

## User Guide – MODBUS TCP/IP protocol Firmware Version : 8100

# SS 8188

### 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    |
| 40012             | Power Up / Safe                | R/W    |
| 40013             | Watchdog timer                 | R/W    |
| 40031             | Digital Outputs                | 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    |

### COILS TABLE

| (*)Coil (Hex) | (*)Coil (Dec) | Descrizione      | Accesso |
|---------------|---------------|------------------|---------|
| 0x0092        | 00146         | Watch-dog Enable | R/W     |
| 0x0093        | 00147         | Watch-dog Event  | R/W     |
| 0x0094        | 00148         | Power-Up Event   | R/W     |
|               |               |                  |         |
| 0x01E9        | 00489         | Output #0        | R/W     |
| 0x01EA        | 00490         | Output #1        | R/W     |
| 0x01EB        | 00491         | Output #2        | R/W     |
| 0x01EC        | 00492         | Output #3        | R/W     |
| 0x01ED        | 00493         | Output #4        | R/W     |
| 0x01EE        | 00494         | Output #5        | R/W     |
| 0x01EF        | 00495         | Output #6        | R/W     |
| 0x01F0        | 00496         | Output #7        | 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      |
|               |               |                  |         |
| 0x0209        | 00521         | Latch salita #0  | R/W     |
| 0x020A        | 00522         | Latch salita #1  | R/W     |
| 0x020B        | 00523         | Latch salita #2  | R/W     |
| 0x020C        | 00524         | Latch salita #3  | R/W     |
| 0x020D        | 00525         | Latch salita #4  | R/W     |
| 0x020E        | 00526         | Latch salita #5  | R/W     |
| 0x020F        | 00527         | Latch salita #6  | R/W     |
| 0x0210        | 00528         | Latch salita #7  | R/W     |
|               |               |                  |         |
| 0x0219        | 00537         | Latch discesa #0 | R/W     |
| 0x021A        | 00538         | Latch discesa #1 | R/W     |
| 0x021B        | 00539         | Latch discesa #2 | R/W     |
| 0x021C        | 00540         | Latch discesa #3 | R/W     |
| 0x021D        | 00541         | Latch discesa #4 | R/W     |
| 0x021E        | 00542         | Latch discesa #5 | R/W     |
| 0x021F        | 00543         | Latch discesa #6 | R/W     |
| 0x0220        | 00544         | Latch discesa #7 | 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: and/or coil.

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**

## DESCRIPTION MODBUS REGISTERS

### 40002 / 40003 : FIRMWARE

Field of 2 read only registers ; contains the firmware identifier provided by the manufactured.  
 - Default value: 8100 (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: "8188" (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 40013 "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  |    |    |    |    |    |     |     |     |    |    |    |    |    |    |    |    |

### 40012 : POWERUP/SAFE

At the power-on (PowerUp) and in case of watchdog alarm (Safe), the output are automatically forced to the value set in this register. Each bit of the register corresponds to a digital output, in function of the following table:  
 - Default value: 0

| Bit    | 15       | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07   | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
|--------|----------|----|----|----|----|----|----|----|------|----|----|----|----|----|----|----|
| Output | #7       | #6 | #5 | #4 | #3 | #2 | #1 | #0 | #7   | #6 | #5 | #4 | #3 | #2 | #1 | #0 |
| Value  | Power Up |    |    |    |    |    |    |    | Safe |    |    |    |    |    |    |    |

### 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.)

### 40031 : DIGITAL OUTPUTS

This register allows to command directly the state of the output transistor (0 = OFF ; 1 = ON).

It is also possible to read and drive the outputs 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 |
|--------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Output | -  | -  | -  | -  | -  | -  | -  | -  | #7 | #6 | #5 | #4 | #3 | #2 | #1 | #0 |

### 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 | -  | -  | -  | -  | -  | -  | -  | -  | #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 | -  | -  | -  | -  | -  | -  | -  | -  | #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 | -  | -  | -  | -  | -  | -  | -  | -  | #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 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.



The screenshot shows the login interface for the SIELCO SISTEMI IOLOG-DATA ACQUISITION SYSTEM. At the top left is the SIELCO SISTEMI logo. To its right, the text "IOLOG-DATA ACQUISITION SYSTEM" is displayed. Below the logo and title, a horizontal line separates the header from the main content. In the center, there is a prompt: "Enter Username and Password then press LOGIN". Below this prompt is a login form with two input fields: "Username" and "Password". A blue "LOGIN" button is positioned below the password field. At the bottom of the page, there is a footer with the text "Visit our website:" followed by a button containing the URL "www.sielcosistemi.com".

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.



The screenshot shows the main menu of the SIELCO SISTEMI IOLOG-DATA ACQUISITION SYSTEM. At the top left is the SIELCO SISTEMI logo. To its right, the text "IOLOG-DATA ACQUISITION SYSTEM" is displayed. Below the logo and title, a horizontal line separates the header from the main content. In the center, there are three buttons: "Back", "Home", and "Logout". Below these buttons is a "Select Language" button. Underneath, there is a language selection dropdown menu showing "ENGLISH" and an "OK" button. At the bottom of the page, there is a footer with the text "Visit our website:" followed by a button containing the URL "www.sielcosistemi.com". The background of the main menu features a collage of industrial equipment, including a rack of modules, a laptop displaying a software interface, and a power supply unit.

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.