USER MANUAL

ZE-4DI-2AI-2DO

ZE-2AI

Z-4DI-2AI-2DO

Mixed I/O modules, multiport and multiprotocol

Modbus RTU / ModbusTCP-IP

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Seneca ZE-4DI-2AI-2DO/ZE-2AI/Z-4DI-2AI-2DO

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1. Models comparison

MODEL	NR 4 DIGITAL INPUTS WITH COUNTERS	NR 2 ANALOG INPUTS	NR 2 DIGITAL OUTPUT RELAYS	NR 1 ETHERNET 100 Mb	NR 2 RS485	USB PORT
ZE-2AI	NO	YES	NO	YES	YES	YES
ZE-4DI-2AI-2DO	YES	YES	YES	YES	YES	YES
Z-4DI-2AI-2DO	YES	YES	YES	NO	YES	YES

MODEL	MODBUS RTU SLAVE PROTOCOL	MODBUS TCP-IP SERVER PROTOCOL	EMBEDDED WEBSERVER
ZE-2AI	YES	YES	YES
ZE-4DI-2AI-2DO	YES	YES	YES
Z-4DI-2AI-2DO	YES	NO	NO

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2. Analog Inputs

All models include 2 analogue inputs (max. resolution 16 bit) configurable in current or voltage.

The sampling time for each channel is configurable from 10 ms to 300 ms.

The resolution of the ADC depends on the set acquisition speed:

If the channel acquisition speed is < 150 ms the ADC is set with a resolution of 12 bits

If the channel acquisition speed is >= 150 ms the ADC is set with a resolution of 16 bit

2.1. Scaling an Analog Measure

The measure value in mV or uA is stored on registers AIN1 and AIN2, a scale measure it's also available.

The scaled measure it's stored on AIN1 ENG and AIN2 ENG registers.

For scaling a measure 4 registers are used: AIN Start Scale, AIN Stop scale, AIN ENG. Start scale and AIN ENG. Stop scale.

For example we want to scale a 4-20mA input into a 0-10000 value:

Start Scale must be 4 mA

Stop Scale must be 20 mA

Start Scale eng. must be 0

Stop Scale eng. must be 10000

The pure ADC value it's stored into the AIN ADC register

2.2. Analogue measurement update time

The acquisition speed per channel is configurable from 10ms to 300ms: the higher the acquisition speed, the lower the measurement stability.

The acquisition time is considered per channel, so there will be a minimum channel update time of 20ms.

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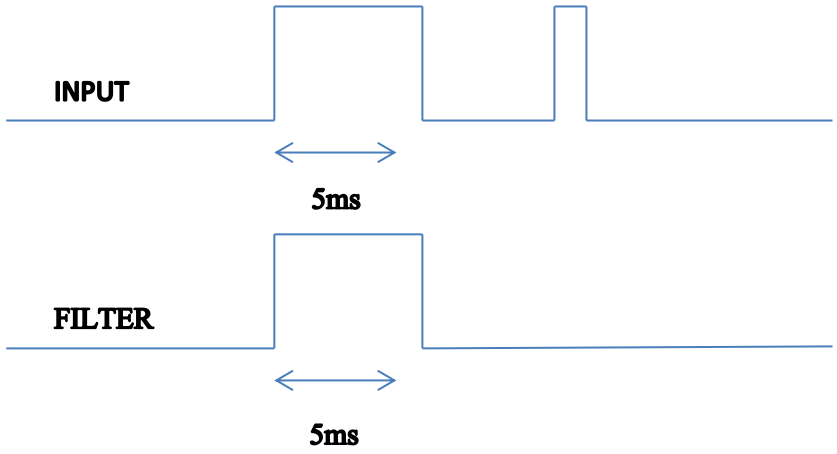
3. Digital Inputs (only ZE-4DI-2AI-2DO and Z-4DI-2AI-2DO)

4 Digital inputs are available, the inputs can be configured in PNP (the input will close to +12V) or NPN (the input will close to GND) mode.

3.1. Digital Inputs filter

A filter can be used for noisy inputs, the filter value limit the maximum input frequency.

For example using a filter of 5ms:



The maximum frequency can be obtained by the formula:

$$f_{max}[Hz] = \frac{500}{Filter_{time}[ms]}$$

Note that the maximum frequency it's limited to 5 KHz.

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4. Totalizers (only ZE-4DI-2AI-2DO and Z-4DI-2AI-2DO)

ZE-4DI-2AI-2DO and Z-4DI-2AI-2DO include 4 32 bits totalizers. The maximum frequency is 5 KHz, the input filter (see chapter 9) can be used for limit the input frequency. The Totalizer values are stored into a not volatile memory so the power can switched off without changing the Totalizer values.

4.1. Totalizers overflow

The totalizer overflow it's at 4294967295 (hexadecimal value 0xFFFFFFFF), so another pulse will put the value to 0.

5. Counters (only ZE-4DI-2AI-2DO and Z-4DI-2AI-2DO)

ZE-4DI-2AI-2DO and Z-4DI-2AI-2DO include 4 32 bits counters. The maximum frequency is 5 KHz, the input filter (see chapter 9) can be used for limit the input frequency. The Counter values are stored into a not volatile memory so the power can switched off without changing the Counter values.

5.1. Counters overflow

The totalizer overflow it's at 4294967295 (hexadecimal value 0xFFFFFFFF), so another pulse will put the value to 0.

6. Digital Outputs (only ZE-4DI-2AI-2DO and Z-4DI-2AI-2DO)

Two Digital Outputs can be set by Modbus register and by Webserver (only ZE-4DI-2AI-2DO).
The digital outputs are made by two relays (max 2A output).

6.1. Digital Outputs fail mode

The Digital Outputs support the standard Seneca out fail mod e: if there isn't a Modbus RTU/TCP-IP communication for a configured time, the Outputs are set to a safe values.

The idea behind this police is that the absence of communication means that something is wrong and therefore the outputs must be set to the fail state.

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7. RS485 and USB Serial Communication (only Z-4DI-2AI-2DO)

All the models features two serial communications RS485 ports, also the USB port can be used for communication purpose.

The RS485 ports and USB port can work all at the same time and are independent.

The protocol supported for both ports is the Modbus RTU slave, for more information about this protocol please refer to Modbus specification website:

http://www.modbus.org/specs.php

The default configuration for RS485#1 and RS485/RS232#2 ports is:

- Modbus station address: 1
- baud rate: 38400 baud
- parity: none
- data bit: 8
- stop bit: 1

The configuration for USB port is fixed and not configurable:

- Modbus station address: 1
- baud rate: 115200 baud
- parity: none
- data bit: 8
- stop bit: 1

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8. Ethernet communication (only ZE-2AI and ZE-4DI-2AI-2DO)

The ZE models include a fast Ethernet port (100Mbit), the TCP-IP integrated protocol supports:

-Static IP address or DHCP

-Gateway support

-Modbus TCP-IP server protocol (support up to 4 Modbus TCP-IP client at the same time)

-Webserver (with user / password protection)

The default configuration for the Ethernet port is:

- Static Ip address 192.168.90.101
- Modbus station address: 1
- Modbus TCP-IP client 1 port 502
- Modbus TCP-IP client 2 port 503
- Modbus TCP-IP client 3 port 504
- Modbus TCP-IP client 4 port 505

WARNING!

BEFORE CONNECT A ZE MODULE BE SURE THAT THE IP ADDRESS 192.168.90.101 IT'S NOT USED BY ANOTHER ETHERNET DEVICE.

8.1. Static IP address and DHCP

The default IP address is the static 192.168.90.101, it's also possible to obtain an IP and a Gateway address from a DHCP server. Typically a DHCP server it's always active into a Router (a range of address are reserved for the internal DHCP server).

Using a DHCP can create problem for a connection with ZE module because the IP can change without notice (after a timeout).

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9. Modbus RTU and Modbus TCP-IP registers map

The supported communication protocol is:

ModBUS RTU Slave (both from RS485 port and USB port if applicable)

Modbus TCP-IP Server (ZE-2AI and ZE-4DI-2AI-2DO models only)

For more information on these protocols, please refer to the website

http://www.modbus.org/specs.php.

9.1. Tables abbreviations

The following ModBUS functions are supported:

Read Holding Register (function 3)

Write Single Register (function 6)

Write Multiple registers (function 16)

ATTENTION!

All 32-bit values are contained in 2 consecutive registers

ATTENTION!

Any 64-bit values are contained in 4 consecutive registers

ATTENTION!

Any registers with RW* (contained in flash memory) can be written a maximum of approx. 10000 times

It must be the responsibility of the PLC programmer / ModBUS Master not to exceed this limit

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10. MODBUS REGISTER TABLE

The following abbreviations are used in the register tables:

MS	Most Significant
LS	Least Significant
MSBIT	Most Significant Bit
LSBIT	Least Significant Bit
MMSW	“Most” Most Significant Word (16bit)
MSW	Most Significant Word (16bit)
LSW	Least Significant Word (16bit)
LLSW	“Least” Least Significant Word (16bit)
RO	Read Only
RW*	Read-Write: REGISTERS CONTAINED IN FLASH MEMORY: WRITABLE AT MOST ABOUT 10000 TIMES
RW**	Read-Write: REGISTERS WRITABLE ONLY AFTER THE COMMAND HAS BEEN WRITTEN "ENABLE WRITE CUSTOM ENERGIES=49616"
UNSIGNED 16 BIT	Unsigned integer register that can take values from 0 to 65535
SIGNED 16 BIT	Integer register with sign that can take values from -32768 to +32767
UNSIGNED 32 BIT	Unsigned integer register that can take values from 0 to 4294967296
SIGNED 32 BIT	Integer register with sign that can take values from -2147483648 to 2147483647
UNSIGNED 64 BIT	Unsigned integer register that can take values from 0 to 18,446,744,073,709,551,615
SIGNED 64 BIT	Signed integer register that can take values from -2^63 to 2^63-1
FLOAT 32 BIT	32-bit, single-precision floating-point register (IEEE 754) https://en.wikipedia.org/wiki/IEEE_754
BIT	Boolean register, which can take the values 0 (false) or 1 (true)

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10.1 NUMBERING OF '0 BASED' OR '1 BASED' MODBUS ADDRESSES

Holding registers according to the ModBUS standard are addressable from 0 to 65535, there are 2 different address numbering conventions: '0 BASED' and '1 BASED'.

For the sake of clarity, Seneca shows its register tables in both conventions.

ATTENTION!

CAREFULLY READ THE DOCUMENTATION OF THE MODBUS MASTER DEVICE IN ORDER TO UNDERSTAND WHICH OF THE TWO CONVENTIONS THE MANUFACTURER HAS DECIDED TO USE.

10.2. NUMBERING OF MODBUS ADDRESSES WITH '0 BASED' CONVENTION

The numbering is of the type:

INDIRIZZO MODBUS HOLDING REGISTER (OFFSET)	*SIGNIFICANCE*
0	FIRST REGISTER
1	SECOND REGISTER
2	THIRD REGISTER
3	FOURTH REGISTER
4	FIFTH REGISTER

Thus, the first register is located at address 0.

In the following tables, this convention is indicated by "OFFSET ADDRESS".

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10.3. MODBUS ADDRESS NUMBERING WITH '1 BASED' CONVENTION (STANDARD)

The numbering is that established by the Modbus consortium and is of the type:

MODBUS ADDRESS HOLDING REGISTER 4x	*MEANING*
40001	FIRST REGISTER
40002	SECOND REGISTER
40003	THIRD REGISTER
40004	FOURTH REGISTER
40005	FIFTH REGISTER

In the following tables, this convention is referred to as 'ADDRESS 4x' because a 4 is added to the address so that the first ModBUS register is 40001.

A further convention where the number 4 is omitted in front of the register address is also possible:

MODBUS HOLDING ADDRESS WITHOUT 4x	*MEANING*
1	FIRST REGISTER
2	SECOND REGISTER
3	THIRD REGISTER
4	FOURTH REGISTER
5	FIFTH REGISTER

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10.4 BIT CONVENTION WITHIN A MODBUS HOLDING REGISTER

A ModBUS Holding Register consists of 16 bits with the following convention:

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

For example, if the register value in decimal is

12300

the value 12300 in hexadecimal applies:

0x300C

hexadecimal 0x300C in binary value applies:

11 0000 0000 1100

So, using the above convention we get:

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

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10.5 CONVENTION OF MSB and LSB BYTES WITHIN A MODBUS HOLDING REGISTER

A ModBUS Holding Register consists of 16 bits with the following convention:

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

LSB Byte (Least Significant Byte) is defined as the 8 bits ranging from Bit 0 to Bit 7 inclusive, MSB Byte (Most Significant Byte) is defined as the 8 bits ranging from Bit 8 to Bit 15 inclusive:

BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9	BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE MSB								BYTE LSB							

10.6 REPRESENTATION OF A 32-BIT VALUE IN TWO CONSECUTIVE MODBUS HOLDING REGISTERS

The representation of a 32-bit value in the Holding Registers in ModBUS is done using 2 consecutive Holding Registers (one Holding Register is 16 bits).

To obtain the 32-bit value, two consecutive registers must therefore be read:

For example if register 40064 holds the most significant 16 bits (MSW) while register 40065 holds the least significant 16 bits (LSW) the 32-bit value is obtained by composing the 2 registers:

BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9	BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
40064 MOST SIGNIFICANT WORD															

BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9	BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
40065 LEAST SIGNIFICANT WORD															

$$Value_{32bit} = Register_{LSW} + (Register_{MSW} * 65536)$$

In the read registers, it is possible to exchange the most significant word for the least significant one, so it is possible to get 40064 as LSW and 40065 as MSW.

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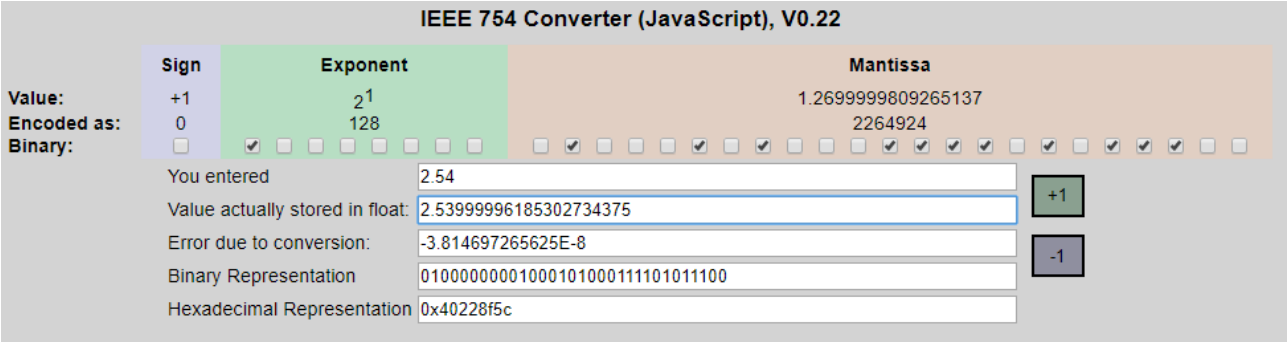
10.7 TIPI DI DATO FLOATING POINT A 32 BIT (IEEE 754)

The IEEE 754 standard (https://en.wikipedia.org/wiki/IEEE_754) defines the format for the representation of floating-point numbers.

As already mentioned, since it is a 32-bit data type, its representation occupies two 16-bit holding registers.

To obtain a binary/hexadecimal conversion of a Floating point value, you can refer to an online converter at this address:

http://www.h-schmidt.net/FloatConverter/IEEE754.html



Using the last representation, the value 2.54 is represented in 32 bits as:

0x40228F5C

Since we have 16-bit registers available, the value must be divided into MSW and LSW:

0x4022 (16418 decimal) are the 16 most significant bits (MSW) while 0x8F5C (36700 decimal) are the 16 least significant bits (LSW).

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10.8 Modbus TCP-IP and Modbus RTU register addresses ZE-4DI- 2AI-2DO and Z-4DI-2AI-2DO

ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
40001	0	*Machine ID*	-	-	*Identification Code*	*R*	*Unsigned 16bits*
40002	1	*FW Code*	-	-	*FW Code revision*	*R*	*Unsigned 16bits*
40003	2	***Status***	**-**	**-**	bit 0=OUTPUT FAIL bit 1=AIN1 underflow bit 2=AIN1 overflow bit 3=AIN2 underflow bit 4=AIN2 overflow bit 15..8= Not used	R	Unsigned 16bits
40004	3	***Analog Input***	**-**	***1***	Analog input 1 Electrical value: mV or uA	R	Unsigned 16bits
40005	4	***Analog Input Scaled Value***	**-**	***1***	Analog input 1 Scaled value	R	Unsigned 16bits
40006	5	***Analog Input***	**-**	***2***	Analog input 2 Electrical value: mV or uA	R	Unsigned 16bits
40007	6	***Analog Input Scaled Value***	**-**	***2***	Analog input 2 Scaled value	R	Unsigned 16bits
40008	7	***OUTPUTS***	**-**	***1 and 2***	Bit 0=OUTPUT1 Bit 1=OUTPUT2	R/W	Unsigned 16bits
40009	8	***OUTPUT1***	**-**	***1***	0=OUTPUT NOT EXCITED 1=OUTPUT EXCITED	R/W	Unsigned 16bits
40010	9	***OUTPUT2***	**-**	***2***	0=OUTPUT NOT EXCITED 1=OUTPUT EXCITED	R/W	Unsigned 16bits
40011	10	***INPUTS***	**-**	***1 and 2***	Bit 0=INPUT1 Bit 1=INPUT2 Bit 2=INPUT3 Bit 3=INPUT4	R	Unsigned 16bits
40012	11	***INPUT 1***	**-**	***1***	0=INPUT LOW 1=INPUT HIGH	R	Unsigned 16bits
40013	12	***INPUT 2***	**-**	***2***	0=INPUT LOW 1=INPUT HIGH	R	Unsigned 16bits
40014	13	***INPUT3***	**-**	***3***	0=INPUT LOW 1=INPUT HIGH	R	Unsigned 16bits

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ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
40014	13	***INPUT4***	**-**	***4***	0=INPUT LOW 1=INPUT HIGH	R	Unsigned 16bits
40016	15	***TOTALIZER 1***	***MSW***	***1***	Totalizer 1	R/W	Unsigned 32 bits
40017	16		***LSW***				
40018	17	***TOTALIZER 2***	***MSW***	***2***	Totalizer 2	R/W	Unsigned 32 bits
40019	18		***LSW***				
40020	19	***TOTALIZER 3***	***MSW***	***3***	Totalizer 3	R/W	Unsigned 32 bits
40021	20		***LSW***				
40022	21	***TOTALIZER 4***	***MSW***	***4***	Totalizer 4	R/W	Unsigned 32 bits
40023	22		***LSW***				
40024	23	***COUNTER 1***	***MSW***	***1***	Counter 1	R/W	Unsigned 32 bits
40025	24		***LSW***				
40026	25	***COUNTER 2***	***MSW***	***2***	Counter 2	R/W	Unsigned 32 bits
40027	26		***LSW***				
40028	27	***COUNTER 3***	***MSW***	***3***	Counter 3	R/W	Unsigned 32 bits
40029	28		***LSW***				
40030	29	***COUNTER 4***	***MSW***	***4***	Counter 4	R/W	Unsigned 32 bits
40031	30		***LSW***				
40032	31	***IP ADDR. 0***	**-**	**-**	Actual IP address, 1st number	R	Unsigned 16 bits
40033	32	***IP ADDR. 1***	**-**	**-**	Actual IP address, 2nd number	R	Unsigned 16 bits
40034	33	***IP ADDR. 2***	**-**	**-**	Actual IP address, 3rd number	R	Unsigned 16 bits
40035	34	***IP ADDR. 3***	**-**	**-**	Actual IP address, 4th number	R	Unsigned 16 bits
40036	35	***IP MASK 0***	**-**	**-**	Actual IP mask, 1st number	R	Unsigned 16 bits
40037	36	***IP MASK 1***	**-**	**-**	Actual IP mask, 2nd number	R	Unsigned 16 bits
40038	37	***IP MASK 2***	**-**	**-**	Actual IP mask, 3rd number	R	Unsigned 16 bits
40039	38	***IP MASK 3***	**-**	**-**	Actual IP mask, 4th number	R	Unsigned 16 bits
40040	39	***IP GATEWAY 0***	**-**	**-**	Actual IP gateway, 1st number	R	Unsigned 16 bits
40041	40	***IP GATEWAY 1***	**-**	**-**	Actual IP gateway, 2nd number	R	Unsigned 16 bits
40042	41	***IP GATEWAY 2***	**-**	**-**	Actual IP gateway , 3rd number	R	Unsigned 16 bits
40043	42	***IP GATEWAY 3***	-	-	Actual IP gateway , 4th number	R	Unsigned 16 bits
40044	43	***MAC ADDR.0***	-	-	MAC address,	R	Unsigned 16 bits
	-40001				1st number (hexadecimal interpretation)		

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ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
40045	44	***MAC ADDR.1***	-	-	MAC address, 2nd number (hexadecimal interpretation)	R	Unsigned 16 bits
40046	45	***MAC ADDR.2***			MAC address, 3rd number (hexadecimal interpretation)	R	Unsigned 16 bits
40047	46	***AIN1 ADC***	-	-	Analog input 1 ADC value	R	Unsigned 16 bits
40048	47	***AIN2 ADC***			Analog input 2 ADC value	R	Unsigned 16 bits
40101	100	***AIN INPUT SPEED***	-	-	Analog input speed from 10 to 300 [ms] for channel	R/W	Unsigned 16 bits
40102	101	***NOT USED***	-	-	-	R/W	Unsigned 16 bits
40103	102	***AIN1 TYPE***	-	***1***	Analog input 1 mode 0=mA 1=mV	R/W	Unsigned 16 bits
40104	103	***AIN1 START SCALE***	-	***1***	Start scale (electrical) for analog input 1: expressed in mV or uA	R/W	Unsigned 16 bits
40105	104	***AIN1 STOP SCALE***	-	***1***	Stop scale (electrical) for analog input 1: expressed in mV or uA	R/W	Unsigned 16 bits
40106	105	***AIN1 ENG. START SCALE***	-	***1***	Start scale (engineering) for analog input 1: expressed in mV or uA	R/W	Unsigned 16 bits
40107	106	***AIN1 ENG. STOP SCALE***	-	***1***	Stop scale (engineering) for analog input 1: expressed in mV or uA	R/W	Unsigned 16 bits
40108	107	***NOT USED***	-	-	-	R/W	Unsigned 16 bits
40103	102	***AIN2 TYPE***	-	***2***	Analog input 2 mode 0=mA 1=mV	R/W	Unsigned 16 bits
40104	103	***AIN2 START SCALE***	-	***2***	Start scale (electrical) for analog input 2: expressed in mV or uA	R/W	Unsigned 16 bits
40105	104	***AIN2 STOP SCALE***	-	***2***	Stop scale (electrical) for	R/W	Unsigned 16 bits

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ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
					analog input 2: expressed in mV or uA		
40106	105	***AIN2 ENG. START SCALE***	-	***2***	Start scale (engineering) for analog input 2: expressed in mV or uA	R/W	Unsigned 16 bits
40107	106	***AIN2 ENG. STOP SCALE***	-	***2***	Stop scale (engineering) for analog input 2: expressed in mV or uA	R/W	Unsigned 16 bits
40114	113	***DIN1 FILTER***	***-***	***1***	Digital input 1 filter in ms	R/W	Unsigned 16 bits
40115	114	***DIN2 FILTER***	***-***	***2***	Digital input 2 filter in ms	R/W	Unsigned 16 bits
40116	115	***DIN3 FILTER***	***-***	***3***	Digital input 3 filter in ms	R/W	Unsigned 16 bits
40117	116	***DIN4 FILTER***	***-***	***4***	Digital input 4 filter in ms	R/W	Unsigned 16 bits
40118	117	***DIN NPN/PNP***	-	-	Digital input type: 0=NPN, 1=PNP	R/W	Unsigned 16 bits
40119	118	***DOUT FAIL MODE***	-	-	Digital output fail mode: 0=disabled 1=enabled	R/W	Unsigned 16 bits
40120	119	***DOUT FAIL TIMEOUT***	-	***-***	Timeout start fail for digital outputs (in seconds)	R/W	Unsigned 16 bits
40121	120	***DOUT1 FAIL VALUE***	-	-	Digital output1 value in fail case.	R/W	Unsigned 16 bits
40122	121	***DOUT2 FAIL VALUE***	-	-	Digital output2 value in fail case.	R/W	Unsigned 16 bits
40123	122	***IP DHCP***	***-***	***-***	***0=Ethernet IP is static 1=Ethernet IP is acquired from a DHCP server***	R/W	Unsigned 16 bits
40124	123	***IP ADDRESS 0-1***	***-***	***-***	***Most significant byte=IP address 0 (if static) Less significant byte=IP address 1 (if static)***	R/W	Unsigned 16 bits
40125	124	***IP ADDRESS 2-3***	***-***	***-***	Most significant byte=IP address 2 (if static). Less significant	R/W	Unsigned 16 bits

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ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
					byte=IP address 3 (if static)		
40126	125	***IP MASK 0-1***	**-**	**-**	Most significant byte=IP mask 0 (if static) Less significant byte=IP mask 1 (if static)	R/W	Unsigned 16 bits
40127	126	***IP MASK 2-3***	**-**	**-**	***Most significant byte=IP mask 2 (if static) Less significant byte=IP mask 3 (if static)***	R/W	Unsigned 16 bits
40128	127	***IP GATEWAY 0-1***	**-**	**-**	***Most significant byte=IP gateway 0 (if static). Less significant byte=IP gateway 1 (if static).***	R/W	Unsigned 16 bits
40129	128	***IP GATEWAY 2-3***	**-**	**-**	***Most significant byte=IP gateway 2 (if static). Less significant byte=IP gateway 3 (if static).***	R/W	Unsigned 16 bits
40130	129	***TCP/IP PORT 1***	**-**	**-**	Port of TCP/IP client 1	R/W	Unsigned 16 bits
40131	130	***TCP/IP TMO 1***	**-**	**-**	Timeout of TCP/IP port 1 (in ms)	R/W	Unsigned 16 bits
40132	131	***TCP/IP ADDR 1***	**-**	**-**	Modbus address for TCP/IP port 1 (MSB)	R/W	Unsigned 16 bits
40133	132	***485#1 BAUDRATE***	**-**	**-**	***Baudrate value for RS485 port 1 (baudrate /10, so write 3840 for 38400 baud etc…)***	R/W	Unsigned 16 bits
40134	133	***485#1 PARITY / STOP BITS***	**-**	**-**	***PARITY=MSB (0=no parity, 1=odd, 2=even) STOP BITS=LSB (0=1 stop bit, 1=2 stop bits)***	R/W	Unsigned 16 bits

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ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
40135	134	***485#1 TIMEOUT***	**-**	**-**	Timeout of RS485 port 1 in ms	R/W	Unsigned 16 bits
40136	135	***485#2 BAUDRATE***	**-**	**-**	Baudrate value for RS485 port 2 (baudrate /10, so write 3840 for 38400 baud etc…)	R/W	Unsigned 16 bits
40137	136	***485#2 PARITY / STOP BITS***	**-**	**-**	***PARITY=MSB (0=no parity, 1=odd, 2=even) STOP BITS=LSB (0=1 stop bit, 1=2 stop bits)***	R/W	Unsigned 16 bits
40138	137	***485#2 TIMEOUT***	**-**	**-**	Timeout of RS485 port 2 in ms	R/W	Unsigned 16 bits
40139	138	***485#1 ADDR 485#2 ADDR***	**-**	**-**	***MODBUS ADDR. 485#1=MSB MODBUS ADDR. 485#2=LSB***	R/W	Unsigned 16 bits
40901	900	***TCP/IP PORT 2***	**-**	**-**	Port of TCP/IP client 2	R/W	Unsigned 16 bits
40902	901	***TCP/IP TMO 2***	**-**	**-**	Timeout of TCP/IP port 2 (in ms)	R/W	Unsigned 16 bits
40903	902	***TCP/IP ADDR 2***	**-**	**-**	Modbus address for TCP/IP port 2 (MSB)	R/W	Unsigned 16 bits
40904	903	***TCP/IP PORT 3***	**-**	**-**	Port of TCP/IP client 3	R/W	Unsigned 16 bits
40905	904	***TCP/IP TMO 3***	**-**	**-**	Timeout of TCP/IP port 3 (in ms)	R/W	Unsigned 16 bits
40906	905	***TCP/IP ADDR 3***	**-**	**-**	Modbus address for TCP/IP port 3 (MSB)	R/W	Unsigned 16 bits
40907	906	***TCP/IP PORT 4***	**-**	**-**	Port of TCP/IP client 4	R/W	Unsigned 16 bits
40908	907	***TCP/IP TMO 4***	**-**	**-**	Timeout of TCP/IP port 4 (in ms)	R/W	Unsigned 16 bits
40909	908	***TCP/IP ADDR 4***	**-**	**-**	Modbus address for TCP/IP port 4 (MSB)	R/W	Unsigned 16 bits
40951	950	***WEBSERVER PORT***	**-**	**-**	Webserver Port	R/W	Unsigned 16 bits
41001	1000	***COMMAND***	**-**	**-**	Command Register	R/W	Unsigned 16 bits
41002	1001		**-**	**-**		R/W	

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ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
		COMMAND AUX1			Auxiliary 1 Command Register		Unsigned 16 bits
41003	1002	***COMMAND AUX2***	**-**	**-**	Auxiliary 2 Command Register	R/W	Unsigned 16 bits

The Command register (address 41001) allows commands to be executed.

Please note that the following numeric commands are written in hexadecimal format!

- to save the EEPROM configuration, write 0x0001 to register 41001

- to reset the device, write 0x0005 to reg. 41001

- to load default settings, write 0x0006 to register 41001

- to clear totaliser 1, write 0x0007 to register 41001

- to clear totaliser 2, write 0x0008 to register 41001

- to clear totaliser 3, write 0x0009 to register 41001

- to clear totaliser 4, write 0x000A to register 41001

- to clear counter 1, write 0x000B to register 41001

- to clear counter 2, write 0x000C

- to clear counter 3, write 0x000D

- to clear counter 4, write 0x000E

- to set a 32-bit value in totalizer 1, write the desired value to register 41002 (MSW of the 32-bit value)-41003 (LSW of the 32-bit value), then write 0x000F to register 41001

- to set a 32-bit value in totaliser 2, write the desired value to register 41002 (MSW of 32bit value)-41003 (LSW of 32bit value), then write 0x0010 to register 41001.

- to set a 32-bit value in totaliser 3, write the desired value to reg. 41002 (MSW of 32bit value)-41003 (LSW of 32bit value), then write 0x0011 to reg. 41001.

- to set a 32-bit value in totaliser 4, write the desired value to reg. 41002 (MSW of 32bit value)-41003 (LSW of 32bit value), then write 0x0012 to reg. 41001.

- to set a 32-bit value in counter 1, write the desired value to reg. 41002 (MSW of 32bit value)-41003 (LSW of 32bit value), then write 0x0013 to reg. 41001.

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- to set a 32-bit value in counter 2, write the desired value to reg. 41002 (MSW of 32bit value)-41003 (LSW of 32bit value), then write 0x0014 to reg. 41001.

- to set a 32-bit value in counter 3, write the desired value to reg. 41002 (MSW of 32bit value)-41003 (LSW of 32bit value), then write 0x0015 to reg. 41001.

- to set a 32 bit value in counter 4, write the desired value to reg. 41002 (MSW of 32bit value)-41003 (LSW of 32bit value), then write 0x0016 to reg. 41001

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10.9 Modbus TCP-IP and Modbus RTU register addresses ZE-2AI

ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
40001	0	*Machine ID*	-	-	*Identification Code*	*R*	*Unsigned 16bits*
40002	1	*FW Code*	-	-	*FW Code revision*	*R*	*Unsigned 16bits*
40003	2	***Status***	**-**	**-**	bit 0=OUTPUT FAIL bit 1=AIN1 underflow bit 2=AIN1 overflow bit 3=AIN2 underflow bit 4=AIN2 overflow bit 15..8= Not used	R	Unsigned 16bits
40004	3	***Analog Input***	**-**	***1***	Analog input 1 Electrical value: mV or uA	R	Unsigned 16bits
40005	4	***Analog Input Scaled Value***	**-**	***1***	Analog input 1 Scaled value	R	Unsigned 16bits
40006	5	***Analog Input***	**-**	***2***	Analog input 2 Electrical value: mV or uA	R	Unsigned 16bits
40007	6	***Analog Input Scaled Value***	**-**	***2***	Analog input 2 Scaled value	R	Unsigned 16bits
40008	7	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16bits
40009	8	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16bits
40010	9	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16bits
40011	10	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16bits
40012	11	***NOT USED*** ***NOT USED***	**-** **-**	**-** **-**	- -	R	Unsigned 16bits
40013	12	***NOT USED*** ***NOT USED***	**-** **-**	**-** **-**	- -	R	Unsigned 16bits
40014	13	***NOT USED*** ***NOT USED***	**-** **-**	**-** **-**	- -	R	Unsigned 16bits
40014	13	***NOT USED***	**-**	**-**	-	R	Unsigned 16bits
40016	15	***NOT USED***	***MSW***	**-**	-	R/W	Unsigned 32 bits
40017	16		***LSW***				
40018	17	***NOT USED***	***MSW***	**-**	-	R/W	Unsigned 32 bits
40019	18		***LSW***				
40020	19	***NOT USED***	***MSW***	**-**	-	R/W	

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ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
40021	20		***LSW***				Unsigned 32 bits
40022	21	***NOT USED***	***MSW***	**-**	-	R/W	Unsigned 32 bits
40023	22		***LSW***				
40024	23	***NOT USED***	***MSW***	**-**	-	R/W	Unsigned 32 bits
40025	24		***LSW***				
40026	25	***NOT USED***	***MSW***	**-**	-	R/W	Unsigned 32 bits
40027	26		***LSW***				
40028	27	***NOT USED***	***MSW***	**-**	-	R/W	Unsigned 32 bits
40029	28		***LSW***				
40030	29	***NOT USED***	***MSW***	**-**	-	R/W	Unsigned 32 bits
40031	30		***LSW***				
40032	31	***IP ADDR. 0***	**-**	**-**	Actual IP address, 1st number	R	Unsigned 16 bits
40033	32	***IP ADDR. 1***	**-**	**-**	Actual IP address, 2nd number	R	Unsigned 16 bits
40034	33	***IP ADDR. 2***	**-**	**-**	Actual IP address, 3rd number	R	Unsigned 16 bits
40035	34	***IP ADDR. 3***	**-**	**-**	Actual IP address, 4th number	R	Unsigned 16 bits
40036	35	***IP MASK 0***	**-**	**-**	Actual IP mask, 1st number	R	Unsigned 16 bits
40037	36	***IP MASK 1***	**-**	**-**	Actual IP mask, 2nd number	R	Unsigned 16 bits
40038	37	***IP MASK 2***	**-**	**-**	Actual IP mask, 3rd number	R	Unsigned 16 bits
40039	38	***IP MASK 3***	**-**	**-**	Actual IP mask, 4th number	R	Unsigned 16 bits
40040	39	***IP GATEWAY 0***	**-**	**-**	Actual IP gateway, 1st number	R	Unsigned 16 bits
40041	40	***IP GATEWAY 1***	**-**	**-**	Actual IP gateway, 2nd number	R	Unsigned 16 bits
40042	41	***IP GATEWAY 2***	**-**	**-**	Actual IP gateway , 3rd number	R	Unsigned 16 bits
40043	42	***IP GATEWAY 3***	-	-	Actual IP gateway , 4th number	R	Unsigned 16 bits
40044	43	***MAC ADDR.0***	-	-	MAC address,	R	Unsigned 16 bits
	-40001				1st number (hexadecimal interpretation)		
40045	44	***MAC ADDR.1***	-	-	MAC address, 2nd number (hexadecimal interpretation)	R	Unsigned 16 bits
40046	45	***MAC ADDR.2***			MAC address, 3rd number (hexadecimal interpretation)	R	Unsigned 16 bits
40047	46	***AIN1 ADC***	-	-	Analog input 1 ADC value	R	Unsigned 16 bits
40048	47	***AIN2 ADC***			Analog input 2 ADC value	R	Unsigned 16 bits
40101	100	***AIN INPUT SPEED***	-	-	Analog input speed from 10 to 300 [ms] for channel	R/W	Unsigned 16 bits

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ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
40102	101	***NOT USED***	-	-	-	R/W	Unsigned 16 bits
40103	102	***AIN1 TYPE***	-	***1***	Analog input 1 mode 0=mA 1=mV	R/W	Unsigned 16 bits
40104	103	***AIN1 START SCALE***	-	***1***	Start scale (electrical) for analog input 1: expressed in mV or uA	R/W	Unsigned 16 bits
40105	104	***AIN1 STOP SCALE***	-	***1***	Stop scale (electrical) for analog input 1: expressed in mV or uA	R/W	Unsigned 16 bits
40106	105	***AIN1 ENG. START SCALE***	-	***1***	Start scale (engineering) for analog input 1: expressed in mV or uA	R/W	Unsigned 16 bits
40107	106	***AIN1 ENG. STOP SCALE***	-	***1***	Stop scale (engineering) for analog input 1: expressed in mV or uA	R/W	Unsigned 16 bits
40108	107	***NOT USED***	-	-	-	R/W	Unsigned 16 bits
40103	102	***AIN2 TYPE***	-	***2***	Analog input 2 mode 0=mA 1=mV	R/W	Unsigned 16 bits
40104	103	***AIN2 START SCALE***	-	***2***	Start scale (electrical) for analog input 2: expressed in mV or uA	R/W	Unsigned 16 bits
40105	104	***AIN2 STOP SCALE***	-	***2***	Stop scale (electrical) for analog input 2: expressed in mV or uA	R/W	Unsigned 16 bits
40106	105	***AIN2 ENG. START SCALE***	-	***2***	Start scale (engineering) for analog input 2: expressed in mV or uA	R/W	Unsigned 16 bits
40107	106	***AIN2 ENG. STOP SCALE***	-	***2***	Stop scale (engineering) for analog input 2: expressed in mV or uA	R/W	Unsigned 16 bits
40114	113	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16 bits

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ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
40115	114	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16 bits
40116	115	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16 bits
40117	116	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16 bits
40118	117	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16 bits
40119	118	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16 bits
40120	119	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16 bits
40121	120	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16 bits
40122	121	***NOT USED***	**-**	**-**	-	R/W	Unsigned 16 bits
40123	122	***IP DHCP***	**-**	**-**	***0=Ethernet IP is static 1=Ethernet IP is acquired from a DHCP server***	R/W	Unsigned 16 bits
40124	123	***IP ADDRESS 0-1***	**-**	**-**	***Most significant byte=IP address 0 (if static) Less significant byte=IP address 1 (if static)***	R/W	Unsigned 16 bits
40125	124	***IP ADDRESS 2-3***	**-**	**-**	Most significant byte=IP address 2 (if static). Less significant byte=IP address 3 (if static)	R/W	Unsigned 16 bits
40126	125	***IP MASK 0-1***	**-**	**-**	Most significant byte=IP mask 0 (if static) Less significant byte=IP mask 1 (if static)	R/W	Unsigned 16 bits
40127	126	***IP MASK 2-3***	**-**	**-**	***Most significant byte=IP mask 2 (if static) Less significant byte=IP mask 3 (if static)***	R/W	Unsigned 16 bits
40128	127	***IP GATEWAY 0-1***	**-**	**-**	***Most significant byte=IP gateway 0 (if static). Less significant byte=IP gateway 1 (if static).***	R/W	Unsigned 16 bits
40129	128	***IP GATEWAY 2-3***	**-**	**-**	***Most significant byte=IP gateway 2 (if static). Less significant byte=IP***	R/W	Unsigned 16 bits

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ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
					gateway 3 (if static).		
40130	129	***TCP/IP PORT 1***	**-**	**-**	Port of TCP/IP client 1	R/W	Unsigned 16 bits
40131	130	***TCP/IP TMO 1***	**-**	**-**	Timeout of TCP/IP port 1 (in ms)	R/W	Unsigned 16 bits
40132	131	***TCP/IP ADDR 1***	**-**	**-**	Modbus address for TCP/IP port 1 (MSB)	R/W	Unsigned 16 bits
40133	132	***485#1 BAUDRATE***	**-**	**-**	***Baudrate value for RS485 port 1 (baudrate /10, so write 3840 for 38400 baud etc…)***	R/W	Unsigned 16 bits
40134	133	***485#1 PARITY / STOP BITS***	**-**	**-**	***PARITY=MSB (0=no parity, 1=odd, 2=even) STOP BITS=LSB (0=1 stop bit, 1=2 stop bits)***	R/W	Unsigned 16 bits
40135	134	***485#1 TIMEOUT***	**-**	**-**	Timeout of RS485 port 1 in ms	R/W	Unsigned 16 bits
40136	135	***485#2 BAUDRATE***	**-**	**-**	Baudrate value for RS485 port 2 (baudrate /10, so write 3840 for 38400 baud etc…)	R/W	Unsigned 16 bits
40137	136	***485#2 PARITY / STOP BITS***	**-**	**-**	***PARITY=MSB (0=no parity, 1=odd, 2=even) STOP BITS=LSB (0=1 stop bit, 1=2 stop bits)***	R/W	Unsigned 16 bits
40138	137	***485#2 TIMEOUT***	**-**	**-**	Timeout of RS485 port 2 in ms	R/W	Unsigned 16 bits
40139	138	***485#1 ADDR 485#2 ADDR***	**-**	**-**	***MODBUS ADDR. 485#1=MSB MODBUS ADDR. 485#2=LSB***	R/W	Unsigned 16 bits
40901	900	***TCP/IP PORT 2***	**-**	**-**	Port of TCP/IP client 2	R/W	Unsigned 16 bits
40902	901	***TCP/IP TMO 2***	**-**	**-**	Timeout of TCP/IP port 2 (in ms)	R/W	Unsigned 16 bits
40903	902	***TCP/IP ADDR 2***	**-**	**-**	Modbus address for TCP/IP port 2 (MSB)	R/W	Unsigned 16 bits
40904	903	***TCP/IP PORT 3***	**-**	**-**	Port of TCP/IP client 3	R/W	Unsigned 16 bits
40905	904	***TCP/IP TMO 3***	**-**	**-**	Timeout of TCP/IP port 3 (in ms)	R/W	Unsigned 16 bits
40906	905	***TCP/IP ADDR 3***	**-**	**-**	Modbus address for TCP/IP port 3 (MSB)	R/W	Unsigned 16 bits
40907	906	***TCP/IP PORT 4***	**-**	**-**	Port of TCP/IP client 4	R/W	Unsigned 16 bits

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ADDRESS (4x)	OFFSET	REGISTER	ORDER	CHANNEL	DESCRIPTION	R/W	TYPE
40908	907	***TCP/IP TMO 4***	**-**	**-**	Timeout of TCP/IP port 4 (in ms)	R/W	Unsigned 16 bits
40909	908	***TCP/IP ADDR 4***	**-**	**-**	Modbus address for TCP/IP port 4 (MSB)	R/W	Unsigned 16 bits
40951	950	***WEBSERVER PORT***	**-**	**-**	Webserver Port	R/W	Unsigned 16 bits
41001	1000	***COMMAND***	**-**	**-**	Command Register	R/W	Unsigned 16 bits
41002	1001	***COMMAND AUX1***	**-**	**-**	Auxiliary 1 Command Register	R/W	Unsigned 16 bits
41003	1002	***COMMAND AUX2***	**-**	**-**	Auxiliary 2 Command Register	R/W	Unsigned 16 bits

The Command register (address 41001) allows commands to be executed.

Please note that the following numeric commands are written in hexadecimal format!

- **to save the EEPROM configuration,** write 0x0001 to register 41001
- **to reset the device,** write 0x0005 to reg. 41001
- **to load default settings, write 0x0006 to register 41001**

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11. COLLEGAMENTO AL WEB SERVER (SOLO ZE-4DI-2AI-2DO e ZE-2AI)

To access the webserver, open a browser and type (with default ip address)

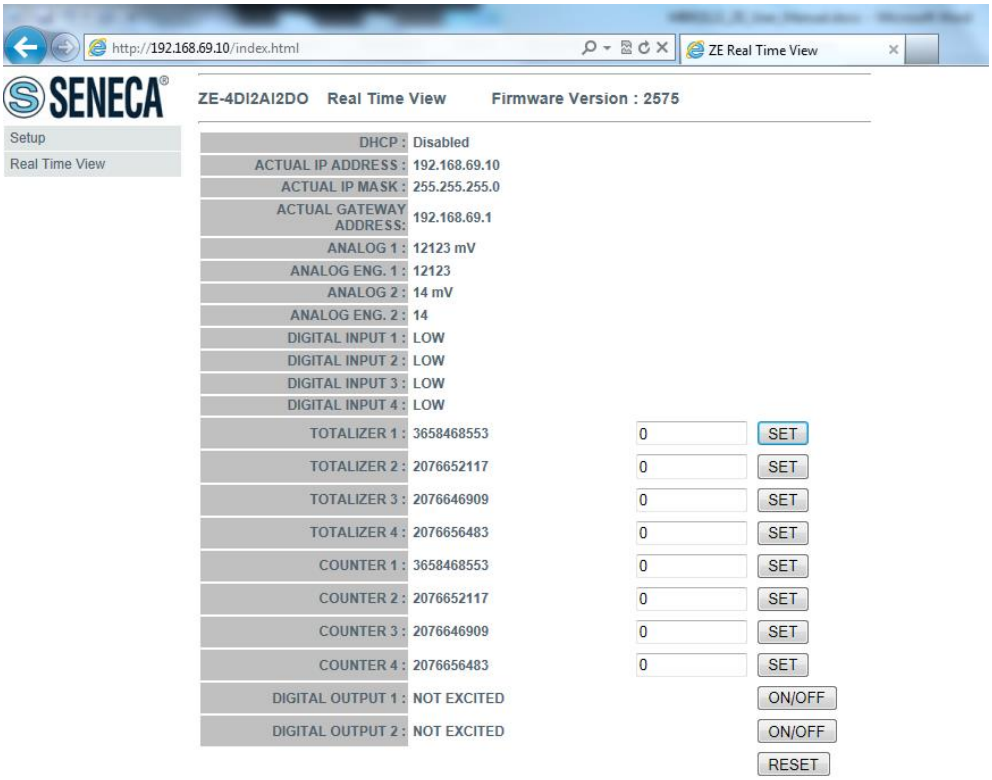
Http://192.168.90.101

The default password and user name are:

User name: admin

Password: admin

If the Ip configuration is performed correctly, the web server is displayed as follows:



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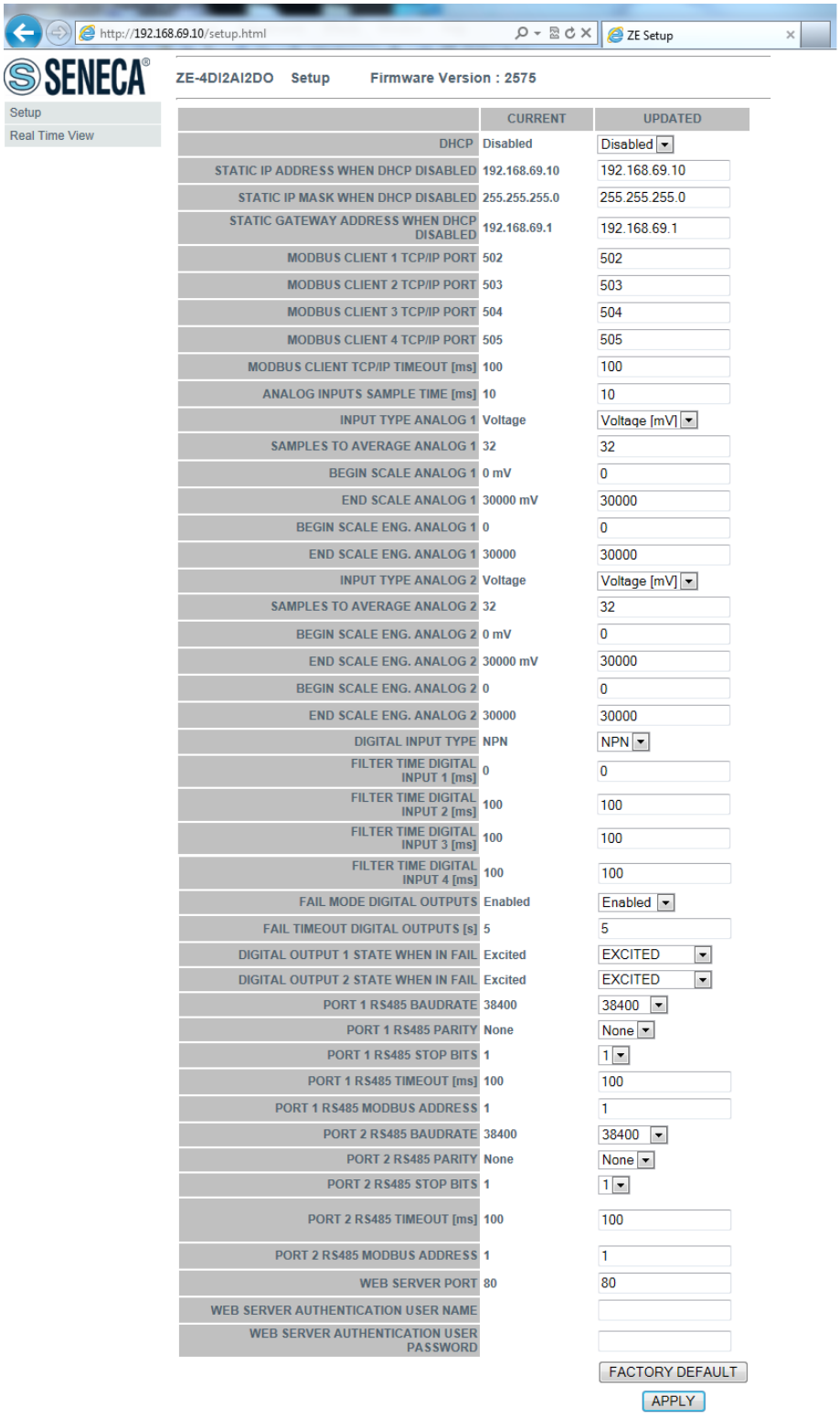
11.1 CONFIGURATION OF THE ZE MODULE WITH THE WEB SERVER

The web server can be used to configure the ZE module. To view all parameters, click on the 'Setup' button to the left of the screen:



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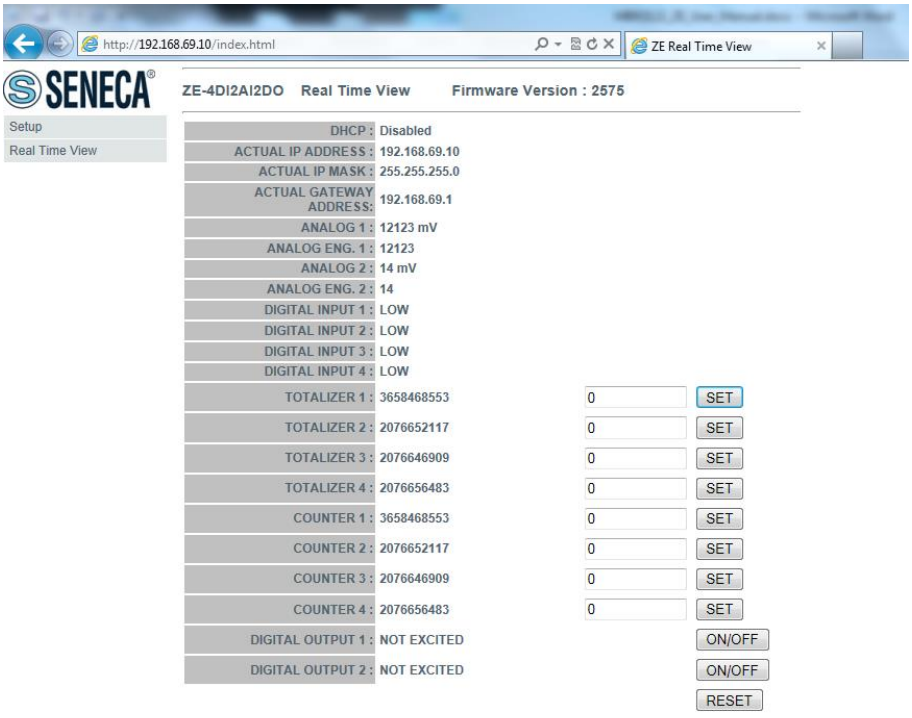
The first column represents the parameter name and the second column (current) is the value of the current parameter. The last column (updated) can be used to change the current configuration.

Once the configuration has been made, you must confirm with 'APPLY' to make the new configuration operational.

ATTENTION!
ALWAYS REMEMBER TO CONFIGURE THE WEB SERVER AUTHENTICATION USERNAME AND PASSWORD TO RESTRICT ACCESS TO THE WEB SERVER. IF YOU LEAVE THE TWO PARAMETER TEXT BOXES BLANK, AUTHENTICATION WILL NOT BE REQUIRED TO ACCESS THE WEB SERVER. FOR SECURITY REASONS, AUTHENTICATION PARAMETERS CAN ONLY BE CHANGED VIA THE WEB SERVER.

11.2 REAL-TIME VALUES ON THE WEB SERVER

It is also possible to use the web server to display values in real time. The 'Real Time view' page can also be used to change values for totalisers, counters and outputs:



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12 SOFTWARE EASY SETUP for Windows (SOLO Z-4DI-2AI-2DO)

From the Quick Start menu, select the device model (you can also click on the tab and select the correct model from the button).

The 'Easy ZE' configuration software starts:

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Click 'AUTOMATIC SEARCH' for automatic connection to the Z-4DI-2AI-2DO device.
The software tries to connect with all serial ports until the device responds.
At this point, the configuration menu will be displayed:

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13 Firmware Update

13.1 Model Z-4DI-2AI-2DO

With a new Easy Setup revision, Seneca is able to include new firmware for the device.

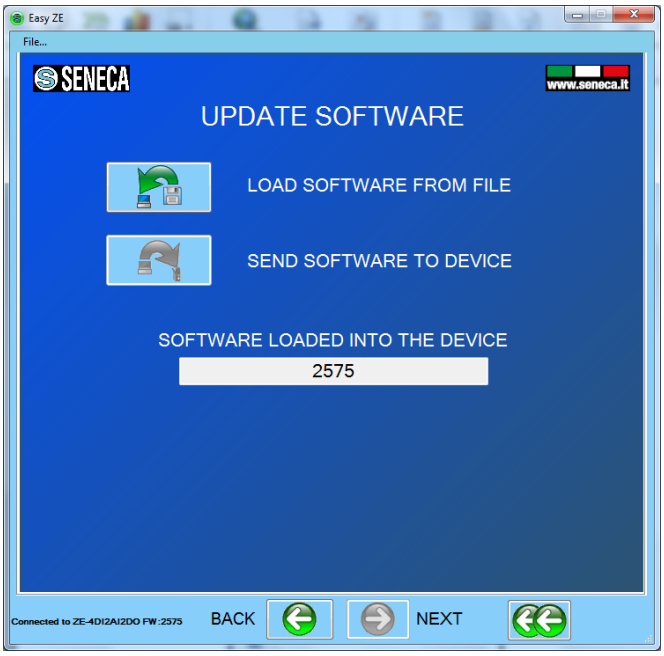
A new firmware update can include new features or bug fixes.

WARNING!

Once the firmware update has started, do not switch off the device before the procedure is complete.

Switch on the ZE device and connect it to the PC

On the configuration menu, click on 'Software update'.



Press "Load software from file": the software will directly open the firmware directory.
If the "new software" revision is newer than the "software in the device" revision, click "Send software to the device".
The firmware update takes about 6 minutes.

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13.2 Model ZE-4DI-2AI-2DO/ZE-2AI

To update devices use the webserver under 'Firmware Update'.

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