USER MANUAL

Z-D-IN

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Date	Revision	Notes
03/08/2016	2	Rewriting
13/01/2022	3	Corrected the bytes of register 40010

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Seneca **Z-D-IN**

CAUTION!

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1. Introduction

The Z-D-IN module acquires 5 single-ended digital signals, then converts them to a digital format (IN 1-5 state).

The supported communication protocol is Modbus RTU.

The following counters are available:

4 counters at 16 bit

1 counter at 16/32 bit (configurable).

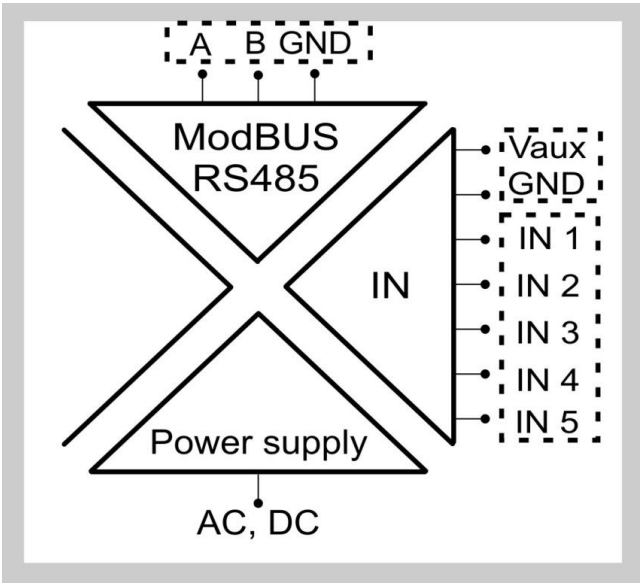
1.1. Features

- Acquisition of digital signals from sensor: Reed, NPN, PNP, Proximity, contact, etc...
- Counters are saved to a non volatile memory (NVM)
- Input signals can be filtered
- Pulse counters for digital signals, with max frequency equal to: 100 Hz for 16bit-registers (the signal is acquired from IN1-4); 10kHz for 32bit-register IN5
- Node address and baud-rate configurable from Dip-Switches
- RS485 serial communication with MODBUS-RTU protocol.

2. Features

INPUT	
Number	5
Filter	Configurable between: 1[ms] and 250[ms]
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

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

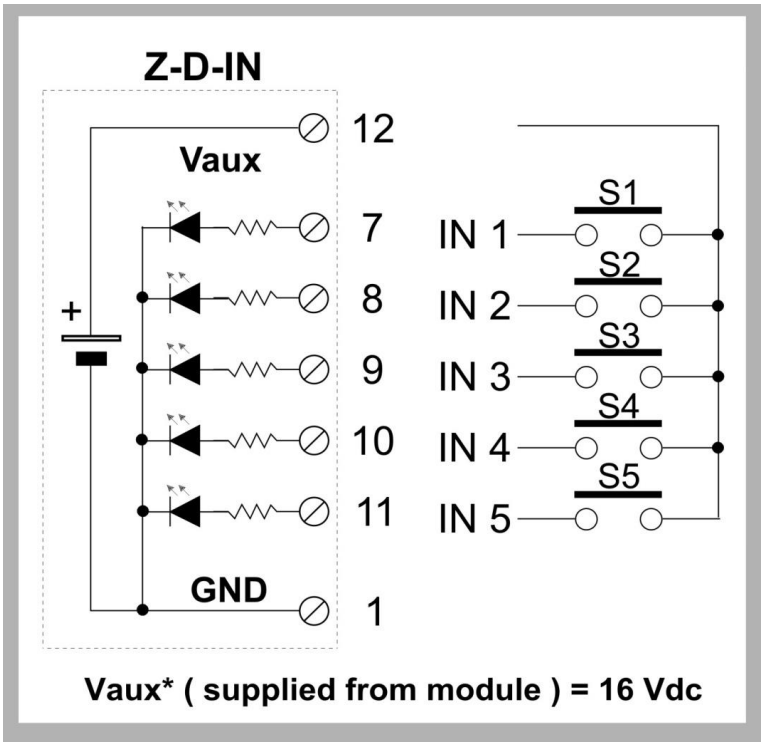


POWER SUPPLY	
Supply voltage	10 – 40 Vdc or 19 – 28 Vac (50Hz - 60Hz)
Power consumption	Min: 0.5W; Max: 2.5W

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	-	40001	0
Inputs Overflows	Digital inputs 1..5 status value And Overflows Bit 0 (LSB) = IN1 status Bit 1 = IN2 status Bit 2 = IN3 status Bit 3 = IN4 status Bit 4 = IN5 status For example if the register value is: 29 decimal = (MSB)0000 0000 0001 1101(LSB) binary IN1 = 1 IN2 = 0 IN3 = 1 IN4 = 1 IN5 = 1 Bit 8 = Overflow/Underflow Counter 1 Bit 9 = Overflow/Underflow Counter 2 Bit 10 = Overflow/Underflow Counter 3 Bit 11 = Overflow/Underflow Counter 4 Bit 12 = Overflow/Underflow Counter 5 Overflow/Underflow bits are set from the firmware when the counter pass from 65535 to 0 (overflow) or from 0 to 65535 (underflow)	Unsigned 16 bits	R/W	0	40002	1

	Overflow bits can be written to 0 for reset.					
Counter 1	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter value can be written	Unsigned 16 bits	R/W (Non volatile)	-	40003	2
Counter 2	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter value can be written	Unsigned 16 bits	R/W (Non volatile)	-	40004	3
Counter 3	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter value can be written	Unsigned 16 bits	R/W (Non volatile)	-	40005	4
Counter 4	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter value can be written	Unsigned 16 bits	R/W (Non volatile)	-	40006	5
Counter 5 (16 bit mode)	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter value can be written. If configured to 32 bit use the registers: 40019 (LSW) 40020 (MSW)	Unsigned 16 bits	R/W (Non volatile)	-	40007	6
Filter	Filter (from 1 to 254) in ms applied to all input-signals (except IN5 if bit7 of the register 40009 is = 1). Limit values: if =1[ms]=filtering noise with frequency > 1kHz (max frequency allowed 1KHz) if =254[ms]=filtering noise with frequency>4Hz (max frequency allowed 4Hz)		R/W (*) (Non volatile)	3 [ms]	40008	7
Configuration Flags	Bit 0 Input Logic If Bit0 = 0 Direct Input logic (0 = open, 1 = close) If Bit0 = 1 inverse Input logic (1 = open, 0 = close) Bit 1 Count mode If Bit1 = 0 upcounter If Bit1 = 1 downcounter Bit 2 RS485 Delay If Bit2=0 no pause between the end of Rx message and the start of Tx message If Bit2=1 insert a pause between the end of Rx message and the start of Tx message Bit 3 RS485 Parity Bit If Bit3=0 no parity If Bit3=1 bit parity ON	Unsigned 16 bits	R/W (*) (Non volatile)	0	40009	8

	Bit 4 RS485 Parity Type If Bit4=0 Even Parity If Bit4=1 Odd Parity Bit 5 Not Used Bit 6 Not Used Bit 7 32 Bit IN5 mode If Bit7=0 IN5 is at 16Bit (default) If Bit7=1 IN5 is at 32Bit (and the filter is disabled, max 10KHz Input mode) Bit8..15 Not Used					
Baud Rate Node Address	Bit0..7 Baud rate for RS485 0=4800; 1=9600; 2=19200; 3=38400; 4=57600; 5=115200; 6=1200; 7=2400 Bit 0..7 (LSB) Modbus Node Address Bit 9..15 (MSB) Baud Rate for RS485 from 1 to 255	Unsigned 16 bits	R/W (*) (Non volatile)	38400 baud Address 1	40010	9
Bit Command Register	Bit Command Register Bit 0 (LSB) if written to 1: Save configuration in memory (EEPROM). The content of 40008, 40009, 40010 registers is overwritten, respectively, in the 40072, 40073, 40074 registers (these ones are in memory EEPROM): Bit 1 if written to 1: Reset Command Bit 2…15: Not used	Unsigned 16 bits	R/W	0	40011	10
FW Revision	Firmware internal code	Unsigned 16 bits	R	-	40013	12
Counter 1 copy	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter value can be written	Unsigned 16 bits	R/W (Non volatile)	-	40015	14
Counter 2 copy	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter value can be written	Unsigned 16 bits	R/W (Non volatile)	-	40016	15
Counter 3 copy	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter value can be written	Unsigned 16 bits	R/W (Non volatile)	-	40017	16

Counter 4 copy	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter value can be written	Unsigned 16 bits	R/W (Non volatile)	-	40018	17
Counter 5 (32 bit mode)	32 bit counter (from 0 to 4294967295) The value is stored into a non volatile RAM (FeRAM). The Counter value can be written.	Unsigned 16 bits	R/W (Non volatile)	-	40019 (LSW) 40020 (MSW)	18-19

R/W(*) = the register value is written in not volatile memory only after that the Bit Command Register is set to 1

6. LEDs for signalling

In the front-side panel there are 9 LEDs and their state refers to important operating conditions of the module.

LED	*LED status*	*Meaning*
PWR	Constant light	The power is on
ERR	Blinking light	The module has at least one of the errors/overflows described in RS485 Registers table
	Constant light	Module failure
RX	Constant light	Verify if the bus connection is corrected
	Blinking light	The module received a data packet
TX	Blinking light	The module sent a data packet
	Constant light	Verify if the bus connection is corrected
1-5	Constant light	IN1-5 state equal to «1»
	No light	IN1-5 state equal to «0» (if the power is on)

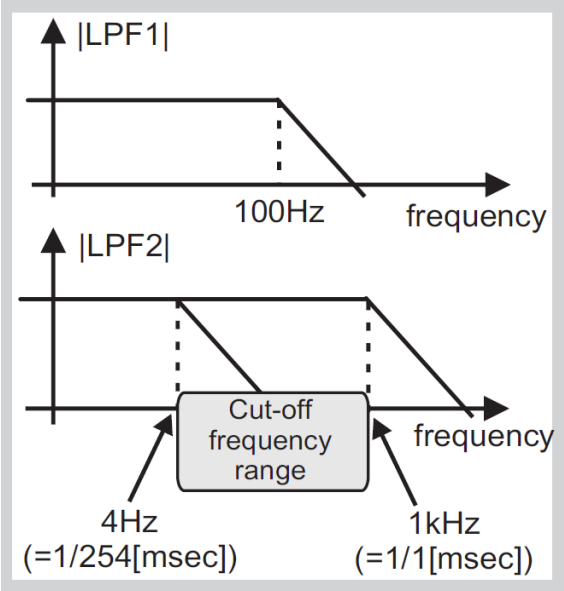
7. Filter

LPF1 action: Input filter

Cut-off frequency equal to 100Hz for IN1-5

LPF2 action: Filter 1-254

Cut-off frequency range to attenuate lower-frequencies noise: from 4Hz to 1kHz. The noise is overlapped to the desired digital signal.



8. EASY SETUP

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

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