Word
	1	DI_01	DO_01	100001	1	
	2	DI_02	DO_02	100002	2	
	3	DI_03	DO_03	100003	3	
	4	DI_04	DO_04	100004	4	
	5	DI_05	DO_05	100005	5	
	6	DI_06	DO_06	100006	6	
	7	DI_07	DO_07	100007	7	
1	8	DI_08	DO_08	100008	8	
I	9	DI_09	DO_09	100009	9	
	10	DI_10	DO_10	100010	10	
	11	DI_11	DO_11	100011	11	
	12	DI_12	DO_12	100012	12	
	13	DI_13	DO_13	100013	13	
	14	DI_14	DO_14	100014	14	
	15	DI_15	DO_15	100015	15	1
	16	DI_16	DO_16	100016	16	
	17	DI_17	DO_17	100017	17	
	18	DI_18	DO_18	100018	18	
	19	DI_19	DO_19	100019	19	
	20	DI_20	DO_20	100020	20	
	21	DI_21	DO_21	100021	21	
	22	DI_22	DO_22	100022	22	
	23	DI_23	DO_23	100023	23	
2	24	DI_24	DO_24	100024	24	
2	25	DI_25	DO_25	100025	25	2
	26	DI_26	DO_26	100026	26	
	27	DI_27	DO_27	100027	27	
	28	DI_28	DO_28	100028	28	
	29	DI_29	DO_29	100029	29	
	30	DI_30	DO_30	100030	30	
	31	DI_31	DO_31	100031	31	
	32	DI_32	DO_32	100032	32	



			Digital output			
	Clie	ent (master)	Ser	ver (slave)		
Word	Bit	Output name	Input name	Address	Bit	Word
	1	DO_01	DI_01	000001	1	
	2	DO_02	DI_02	000002	2	
	3	DO_03	DI_03	000003	3	
	4	DO_04	DI_04	000004	4	
	5	DO_05	DI_05	000005	5	
	6	DO_06	DI_06	000006	6	
	7	DO_07	DI_07	000007	7	
1	8	DO_08	DI_08	000008	8	1
	9	DO_09	DI_09	000009	9	
	10	DO_10	DI_10	000010	10	
	11	DO_11	DI_11	000011	11	
	12	DO_12	DI_12	000012	12	
	13	DO_13	DI_13	000013	13	-
	14	DO_14	DI_14	000014	14	
	15	DO_15	DI_15	000015	15	
	16	DO_16	DI_16	000016	16	
	17	DO_17	DI_17	000017	17	
	18	DO_18	DI_18	000018	18	
	19	DO_19	DI_19	000019	19	
	20	DO_20	DI_20	000020	20	
	21	DO_21	DI_21	000021	21	
	22	DO_22	DI_22	000022	22	
	23	DO_23	DI_23	000023	23	
2	24	DO_24	DI_24	000024	24	2
2	25	DO_25	DI_25	000025	25	2
	26	DO_26	DI_26	000026	26	
	27	DO_27	DI_27	000027	27	
	28	DO_28	DI_28	000028	28	
	29	DO_29	DI_29	000029	29	
	30	DO_30	DI_30	000030	30	
	31	DO_31	DI_31	000031	31	
	32	DO_32	DI_32	000032	32	

Analog input									
	Client (master)	Se	Server (slave)						
Word	Input name	Output name	Address	Word					
1	AI_01	AO_01	400001	1					
2	AI_02	AO_02	400002	2					
3	AI_03	AO_03	400003	3					
4	AI 04	AO 04	400004	4					

Analog output									
Clie	ent (master)	Server (slave)							
Word	Output name	Intput name	Address	Word					
1	AO_01	AI_01	300001	1					
2	AO_02	AI_02	300002	2					
3	AO_03	AI_03	300003	3					
4	AO_04	AI_04	300004	4					

# 4 CS8C versus CS9 Modbus server

CS8C and CS9 Modbus server configuration are not compatible.

You will have to rebuild/adapt your configuration on both side (controller and equipment).

Modbus specification define only bit and word data types (coils/discrete input, holding register/input register). Other data types are manufacturer specific.

Modbus specification gives manufacturer a lot of leeway on how to manage/store data.

Some of CS8C and CS9 Modbus server configuration difference are:

- Different way of storing data:
  - CS8C use one table for bit and one for word
  - CS9 use one table for input and one table for output
  - CS9 use a different bit arrangement (8 to 15 and then 0 to 7)
- Different way of managing others data types: the two word used for float / real32 representation are reversed between CS8C and CS9.

#### 4.1 Data storage illustration





### 4.2 Data types illustration

Here below a simple comparison done with Modbus doctor with the different data types. As you can see, to get the same value, Modbus doctor configuration need to be different between CS8C and CS9.

Modbus doctor (<u>https://www.kscada.com/modbusdoctor.html</u>) is a freeware, not supported by STÄUBLI, used only for easy illustration of the difference.

CS8															
		9						Unsigne	d values		Modbu	us doctor conf	iguration		
Туре	Quantity	Nb register	Value	Byte 0	Byte 1	Byte 2	Byte 3	Register 0	Register 1	swap byte	swap word	unsigned	Display mode	Value	
bit	16	1	15 0 1000000 00000010 32770	7 0 00000010 2	15 8 10000000 128			640							
word	1	2	65534 65535	255 255	254 255			65534 65535				X X	16 bits word 16 bits word	65534 65535	
dword	1	2	4294967294	255	254	255	255	65534	65535			х	32 bits word	4294967294	
flash	2	4	-3,1415	14	86	192	73	3670	49225				32 bits float	-3,1415	
noat	2	2	4	3,1415	14	86	64	73	3670	16457				32 bits float	3,1415

CS9														
		20						Unsigne	d values	Modbus doctor configuration				
Туре	Quantity	Nb register	Value	Byte 0	Byte 1	Byte 2	Byte 3	Register 0	Register 1	swap byte	swap word	unsigned	Display mode	Value
bit	16	1	15 0 1000000 00000010 32770	7 0 00000010 2	15 8 10000000 128			640						
hvte	2	1	1	1				511					8 bit byte	1
ay te	-	-	255	255				511					8 bit byte	255
signed 8	2	1	-128	128				32895					8 bit byte	128
Signedo	2	1	127	127				52055					8 bit byte	127
unsigned	2	1	1	1				511					8 bit byte	1
unsignedo	2	1	255	255				511					8 bit byte	255
word	1	1	65534	255	254			65534				х	16 bits word	65534
signed16	2	2	-32768	128	0			32768					16 bits word	-32768
Signeuro	2	2	32767	127	255			32767					16 bits word	32767
unsigned16	1	1	65534	255	254			65534				х	16 bits word	65534
dword	1	2	4294967294	255	255	255	254	65535	65534		х	х	32 bits word	4294967294
cignod 22	2	4	-2147483648	128	0	0	0	32768	0		х		32 bits word	-2147483648
signedsz	2	4	2147483647	127	255	255	255	32767	65535		Х		32 bits word	2147483647
unsigned32	1	2	4294967294	255	255	255	254	65535	65534		Х	Х	32 bits word	4294967294
	2	4	-3,1415	192	73	14	86	49225	3670		Х		32 bits float	-3,1415
realsz	2	4	3,1415	64	73	14	86	16457	3670		Х		32 bits float	3,1415

Sign not taken into account by Modbus doctor on 8 bit byte

### 5 Modbus server on CS8C

Coils are merged internally in a single table with first the Status coils and then the Input coils.

From the CS8C point of view, first the digital input than the digital output.

From the master point of view, first the digital output than the digital input.

Registers are merged internally in a single table with first the Holding registers and then the Input registers.

From the CS8C point of view, first the analog input than the analog output.

From the master point of view, first the analog output than the analog input.

Depending on what client equipment support, it could be interesting to have coils quantity as a multiple of 16 to prevent trouble with system managing only words.



#### 5 - Modbus server on CS8C



In SRS, select the controller in the cell explorer, make a right click on it and select "Physical IOs", then "Modbus IO config".

II Explorer		- 中 :
🚓 Conve	rsion_Modbus	
4 🔳 Co	ntroller1 [s7.11]	
Mas	New Application	Ctrl+N,A
4 : 🔛	Open Application	Ctrl+O
Mat	Import VAL3 Applications	
MB	Upload All Applications	
	Select As Source To Compare	Ctrl+T, S
52	Transfer Manager	Ctrl+R,T
2	Profile Editor	Ctrl+R,P
2	Remote Profile Editor	
Te	Remote Options	
-	Show Emulator	Ctrl+R.S
	Restart Emulator	Ctrl+R 7
S.	Pemote Access	Ctrl+P A
har	Diversional I/On	Chilling
Ce	Physical IOs	Cul+w,r
x nert	Delete	Del
Mise	Explore	
Desc	Controller Configuration	Ctrl+R,O
1	Properties	F4

Do not change "Topic name" and "TCP port".

Connection number can be adjust if needed (more than one client, client disconnections ...)

Topic name	Modbus	TCP port	502	Connection number 1 🚖
🗅 🗋 🗙				

Add a new item at the bottom of the list

Add a new item above the selected item

Transfer

Manager

Delete the selected item

Do the proper configuration

Bave it as "modbus.xml" (SRS place you in the right folder)

With "Transfer manager", send the "Modbus" configuration to the controller.

Reboot the controller in order to take into account the new configuration.



### 5.1 Example with a PLC/screen configured as a client

In this example, the client has 12 digital outputs, 10 digital inputs, 2 analog outputs, 4 analog inputs.

In order to prevent issues we will round up digital outputs and inputs to the next 16 multiple.

	PLC / s	creen,	client (master)	CS8	BC, server (sla	ave)		
	Word	Bit	Output name	Input name	Address	Bit	Word	
		1	DO_01	DI_01	000001	1		
		2	DO_02	DI_02	000002	2		
		3	DO_03	DI_03	000003	3		
		4	DO_04	DI_04	000004	4		
		5	DO_05	DI_05	000005	5		
Ŧ		6	DO_06	DI_06	000006	6		
ф Г		7	DO_07	DI_07	000007	7		put
no	1	8	DO_08	DI_08	000008	8	1	. <b></b>
tal	1	9	DO_09	DI_09	000009	9		ita
igi		10	DO_10	DI_10	000010	10		Dig
		11	DO_11	DI_11	000011	11		
		12	DO_12	DI_12	000012	12		
		13	DO_free_01	DI_free_01	000013	13		
		14	DO_free_02	DI_free_02	000014	14		
		15	DO_free_03	DI_free_03	000015	15		
		16	DO_free_03	DI_free_04	000016	16		
		1	DI_01	DO_01	100017	17		
		2	DI_02	DO_02	100018	18		
		3	DI_03	DO_03	100019	19		
		4	DI_04	DO_04	100020	20		
		5	DI_05	DO_05	100021	21		
<u>ب</u>		6	DI_06	DO_06	100022	22		Ŧ
nd		7	DI_07	DO_07	100023	23		tpu
. <u> </u>	2	8	DI_08	DO_08	100024	24	2	no
ita	2	9	DI_09	DO_09	100025	25	2	tal
Dig		10	DI_10	DO_10	100026	26		igi
		11	DI_free_01	DO_free_01	100027	27		
		12	DI_free_02	DO_free_02	100028	28		
		13	DI_free_03	DO_free_03	100029	29		
		14	DI_free_04	DO_free_04	100030	30		
		15	DI_free_05	DO_free_05	100031	31		
		16	DI_free_06	DO_free_06	100032	32		

PLC / screen, client (master) CS8C, server (slave)			(slave)			
	Word	Input name	Output name	Address	Word	
Analog	1	AO_01	AI_01	300001	1	Analog
output	2	AO_02	AI_02	300002	2	input
	1	AI_01	AO_01	400003	3	
Analog	2	AI_02	AO_02	400004	4	Analog
input	3	AI_03	AO_03	400005	5	output
	4	AI_04	AO_04	400006	6	]

Start by adding 16 items that you configure as "bit" and "CS8 input (R/W)". Name them properly; they will correspond to client digital outputs (12 digital outputs and 4 free to reach 16).



Add 16 items that you configure as "bit" and "CS8 output (R)". Name them properly; they will correspond to client digital inputs (10 digital inputs and 6 free to reach 16).

Add 2 items that you configure as "word" and "CS8 input (R/W)". Name them properly; they will correspond to client analog outputs (2 analog outputs).

Add 4 items that you configure as "word" and "CS8 output (R)". Name them properly; they will correspond to client analog inputs (4 analog inputs).

You should get below result.

opic name Modbus TCP port 50	Connection number			
C, ×				
Name	Туре	Address	Size	Client Access
DI_01	BIT 🔫	0	1	CS8 Input (R/W)
DI_02	BIT 👻	1	1	CS8 Input (R/W)
DI_03	BIT 👻	2	1	CS8 Input (R/W)
DI_04	BIT 👻	3	1	CS8 Input (R/W)
DI_05	BIT 👻	4	1	CS8 Input (R/W)
DI_06	BIT 👻	5	1	CS8 Input (R/W)
DI_07	BIT 👻	6	1	CS8 Input (R/W)
DI_08	BIT 👻	7	1	CS8 Input (R/W)
DI_09	BIT 👻	8	1	CS8 Input (R/W)
DI_10	BIT 👻	9	1	CS8 Input (R/W)
DI_11	BIT 👻	10	1	CS8 Input (R/W)
DI_12	BIT 👻	11	1	CS8 Input (R/W)
DI_free_01	BIT 👻	12	1	CS8 Input (R/W)
DI_free_02	BIT 👻	13	1	CS8 Input (R/W)
DI_free_03	BIT 👻	14	1	CS8 Input (R/W)
DI_free_04	BIT 👻	15	1	CS8 Input (R/W)
DO_01	BIT 👻	16	1	CS8 Output (R)
DO_02	BIT 👻	17	1	CS8 Output (R)
DO_03	BIT 👻	18	1	CS8 Output (R)
DO_04	BIT 👻	19	1	CS8 Output (R)
DO_05	BIT 👻	20	1	CS8 Output (R)
DO_06	BIT 👻	21	1	CS8 Output (R)
DO_07	BIT 👻	22	1	CS8 Output (R)
DO_08	BIT 👻	23	1	CS8 Output (R)
DO_09	BIT 👻	24	1	CS8 Output (R)
DO_10	BIT 👻	25	1	CS8 Output (R)
DO_free_01	BIT 👻	26	1	CS8 Output (R)
DO_free_02	BIT 👻	27	1	CS8 Output (R)
DO_free_03	BIT 👻	28	1	CS8 Output (R)
DO_free_04	BIT 👻	29	1	CS8 Output (R)
DO_free_05	BIT	30	1	CS8 Output (R)
DO_free_06	BIT 👻	31	1	CS8 Output (R)
AI_01	WORD -	0	1	CS8 Input (R/W)
AI_02	WORD -	1	1	CS8 Input (R/W)
AO_01	WORD -	2	1	CS8 Output (R)
AO_02	WORD -	3	1	CS8 Output (R)
AO_03	WORD -	4	1	CS8 Output (R)
40.04	WORD			

Save 🔒 and close 🔤

You now have all your IOs available in SRS and you just have to link VAL3 variables with physical IOs.

)000	IO physiques-Controll	er1 🗇 🗙 👔 Vue 3D		
I	O physiques		Description	Lien physique
► I	= ) 📖 ModbusSrv-	0		
	🕂 🗖 🗣 🛛 Modbus	Bit		
	🕂 🗐 🔶 Entre	ées digitales		
	-04	DI_01	%I0	ModbusSrv-0\Modbus-Bit\DI_01
		DI_02	%I1	ModbusSrv-0\Modbus-Bit\DI_02
		DI_03	%I2	ModbusSrv-0\Modbus-Bit\DI_03
		DI_04	%I3	ModbusSrv-0\Modbus-Bit\DI_04
		DI_05	%I4	ModbusSrv-0\Modbus-Bit\DI_05
		DI_06	%15	ModbusSrv-0\Modbus-Bit\DI_06
		DI_07	%16	ModbusSrv-0\Modbus-Bit\DI_07
		DI_08	%17	ModbusSrv-0\Modbus-Bit\DI_08
		DI_09	%18	ModbusSrv-0\Modbus-Bit\DI_09
		DI_10	%19	ModbusSrv-0\Modbus-Bit\DI_10
		DI_11	%I10	ModbusSrv-0\Modbus-Bit\DI_11
		DI_12	%I11	ModbusSrv-0\Modbus-Bit\DI_12
		DI_free_01	%I12	ModbusSrv-0\Modbus-Bit\DI_free_01
		DI_free_02	%I13	ModbusSrv-0\Modbus-Bit\DI_free_02
		DI_free_03	%I14	ModbusSrv-0\Modbus-Bit\DI_free_03
		DI_free_04	%I15	ModbusSrv-0\Modbus-Bit\DI_free_04
	E Sorti	ies digitales		
		00_01	%Q16	ModbusSrv-0\Modbus-Bit\DO_01
	-0	00_02	%Q17	ModbusSrv-0\Modbus-Bit\DO_02
		00_03	%Q18	ModbusSrv-0\Modbus-Bit\DO_03
	-=	00_04	%Q19	ModbusSrv-0\Modbus-Bit\DO_04
		00_05	%Q20	ModbusSrv-0\Modbus-Bit\DO_05
		00_06	%Q21	ModbusSrv-0\Modbus-Bit\DO_06
		00_07	%Q22	ModbusSrv-0\Modbus-Bit\DO_07
		0_08	%Q23	ModbusSrv-0\Modbus-Bit\DO_08
		00_09	%Q24	ModbusSrv-0\Modbus-Bit\DO_09
		00_10	%Q25	ModbusSrv-0\Modbus-Bit\DO_10
		00_free_01	%Q26	ModbusSrv-0\Modbus-Bit\DO_free_01
		DO_free_02	%Q27	ModbusSrv-0/Modbus-Bit\DO_free_02
		DO_free_03	%Q28	ModbusSrv-0/Modbus-Bit\DO_free_03
		DO_free_04	%Q29	ModbusSrv-0/Modbus-Bit\DO_free_04
		DO_free_05	%Q30	ModbusSrv-0\Modbus-Bit\DO_free_05
		DO_free_06	%Q31	ModbusSrv-0\Modbus-Bit\DO_free_06
	H Modbus	Word		
	Entr	ees analogiques		
		AI_01	%IW0	ModbusSrv-0/Modbus-Word/AI_01
		A1_02	%IW1	ModbusSrv-0 Wodbus-Word \AI_02
	Sorti	es analogiques		
		AO_01	%QW2	ModbusSrv-0 Modbus-Word AO_01
		AO_02	%QW3	ModbusSrv-0 Wodbus-Word AO_02
		AO_03	%QW4	ModbusSrv-0 Modbus-Word AO_03
		AO_04	%QW5	ModbusSrv-0 Wodbus-Word AO_04



### 5.2 Example with a WAGO/STÄUBLI Modbus client (5109-8888)

That specific client has built-in:

- 2 bit output: a life bit and one unused
- 2 analog output: a version number and one unused

It is after those that, respectively, bit output then bit input and analog output then analog input appears.

We have 12 digital outputs, 10 digital inputs, 2 analog outputs, 4 analog inputs

V	VAGO (	5109-8888), client (master)	CS8C, server (sla	ave)	
	Bit	Output name	Input name	Bit	
	1	LifeBit	LifeBit	1	
	2	NullBit	NullBit	2	
	3	DO_01	DI_01	3	
	4	DO_02	DI_02	4	
¥	5	DO_03	DI_03	5	Ŧ
tpr	6	DO_04	DI_04	6	nd
no	7	DO_05	DI_05	7	Ŀ.
tal	8	DO_06	DI_06	8	lita
jĝi	9	DO_07	DI_07	9	biC
	10	DO_08	DI_08	10	_
	11	DO_09	DI_09	11	
	12	DO_10	DI_10	12	
	13	DO_11	DI_11	13	
	14	DO_12	DI_12	14	
	1	DI_01	DO_01	15	
	2	DI_02	DO_02	16	
Ļ	3	DI_03	DO_03	17	Ŧ
nd	4	DI_04	DO_04	18	tpu
. <u> </u>	5	DI_05	DO_05	19	no
ita	6	DI_06	DO_06	20	tal
Dig	7	DI_07	DO_07	21	igi
_	8	DI_08	DO_08	22	Ц
	9	DI_09	DO_09	23	
	10	DI_10	DO_10	24	

WAGO	D (5109-8888),	client (master)	CS8C, 9	server (slave)	
	Word	Input name	Output name	Word	
	1	mbVersion	mbVersion	1	
Analog	2	mbUnused	mbUnused	2	Analog
output	3	AO_01	AI_01	3	input
	4	AO_02	AI_02	4	
	1	AI_01	AO_01	5	
Analog	2	AI_02	AO_02	6	Analog
input	3	AI_03	AO_03	7	output
	4	AI_04	AO_04	8	

Start by adding 2 items that you configure as "bit" and "CS8 input (R/W)". Name them respectively LifeBit and NullBit, they correspond to 2 internal bit of WAGO 5109-8888.

Add 12 items that you configure as "bit" and "CS8 input (R/W)". Name them properly; they will correspond to WAGO 5109-8888 digital outputs.

Add 10 items that you configure as "bit" and "CS8 output (R)". Name them properly; they will correspond to WAGO 5109-8888 digital inputs.

Add 2 items that you configure as "word" and "CS8 input (R/W)". Name them respectively mbVersion and mbUnused.

Add 2 items that you configure as "word" and "CS8 input (R/W)". Name them properly; they will correspond to WAGO 5109-8888 analog outputs (2 analog outputs).

Add 4 items that you configure as "word" and "CS8 output (R)". Name them properly; they will correspond to WAGO 5109-8888 analog inputs (4 analog inputs).

You should get below result.

Stäubli Modbus IO Config *					
▲ 🗠 🖬 🗠					
Topic name Modbus TCP port 5	Connection number 1				
) 🗋 🗙					
Name	Туре	Address	Size	Client Access	
LifeBit	BIT 👻	0	1	CS8 Input (R/W)	
NullBit	BIT 👻	1	1	CS8 Input (R/W)	_
DI_01	BIT 👻	2	1	CS8 Input (R/W)	_
DI_02	BIT 👻	3	1	CS8 Input (R/W)	_
DI_03	BIT 👻	4	1	CS8 Input (R/W)	
DI_04	BIT 💌	5	1	CS8 Input (R/W)	
DI_05	BIT 💌	6	1	CS8 Input (R/W)	
DI_06	BIT	7	1	CS8 Input (R/W)	
DI_07	BIT	8	1	CS8 Input (R/W)	
DI_08	BIT 🔻	9	1	CS8 Input (R/W)	
DI_09	BIT 💌	10	1	CS8 Input (R/W)	
DI_10	BIT 💌	11	1	CS8 Input (R/W)	
DI_11	BIT 💌	12	1	CS8 Input (R/W)	
DI_12	BIT 💌	13	1	CS8 Input (R/W)	
DO_01	BIT 🔻	14	1	CS8 Output (R)	
DO_02	BIT 👻	15	1	CS8 Output (R)	
DO_03	BIT 💌	16	1	CS8 Output (R)	
DO_04	BIT 👻	17	1	CS8 Output (R)	
DO_05	BIT 👻	18	1	CS8 Output (R)	
DO_06	BIT 👻	19	1	CS8 Output (R)	
DO_07	BIT 👻	20	1	CS8 Output (R)	
DO_08	BIT 🔻	21	1	CS8 Output (R)	
DO_09	BIT 🔻	22	1	CS8 Output (R)	
DO_10	BIT	23	1	CS8 Output (R)	
mbVersion	WORD -	0	1	CS8 Input (R/W)	
mbUnused	WORD -	1	1	CS8 Input (R/W)	
AI_01	WORD -	2	1	CS8 Input (R/W)	
AI_02	WORD -	3	1	CS8 Input (R/W)	
AO_01	WORD -	4	1	CS8 Output (R)	
AO_02	WORD -	5	1	CS8 Output (R)	
AO_03	WORD -	6	1	CS8 Output (R)	
AO_04	WORD	7	1	CS8 Output (R)	



You now have all your IOs available in SRS and you just have to link VAL3 variables with physical IOs.

🗯 IO physiques-Controller1 🛥 🗙 👔 Vue 3D		
IO physiques	Description	Lien physique
▶ 🖵 🕅 🕮 ModbusSrv-0		
- Modbus-Bit		
🕂 🗐 💠 Entrées digitales		
- LifeBit	%I0	ModbusSrv-0\Modbus-Bit\LifeBit
- NullBit	%I1	ModbusSrv-0\Modbus-Bit\NullBit
- DI_01	%I2	ModbusSrv-0\Modbus-Bit\DI_01
- DI_02	%I3	ModbusSrv-0\Modbus-Bit\DI_02
- DI_03	%I4	ModbusSrv-0\Modbus-Bit\DI_03
- DI_04	%15	ModbusSrv-0\Modbus-Bit\DI_04
- DI_05	%16	ModbusSrv-0\Modbus-Bit\DI_05
- DI_06	%I7	ModbusSrv-0\Modbus-Bit\DI_06
- DI_07	%18	ModbusSrv-0\Modbus-Bit\DI_07
- DI_08	%19	ModbusSrv-0\Modbus-Bit\DI_08
- DI_09	%I10	ModbusSrv-0\Modbus-Bit\DI_09
- DI_10	%I11	ModbusSrv-0\Modbus-Bit\DI_10
- DI_11	%I12	ModbusSrv-0\Modbus-Bit\DI_11
L DI_12	%I13	ModbusSrv-0\Modbus-Bit\DI_12
Sorties digitales		
-DO_01	%Q14	ModbusSrv-0\Modbus-Bit\DO_01
-DO_02	%Q15	ModbusSrv-0\Modbus-Bit\DO_02
- DO_03	%Q16	ModbusSrv-0\Modbus-Bit\DO_03
- DO_04	%Q17	ModbusSrv-0\Modbus-Bit\DO_04
DO_05	%Q18	ModbusSrv-0\Modbus-Bit\DO_05
- DO_06	%Q19	ModbusSrv-0/Modbus-Bit/DO_06
-DO_07	%Q20	ModbusSrv-0\Modbus-Bit\DO_07
- DO_08	%Q21	ModbusSrv-0\Modbus-Bit\DO_08
- DO_09	%Q22	ModbusSrv-0\Modbus-Bit\DO_09
DO_10	%Q23	ModbusSrv-0\Modbus-Bit\DO_10
🗄 🗐 💱 Modbus-Word		
Entrées analogiques		
- mbVersion	%IW0	ModbusSrv-0\Modbus-Word\mbVersion
- mbUnused	%IW1	ModbusSrv-0\Modbus-Word\mbUnused
	%IW2	ModbusSrv-0\Modbus-Word\AI_01
AI_02	%IW3	ModbusSrv-0\Modbus-Word\AI_02
Sorties analogiques		
-Dim AO_01	%QW4	ModbusSrv-0\Modbus-Word\AO_01
-Dim AO_02	%QW5	ModbusSrv-0\Modbus-Word\AO_02
	%QW6	ModbusSrv-0\Modbus-Word\AO_03
AO_04	%QW7	ModbusSrv-0\Modbus-Word\AO_04

Below, corresponding WAGO coupler configuration set to use automatic configuration.

Login: admin

Password: wago

🗲 🕘 🥖 http://192.168.0.1/webser 🔎 👻 🥔 WAGO H	Ethernet Web-Based ×	☆ ☆
Fichier Edition Affichage Favoris Outils ?		a formal
WAGD <sup>°</sup>	Web-based Management	WAGO Kontakttechnik GmbH & Co. KG Hansatr. 27 D-32423 Minden WWW.WARO.com
Navigation	Stäubli configuration	
- Information - TCP/IP - IO config	This page is for the configuration of the communication settings. Changes will take effect immediately.	
-• Stäubli	Settings	
	Stäubli controller IP address 192 168 0 254	
	Configuration byte 67	-
	Modbus/TCP timeout [ms] 50	-
	AUTO CUSTOM	-
	Analog input address (WORD - R/W) 0 1	
	Analog output address (WORD - R) 4 1	
	Digital input address (BIT - R/W) 0	
	Digital ouput address (BIT - R) 14	
	Use custom configuration (0 = AUTO, 1 = CUSTOM)	
	UNDO	
¥		*



## 6 Modbus server on CS9

All is managed internally as word but stored as 2 bytes.

Holding registers follow status coils in a single table.

Input registers follow input coils in a single table.

That is why you must always have a multiple of 16 for coils to fill a word multiple.



For data transmission, Modbus protocol specify that values must be encoded as big endian (Most Significant Byte first then Last Significant Byte).

On CS9 this also apply on coils for their internal storage, thus you will have a swap between first 8 coils and last 8 coils:

Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Coil	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8



In SRS, select the controller in the cell explorer, make a right click on it and select "Physical IOs", "Add IO board", "Open Modbus/TCP – Client/Server – J207/J208 – RE/OMB"



SYCON.net - [J207J208_Open_Modbus_TCP_NETX_51_	E_OMB.spj)	
Ele View Device Network Extras Help		
같 같 🚳		
1.0		
at Project	netDevice	
Project: J207/208_Open_Modbus_TCP_NETX_51_R     J207/208 RE/OMB[NETX 51 RE/OMB]		
	CANopen	
	2077208 E/OMB[NETX 51 RE/OMB]<> E/OMB[NETX 51 RE/OMB]<> E/OMB[NETX 51 RE/OMB]<>	
	CEE	
	e 🛁 POWERLINK	
	I PROFIBUS DPV 0	
	PROFINET IO	
	😥 🧰 SERCOS 🖬	
	dish Babilion (Vandar)	Thi Class ) Faund /
	15 Televis Avenue A	The class X Pound /
	AS-Interface	
	· · · · · · · · · · · · · · · · · · ·	
	Id d > >> Network View	
•		
The module with vendor ID(0x1D) and module iden	ifier #xc3001010] is found in file [Festo-FB37-20150923 aml] and [Festo FB37-20150923 - OMRON.aml]. The first module description will be use	d -> Device: Hilscher.ECATGenSt
The module with vendor ID(9xLD) and module iden	iner-measurers in reasoning in the protection of the second state of the second state of the second state of the second second second state of the second seco	d -> Device: Hischer.ECATGenSt dl -> Device: Hilscher.ECATGenSt
The module with vendor ID[0x1D] and module ider	ifier[#xe0020202] is found in file [Festo-FB37-20150923.aml] and [Festo FB37-20150923 - OMRON.aml]. The first module description will be use	dl -> Device: Hilscher.ECATGenSla
Could not load the DTM: MEModuleDtm.ModDtm	lain	
Could not load the DTM: SickFSCommDtm2.ModE	mMain	
H + F F SYCON.net hetDevice	۲. W	•
early	Administrator	NUM

Select "Configuration" branch, select "I/O Server". Check "Map FC1 and FC3" if input and output are merged in a single table (one for digital IO, one for analog IO).

Uncheck "DHCP", enable and set "IP address" and "Netmask". Here, you specify the server IP address.

Fill "Register Input" and "Register Output" size. Be careful as all detailed configuration you will do on next step will be lost if you change thoses values.

"Apply".

netDevice - Configuration J20	07J208 RE/OMB[NETX 51 RE/OMB]<>			
IO Device: NETX ! Vendor: Hilsche	51 RE/OMB er GmbH		Device ID: - Vendor ID: 0x011e	Fot
Navigation area 📃		Configuration		
Settings	Interface			^
netX Driver	Bus startup:	Automatic 👻		
Device Assignment	Watchdog time:	1000 ms		
	Protocol mode:	I/O Server -		
Configuration	Data s <u>w</u> ap:	No 👻		
Signal Configuration	Map FC1 and FC3			
	Bus			
	Provided server connections:	4		
	Client connection watchdog time:	1000 ms		
	Response timeout:	2000 ms		
	Send acknowledgement timeout:	31000 ms		E
	Connect acknowledgement timeout:	31000 ms		
	Close acknowledgem, at times to	13000 ms		
	IP address:	192 . 168 . 0 . 254 V Enable		
	Netmask:	255 . 255 . 255 . 0 🕼 Enable		
	Gateway:	0.0.0.0 []] <u>E</u> nable		
	Extras:	Boot P DHCP		
-		100MBit Full Duplex		
r r				
	Begister (Input): 5	Register (Qutput): 5		
		Default		
			OK Cance Ap	ply Help

Select "Signal Configuration" branch to access word arrays, which has been built.24/42© Stäubli 2020 - TSS.000.016.04-AModbus configuration CS8C CS9

#### 6 - Modbus server on CS9



Right click on the array and select "Edit Signal"

You can now split / merge / rename items.

Press "Apply" after each change to do it.

netDevice - Configuration J20	7J208 RE/OMB[NETX 51 RE/OMB]<>			
IO Device: NETX 5 Vendor: Hilsche	I RE/ONB GerbH	Device ID: Vendor ID:	- 0x011e	FDT
Navigation area Settings Driver Device Assignment Firmware Download Configuration Configuration Signal Configuration	Signal Configuration Stat D Registers In Stat D Sequence Dut Stat D Sequence D Sequence Dut Stat D Sequence D Sequenc			Module Type 5 Registers In 5 Registers Out
		OK I	Zancel Arx	aly Help

When finished, press "Ok" then "File", "Save" and close SYCON.



With "Transfer manager", send the "J207/J208" configuration to the controller.

Reboot the controller in order to take into account the new configuration.

Transfer Manager

Outil de transfert           Fichier         Affichage         Langue         ?			
	≪	-1 1	
□         ■         Emulsiteur - Controller/2 (s0 90:59_E51739)           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □           □         □         □         □         □           □         □         □         □         □           □         □         □         □         □           □         □         □         □         □           □         □ <td></td> <td></td> <td></td>			
<u>Actualiser</u> Supprimer	Actualiser	Supprimer	Backup
			Filtres exclus



#### 6.1 Example with a PLC/screen configured as a client

In this example, the client has 12 digital outputs, 10 digital inputs, 2 analog outputs, 4 analog inputs. In order to prevent issues we will round up digital outputs and inputs to the next 16 multiple.

PLC / screen, client (master)		CS	69, server (sla	ave)				
	Word	Bit	Output name	Input name	Address	Bit	Word	
		1	DO_01	DI_01	000009	9		
		2	DO_02	DI_02	000010	10		
		3	DO_03	DI_03	000011	11		
		4	DO_04	DI_04	000012	12		
		5	DO_05	DI_05	000013	13		
Ŧ		6	DO_06	DI_06	000014	14		
tp (		7	DO_07	DI_07	000015	15		put
no	1	8	DO_08	DI_08	000016	16	1	. <u> </u>
tal	1	9	DO_09	DI_09	000001	1		ita
ligi		10	DO_10	DI_10	000002	2		Dig
		11	DO_11	DI_11	000003	3		
		12	DO_12	DI_12	000004	4		
		13	DO_free_01	DI_free_01	000005	5		
		14	DO_free_02	DI_free_02	000006	6		
		15	DO_free_03	DI_free_03	000007	7		
		16	DO_free_04	DI_free_04	800000	8		
Analog	2		AO_01	AI_01	300002		2	Analog
output	3		AO_02	AI_02	300003		3	input

PLC / screen, client (master)		CS	69, server (sla	ave)				
	Word	Bit	Output name	Input name	Address	Bit	Word	
	1	DI_01	DO_01	100009	9			
		2	DI_02	DO_02	100010	10		
		3	DI_03	DO_03	100011	11		
		4	DI_04	DO_04	100012	12		
		5	DI_05	DO_05	100013	13		
		6	DI_06	DO_06	100014	14		Ŧ
put		7	DI_07	DO_07	100015	15		tpu
. <u> </u>	1	8	DI_08	DO_08	100016	16	1	no
ita	I	9	DI_09	DO_09	100001	1	I	tal
Dig		10	DI_10	DO_10	100002	2		igi
		11	DI_free_01	DO_free_01	100003	3		
		12	DI_free_02	DO_free_02	100004	4		
		13	DI_free_03	DO_free_03	100005	5		
		14	DI_free_04	DO_free_04	100006	6		
		15	DI_free_05	DO_free_05	100007	7		
		16	DI_free_06	DO_free_06	100008	8		
	2		AI_01	AO_01	400002		2	
Analog	3		AI_02	AO_02	400003		3	Analog
input	4		AI_03	AO_03	400004		4	output
	5		AI_04	AO_04	400005		5	

Above exchange table shows that we need 5 register (input) and 3 register (output).

IO Device: NETX Vendor: Hilsch	51 RE/OMB er GmbH	Device ID: Vendor ID:	- 0x011e
Navigation area		Configuration	
Settings	Interface		
netX Driver	Bus startup:	Automatic 👻	
Device Assignment	Watchdog time:	1000	ms
Configuration	Protocol mode:	I/O Server 💌	
Configuration	Data s <u>w</u> ap:	No 👻	
Signal Configuration	Map FC1 and FC3		
	Bus		
	Provided server connections:	4	
	Client connection watchdog time:	1000	ms
	Response timeout:	2000	ms
	Send acknowledgement timeout:	31000	ms
	Connect acknowledgement timeout:	31000	ms
	Close acknowledgement timeout:	13000	ms
	IP address:	192 . 168 . 0 . 254	Enable
	Netmask:	255 . 255 . 255 . 0	Enable
	Gateway:	0.0.0.0	Enable
	Extras:	BootP DHCP	
		100MBt Full Dupley	<u>(</u>
	Data	Auto-neg.	
	Register (Input): 5	Register (Qutput): 3	
			Default

netDevice - Configuration	207J208 RE/OMB[NETX 51 RE/OMB]	•		- <b>O</b> X
IO Device: NET Vendor: Hils	X 51 RE/OMB ther GmbH	Device ID: Vendor ID:	- 0x011e	Pa
Navigation area	3	Signal Configuration		
Settings Driver netX Driver	Slot Name Slot 0 5 Registers In			Module Type 5 Registers In
Device Assignment Firmware Download	Name 5 InWORDs	Type 5 word array	Offset 0	
Configuration Configuration	Slot 0 3 Registers Out			3 Registers Out
		ОК	Cancel Ar	oply Help

In "Signal Configuration", split "Registers In" and "Registers Out" as defined in the exchange table.

#### 6 - Modbus server on CS9



IO Device: NETX Vendor: Hilsch	51 RE/OMB er GmbH	Device ID: Vendor ID:	- 0x011e	-
Navigation area		Signal Configuration		
<ul> <li>Settings</li> <li>metX Driver</li> <li>netX Driver</li> <li>Device Assignment</li> <li>Firmware Download</li> <li>Configuration</li> <li>Configuration</li> <li>Configuration</li> <li>Signal Configuration</li> </ul>	Stat         Harre           Stat         2 Register Dit           Name         0.09           Di         10           Di         11           Di         160           Di         10           Di         10	Type bit bit bit bit bit bit bit bit bit bit	Offset         00           01         01           03         03           04         03           05         06           07         10           11         13           15         16           17         2           4         4	Module Type 5 Registers 1 3 Registers 1 
			Cruzi C. La	alu ) ( uniu

IO Device: NETX 5 Vendor: Hische	51 RE/OMB r GmbH	Device ID: Vendor ID:	- 0x011e	
Navigation area 📃		Signal Configuration		
Settings	Clat Name			Madula Tura
🔄 Driver	Slot Name			E Desisters I
netX Driver	Side of S Registers in			15 Registers I
Device Assignment	Name	Туре	Offset	
Firmware Download	DO_09	bit	0.0	
Configuration	DO_10	bit	0.1	
Configuration	DO_free_01	bit	0.2	
Signal Configuration	DO_free_02	bit	0.3	
	DO_free_03	bit	0.4	
	DO_free_04	bit	0.5	
	DO_free_05	bit	0.6	
	DO_free_06	bit	0.7	
	00_01	Dit	1.0	
	00_02	bit	12	
	DO 04	bit	13	
	DO 05	bit	14	
	DO 06	bit	1.5	
	DO 07	bit	1.6	
	DO_08	bit	1.7	
	AO_01	word	2	
	AO_02	word	4	
	AO_03	word	6	
	AO_04	word	8	
	Slot 0 3 Registers Out			3 Registers
		ОК	Cancel Ap	ply Help

You now have all your IOs available in SRS and you just have to link VAL3 variables with physical IOs.

🎟 IO physiques-Controller2 😕 🗙	🚯 Vue 3D	
IO physiques	Description	Lien physique
	3207/3208	
Entrées digitales		
- %IO	DI_09	CCCE5CD8-ABC1-48DF-9290-64D69510C130
- %I1	DI_10	0EF46B70-1E45-4291-9BE1-16DFB9F4B8D1
- %I2	DI_11	493D689D-3018-47EC-900D-052832CB05B2
-E 📢 %I3	DI_12	8C5B3FC8-4BF7-4B00-8B4D-CF270FE480BB
- %I4	DI_free_01	DCF15D7A-3752-4B3B-BC29-E1C752ADF7CA
	DI_free_02	CF2A0BEF-7A04-4E9E-B4D1-22BA9DD4D7BE
	DI_free_03	91EF4FFF-10E2-4832-A8F1-76BD5B50F474
- <b>E</b> 47 %17	DI_free_04	3A5E439B-3F2A-45AF-839C-D6F619C87422
	DI_01	0654104C-2915-4E11-84E7-35B8D2EEC696
	DI_02	F212DD5F-794B-474E-A2C9-3F70A60812D1
- %I10	DI_03	1361AB3C-AD62-40B6-940F-7E4A4201646D
- %I11	DI_04	9C0706DA-B257-4A9C-AED4-D12BF71833BD
- <b>I</b> - %I12	DI_05	68E8231A-A2CF-4436-9D9B-8CC3674D4E3D
- <b>I</b> 42 %I13	DI_06	56B4859D-A3A9-4484-BAE3-72A6A7812EB1
- <b>I</b> 4 %I14	DI_07	227FC60D-86DD-4076-B496-6A5F3E95BD32
└─ <b>─√</b> %I15	DI_08	846C64EE-5847-4E16-881C-4B88A9B53539
Sorties digitales		
- <b>D</b> III %Q0	DO_09	4A310D3A-62C0-4AB8-9B8D-894E8B1D2B7A
- <b>D</b> ••• %Q1	DO_10	62ABB1F4-FD17-4354-A645-C262A5CE6C54
- %Q2	DO_free_01	F27CC68B-6285-4678-BF73-5DD128FF904E
- %Q3	DO_free_02	7E10C8E4-1E7D-4660-A071-9378E34BE1CB
- <b></b> %Q4	DO_free_03	BA9F2C72-ED1B-4EE7-B964-48159BAF3877
%Q5	DO_free_04	BC444DC7-0C5F-41FD-B856-991CDD9C7F9F
%Q6	DO_free_05	A9B7B449-EAFA-4CCF-AF8E-BB7B53FE9DCC
~%Q7	DO_free_06	AAD94247-863B-4F1F-86F7-D4E53AF3F8AE
%Q8	DO_01	11DD89FD-1401-460A-8FA4-29040348CC30
- <u></u> %Q9	DO_02	1C1238E2-D266-47A1-9978-2B954FE36B28
%Q10	DO_03	DA10CD9F-D857-4A61-AB9F-4C98CC142F7D
%Q11	DO_04	2AD7B019-8E61-4FE1-B2A2-C41553A41098
~%Q12	DO_05	890449F7-72BE-4A3B-A13A-20D67AA8B3B2
%Q13	DO_06	0E061E2F-A5A1-4C6F-9436-36B3FE1F6326
%Q14	DO_07	E0F8ACF3-B3F3-4FFB-A35D-87FAC8FE0809
%Q15	DO_08	8F025DBB-EEBE-4379-B7F2-D6FE45563786
Entrées analogiques		
~%IW16	AI_01	4A8176D9-F8C6-43AF-A230-4632D083538E
~%1W32	AI_02	2E1EF23A-9B39-491F-888D-DAB21406D6C0
Sorties analogiques	10.01	
%QW16	AO_01	A /E4A964-84-4-46 / 2-9298-346A 1315AC49
%QW32	AO_02	FD5/CCA8-33D5-458A-88DC-28C2CDC686DE
%QW48	AU_U3	25EB93A3-2800-4878-990A-123E3F9E64F9
~%QW64	AO_04	AED6BB89-25DE-4AD8-B211-896561619DF9



### 6.2 Example with a WAGO/STÄUBLI Modbus client (5109-8888)

That specific client has built-in:

- 2 bit output: a life bit and one unused
- 2 analog output: a version number and one unused

We have 12 digital outputs, 10 digital inputs, 2 analog outputs, 4 analog inputs

WAGO (5109-8888), client (master)		CS9, ser	ver (slav	ve)			
	Word	Bit	Output name	Input name	Bit	Word	
	1	LifeBit	LifeBit	9			
	2	NullBit	NullBit	10			
	3	DO_01	DI_01	11			
		4	DO_02	DI_02	12		
		5	DO_03	DI_03	13		
ŧ		6	DO_04	DI_04	14		
þ		7	DO_05	DI_05	15		put
no	4	8	DO_06	DI_06	16	4	. <b></b>
tal	I	9	DO_07	DI_07	1	I	ital
ligi		10	DO_08	DI_08	2		Dig
		11	DO_09	DI_09	3		
		12	DO_10	DI_10	4		
		13	DO_11	DI_11	5		
		14	DO_12	DI_12	6		
		15	DO_free_01	DI_free_01	7		
		16	DO_free_02	DI_free_02	8		
Analog	2		mbVersion	mbVersion		2	Analog
output	3		mbUnused	mbUnused		3	input
	4		AO_01	AI_01		4	
	5		AO_02	AI_02		5	

WAGO (5109-8888), client (master)		CS9, ser	ver (slav	ve)			
	Word	Bit	Output name	Input name	Bit	Word	
	1	DI_01	DO_01	9			
		2	DI_02	DO_02	10		
		3	DI_03	DO_03	11		
		4	DI_04	DO_04	12		
		5	DI_05	DO_05	13		
		6	DI_06	DO_06	14		Ħ
but		7	DI_07	DO_07	15		tpu
. <u></u>	4	8	DI_08	DO_08	16	1	no
ital	I	9	DI_09	DO_09	1		tal
Dig		10	DI_10	DO_10	2		igi
		11	DI_free_01	DO_free_01	3		
		12	DI_free_02	DO_free_02	4		
		13	DI_free_03	DO_free_03	5		
		14	DI_free_04	DO_free_04	6		
		15	DI_free_05	DO_free_05	7		
		16	DI_free_06	DO_free_06	8		
	2		AI_01	AO_01		2	
Analog	3		AI_02	AO_02		3	Analog
input	4		AI_03	AO_03		4	output
	5		AI_04	AO_04		5	

Below a sample SRS configuration for such client with 12 digital inputs, 8 digital outputs, 2 analog inputs and 4 analog outputs.

Navigation area		Signal Configuration	I	
Settings	Slot Name			Module T
Shiver	Slot 0 5 Registers In			5 Registe
De vice Assistant	News	Ture	0#	
Einen Deurstend	CS9 output Rit 0	Type	Onser	
Configuration	CS9 output_Bit_1	bit	0.0	
Configuration	CS9 output Bit 2	bit	0.2	
Configuration	CS9 output Bit 3	bit	0.3	
Signal Configuration	CS9 output_Bit_4	bit	0.4	
	CS9 output_Bit_5	bit	0.5	
	CS9 output_Bit_6	bit	0.6	
	CS9 output_Bit_7	bit	0.7	
	CS9 output_Bit_8	bit	1.0	
	CS9 output_Bit_9	bit	1.1	
	CS9 output_Bit_10	bit	1.2	
	CS9 output_Bit_12	bit	1.5	
	CS9 output_bit_12	bit	1.5	
	CS9 output Bit 14	bit	1.6	
	CS9 output_Bit_15	bit	1.7	
	CS9 output_Word_1	word	2	
	CS9 output_Word_2	word	4	
	CS9 output_Word_3	word	6	
	CS9 output_Word_4	word	8	
	Slot 0 3 Registers Out			3 Registe
	Name	Туре	Offset	
	CS9 input_Bit_0	bit	0.0	
	CS9 input_Bit_1	bit	0.1	
	CS9 input_Bit_2	bit	0.2	
	CS9 input_Bit_3	bit	0.3	
	CS9 input_Bit_4	bit	0.4	
	CS9 input_Bit_5	DIL	0.5	
	CS9 input_Bit_6	Dit	0.5	
	CS9 input_Bit_8	bit	10	
	CS9 input Bit 9	bit	11	
	CS9 input Bit 10	bit	1.2	
	CS9 input_Bit_11	bit	1.3	
	CS9 input_Bit_12	bit	1.4	
	CS9 input_Bit_13	bit	1.5	
	CS9 input_Bit_14	bit	1.6	
	CS9 input_Bit_15	bit	1.7	
	CS9 input_Word_1	word	2	
	CS9 input_Word_2	word	4	



Below, corresponding WAGO coupler configuration where analog input and output must be shifted by the amount of word used for the bits and thus use a custom configuration.

Login: admin

Password: wago

Eichier Erlition Affichage Favoris Outlis 2	Ethernet Web-Based ×	□ □ × ☆ ☆ 領
	Web-based Management	WAGO Kontakttecht GmbH & Co. k Hansastr. D-32423 Mind
^ Navigation → Information	Stäubli configuration	
• TCP/IP • IO config • Stäubli	This page is for the configuration of the communication settings. Changes will take effect immediately.	
	Stäubli controller IP address 192 168 0 254 Configuration byte 67	
	Modbus/ICP timeout [ms]         50           AUTO         CUSTOM           Analog input address (WORD - R/W)         0         1           Analog output address (WORD - R)         4         1	
	Digital input address (BIT - R/W)         0         0           Digital ouput address (BIT - R)         14         0           Use custom configuration (0 = AUTO, 1 = CUSTOM)         1	
	UNDO SUBMIT	
v		



### 7 Modbus client on CS9

Internally, all is managed as word but stored in 2 bytes.

For data transmission, Modbus protocol specify that values must be encoded as big endian (Most Significant Byte first then Last Significant Byte).

On CS9 this also apply on coils for their internal storage, thus you will have a swap between first 8 coils and last 8 coils:

Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Coil	9	10	11	12	13	14	15	16	1	2	3	4	5	6	7	8

If you use "Data swap", coils (digital IOs) will be back in order but the 2 bytes used of registers (analog IOs) will be swapped also and thus may give erroneous value.

In SRS, select the controller in the cell explorer, make a right click on it and select "Physical IOs", "Add IO board", "Open Modbus/TCP – Client/Server – J207/J208 – RE/OMB"



SYCON.net - [J207J208_Open_Modbus_TCP_NETX_51_F	E_OMB.spj]			
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adfinit .	natDesize			
Department (2071208 Onen Medhus TCP NETY 51 P	neuverou			
J207/208 RE/OMBINETX 51 RE/OMBI			Î O MARIA	1
	-			
			. CC-Link	
	J207J20 RE/OMB[NETX 51 RE/OMB]<>		E DeviceNet	
	THE REPORT OF TH		EtherCAT	
	1000		EtherNet/P	
			Open Modbus/TCP     DOWERI INK	
			PROFIBUS DPV 0	
			PROFIBUS DPV 1	
			- PROFINET IO	
			🔬 🚞 SERCOS 🖩	
			Fieldbus (Vendor), DTM Class ), Fo	ound /
			AS-Interface	
			*	
	Id a b b Network View		·	
The module with vendor ID[0x1D] and module ident	fier[#xc3001010] is found in file [Festo-FB37-20150923.aml] and [Festo FB37-2	0150923 - OMRON.xml]. 1	The first module description will be used -> Device: F	filscher.ECATGenSla
The module with vendor ID[0x1D] and module iden	fier[#xe0020000] is found in file [Festo-FB37-20150923.xml] and [Festo FB37-2	0150923 - OMRON.xml]. 1	The first module description will be used! -> Device: H	filscher.ECATGenSla
The module with vendor ID[0x1D] and module iden	fier[#xe0020002] is found in file [Festo-FB37-20150923.xml] and [Festo FB37-2	0150923 - OMRON.xml], 1	The first module description will be used -> Device: H	filscher.ECATGenSla
The module with vendor ID[0x1D] and module iden	fier[#xe0020202] is found in file [Festo-FB37-20150923.xml] and [Festo FB37-2	0150923 - OMRON.xml], 1	The first module description will be used! -> Device: H	filscher.ECATGenSla
Could not load the DTM: MEModuleDtm.ModDtmM	an			
Could not load the DTM: SickFSCommDtm2.ModD	nMain			
o⊓ + F F SYCON.net \ netDevice /		٠		+
Ready			Administrator	NUM

Select "Configuration" branch, select "Client".

Uncheck "DHCP", enable and set "IP address" and "Netmask". Here, you specify the client address. "Apply".

IO Device: NETX Vendor: Hilsch	51 RE/OMB er GmbH	Device ID: Vendor ID:	- 0x011e	
Navigation area		Configuration		
Settings	Interface			
netX Driver	Bus startup:	Automatic	]	
Device Assignment	Watchdog time:	1000	ms	
Firmware Download	Protocol mode:	Client -	1	
Configuration	Data swap:	No	-	
Signar Configuration	Man FC1 and FC3		1	
Command Table	Pue			
	Provided server connections:			
	Client connection watchdog time:	1000	ms	
	Response timeout:	2000	ms	
	Send acknowledgement timeout:	31000	ms	
	Connect acknowledgement timeout:	31000	ms	
	Close acknowledgement timeout:	13000	ms	
	IP address:	192 . 168 . 000 . 001	Enable	
	Netmask:	255 . 255 . 255 . 0	Enable	
	Gataway	0 0 0 0	Eastela	
	Galeway.			
	Extras:	BootP DHCP		
		100NBt Full Duple	ŭ	
	Data	Auto-neg.		
	Parister (larget), 2000	Barrister (Dutruit), 2000		
	Degister (input).	Hegister Qutput).	<u></u>	
			Delant	
			<b>`</b> _	_



Select "Command table" branch.

Add as many device as needed

For each device, you specify the server IP address in "Device Address", Select the proper "Function code", specify the start "Address" and the "Number of Register".

Image: Display the set of	
Navigation area     Command Table       Settings     Driver     0 mm       Driver     Decise Address     Ust Indee ColleC15       Firmware Download     Configuration     132:160.024       Configuration     Direct Address     Ust Indee ColleC15       Settings     Direct Address     Ust Indee ColleC15       Settings     Direct Address     Ust Indee ColleC15       Settings     Direct Mutic Program     0	
a Settings Driver Perick Arkingen Gommand Table a Configuration ■ Command Table Signar Common the Signar Common t	
	Cycle T
OK Cancel Appli	y Help

Select "Signal configuration" branch.

	GmbH		Vendor ID:	0x011e	
avigation area 📃		Signal Configuratio	n		
Settings	Slot Name				Module T
Driver	Addr 192.168.0.254 / Coil 0 2 Bytes 0	Dut			2 Bytes C
Device Assignment	Name	Time Offret			
Firmware Download	2 OutBytes	2 byte array 0			
Configuration	Addr 192 168 0 254 / Begister 0 2 Words	Out			2 Words
Configuration	Addr 192.168.0.254 / Coil 14 2 Bytes I	n			2 Bytes In
Command Table	Addr 192.168.0.254 / Register 2 4 Words	In			4 Words I
			ок	Cancel App	ply Help

Split "Bytes Out", "Words Out", "Bytes In", "Words In" as defined in the exchange table.

When finished, press "Ok" then "File", "Save" and close SYCON.

With "Transfer manager", send the "J207/J208" configuration to the controller.

Reboot the controller in order to take into account the new configuration.



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<b>Pi</b>	≪		
Controler2 (38 9C49_051789)     Controler2 (38 9C49_05178		Supplicat	Bachus
	Actualiser	Supprimer	Dackup
			□ Filtres exclus 💥



### 7.1 Example with a CS9 configured as a client connected to a CS8C as server

We have:

- 12 digital outputs, FC15, start at address 0, quantity 12
- 10 digital inputs, FC2, start at address 12 (the 12 digital outputs), quantity 10
- 2 analog outputs, FC16, start at address 0, quantity 2
- 4 analog inputs, FC4, start at address 2 (the 2 analog outputs), quantity 4

	CS	9 client	(master)	CS8C, se	rver (sla	ave)	
	Word	Bit	Output name	Input name	Bit	Word	
		1	DO_01	DI_01	9		
		2	DO_02	DI_02	10		
		3	DO_03	DI_03	11		
		4	DO_04	DI_04	12		
		5	DO_05	DI_05	13		1
ŧ		6	DO_06	DI_06	14		
tþr		7	DO_07	DI_07	15		put
no	4	8	DO_08	DI_08	16	4	.⊑
, Ital	I	9	DO_09	DI_09	1		ital
igi		10	DO_10	DI_10	2		Dig
		11	DO_11	DI_11	3		
		12	DO_12	DI_12	4		
		13	DO_free_01	DI_free_01	5		
		14	DO_free_02	DI_free_02	6		
	15	DO_free_03	DI_free_03	7		l	
		16	DO_free_04	DI_free_04	8		
		1	DI_01	DO_01	9		
	2	DI_02	DO_02	10			
		3	DI_03	DO_03	11		
		4	DI_04	DO_04	12		
		5	DI_05	DO_05	13		
		6	DI_06	DO_06	14		Ŧ
but		7	DI_07	DO_07	15		tpu
.⊆	4	8	DI_08	DO_08	16		no
ital	Ĩ	9	DI_09	DO_09	1		tal
Dig		10	DI_10	DO_10	2		igi
		11	DI_free_01	DO_free_01	3		
		12	DI_free_02	DO_free_02	4		
		13	DI_free_03	DO_free_03	5		
		14	DI_free_04	DO_free_04	6		
		15	DI_free_05	DO_free_05	7		
		16	DI_free_06	DO_free_06	8		
Analog	2		AO_01	AI_01		2	Analog
output	3		AO_02	AI_02		3	input
	2		AI_01	AO_01		2	
Analog	3		AI_02	AO_02		3	Analog
input	4		AI_03	AO_03		4	output
	5		AI_04	AO_04		5	-

netDevice - Configuration J203	J208 RE/OMB[NETX 51 RE/ON	IB]<>					
IO Device: NETX 5: Vendor: Hilscher	l RE/OMB GmbH				Device ID: Vendor ID:	- 0x011e	FDT
Navigation area			Signal C	onfiguration			
Settings	Slot	Name					Module Type
Driver	Addr 192 168 0 254 / Coil 0	2 Bytes Out					2 Bytes Out
netX Driver							
Device Assignment	Name DO 01	lype	Offset				
Firmware Download	00_01	bit	0.0				
Configuration	DO 03	bit	0.2				
Configuration	DO_04	bit	0.3				
Command Table	DO_05	bit	0.4				
	DO_06	bit	0.5				
	00_07	bit	0.6				
	DO_08	bit	1.0				
	DO 10	bit	1.1				
	D0_11	bit	1.2				
	DO_12	bit	1.3				
	DO_free_01	bit	1.4				
	DO_free_02	bit	1.5				
	DO_free_03	Dit	1.0				
	Addr 192.168.0.254 / Register	0 2 Words Out					2 Words Out
	Addr 192 168 0 254 / Coll 12	2 Dytes in					2 Dytes In 4 Words In
		2 4 110100 11					4 110105 111
					ОК	Cancel Ap	ply Help
~~							.4

netDevice - Configuration J207	7J208 RE/OMB[NETX 51 RE/OMB]<	>					
IO Device: NETX 5: Vendor: Hilscher	1 RE/OMB GmbH				Device ID: Vendor ID:	- 0x011e	PDT
Navigation area			Signal Con	figuration			
<ul> <li>Settings</li> <li>Triver</li> <li>Device Asignment</li> <li>Firmware Download</li> <li>Configuration</li> <li>Configuration</li> <li>Command Table</li> <li>Signal Configuration</li> </ul>	Skot         1           Addr 192 168 0.254 / Coll 0         2           Addr 192 168 0.254 / Register 0         2           Name         0           A0_01         2           Addr 192 168 0.254 / Coll 12         2           Addr 192 168 0.254 / Coll 12         2           Addr 192 168 0.254 / Coll 12         2	iame Bytes Out Words Out I Type word word Bytes in Words in	Offset				Module Type 2 Bytes Out 2 Uvords Out 2 Bytes In 4 Words In
an,					ОК	Cancel Ap	oly Help

#### 7 - Modbus client on CS9



▶ netDevice - Configuration J207	7J208 RE/OMB[NETX 51 RE/OMB]<>					23
IO Device: NETX 5: Vendor: Hilscher	1 RE/OMB GmbH			Device ID: Vendor ID:	- 0x011e	FDT
Navigation area			Signal Config	uration		
<ul> <li>Setings</li> <li>Setings</li> <li>Driver</li> <li>netX Driver</li> <li>netX Driver</li> <li>Device Asignment</li> <li>Firmware Download</li> <li>Configuration</li> <li>Configuration</li> <li>Command Table</li> <li>→ Signal Configuration</li> </ul>	Skt         Name           Add 192:160.254 / Coli 0         2 Bytes OL           Add 192:160.254 / Coli 12         2 Bytes OL           Add 192:160.254 / Coli 12         2 Bytes In           Name         0         0           10         0         0	A Type bit bit bit bit bit bit bit bit bit bit	Offset         0           01         01           02         03           04         05           06         07           10         11           11         14           14         14           15         16           16         17		4 Words	Type Dut Out In
<b>4</b>				OK	Cancel Apply Help	

IO Device: NETX Vendor: Hilschr	51 RE/OMB er GmbH			Device ID: Vendor ID:	- 0x011e	•
vigation area			Signal Configur	ration		
⇒ Driver netX Driver Device Assignment Firmware Download Configuration Configuration	Slot         Name           Addr 192.168.0.254 / Coil 0         2 Byte           Addr 192.168.0.254 / Register 0         2 Worn           Addr 192.168.0.254 / Register 2         2 Byte           Addr 192.168.0.254 / Register 2         4 Worn	is Out de Out is In de In Type	Offset			Module Ty 2 Bytes Ou 2 Words O 2 Bytes In 4 Words In
Command Table	A_01 A_02 A_03 A_03 A_04	word word word word	2 4 6 8			

# 8 Appendix

### 8.1 Modbus function code

Extract from Modbus specification (http://www.modbus.org/specs.php)

Data type	Mode	Function name	Function code (FC)
Bit	Digital input (read only)	Read Discrete Inputs	2
	Digital output (read / write)	Read Coils	1
		Write Single Coil	5
		Write Multiple Coils	15
Word (16 bits)	Analog input (read only)	Read Input Registers	4
	Analog output (read / write)	Read Holding Registers	3
		Write Single Register	6
		Write Multiple registers	16