USER MANUAL

Z-10-D-IN

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Date	Revision	Notes
22/02/2016	1	Rewriting

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Seneca **Z-10-D-IN**

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1. Introduction

The Z-10-D-IN module acquires 10 single-ended digital signals, then converts them to a digital format (IN 1-10 state).

The supported communication protocol is Modbus RTU.

The following counters are available:

8 counters at 16 bits

2 counters at 32 bits.

1.1. Features

- Acquisition of digital signals from sensor: Reed, NPN, PNP, Proximity, contact, etc...
- Counters are saved to a non volatile memory (NVM)
- Input signals IN1-IN8 can be filtered
- Pulse counters for digital signals, with max frequency equal to: 100 Hz for 16bit-registers (the signal is acquired from IN1-8); 10kHz, 32bit-registers (the signal is acquired from IN9-IN10)
- Advanced pulse management for digital signals IN9-IN10 (see table 1)
- Up to 10 sensors power by internal supply voltage (Vaux=16V)
- Node address and baud-rate configurable from Dip-Switches
- RS485 serial communication with MODBUS-RTU protocol, maximum 32 nodes.

2. Features

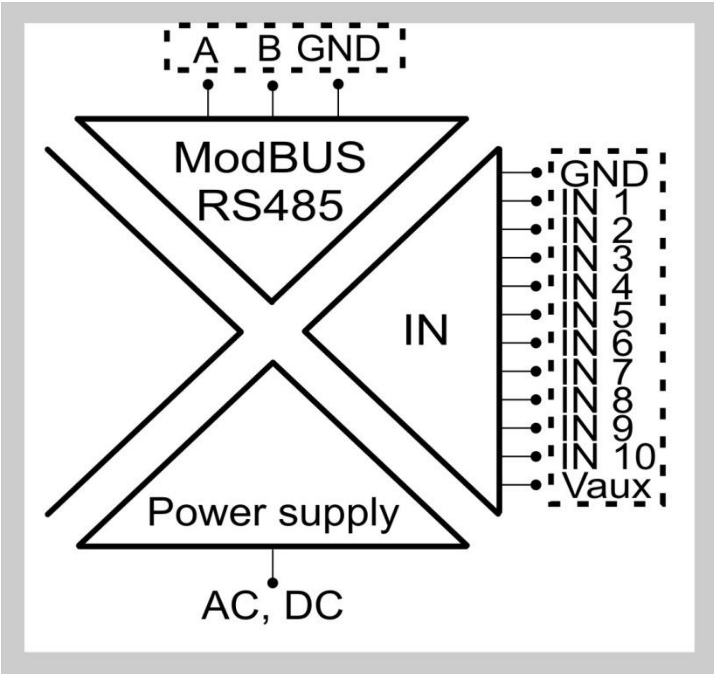
INPUT	
Number	10
Input filter	Cut-off frequency: 100Hz (for IN1-8); 10kHz (for IN9-10)
Filter	Configurable between: 1[ms] and 254[ms]
Protection	This module provides inputs and power supply (Vaux) protection against the overvoltage surge transient by transient suppressor TVS (600W/ms); max current supplied from Vaux is 100mA (limited by internal series PTC)
Pulse min duration (ton)	4ms (for IN1-IN8); 50µs (for IN9-IN10)
Sensor=closed	The sensor is detected «closed» if: acquired signal voltage >12 Vdc and acquired signal current > 3 mA
Sensor=open	The sensor is detected «open» if: acquired signal voltage <10 Vdc and acquired signal current < 2 mA

Internal supply Vaux	The screw terminal 12 (Vaux) supplies 16 V with reference to the screw terminal 1 (GND)

Measure error for frequency: 2% of fmax (for IN1-IN8: ±2Hz; for IN9-IN10: ±200Hz)

Measure error for period, ton, toff: 1ms

CONNECTIONS	
RS485 interface	IDC10 connector for DIN 46277 rail (back-side panel)
1500 Vac ISOLATIONS	
	Between: power supply, ModBUS RS485, digital inputs

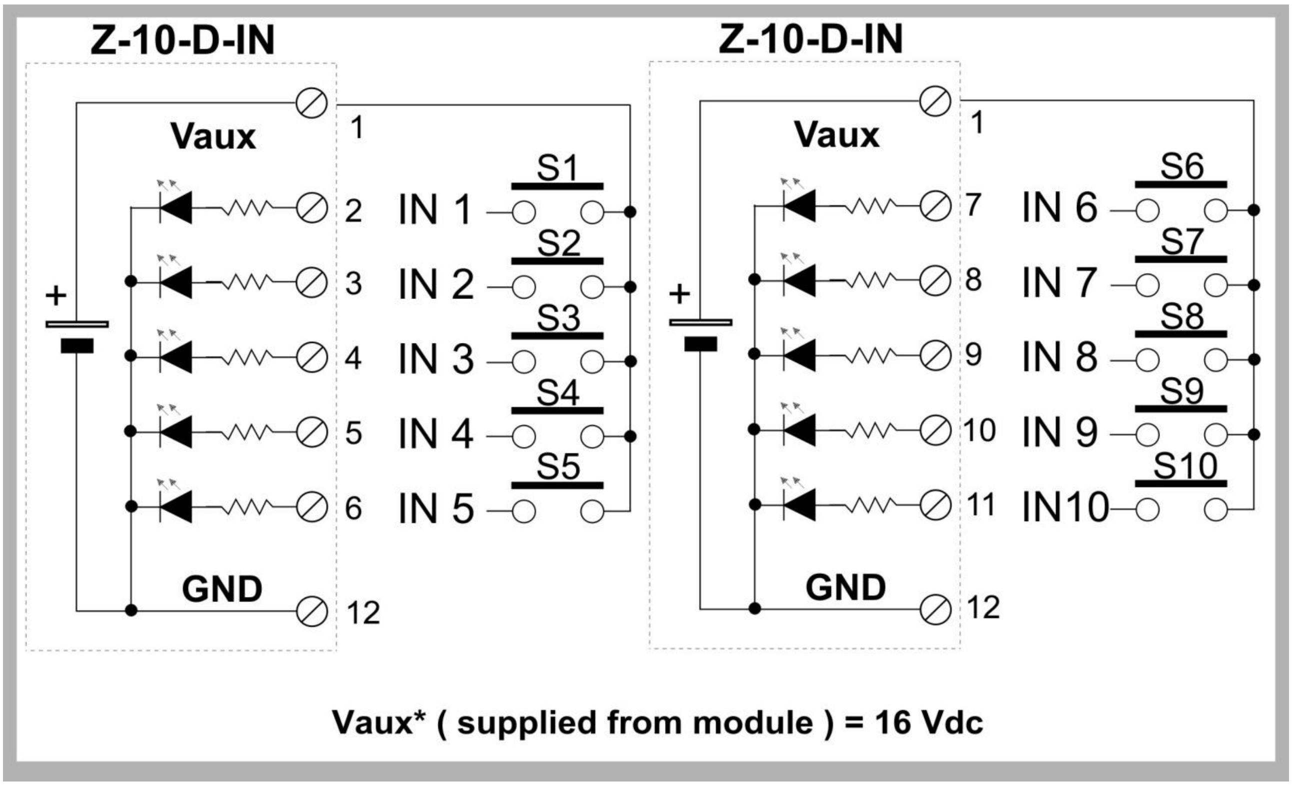


POWER SUPPLY	
Supply voltage	10 – 40 Vdc or 19 – 28 Vac (50Hz - 60Hz)
Power consumption	Min: 0.5W; Max: 2.5W

The power supply transformer necessary to supply the module must comply with EN60742 (Isolated transformers and safety transformers requirements). To protect the power supply, is recommended to install a fuse.

3. Input connections

Power on the module with < 40 Vdc or < 28 Vac voltage supply. These upper limits must not be exceeded to avoid serious damage to the module.



4. Dip-switches table

Power off the module before configuring it by Dip-Switches to avoid serious damage due to electrostatic discharges.

In the following tables: box without circle means Dip-Switch=0 (OFF state); box with circle means Dip-Switch=1 (ON state).

BAUD-RATE (Dip-Switches: DIP-SWITCH STATUS)		
1	2	Meaning
		Baud-rate=9600 Baud
	•	Baud-rate=19200 Baud
•		Baud-rate=38400 Baud
•	•	Baud-rate=57600 Baud

ADDRESS (Dip-Switches: DIP-SWITCH STATUS)						
3	4	5	6	7	8	Meaning
						Address and Baud-Rate are acquired from memory(EEPROM)
					•	Address=1
				•		Address=2
				•	•	Address=3
			•			Address=4
X	X	X	X	X	X	……………………
•	•	•	•	•	•	Address=63

RS485 TERMINATOR (Dip-Switches: DIP-SWITCH STATUS)		
9	10	Meaning
		RS485 terminator disabled
	•	RS485 terminator enabled

5. Modbus RTU protocol

All registers are "Holding register" (Read Modbus function 3) with the convention that the first register is the 40001 address.

The following Modbus functions are supported:

Read Modbus Register (function 3)

Write Single Modbus Register (function 6)

Write Multiple Modbus Registers (function 16)

All values in 32bits are stored into 2 consecutive registers

For more info refers to:

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

5.1. Abbreviation used

In the following table this abbreviations are used:

"MS" = Most significant
"LS" = Less significant
"MSB" = Most significant Bit
"LSB" = Less significant Bit
"MSW" = Most significant Word (16 bits)
"LSW" = Less significant Word (16 bits)
"R" = Read only register
"RW" = Read and write register

“Unsigned 16 bits” = Unsigned 16 bits register
“Signed 16 bits” = 16 bits register with sign
“Float 32 bits” = Floating point single precision 32 bits (IEEE 754) register
“0x” = Hexadecimal Value (example 0x1234 = 4660 decimal)
“0b” = Binary Value (example 0b1110 = 14 decimal)

Default communication parameters are 38400 baud, 8bit , parity None, 1 stop bit.

5.2. *Modbus Register Addresses*

Register Name	Comment	Register Type	R/W	Default value or Start Value	Modbus Address	Modbus Offset Address
MachineID	Module ID code	Unsigned 16 bits	R	0x0A00	40001	0
Inputs	Digital inputs 1..10 status value Bit 0 (LSB) = IN1 status Bit 1 = IN2 status Bit 2 = IN3 status Bit 3 = IN4 status Bit 4 = IN5 status Bit 5 = IN6 status Bit 6 = IN7 status Bit 7 = IN8 status Bit 8 = IN9 status Bit 9 = IN10 status Bit 10..14 = not used Bit 15 (MSB) = not used For example if the register value is: 813 decimal = (MSB)0000 0011 0010 1101(LSB) binary IN1 = 1 IN2 = 0 IN3 = 1 IN4 = 1 IN5 = 0 IN6 = 1 IN7 = 0 IN8 = 0 IN9 = 1 IN10 =1	Unsigned 16 bits	R	0	40002	1
Counter 1	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 1 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40003	2

Counter 2	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 2 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40004	3
Counter 3	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 3 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40005	4
Counter 4	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 4 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40006	5
Counter 5	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 5 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40007	6
Counter 6	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 6 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40008	7
Counter 7	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 7 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40009	8
Counter 8	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 8 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40010	9
Counter 9	32 bit counter (from 0 to 4294967295) The value is stored into a non volatile RAM (FeRAM). The Counter 9 value can be written (for example writing 0 for setting the counter)	Unsigned 32 bits	R/W	-	40011 (LSW) 40012 (MSW)	10-11
Counter 10	16 bit counter (from 0 to 4294967295) The value is stored into a non volatile RAM (FeRAM).	Unsigned 32 bits	R/W	-	40013 (LSW) 40014 (MSW)	12-13

	The Counter 10 value can be written (for example writing 0 for setting the counter)					

Counters Overflow Flags	The flag is "1" if the counter has performed an overflow Bit 0 (LSB)= Overflow Counter 1 Bit 1 = Overflow Counter 2 Bit 2 = Overflow Counter 3 Bit 3 = Overflow Counter 4 Bit 4 = Overflow Counter 5 Bit 5 = Overflow Counter 6 Bit 6 = Overflow Counter 7 Bit 7 = Overflow Counter 8 Bit 8 = Overflow Counter 9 Bit 9 = Overflow Counter 10 Bit 10..14 = not used Bit 15 (MSB) = not used	Unsigned 16 bits	R/W	0	40015	14
Measure B	Input B measure value	Unsigned 16 bits	R	0	40016	15
Measure A	Input A measure value	Unsigned 16 bits	R	0	40017	16
Measure A/B Type	Bit [15..12] = 0b0000 Measure A frequency Bit[15..12] = 0b0001 Measure A period Bit[15..12] = 0b0010 Measure A Ton Bit[15..12] = 0b0011 Measure A Toff Bit[11..8] = 0b0001 Measure A from input 1 Bit[11..8] = 0b0010 Measure A from input 2 Bit[11..8] = 0b0011 Measure A from input 3 Bit[11..8] = 0b0100 Measure A from input 4 Bit[11..8] = 0b0101 Measure A from input 5 Bit[11..8] = 0b0110 Measure A from input 6 Bit[11..8] = 0b0111 Measure A from input 7 Bit[11..8] = 0b1000 Measure A from input 8 Bit[11..8] = 0b1001 Measure A from input 9 (only frequency)	Unsigned 16 bits	R/W*	0	40018	17

	Bit[11..8] = 0b1010 Measure A from input 10 (only frequency) Bit [7..4] = 0b0000 Measure B frequency Bit[7..4] = 0b0001 Measure B period Bit[7..4] = 0b0010 Measure B Ton Bit[7..4] = 0b0011 Measure B Toff Bit[3..0] = 0b0001 Measure B from input 1 Bit[3..0] = 0b0010 Measure B from input 2 Bit[3..0] = 0b0011 Measure B from input 3 Bit[3..0] = 0b0100 Measure B from input 4 Bit[3..0] = 0b0101 Measure B from input 5 Bit[3..0] = 0b0110 Measure B from input 6 Bit[3..0] = 0b0111 Measure B from input 7 Bit[3..0] = 0b1000 Measure B from input 8 Bit[3..0] = 0b1001 Measure B from input 9 (only frequency) Bit[3..0] = 0b1010 Measure B from input 10 (only frequency)					
IN1..IN8 FILTER	Filter value from 1 ms to 255 ms. For example with filter = 1 ms will attenuate pulse with frequency > 1/1ms = 1000 Hz With filter = 10 ms will attenuate pulse with frequency > 1/10ms=100 Hz	Unsigned 16 bits	R/W*	3 ms	40019	18
IN9..IN10 COUNT MODE / RS485 PARITY	Bit [12:8] = 0b00000 IN9 Upcounter IN10 Upcounter Bit [12:8] = 0b00001 IN9 Downcounter IN10 Upcounter Bit [12:8] = 0b00010 IN9 Upcounter IN10 Downcounter Bit [12:8] = 0b00100 IN9 Downcounter IN10 Downcounter	Unsigned 16 bits	R/W*	0	40020	19

	Bit [12:8] = 0b01000 Count+1 from IN9 and Count-1 from IN10. Only Count 9 Is active Bit [12:8] = 0b10000 if IN10=1 Count9 Upcounter, if IN10=0 Counter9 Downcounter Bit[4] = 0 Port RS485 Parity Even Bit[4] = 1 Port RS485 Parity Odd Bit[3] = 0 Port RS485 Parity Not Active Bit[3] = 1 Port RS485 Parity Active Bit[2] = 0 Delay Between Rs485 Port TX and RX disabled Bit[2] = 1 Delay Between Rs485 Port TX and RX enabled Bit[1] = 0 IN1..IN8 Upcounter Bit[1] = 1 IN1..IN8 Downcounter Bit[0] = 0 IN1..IN10 Normal Logic Bit[0] = 0 IN1..IN10 Reverse Logic					
ADDRESS BAUDRATE	Bit[15..8] = 0b00000000 RS485 use 4800baud Bit[15..8] = 0b00000001 RS485 use 9600baud Bit[15..8] = 0b00000010 RS485 use 19200baud Bit[15..8] = 0b00000011 RS485 use 38400baud Bit[15..8] = 0b00000100 RS485 use 57600baud Bit[15..8] = 0b00000101 RS485 use 115200baud Bit[15..8] = 0b00000110 RS485 use 1200baud Bit[15..8] = 0b00000111 RS485 use 2400baud Bit[7:0] = Station Node Address (if all dip switched are set to OFF)	Unsigned 16 bits	R/W*	0b0000010000000001 (38400 baud, station address 1)	40021	20
COMMAND	If set to 2: Copy the actual contents of registers R/W* into EEPROM.	Unsigned 16 bits	R/W	0	40022	21

	If set to 1: Perform a Reset					
FW REVISION	Fw revision	Unsigned 16 bits	R	-	40024	23

6. EASY SETUP

To configure the Z-10-D-IN download the Easy Setup PC software from the Seneca Website:

http://www.seneca.it/en/linee-di-prodotto/software/easy/easy-setup/