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**Modbus TCP/IP server
16 Digital Inputs**

User Guide – MODBUS TCP/IP protocol
Firmware Version : 8200

SS 8148

PRELIMINARY DESCRIPTION

All of the data shared by a device communicating by Modbus TCP/IP protocol are mapped in tables, at each data is associated a proper address.
Each data can be of two types:
- "REGISTER",   data of 2 bytes size (word of 16 bits) that can be associated to analogue input or output, variables, set-point, etc...
- "COIL",   data of 1 single bit that can be associated to digital input or output or to a logic state.
A register could contain the image (mirror) of more coils; in example the 16 digital inputs of a device could be read or written as bit (singularly) addressing the coil related to each input or can be read or written as a single word addressing the associated register wherein each bit corresponds to a coil.
In the Modbus protocol, registers and coils are divided as per the following groups of addresses:
0xxxx and 1xxxx = Coils (bit)
3xxxx and 4xxxx = Registers (word)
When reading functions are performed, use the tables indicated below to address the registers .
It is possible to access to the internal registers of the device by direct command Modbus TCP/IP or by the integrated web server.

REGISTERS TABLE

Register Position	Description	Access
40002	Firmware [0]	RO
40003	Firmware [1]	RO
40004	Name [0]	R/W
40005	Name [1]	R/W
40007	Node ID	R/W
40011	System Flags	R/W
40013	Watchdog timer	R/W
40032	Digital Inputs	RO
40033	Digital Inputs Rise Latch	R/W
40034	Digital Inputs Fall Latch	R/W
40035	Freq. Digital Input 0	RO
40036	Freq. Digital Input 1	RO
40037	Freq. Digital Input 2	RO
40038	Freq. Digital Input 3	RO
40039	32 bit Counter Digital Input 0	R/W
40041	32 bit Counter Digital Input 1	R/W
40043	32 bit Counter Digital Input 2	R/W
40045	32 bit Counter Digital Input 3	R/W

SUPPORTED MODBUS FUNCTION CODES

Function	Description
01	Read Coil Status (0xxxx)
02	Read Inputs Status (1xxxx)
03	Read Holding Registers (4xxxx)
04	Read Inputs Registers (3xxxx)
05	Force Single Coil
06	Preset Single Register
15 (0F)	Force Multiple Coil
16 (10)	Preset Multiple Registers

NOTES:

Registers and coils marked as RO in the column 'Access' are Read Only registers.
Registers and coils marked as R/W in the column 'Access' are Read and Write registers.
For the devices of SS8000 series, the group of data 0xxxx is the mirror of the group 1xxxx, the group of data 3xxxx is the mirror of the group 4xxxx, therefore the first register could be addressed either as 30002 (with function 04) or 40002 (with function 03).

The maximum number of coils that can be read through Modbus functions 01 and 02 (see "Supported modbus functions codes") are: **128**
The maximum number of registers that can be read through Modbus functions 03 and 04 (see "Supported modbus functions codes") are: **64**
The maximum number of registers that can be written by Modbus function 16 (see "Supported modbus functions codes") are: **64**
The maximum number of coils that can be written by Modbus function 15 (see "Supported modbus functions codes") are: **64**

COILS TABLE

(*)Coil (Hex)	(*)Coil (Dec)	Description	Access
0x00A1	00161	Watch-dog Enable	R/W
0x00A2	00162	Watch-dog Event	R/W
0x00A3	00163	Power-Up Event	R/W
0x01F9	00505	Input #0	RO
0x01FA	00506	Input #1	RO
0x01FB	00507	Input #2	RO
0x01FC	00508	Input #3	RO
0x01FD	00509	Input #4	RO
0x01FE	00510	Input #5	RO
0x01FF	00511	Input #6	RO
0x0200	00512	Input #7	RO
0x01F1	00497	Input #8	RO
0x01F2	00498	Input #9	RO
0x01F3	00499	Input #10	RO
0x01F4	00500	Input #11	RO
0x01F5	00501	Input #12	RO
0x01F6	00502	Input #13	RO
0x01F7	00503	Input #14	RO
0x01F8	00504	Input #15	RO
0x0209	00521	Rise Latch Input #0	R/W
0x020A	00522	Rise Latch Input #1	R/W
0x020B	00523	Rise Latch Input #2	R/W
0x020C	00524	Rise Latch Input #3	R/W
0x020D	00525	Rise Latch Input #4	R/W
0x020E	00526	Rise Latch Input #5	R/W
0x020F	00527	Rise Latch Input #6	R/W
0x0210	00528	Rise Latch Input #7	R/W
0x0201	00513	Rise Latch Input #8	R/W
0x0202	00514	Rise Latch Input #9	R/W
0x0203	00515	Rise Latch Input #10	R/W
0x0204	00516	Rise Latch Input #11	R/W
0x0205	00517	Rise Latch Input #12	R/W
0x0206	00518	Rise Latch Input #13	R/W
0x0207	00519	Rise Latch Input #14	R/W
0x0208	00520	Rise Latch Input #15	R/W
0x0219	00537	Fall Latch Input #0	R/W
0x021A	00538	Fall Latch Input #1	R/W
0x021B	00539	Fall Latch Input #2	R/W
0x021C	00540	Fall Latch Input #3	R/W
0x021D	00541	Fall Latch Input #4	R/W
0x021E	00542	Fall Latch Input #5	R/W
0x021F	00543	Fall Latch Input #6	R/W
0x0220	00544	Fall Latch Input #7	R/W
0x0211	00529	Fall Latch Input #8	R/W
0x0212	00530	Fall Latch Input #9	R/W
0x0213	00531	Fall Latch Input #10	R/W
0x0214	00532	Fall Latch Input #11	R/W
0x0215	00533	Fall Latch Input #12	R/W
0x0216	00534	Fall Latch Input #13	R/W
0x0217	00535	Fall Latch Input #14	R/W
0x0218	00536	Fall Latch Input #15	R/W

DESCRIPTION MODBUS REGISTERS

40002 / 40003 : FIRMWARE
Field of 2 read only registers ; contains the firmware identifier provided by the manufactured.
- Default value: 8200 (hex)

40004 / 40005 : NAME
Field of 2 read/write registers (4 bytes or 4 ASCII characters) available for the user, it can contain the name of the device or an abbreviation that identifies its function inside the plant. Each one of the 4 byte could be written by values from 0 to 255, ASCII characters included.
The default value of this field contains the identifier of the device expressed in ASCII characters.
- Default value: "8148" (ASCII).

40007 : NODE ID
Contains the MODBUS address of the device; the values allowed are from 1 to 255 decimal.
This data is necessary for the correct addressing of the device into the Modbus net and must follow the IP address.
- Default value: Dec: 1, Hex: 01 INIT: Dec 245, Hex : F5.

40011 : SYSTEM FLAGS
Contains the enable bits and system events of the device. The following parameters are configurable:

Watchdog Event Enable: this bit allows to enable the Watchdog Event (0 = Watchdog disabled, 1 = Watchdog enabled). If this bit is active and the device doesn't receive commands for the time specified in the register 40012 "Watchdog timer" the outputs of the device will be forced in function of the settings of the register 40011 section "Safe". The Watchdog condition is signalled by the blinking of the led PWR.
If this function is required must be implemented at the power-on of the device; the bit must be reset manually when the Watchdog event is occurred.
Watchdog Event: if this bit is set as 1 indicates that the Watchdog condition has happened (0 = Normal condition; 1 = alarm condition)
PowerUp Event: this bit is forced to 1 at each power on and indicates that the device has been switched off or reset. With the setting of this bit as 0 and checking its state, it is possible to know if a reset of the device has occurred (0 = reset not occurred; 1 = reset occurred).

Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Output	-	-	-	-	-	163	162	161	-	-	-	-	-	-	-	-
Value									Watchdog Event enabling Watchdog Event Power-up Event							

40013 : WATCHDOG TIMER
Contains the value of the WatchDog timer, expressed in step of 1 second. If the WatchDog is enabled and the device doesn't receive commands in a time lower or equal to the value of the one expressed in this register the WatchDog will be activated (see description register "System Flags").
- Default value: 10 (10 sec.)

40032 : DIGITAL INPUTS
This register shows the condition of the digital inputs (0 = OFF; 1 = ON).
The same inputs can also be read using the specific functions of reading coils (01-02) referring to the section in the coils table of which this register is a mirror; it is possible to read at the same time all of the bits of this register without implementing the coils' specific functions.

Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Input	#15	#14	#13	#12	#11	#10	#9	#8	#7	#6	#5	#4	#3	#2	#1	#0

40033 : DIGITAL INPUTS RISE LATCH
The bits of this register are used to indicate the happened condition of the raise edge (event of change of level from the state 0 to the state 1) of each digital input. The latch event shows the single change of state and is not updated by the system; in the case of it is necessary to monitor this parameter continuously, the single bit or the group of bits must be wrote to 0 after the rising edge happened.
It is also possible to read and drive the bits using the specific functions of reading and force coils (01-02-05-15) referring to the section in the coils table of which this register is a mirror; it is possible to read and write at the same time all of the bits of this register without implementing the coils' specific functions.

Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Latch	#15	#14	#13	#12	#11	#10	#9	#8	#7	#6	#5	#4	#3	#2	#1	#0

40034 : DIGITAL INPUTS FALL LATCH
The bits of this register are used to indicate the happened condition of the fall edge (event of change of level from the state 1 to the state 0) of each digital input. The latch event shows the single change of state and is not updated by the system; in the case of it is necessary to monitor this parameter continuously, the single bit or the group of bits must be wrote to 0 after the falling edge happened.
It is also possible to read and drive the bits using the specific functions of reading and force coils (01-02-05-15) referring to the section in the coils table of which this register is a mirror; it is possible to read and write at the same time all of the bits of this register without implementing the coils' specific functions.

Bit	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Latch	#15	#14	#13	#12	#11	#10	#9	#8	#7	#6	#5	#4	#3	#2	#1	#0

40035 : FREQUENCY DIGITAL INPUT 0
This register shows the measure of frequency related to the digital input channel 0. The value, expressed in hundredths of Hertz is an Integer 16 bit format. The maximum value of frequency measurable is 300.00 Hz.

40036 : FREQUENCY DIGITAL INPUT 1
This register shows the measure of frequency related to the digital input channel 1. The value, expressed in hundredths of Hertz is an Integer 16 bit format. The maximum value of frequency measurable is 300.00 Hz.

40037 : FREQUENCY DIGITAL INPUT 2

This register shows the measure of frequency related to the digital input channel 2. The value, expressed in hundredths of Hertz is an Integer 16 bit format. The maximum value of frequency measurable is 300.00 Hz.

40038 : FREQUENCY DIGITAL INPUT 3

This register shows the measure of frequency related to the digital input channel 3. The value, expressed in hundredths of Hertz is an Integer 16 bit format. The maximum value of frequency measurable is 300.00 Hz.

40039-40 (LO-HI) : 32 BIT COUNTER DIGITAL INPUT 0

This couple of registers shows the measure of the digital counter related to the input channel 0. The value is incremented at each change of level from 0 to 1 of the input channel; The type of register is a Unsigned Integer 32 bit and uses 2 registers .
It is possible to reset the value by direct writing. At each power-on of the device the value is set to 0.

40041-42 (LO-HI) : 32 BIT COUNTER DIGITAL INPUT 1

This couple of registers shows the measure of the digital counter related to the input channel 1. The value is incremented at each change of level from 0 to 1 of the input channel; The type of register is a Unsigned Integer 32 bit and uses 2 registers .
It is possible to reset the value by direct writing. At each power-on of the device the value is set to 0.

40043-44 (LO-HI) : 32 BIT COUNTER DIGITAL INPUT 2

This couple of registers shows the measure of the digital counter related to the input channel 2. The value is incremented at each change of level from 0 to 1 of the input channel; The type of register is a Unsigned Integer 32 bit and uses 2 registers .
It is possible to reset the value by direct writing. At each power-on of the device the value is set to 0.

40045-46 (LO-HI) : 32 BIT COUNTER DIGITAL INPUT 3

This couple of registers shows the measure of the digital counter related to the input channel 3. The value is incremented at each change of level from 0 to 1 of the input channel; The type of register is a Unsigned Integer 32 bit and uses 2 registers .
It is possible to reset the value by direct writing. At each power-on of the device the value is set to 0.

WEB SERVER STRUCTURE

To access the server, run the Web browser and edit in the Address Bar the IP address of the device.
It will appear the following window. Depending on the Web browser used some icons and/or writings may have little variation of shape and colour.
If necessary, it is possible to connect to the Sielco Sistemi web site to download the data-sheet and the user guide of the device in use clicking on the button "www.sielcosistemi.com" the bottom part of the window.

Write Username and Password. If the default settings are in use the parameters to access are:
Username: *admin*; Password: *admin*
Click on the button *Login* to access to the Home page of the device; it will appear as follows.
In all the web pages, on the top part of the window there are the buttons:
"*Page Back*" to go back to the page previously visualized; "*Home*" to return to the main page; "*Logout*" to quit and get back to the Login page.

To access the page "*Main Menu*" of the device, select the language by the combobox and click the button "*OK*".
The following window will appear.