USER MANUAL

ZC-16DI-8DO

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MI00270-6

Seneca Z-PC Line module: **ZC-16DI-8DO**

The module ZC-16DI-8DO:

- acquires 16 single-ended digital signals, it converts them to a digital format (IN 1-16 state) and it counts the input-pulse number (pulse counter for IN 1-8);

- controls 8 digital outputs (OUT1-OUT8), each of them (by MOSFET) actives/deactivates a output load.

General characteristics

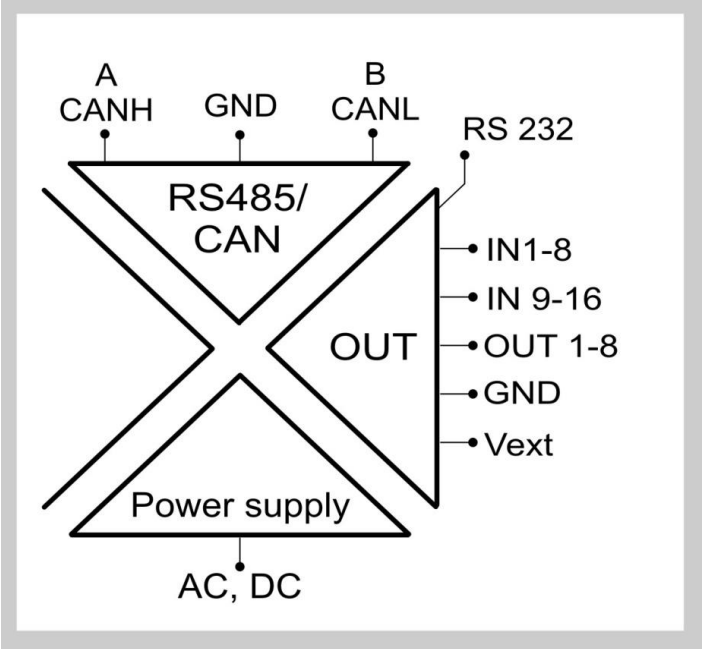
- Acquisition of digital signals from sensor: reed, NPN, PNP, proximity, contact, etc...
- Configuration of a filter applied to input signals IN1-IN8 (noise filter) to attenuate the noise overlapped to the digital signals
- Pulse counters for digital signals IN1-IN8, with max frequency equal to 10kHz, 32bit-registers
- Advanced management of the pulse counters for digital signals IN1-IN8 (for each pulse counter: overflow, preset value and reset/preset command are available)
- Power of 16 sensors using internal supply voltage (Vaux=16V)
- Outputs are available on 8 screw terminals or IDC 10 connectors, to facilitate the connection of 24V-relays
- It is possible to manage the output state if the interval time of RS485-bus communication failure is greater than a configurable time (up to 25.5sec): output is kept at the previous value or output is overwritten on register
- It is possible to manage the output state if there is a over-temperature or short-circuited (towards ground)
- Configuration of the module (node) address and baud-rate by Dip-Switches
- It is possible to add/remove the module to/from RS485-bus without disconnecting the communication or power supply
- It is possible to switch automatically RS485 to RS232 or vice versa
- CAN interface with CANOpen protocol: max 1Mbps

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Features

INPUT	
Number	16
Type	Polarity (EN 61131 – 2 type 2): sink (pnp)
Equivalent low-pass-filter cut-off frequency	Configurable between: 16 Hz and 2.1kHz
Pulse min duration (ton)	350µs
Sensor=off (input threshold)	The sensor is detected «off» if: acquired signal voltage between 0Vdc and 7 Vdc
Sensor=on (input threshold)	The sensor is detected «on» if: acquired signal voltage between 11Vdc and 30Vdc
Switching delay	Typical: 1.2ms; max: 3ms
Adsorbed current	3mA (for each input)
Internal supply Vaux	The screw terminals 24-32 (Vaux) supply 16 V with reference to the screw terminal 7-15-23-31 (GND)
OUTPUT	
Number	8
Type	MOSFET (Open source)
Max current through each load	0.5A. The supplied currents sum through all loads (these currents are inwards with reference to the screw terminals 8-16):<4A, using a fuse or equivalent protection (if the connection is performed through screw terminals)
	25mA. The supplied currents sum through all loads (these currents are inwards with reference to the screw terminals 8-16):<0.2A, using a fuse or equivalent protection (if the connection is performed through IDC10 connector)
Max state-switching frequency for each load	2Hz
MOSFET protection	The MOSFETs are protected against: load short-circuited, over-temperature
MOSFET supply	With reference to the screw terminals 7-15-23-32 (GND), power the MOSFETs by screw terminals 8 or 16 (Vext): min5V, max30V
MOSFET max energy	40mJ with inductive load
MOSFET response time	5/2ms
R_{DSON}	0.75Ω
Switching delay	1ms (max)
CONNECTIONS	
RS485 interface	IDC10 connector for DIN 46277 rail (back-side panel)
1500 Vac ISOLATIONS	
	Between: power supply, ModBUS RS485, digital outputs

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POWER SUPPLY	
Supply voltage	10 – 40 Vdc or 19 – 28 Vac (50Hz - 60Hz)
Power consumption	Typical: 1.5W; Max: 2.5W

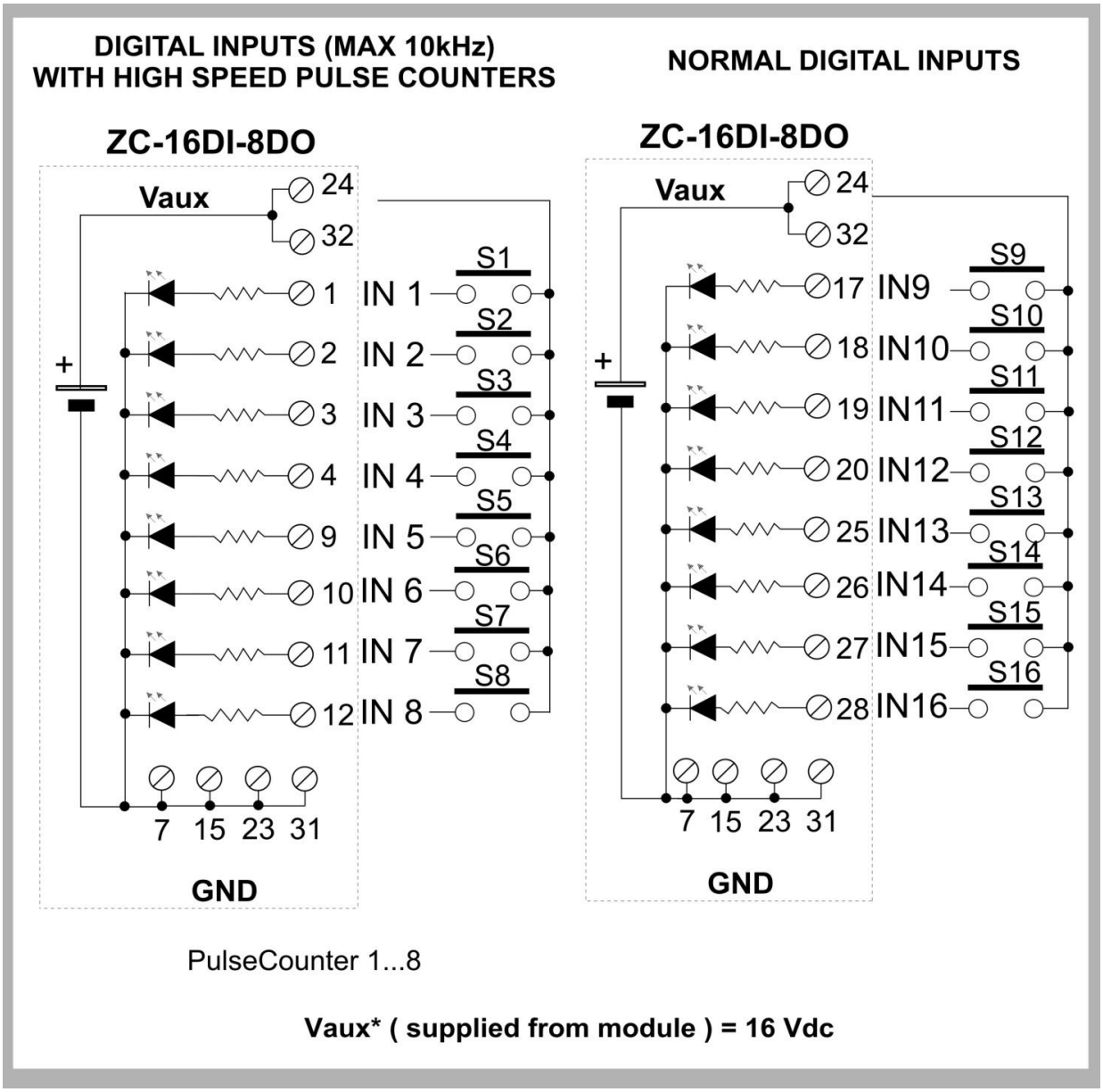
The power supply transformer necessary to supply the module must comply with EN60742 (Isolated transformers and safety transformers requirements). To protect the power supply, it is recommended to install a fuse.

MODULE CASE	
Case-type	PBT, black
Dimensions	Width W = 100 mm, Height H = 112mm, Depth D = 35 mm
Terminal board	Removable 4-way screw terminals: pitch 3.5mm, sections 2.5mm^2
Protection class	IP20 (International Protection)

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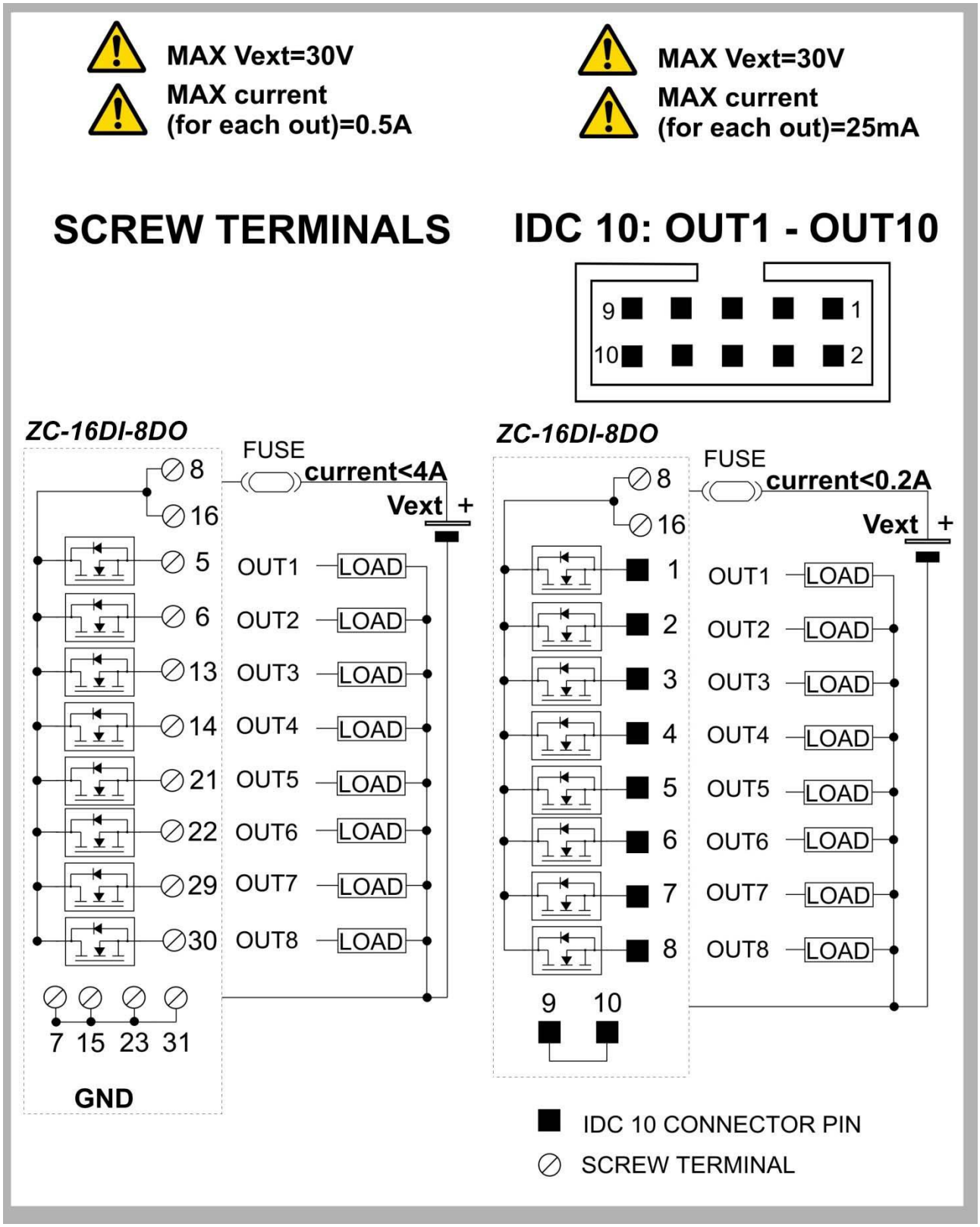
Input connections

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.



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Output connections



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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: SW1)			
1	2	3	Meaning
			Only Baud-Rate is acquired from memory(EEPROM)
		●	Baudrate=2400
	●		Baudrate=4800
	●	●	Baudrate=9600
●			Baudrate=19200
●		●	Baudrate=38400
●	●		Baudrate=57600
●	●	●	Baudrate=115200

ADDRESS (Dip-Switches: SW1)							
4	5	6	7	8	9	10	Meaning
							Only address is acquired from memory(EEPROM)
						●	Address=1
					●		Address=2
					●	●	Address=3
				●			Address=4
				●		●	Address=5
X	X	X	X	X	X	X	……
●	●	●	●	●	●	●	Address=127

RS485 TERMINATOR (Dip-Switches: SW3)	
1	Meaning
	RS485 terminator disabled
●	RS485 terminator enabled

COMMUNICATION PROTOCOL (Dip-Switch: SW2 and SW4)		
SW2	**SW4**	
1	1	
		Protocol is ModBUS
●	●	Protocol is CANOPEN

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RS485 Register table

Name	Range	Interpretation of register	R/W	Default	Address
MachineID	/	MSB, LSB	R		40001
	Id_Code (Module ID)			0x22 (34 decimal)	Bit [15:8]
	Ext_Rev (Module version)				Bit [7:0]
FWREV	/	Word	R		40002
	Firmware Code				
Command	/	Word	R/W		40201
Reg.40201=0x5Cnn (preset counter values are loaded into pulse counters, using a bit interpretation to mask the inputs): load 40025,40026…40039,40040 into 40009, 40010…40023,40024. Examples: 0x5C01 allows to load PresetCounter1 into PulseCounter1 0x5C02 allows to load PresetCounter2 into PulseCounter2 0x5C03 allows to load PresetCounter1 into PulseCounter1 **and** PresetCounter2 into PulseCounter2 (**not** PresetCounter3 into PulseCounter3) and so on 0x5CFF allows to load every PresetCounter into corresponding PulseCounter					
Reg.40201=0x5Dnn (pulse counters value are loaded with zero values, using a bit interpretation to mask the inputs) Examples: 0x5D01 allows to load PulseCounter1 with zero value 0x5D02 allows to load PulseCounter2 with zero value 0x5D03 allows to load PulseCounter1 **and** PresetCounter2 with zero value (**not** PresetCounter3 with zero value) and so on 0x5DFF allows to load every PulseCounter with zero value					
Reg.40201=0x5Enn (counter overflows reset, using a bit interpretation to mask the inputs) Examples: 0x5E01 allows to reset PulseCounter1 overflow 0x5E02 allows to reset PulseCounter2 overflow 0x5E03 allows to reset PulseCounter2 overflow **and** to reset PulseCounter2 overflow (**not** to reset PulseCounter3 overflow) and so on 0x5EFF allows to reset every PulseCounter overflow					
Reg.40201=0xBAB0 (save data in EEPROM memory)					
Reg.40201=0xC1A0 (module reset)					
Reg.40201=0x6BAC (the module writes the Dip-Switches-state in reg.40202)					
Command aux		Bit	R		40202
	These bits aren't used			/	Bit [15:10]
	Dip-Switches "SW1 [4:10]" state. They correspond to the module baud-rate			/	Bit [9:3]
	Dip-Switches "SW1 [1:3]" state. They correspond to the module address			/	Bit [2:0]
Errors	/	Word	R		40006
	These bits aren't used			/	Bit [15:8]
	Memory error (EEPROM): 0=there isn't; 1=there is			/	Bit 7
	These bits aren't used			/	Bit [6:4]
	Over-temperature error: 0=there isn't; 1=there is			/	Bit 3
	These bits aren't used			/	Bit [2:0]
Filter[IN1-8] masked	/	Word	R/W		40043
	These bits aren't used			/	Bit [15:8]
	Input [1..8] Filter enable Mask (only 0x00 or 0xFF allowed) 0x00 = Filter disabled (and Counters 1..8 Enabled) 0xFF = Filter enabled (and Counters 1..8 Disabled)			0xFF	Bit [7:0]

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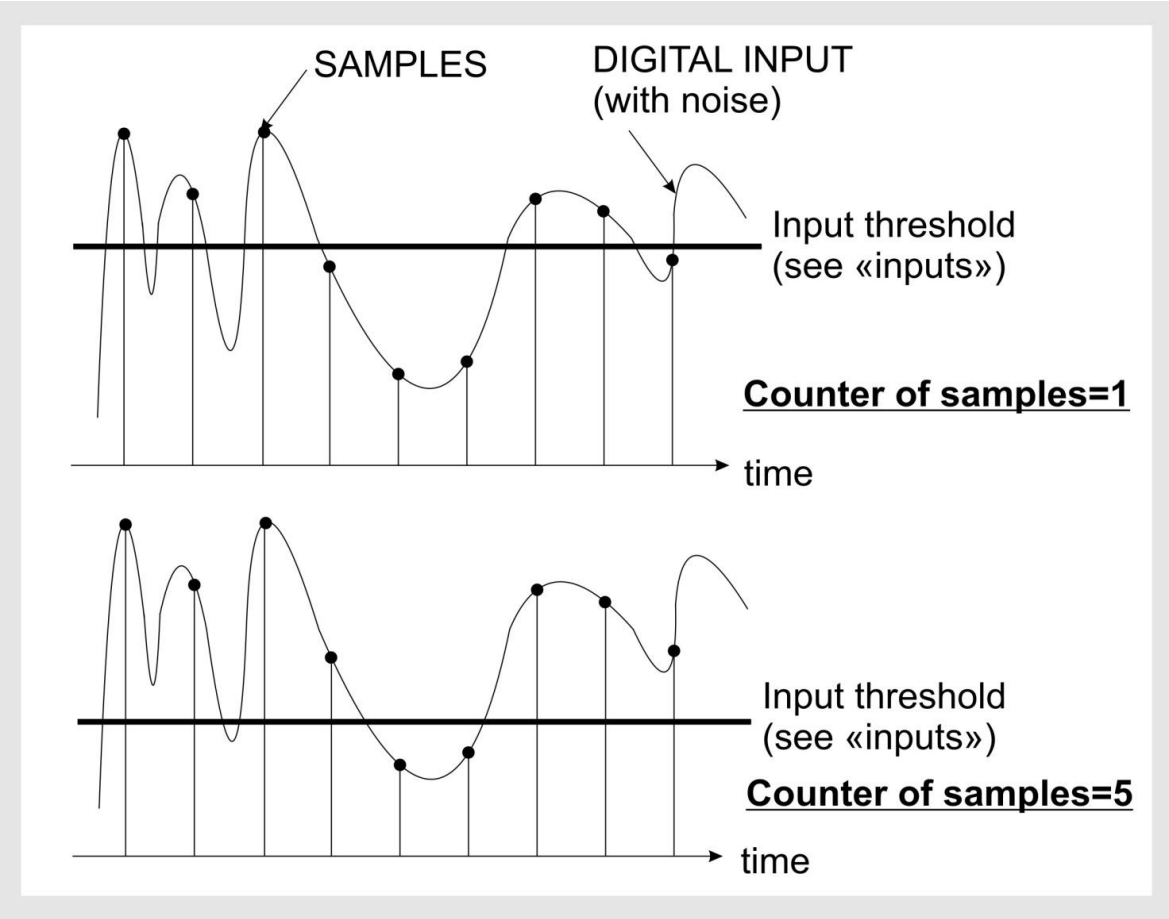
Filter[IN9-16] masked	/	Word	RO		40044
	These bits aren't used			/	Bit [15:8]
	Filter activation for inputs IN9-IN16 using a bit interpretation to mask the inputs: are always deactivated			0x00	Bit [7:0]
Filter Number Of Samples	From 0 to 255	Word	R/W		40045
	These bits aren't used				Bit [15:8]
	Number of samples for filter			0x28 (40 decimal)	Bit [7:0]
Filter Sup	From 0 to 255	Word	R/W		40046
	These bits aren't used				Bit [15:8]
	Inferior threshold for filter			0x14 (20 decimal)	Bit [7:0]
Filter Inf	From 0 to 255	Word	R/W		40047
	These bits aren't used				Bit [15:8]
	Superior threshold for filter			0x14 (20 decimal)	Bit [7:0]

Default equivalent filter value is 100Hz (cut-off frequency).

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Filter functioning

Input filter operates in the following way: the module samples the digital input with a frequency equal to 20kHz, and some samples are captured (in the following figure there are 9 samples).



If counter of samples is greater than (or equal to) reg.40046 (Filter Sup), input signal is detected as “1”.

If counter of samples is less than (or equal to) reg.40047 (Filter Inf), input signal is detected as “0”.

If counter of samples is between reg.40047 (Filter Inf) and reg.40046 (Filter Sup), filter value is kept stored at the previous value.

Example: with reference to the previous figure

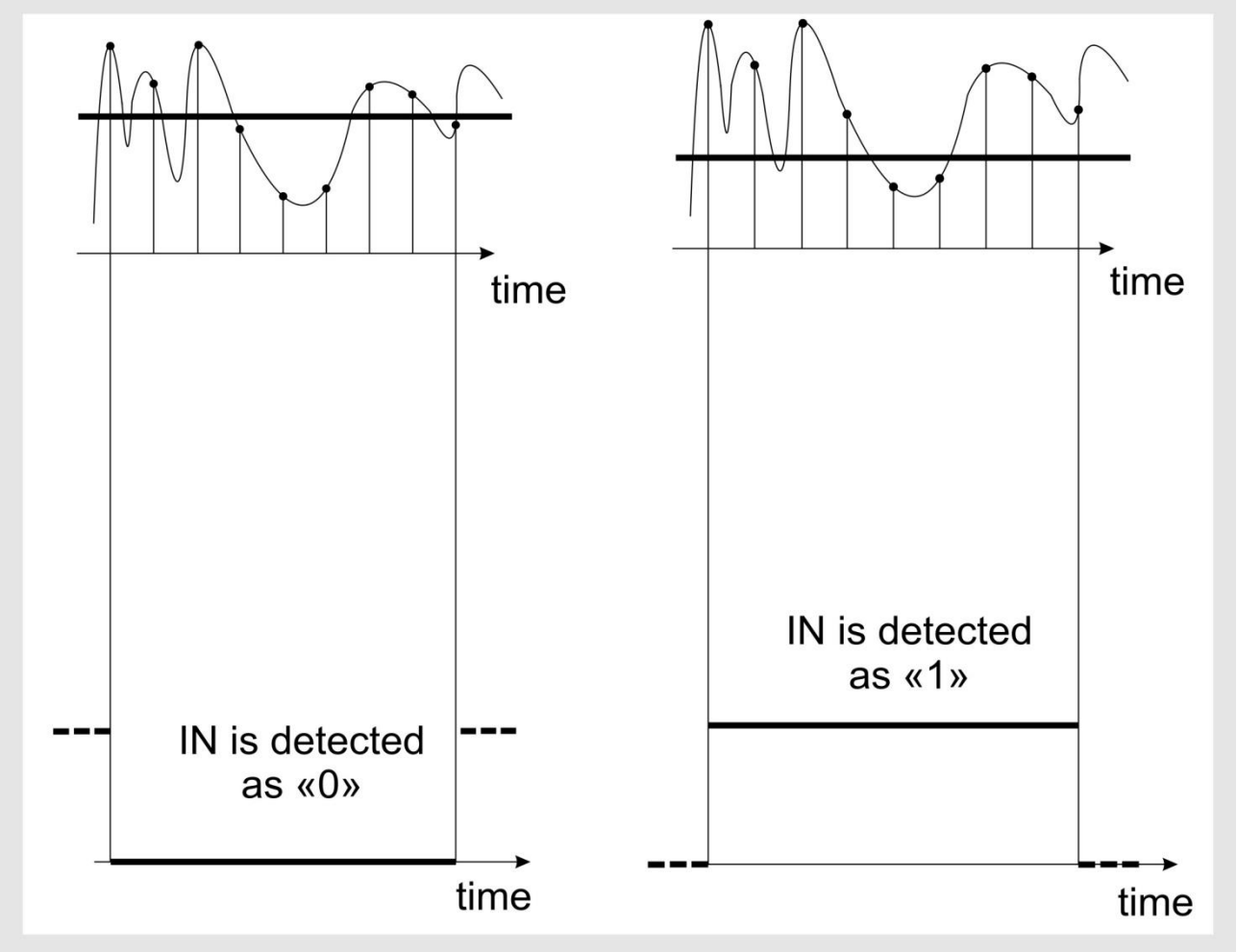
A) Counter of samples (for superior figure)=0+1+1+1-1-1-1+1+1-1=**1**

If Filter Inf =2, Filter Sup=4: 1 ≥ 4 is false, 1 < 2 is true. So input is detected as “0”

B) Counter of samples (for inferior figure)=0+1+1+1+1-1-1+1+1+1=**5**

If Filter Inf =2, Filter Sup=4: 5 ≥ 4 is true, 5 < 2 is false. So input is detected as “1”

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To deactivate the filter, write: reg.40045=0x01, reg.40046=0x00, reg.40047=0x00.

This filter action is described in configuration software as a low pass digital filter, with cut-off frequency from 16Hz to 2.1kHz.

Address Parity	Address: from 0x01=1 to 0xFF=255	MSB, LSB	R/W		40050
	Address for RS485 (address of module/node if parameters are configurated by memory modality)			1	Bit [15:8]
	Parity for RS485: 0=no parity; 1=even; 2=odd			0	Bit [7:0]
Baudrate Delay	Delay: from 0x00=0 to 0xFF=255	MSB, LSB	R/W		40051
	Baud-rate for RS485 (baud-rate of module/node if parameters are configurated by memory modality): 1=2400; 2=4800; 3=9600; 4=19200; 5=38400; 6=57600; 7=115200			38400	Bit [15:8]
	Delay for RS485 (delay of communication response: pauses between the end of Rx message and the start of Tx message)			0	Bit [7:0]
State IN1-IN16		Bit	R		40301
	IN16 state: 0=S16 open; 1=S16 closed			/	Bit 15
	IN15 state: 0=S15 open; 1=S15 closed			/	Bit 14

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	IN14 state: 0=S14 open; 1=S14 closed			/	Bit 13
	IN13 state: 0=S13 open; 1=S13 closed			/	Bit 12
	IN12 state: 0=S12 open; 1=S12 closed			/	Bit 11
	IN11 state: 0=S11 open; 1=S11 closed			/	Bit 10
	IN10 state: 0=S10 open; 1=S10 closed			/	Bit 9
	IN9 state: 0=S9 open; 1=S9 closed			/	Bit 8
	IN8 state: 0=S8 open; 1=S8 closed			/	Bit 7
	IN7 state: 0=S7 open; 1=S7 closed			/	Bit 6
	IN6 state: 0=S6 open; 1=S6 closed			/	Bit 5
	IN5 state: 0=S5 open; 1=S5 closed			/	Bit 4
	IN4 state: 0=S4 open; 1=S4 closed			/	Bit 3
	IN3 state: 0=S3 open; 1=S3 closed			/	Bit 2
	IN2 state: 0=S2 open; 1=S2 closed			/	Bit 1
	IN1 state: 0=S1 open; 1=S1 closed			/	Bit 0
State IN1-IN8		Bit	R		40003
	These bits aren't used			/	Bit [15:8]
	IN8 state: 0=S8 open; 1=S8 closed			/	Bit 7
	IN7 state: 0=S7 open; 1=S7 closed			/	Bit 6
	IN6 state: 0=S6 open; 1=S6 closed			/	Bit 5
	IN5 state: 0=S5 open; 1=S5 closed			/	Bit 4
	IN4 state: 0=S4 open; 1=S4 closed			/	Bit 3
	IN3 state: 0=S3 open; 1=S3 closed			/	Bit 2
	IN2 state: 0=S2 open; 1=S2 closed			/	Bit 1
	IN1 state: 0=S1 open; 1=S1 closed			/	Bit 0
State IN9-IN16		Bit	R		40004
	These bits aren't used			/	Bit [15:8]
	IN16 state: 0=S16 open; 1=S16 closed			/	Bit 7
	IN15 state: 0=S15 open; 1=S15 closed			/	Bit 6
	IN14 state: 0=S14 open; 1=S14 closed			/	Bit 5
	IN13 state: 0=S13 open; 1=S13 closed			/	Bit 4
	IN12 state: 0=S12 open; 1=S12 closed			/	Bit 3
	IN11 state: 0=S11 open; 1=S11 closed			/	Bit 2
	IN10 state: 0=S10 open; 1=S10 closed			/	Bit 1
	IN9 state: 0=S9 open; 1=S9 closed			/	Bit 0
PulseCounter1 MSW	Between:0; (2^31)-1	U32bit-MSW	R		40009
PulseCounter1 LSW		U32bit-LSW	R		40010
	32-bit pulse counter for input 1				
PresetCounter 1 MSW	Between:0; (2^31)-1	U32bit-MSW	R/W		40025
PresetCounter 1 LSW		U32bit-LSW	R/W		40026
	Preset counter value of PulseCounter1			0	
PulseCounter2 MSW	Between:0; (2^31)-1	U32bit-MSW	R		40011
PulseCounter2 LSW		U32bit-LSW	R		40012
	32-bit pulse counter for input 2				
PresetCounter 2 MSW	Between:0; (2^31)-1	U32bit-MSW	R/W		40027
PresetCounter 2 LSW		U32bit-LSW	R/W		40028
	Preset counter value of PulseCounter2			0	
PulseCounter3 MSW	Between:0; (2^31)-1	U32bit-MSW	R		40013

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PulseCounter3 LSW		U32bit-LSW	R		40014
	32-bit pulse counter for input 3				
PresetCounter 3 MSW	Between:0; (2^31)-1	U32bit-MSW	R/W		40029
PresetCounter 3 LSW		U32bit-LSW	R/W		40030
	Preset counter value of PulseCounter3			0	
PulseCounter4 MSW	Between:0; (2^31)-1	U32bit-MSW	R		40015
PulseCounter4 LSW		U32bit-LSW	R		40016
	32-bit pulse counter for input 4				
PresetCounter 4_MSW	Between:0; (2^31)-1	U32bit-MSW	R/W		40031
PresetCounter 4_LSW		U32bit-LSW	R/W		40032
	Preset counter value of PulseCounter4			0	
PulseCounter5 MSW	Between:0; (2^31)-1	U32bit-MSW	R		40017
PulseCounter5 LSW		U32bit-LSW	R		40018
	32-bit pulse counter for input 5				
PresetCounter 5 MSW	Between:0; (2^31)-1	U32bit-MSW	R/W		40033
PresetCounter 5 LSW		U32bit-LSW	R/W		40034
	Preset counter value of PulseCounter5			0	
PulseCounter6 MSW	Between:0; (2^31)-1	U32bit-MSW	R		40019
PulseCounter6 LSW		U32bit-LSW	R		40020
	32-bit pulse counter for input 6				
PresetCounter 6 MSW	Between:0; (2^31)-1	U32bit-MSW	R/W		40035
PresetCounter 6 LSW		U32bit-LSW	R/W		40036
	Preset counter value of PulseCounter6			0	
PulseCounter7 MSW	Between:0; (2^31)-1	U32bit-MSW	R		40021
PulseCounter7 LSW		U32bit-LSW	R		40022
	32-bit pulse counter for input 7				
PresetCounter 7 MSW	Between:0; (2^31)-1	U32bit-MSW	R/W		40037
PresetCounter 7 LSW		U32bit-LSW	R/W		40038
	Preset counter value of PulseCounter7			0	
PulseCounter8 MSW	Between:0; (2^31)-1	U32bit-MSW	R		40023
PulseCounter8 LSW		U32bit-LSW	R		40024
	32-bit pulse counter for input 8				
PresetCounter 8 MSW	Between:0; (2^31)-1	U32bit-MSW	R/W		40039
PresetCounter 8 LSW		U32bit-LSW	R/W		40040

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	Preset counter value of PulseCounter8			0	
Overflow		Bit	R		40008
	These bits aren't used			/	
	Pulse counter 8 overflow: 0=there isn't; 1=there is			/	
	Pulse counter 7 overflow: 0=there isn't; 1=there is			/	
	Pulse counter 6 overflow: 0=there isn't; 1=there is			/	
	Pulse counter 5 overflow: 0=there isn't; 1=there is			/	
	Pulse counter 4 overflow: 0=there isn't; 1=there is			/	
	Pulse counter 3 overflow: 0=there isn't; 1=there is			/	
	Pulse counter 2 overflow: 0=there isn't; 1=there is			/	
	Pulse counter 1 overflow: 0=there isn't; 1=there is			/	

Errors Out1-8	/	Bit	R		40007
	These bits aren't used			/	Bit [15:8]
	Output 8 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 7
	Output 7 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 6
	Output 6 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 5
	Output 5 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 4
	Output 4 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 3
	Output 3 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 2
	Output 2 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 1
	Output 1 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 0
Errors Out1-8 behavior	/	Bit	R/W		40041
	These bits aren't used			/	Bit [15:8]
	Output 8 behavior if bit40007.7=1: 0=output is kept at the previous value; 1=bit40042.7 is overwritten on bit40005.7 and reg.00024			1	Bit 7
	Output 7 behavior if bit40007.6=1: 0=output is kept at the previous value; 1=bit40042.6 is overwritten on bit40005.6 and reg.00023			1	Bit 6
	Output 6 behavior if bit40007.5=1: 0=output is kept at the previous value; 1=bit40042.5 is overwritten on bit40005.5 and reg.00022			1	Bit 5
	Output 5 behavior if bit40007.4=1: 0=output is kept at the previous value; 1=bit40042.4 is overwritten on bit40005.4 and reg.00021			1	Bit 4
	Output 4 behavior if bit40007.3=1: 0=output is kept at the previous value; 1=bit40042.3 is overwritten on bit40005.3 and reg.00020			1	Bit 3
	Output 3 behavior if bit40007.2=1: 0=output is kept at the previous value; 1=bit40042.2 is overwritten on bit40005.2 and reg.00019			1	Bit 2
	Output 2 behavior if bit40007.1=1: 0=output is kept at the previous value; 1=bit40042.1 is overwritten on bit40005.1 and reg.00018			1	Bit 1

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	Output 1 behavior if bit40007.0=1: 0=output is kept at the previous value; 1=bit40042.0 is overwritten on bit40005.0 and reg.00017			1	Bit 0
Errors Out1-8 safe values	/	Bit	R/W		40042
	These bits aren't used			/	Bit [15:8]
	Output 8 safe value: 0; 1			0	Bit 7
	Output 7 safe value: 0; 1			0	Bit 6
	Output 6 safe value: 0; 1			0	Bit 5
	Output 5 safe value: 0; 1			0	Bit 4
	Output 4 safe value: 0; 1			0	Bit 3
	Output 3 safe value: 0; 1			0	Bit 2
	Output 2 safe value: 0; 1			0	Bit 1
	Output 1 safe value: 0; 1			0	Bit 0

State OUT1-OUT8		Bit	R/W		40005
	These bits aren't used			/	Bit [15:8]
	Output OUT8 state: 0=LOAD8 is deactivated (there is no current through LOAD8); 1=LOAD8 is activated (there is current through LOAD8)			0	Bit 7
	Output OUT7 state: 0=LOAD7 is deactivated (there is no current through LOAD7); 1=LOAD7 is activated (there is current through LOAD7)			0	Bit 6
	Output OUT6 state: 0=LOAD6 is deactivated (there is no current through LOAD6); 1=LOAD6 is activated (there is current through LOAD6)			0	Bit 5
	Output OUT5 state: 0=LOAD5 is deactivated (there is no current through LOAD5); 1=LOAD5 is activated (there is current through LOAD5)			0	Bit 4
	Output OUT4 state: 0=LOAD4 is deactivated (there is no current through LOAD4); 1=LOAD4 is activated (there is current through LOAD4)			0	Bit 3
	Output OUT3 state: 0=LOAD3 is deactivated (there is no current through LOAD3); 1=LOAD3 is activated (there is current through LOAD3)			0	Bit 2
	Output OUT2 state: 0=LOAD2 is deactivated (there is no current through LOAD2); 1=LOAD2 is activated (there is current through LOAD2)			0	Bit 1
	Output OUT1 state: 0=LOAD1 is deactivated (there is no current through LOAD1); 1=LOAD1 is activated (there is current through LOAD1)			0	Bit 0
Timeout enabling		Bit	R/W		40052
	These bits aren't used			/	Bit [15:1]
	RS485-bus communication failure diagnostics: 0=deactivated; 1=activated			0	Bit 0
Timeout	From 0x00=0 to 0xFF=255 (=25.5 sec)	Bit	R/W		40053
	These bits aren't used			/	Bit [15:8]
	Timeout [sec/10] (if reg.40052 is "1"): it is the interval time of RS485-bus communication failure, after which the bit 40042.X is overwritten in the bit 40005.X (with X=0;7)			100 (=10sec)	Bit [7:0]

The «Coil Status»-type registers used for ZC-16DI-8DO module are shown in the following table:

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Name	Range	Interpretation of register	R/W	Default	Address
State IN1	0-1	Bit	R		00001
	IN1 state: 0=S1 open; 1=S1 closed			/	
State IN2	0-1	Bit	R		00002
	IN2 state: 0=S2 open; 1=S2 closed			/	
State IN3	0-1	Bit	R		00003
	IN3 state: 0=S3 open; 1=S3 closed			/	
State IN4	0-1	Bit	R		00004
	IN4 state: 0=S4 open; 1=S4 closed			/	
State IN5	0-1	Bit	R		00005
	IN5 state: 0=S5 open; 1=S5 closed			/	
State IN6	0-1	Bit	R		00006
	IN6 state: 0=S6 open; 1=S6 closed			/	
State IN7	0-1	Bit	R		00007
	IN7 state: 0=S7 open; 1=S7 closed			/	
State IN8	0-1	Bit	R		00008
	IN8 state: 0=S8 open; 1=S8 closed			/	
State IN9	0-1	Bit	R		00009
	IN9 state: 0=S9 open; 1=S9 closed			/	
State IN10	0-1	Bit	R		00010
	IN10 state: 0=S10 open; 1=S10 closed			/	
State IN11	0-1	Bit	R		00011
	IN11 state: 0=S11 open; 1=S11 closed			/	
State IN12	0-1	Bit	R		00012
	IN12 state: 0=S12 open; 1=S12 closed			/	
State IN13	0-1	Bit	R		00013
	IN13 state: 0=S13 open; 1=S13 closed			/	
State IN14	0-1	Bit	R		00014
	IN14 state: 0=S14 open; 1=S14 closed			/	
State IN15	0-1	Bit	R		00015
	IN15 state: 0=S15 open; 1=S15 closed			/	
State IN16	0-1	Bit	R		00016
	IN16 state: 0=S16 open; 1=S16 closed			/	
State OUT1	0-1	Bit	R/W		00017
	Output OUT1 state: 0=LOAD1 is deactivated (there is no current through LOAD1); 1=LOAD1 is activated (there is current through LOAD1)			0	
State OUT2	0-1	Bit	R/W		00018
	Output OUT2 state: 0=LOAD2 is deactivated (there is no current through LOAD2); 1=LOAD2 is activated (there is current through LOAD2)			0	
State OUT3	0-1	Bit	R/W		00019
	Output OUT3 state: 0=LOAD3 is deactivated (there is no current through LOAD3); 1=LOAD3 is activated (there is current through LOAD3)			0	
State OUT4	0-1	Bit	R/W		00020
	Output OUT4 state: 0=LOAD4 is deactivated (there is no current through LOAD4); 1=LOAD4 is activated (there is current through LOAD4)			0	
State OUT5	0-1	Bit	R/W		00021
	Output OUT5 state: 0=LOAD5 is deactivated (there is no current through LOAD5); 1=LOAD5 is activated (there is current through LOAD5)			0	

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State OUT6	0-1	Bit	R/W		00022
	Output OUT6 state: 0=LOAD6 is deactivated (there is no current through LOAD6); 1=LOAD6 is activated (there is current through LOAD6)			0	
State OUT7	0-1	Bit	R/W		00023
	Output OUT7 state: 0=LOAD7 is deactivated (there is no current through LOAD7); 1=LOAD7 is activated (there is current through LOAD7)			0	
State OUT8	0-1	Bit	R/W		00024
	Output OUT8 state: 0=LOAD8 is deactivated (there is no current through LOAD8); 1=LOAD8 is activated (there is current through LOAD8)			0	

The «Input Status»-type read only registers used for ZC-16DI-8DO module are shown in the following table:

Name	Range	Interpretation of register	R/W	Default	Address
State IN1	0-1	Bit	R		10001
	IN1 state: 0=S1 open; 1=S1 closed			/	
State IN2	0-1	Bit	R		10002
	IN2 state: 0=S2 open; 1=S2 closed			/	
State IN3	0-1	Bit	R		10003
	IN3 state: 0=S3 open; 1=S3 closed			/	
State IN4	0-1	Bit	R		10004
	IN4 state: 0=S4 open; 1=S4 closed			/	
State IN5	0-1	Bit	R		10005
	IN5 state: 0=S5 open; 1=S5 closed			/	
State IN6	0-1	Bit	R		10006
	IN6 state: 0=S6 open; 1=S6 closed			/	
State IN7	0-1	Bit	R		10007
	IN7 state: 0=S7 open; 1=S7 closed			/	
State IN8	0-1	Bit	R		10008
	IN8 state: 0=S8 open; 1=S8 closed			/	
State IN9	0-1	Bit	R		10009
	IN9 state: 0=S9 open; 1=S9 closed			/	
State IN10	0-1	Bit	R		10010
	IN10 state: 0=S10 open; 1=S10 closed			/	
State IN11	0-1	Bit	R		10011
	IN11 state: 0=S11 open; 1=S11 closed			/	
State IN12	0-1	Bit	R		10012
	IN12 state: 0=S12 open; 1=S12 closed			/	
State IN13	0-1	Bit	R		10013
	IN13 state: 0=S13 open; 1=S13 closed			/	
State IN14	0-1	Bit	R		10014
	IN14 state: 0=S14 open; 1=S14 closed			/	
State IN15	0-1	Bit	R		10015
	IN15 state: 0=S15 open; 1=S15 closed			/	
State IN16	0-1	Bit	R		10016
	IN16 state: 0=S16 open; 1=S16 closed			/	
State OUT1	0-1	Bit	R		10017
	Output OUT1 state: 0=LOAD1 is deactivated (there is no current through LOAD1); 1=LOAD1 is activated (there is current through LOAD1)			0	
State OUT2	0-1	Bit	R		10018

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	Output OUT2 state: 0=LOAD2 is deactivated (there is no current through LOAD2); 1=LOAD2 is activated (there is current through LOAD2)			0	
State OUT3	0-1	Bit	R		10019
	Output OUT3 state: 0=LOAD3 is deactivated (there is no current through LOAD3); 1=LOAD3 is activated (there is current through LOAD3)			0	
State OUT4	0-1	Bit	R		10020
	Output OUT4 state: 0=LOAD4 is deactivated (there is no current through LOAD4); 1=LOAD4 is activated (there is current through LOAD4)			0	
State OUT5	0-1	Bit	R		10021
	Output OUT5 state: 0=LOAD5 is deactivated (there is no current through LOAD5); 1=LOAD5 is activated (there is current through LOAD5)			0	
State OUT6	0-1	Bit	R		10022
	Output OUT6 state: 0=LOAD6 is deactivated (there is no current through LOAD6); 1=LOAD6 is activated (there is current through LOAD6)			0	
State OUT7	0-1	Bit	R		10023
	Output OUT7 state: 0=LOAD7 is deactivated (there is no current through LOAD7); 1=LOAD7 is activated (there is current through LOAD7)			0	
State OUT8	0-1	Bit	R		10024
	Output OUT8 state: 0=LOAD8 is deactivated (there is no current through LOAD8); 1=LOAD8 is activated (there is current through LOAD8)			0	

LEDs for signalling

In the front-side panel there are 28 LEDs and their state refers to important operating conditions of the module.

LED	**LED status**	**Meaning**
PWR	Constant light	The power is on
FAIL	Constant light	The module received a data packet through RS232 port
	Blinking light	The module has at least one of the errors described in RS485 Registers table (at least one output over-temperature error or short-circuited)
ERR (TX)	Constant light	Verify if the bus connection is corrected
	Blinking light	The module sent a data packet
RUN (RX)	Blinking light	The module received a data packet
	Constant light	Verify if the bus connection is corrected
1-16	Constant light	IN1-16 state equal to «1»
	No light	IN1-16 state equal to «0» (if the power is on)
1O-8O	Constant light	OUT1-8 state equal to «1»
	No light	OUT1-8 state equal to «0» (if the power is on and the outputs are supplied)

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Easy-SETUP

To configure the Seneca Z-PC Line modules, it is possible to use Easy-SETUP software,

Free-downloadable from the www.seneca.it; the configuration can be performed by RS232 or RS485 bus communication.

Seneca Z-PC Line module: **ZC-16DI-8DO (CANOpen)**

In this chapter are described the features of ZC-16DI-8DO module, based on CANOpen protocol.

NOTE: "0x" means an exadecimal number interpretation.

CANOpen features

TECHNICAL DATA	
Baud rate	20, 50, 125, 250, 500, 800, 1000 kbps
Counters nr/type	8 (32bit) from input 1..8
Max frequency for counters	10 kHz
Typical ON/OFF delay	1 ms (with filter disabled) for inputs 1.25 ms for outputs
CANOpen TECHNICAL DATA	
NMT	slave Node guarding, heartbeat
Node ID	HW switch or software
Number of PDO	5 TX, 1 RX
PDO modes	Event triggered, Sync (cyclic), Sync (acyclic)
PDO mapping	Variable
PDO linking	supported
Number of SDO	1 server
Error message	yes
Supported application	Cia 301 v4.02
Layer	Cia 401 v2.01

CANOpen TPDOs transmission type supported

Object Value 0x180x Sub 2	TRANSMISSION TYPE
0	Synchronous - acyclic
From 1 to 240	Synchronous - cyclic
255	Asynchronous

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CANOpen PDOs mapping

OBJECTS FOR DEFAULT MAPPING				
PDO NR	**COB-ID**	**MAPPED OBJECTS**	**INDEX**	**SUBINDEX**
RPDO1	0x200 + NodeId	Digital output [1..8]	0x6200	1
TPDO1	0x40000180 + NodeId	Digital input [1..8]	0x6000	1
		Digital input [9..16]	0x6000	2
		Overflow counter [1..8]	0x6000	3
TPDO5	0x40000280 + NodeId	Counter 1 value	0x2210	1
		Counter 2 value	0x2210	2
TPDO6	0x40000380 + NodeId	Counter 3 value	0x2210	3
		Counter 4 value	0x2210	4
TPDO7	0x40000480 + NodeId	Counter 5 value	0x2210	5
		Counter 6 value	0x2210	6
TPDO8	0x40000300 + NodeId	Counter 7 value	0x2210	7
		Counter 8 value	0x2210	8

Note that TPDO COB-ID must start with 0x4.

CANOpen emergency message

The Emergency message is composed by:

2 bytes of EEC (Emergency error code)

1 bytes of ER (Error register)

4 bytes MEF (Manufacturer error filled objects) (0x1002)

EMERGENCY MESSAGE						
BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6
EER		ER	MEF			

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EEC	
CODE	**DESCRIPTION**
0x0000	No error
0x1000	Generic error
0x4201	CPU temperature over T_HIGH_HIGH
0x4202	CPU temperature over T_HIGH
0x4203	CPU temperature under T_LOW
0x8110	Communication Can Overrun
0x8120	Error passive
0x8130	Life Guard error
0x8140	Recovered from bus off
0xFF20	CPU error
0xFF30	Vext for outputs not found/ SPI communication error
0xFF50	Output fail

ER							
BIT 7	**BIT 6**	**BIT 5**	**BIT 4**	**BIT 3**	**BIT 2**	**BIT 1**	**BIT 0**
Generic	0	0	temperature	communication	0	0	Manufacture

Where bit equal to “0” means “no error”.

CANOpen manufacturer specific profile

If hardware switches are in “from memory” mode, the node address is selectable by **Object 0x2001**.

NODE ADDRESS (Object 0x2001)	
Object value	**Description**
0..127	Node address

If hardware switches are in “from memory” mode, the baud rate is selectable by **Object 0x2002**.

BAUDRATE (Object 0x2002)	
Object value	**Description**
1	20 kbit/s
2	50 kbit/s
3	125 kbit/s
4	250 kbit/s
5	500 kbit/s
6	800 kbit/s
7	1 Mbit/s

Object 0x2030 can be used to monitor the CPU temperature.

CPU TEMPERATURE (Object 0x2030)	
Subindex	**Description**
1	Actual temperature [°C/10]
2	Temperature for HOT STOP ERROR [°C/10] 95.0°C
3	Temperature for HOT ERROR [°C/10] 90.0°C
4	Temperature for COLD ERROR [°C/10] -25.0°C

The HOT STOP temperature sends in pre-operational the station.

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The HOT ERROR and the COLD ERROR temperature sends the Emergency Object.

The Object is Read Only.

Object 0x2051 is used to send commands to the station module.

CPU COMMAND (Object 0x2051)	
Command code	**Description**
0x5C0n	Force the preset value (object 0x2211) for counter n
0x5D0n	Force the reset for counter n
0x5E0n	Force the overflow reset (object 0x6000 sub 4)

Object 0x2200 is used to customize the input filter.

FILTER PARAMETERS (Object 0x2200)	
Subindex	**Description**
1	Samples number for filter (default 40)
2	Counter threshold for high level (default 20)
3	Counter threshold for low level (default 20)

For a high level sample the filter counter is incremented, otherwise for a low level the filter counter is decremented.

When the filter counter is greater or equal to subindex2, the input is stated “high”.

When the filter counter is lower or equal to subindex3, the input is stated “low”.

Between subindex2 and subindex3, no state is asserted (dead zone).

Note that the filter can be disabled by selecting:

Subindex1=1

Subindex2=0

Subindex3=0

Object 0x2210 stores the values of the 8 counters in 32bit format.

DIGITAL COUNTERS (Object 0x2210)	
Subindex	**Description**
1	Counter 1 value
2	Counter 2 value
3	Counter 3 value
4	Counter 4 value
5	Counter 5 value
6	Counter 6 value
7	Counter 7 value
8	Counter 8 value

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DIGITAL COUNTERS (Object 0x2211)	
Subindex	**Description**
1	Preset Counter 1 value
2	Preset Counter 2 value
3	Preset Counter 3 value
4	Preset Counter 4 value
5	Preset Counter 5 value
6	Preset Counter 6 value
7	Preset Counter 7 value
8	Preset Counter 8 value

DIP-SWITCH configuration

BAUD-RATE (Dip-Switches: SW1)			
1	2	3	Meaning
			Only Baud-Rate is acquired from memory(EEPROM)
		●	20 kbps
	●		50 kbps
	●	●	125 kbps
●			250 kbps
●		●	500 kbps
●	●		800 kbps
●	●	●	1 Mbps

ADDRESS (Dip-Switches: SW1)							
4	5	6	7	8	9	10	Meaning
							Only address is acquired from memory(EEPROM)
						●	Address=1
					●		Address=2
					●	●	Address=3
				●			Address=4
				●		●	Address=5
X	X	X	X	X	X	X	……
●	●	●	●	●	●	●	Address=127

RS485 TERMINATOR (Dip-Switches: SW3)	
1	Meaning
	RS485 terminator disabled
●	RS485 terminator enabled

COMMUNICATION PROTOCOL (Dip-Switch: SW2 and SW4)		
SW2	**SW4**	
1	1	
		Protocol is ModBUS
●	●	Protocol is CANOPEN

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CANOpen LED description

SERVICE (DIAGNOSTIC) LED DESCRIPTION		
LED	**LED status**	**Meaning**
RUN	Blinking light	Pre-operational mode
	Single flash	Stop mode
	ON	Operational mode
ERROR	Single flash	At least one error counter has reached or exceed the warning level
	Double flash	Guard event
	Triple flash	The SYNC has not received within the configurated communication cycle timeout period
	ON	The CAN controller is bus off
	OFF	No error
FAIL	ON Blinking	Data receiving from RS232
POWER	ON	Power supply
INPUT/OUTPUT LED DESCRIPTION		
LED	**LED status**	**Meaning**
1-8	ON	Input [1..8] is high
	OFF	Input [1..8] is low
9-16	ON	Input [9..16] is high
	OFF	Input [9..16] is low
1O-8O	ON	Output [1..8] is high
	OFF	Output [1..8] is low

CANOpen digital input management

Object 0x6003 is used for input filter configuration.

FILTER CONSTANT INPUT (Object 0x6003)	
Subindex	**Description**
1	Filter enabled for input [1..8]
2	Filter enabled for input [9..16] read only

Object 0x6005 is used for Interrupt Enable:

If the value is “1” the station can generate a synchronous TxPDO (DEFAULT setting).

If the value is “0” the station can’t generate a synchronous TxPDO.

Object 0x6007 is used as Digital Interrupt Mask Low to High.

INTERRUPT MASK LOW TO HIGH (Object 0x6007)	
Subindex	**Description**
1	Interrupt mask on rising edge input [1..8]
2	Interrupt mask on rising edge input [9..16]
4	Interrupt mask for counters overflow

For subindex for 1 and 2, if value is “1” the generation of TxPDO on rising edge is enabled.

If subindex 3 value is “1”, the generation of TxPDO on all 8 counters overflows is enabled.

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Object 0x6008 is used as Digital Interrupt Mask High to Low.

INTERRUPT MASK HIGH TO LOW (Object 0x6008)	
Subindex	**Description**
1	Interrupt mask on falling edge input [1..8]
2	Interrupt mask on falling edge input [9..16]

For subindex 1 and 2, if values is “1” the generation of TxPDO on falling edge is enable.

CANOpen digital output management

Object 0x6200 is used as 8 bit output.

8 BIT OUTPUT (Object 0x6200)	
Subindex	**Description**
1	Output [1..8] value

Object 0x6206 is used in FAULT case:

If the output n corresponding bit is “0”, this output keeps the last value;

If the output n corresponding bit is “1”, this output is loaded with object 0x6207

OUTPUT ERROR MODE (Object 0x6206)	
Subindex	**Description**
1	Output [1..8] error mode

Object 0x6207 is used to store outputs values to load, in fault case (only if in output error mode the corresponding bit value is “1”).

OUTPUT ERROR VALUE	
Subindex	**Description**
1	Output [1..8] error value

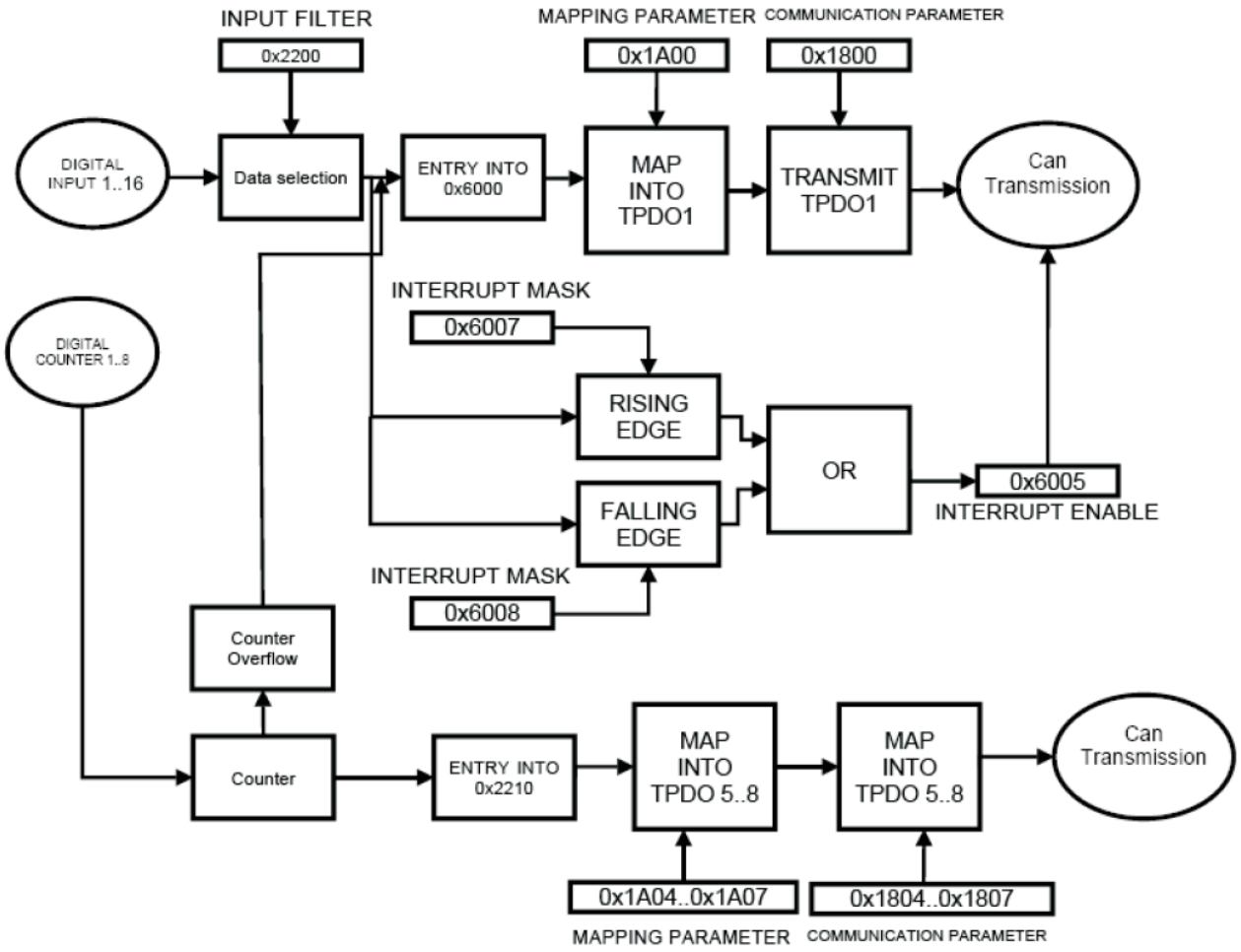
Object 0x6220 is used for outputs corresponding bits.

OUTPUT SINGLE BIT (Object 0x6220)	
Subindex	**Description**
1	Output 1 value
2	Output 2 value
3	Output 3 value
4	Output 4 value
5	Output 5 value
6	Output 6 value
7	Output 7 value
8	Output 8 value

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CANOpen functional diagram

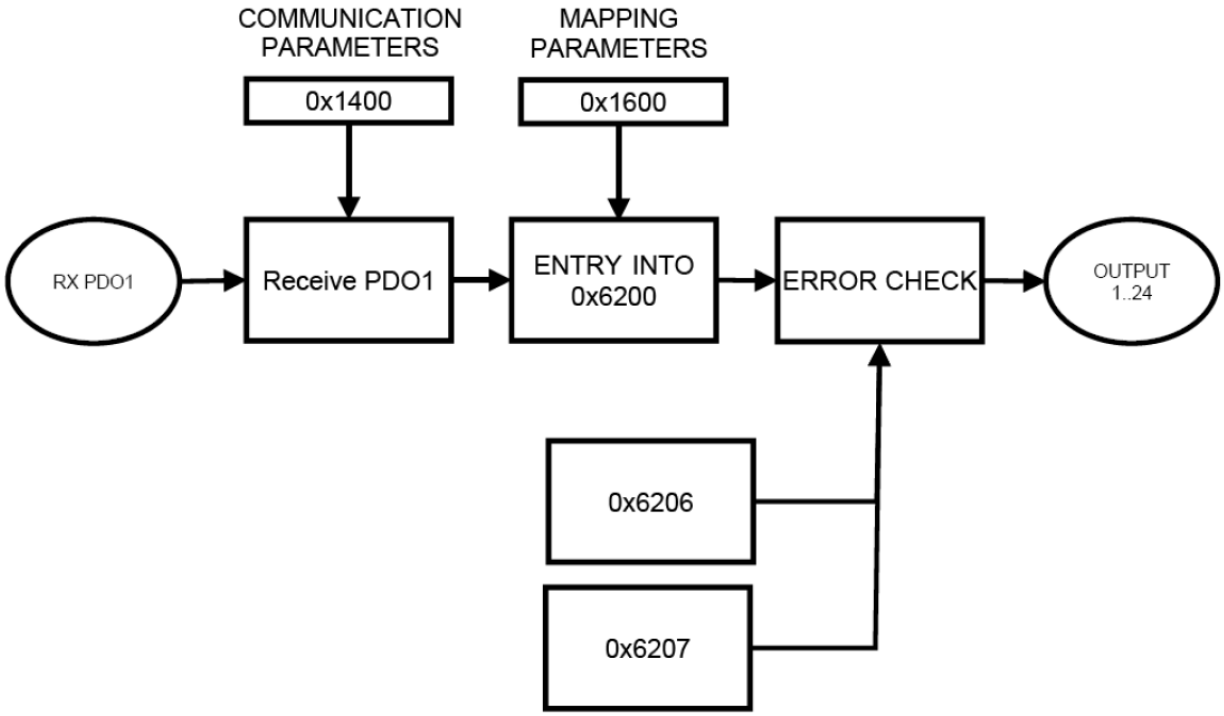
counter mode ON (subindex 1 Object 0x6003=”0”)



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CANOpen functional diagram

Digital output



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CANOpen Object dictionary

COMMUNICATION PROFILE AREA						
INDEX	**SUB INDEX**	**NAME**	**DESCRIPTION**	**TYPE**	**ACCESS**	**DEFAULT**
0x1000	0	Device type	(profile 401=0x191)	UNSIGNED 32	RO	0x00030191
0x1001	0	Error register	Error register (DS401)	UNSIGNED 8	RO	0
0x1002	0	Manufacturer Status register	Status register	UNSIGNED 32	RO	0
0x1005	0	SYNC COB-ID	The device consumes the SYNC message	UNSIGNED 32	RW	0x80
0x1006	0	Comm. window lenght	Sync interval [us]	UNSIGNED 32	RW	0
0x1007	0	Synchronous window lenght	The window [us] for the PDO transmission after the SYNC	UNSIGNED 32	RW	0
0x1008	0	Manufacturer Device name	Device name	VISIBLE STRING	RO	“ZC-16DI-8DO”
0x1009	0	Manufacturer HW version	Hardware version	VISIBLE STRING	RO	“SC000000”
0x100A	0	Manufacturer SW version	Software version	VISIBLE STRING	RO	“SW001191”
0x100C	0	Guard Time	[ms]	UNSIGNED 16	RW	0
0x100D	0	Life time factor	Max delay between two guarding telegrams= Guard_Time· Life_Time_Factor	UNSIGNED 8	RW	0
0x1010	0	Store parameters/ number of mapped object	Max subindex number	UNSIGNED 8	RO	4
	1	Save all parameters	Store not volatile parameters (write in ASCII “save” for store process MSB 0x65766173 LSB)	UNSIGNED 32	RW	1
	2	Save communication parameters	Store not volatile parameters (write in ASCII “save” for store process MSB 0x65766173 LSB)	UNSIGNED 32	RW	1
	3	Save application parameters	Store not volatile parameters	UNSIGNED 32	RW	1
	4	Save manufactures parameters	Store not volatile parameters	UNSIGNED 32	RW	1

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0x1011	0	Restore default/ number of mapped object	Max subindex number	UNSIGNED 8	RO	4
	1	Restore all parameters	Restore not volatile parameters (write in ASCII “load” for store process MSB 0x64616F6C LSB)	UNSIGNED 32	RW	0
	2	Restore communication parameters	Restore not volatile parameters (write in ASCII “load” for store process MSB 0x64616F6C LSB)	UNSIGNED 32	RW	0
	3	Restore application parameters	Restore not volatile parameters (write in ASCII “load” for store process MSB 0x64616F6C LSB)	UNSIGNED 32	RW	0
	4	Restore Manufactures parameters	Restore not volatile parameters (write in ASCII “load” for store process MSB 0x64616F6C LSB)	UNSIGNED 32	RW	0
0x1014	0	COB-ID emergency Object		UNSIGNED 32	RO	$NODEID+ 0x80
0x1017	0	Heartbeat producer time	Time (ms) 0x0000=there is not heartbeat service	UNSIGNED 16	RW	0
0x1018	0	Identity object/ number of mapped object	Max subindex number	UNSIGNED 8	RO	4
	1	Vendor ID	Seneca srl	UNSIGNED 32	RO	0x00000249
	2	Product code	ZC-16DI-8DO Machine ID Code	UNSIGNED 32	RO	0x00000022
	3	Revision number		UNSIGNED 32	RO	0
	4	Serial number		UNSIGNED 32	RO	0
0x1200	0	1st SDO port/ number of mapped object	Max subindex number	UNSIGNED 8	RO	2
	1	COB-ID SDO Client-> Server	COB-ID of receive SDO	UNSIGNED 32	RO	$NODEID+ 0x600
	2	COB-ID SDO Server-> Client	COB-ID of transmit SDO	UNSIGNED 32	RO	$NODEID+ 0x580
0x1400	0	1st receive PDO parameter /number of mapped object	Max subindex number	UNSIGNED 8	RO	3
	1	COB-ID used by PDO	COB-ID of RxPDO1	UNSIGNED 32	RW	$NODEID+ 0x200
	2	Transmission type	Transmission type for PDO1 0x00=synchronous- acyclic 0x01 to 0xF0 =synchronous- cyclic 0xFF=asynchronous	UNSIGNED 8	RW	0xFF

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	3	Inhibit time	Min delay for the next PDO (ms/10)	UNSIGNED 16	RW	0x0000
0x1600	0	1st receive PDO mapping parameter/ number of mapping objects	Max subindex number	UNSIGNED 8	RW	1
	1	1st object to be mapped	First object (default output: 1..8)	UNSIGNED 32	RW	0x62000108 Object=0x6000 Subindex=1 Length=8bit
0x1800	0	1st transmit PDO parameters /number of mapped object	Max subindex number	UNSIGNED 8	RO	3
	1	COB-ID used by PDO	COB-ID of TPDO1	UNSIGNED 32	RW	$NODEID+ 0x40000180
	2	Transmission type	Transmission type forTxPDO1 0x00=synchronous- acyclic 0x01 to 0xF0 =synchronous- cyclic 0xFF=asynchronous	UNSIGNED 8	RW	0xFF
	3	Inhibit time	Min delay for the next PDO (ms/10)	UNSIGNED 16	RW	0x0000
0x1804	0	5th transmit PDO parameters /number of mapped object	Max subindex number	UNSIGNED 8	RO	3
	1	COB-ID used by PDO	COB-ID of TPDO5	UNSIGNED 32	RW	$NODEID+ 0x40000280
	2	Transmission type	Transmission type forTxPDO5 0x00=synchronous- acyclic 0x01 to 0xF0 =synchronous- cyclic 0xFF=asynchronous	UNSIGNED 8	RW	0x01
	3	Inhibit time	Min delay for the next PDO (ms/10)	UNSIGNED 16	RW	0x0000
0x1805	0	6th transmit PDO parameters /number of mapped object	Max subindex number	UNSIGNED 8	RO	3
	1	COB-ID used by PDO	COB-ID of TPDO6	UNSIGNED 32	RW	$NODEID+ 0x40000380
	2	Transmission type	Transmission type forTxPDO6 0x00=synchronous- acyclic 0x01 to 0xF0 =synchronous- cyclic 0xFF=asynchronous	UNSIGNED 8	RW	0x01

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	3	Inhibit time	Min delay for the next PDO (ms/10)	UNSIGNED 16	RW	0x0000
0x1806	0	7th transmit PDO parameters /number of mapped object	Max subindex number	UNSIGNED 8	RO	3
	1	COB-ID used by PDO	COB-ID of TPDO7	UNSIGNED 32	RW	$NODEID+ 0x40000480
	2	Transmission type	Transmission type forTxPDO7 0x00=synchronous-acyclic 0x01 to 0xF0 =synchronous- cyclic 0xFF=asynchronous	UNSIGNED 8	RW	0x01
	3	Inhibit time	Min delay for the next PDO (ms/10)	UNSIGNED 16	RW	0x0000
0x1807	0	8th transmit PDO parameters /number of mapped object	Max subindex number	UNSIGNED 8	RO	3
	1	COB-ID used by PDO	COB-ID of TPDO8	UNSIGNED 32	RW	$NODEID+ 0x40000300
	2	Transmission type	Transmission type forTxPDO8 0x00=synchronous-acyclic 0x01 to 0xF0 =synchronous- cyclic 0xFF=asynchronous	UNSIGNED 8	RW	0x01
	3	Inhibit time	Min delay for the next PDO (ms/10)	UNSIGNED 16	RW	0x0000
0x1A00	0	1st Transmit PDO mapping parameter/ number of mapped object	Max subindex number	UNSIGNED 8	RW	3
	1	1st object to be mapped	First object (default: input 1..8)	UNSIGNED 32	RW	0x60000108 Object=0x6000 Subindex=1 Length=8bit
	2	2nd object to be mapped	Second object (default: input 9..16)	UNSIGNED 32	RW	0x60000208 Object=0x6000 Subindex=2 Length=8bit
	3	3rd object to be mapped	Third object (default: counter 1..8 overflow)	UNSIGNED 32	RW	0x60000308 Object=0x6000 Subindex=3 Length=8bit
0x1A04	0	5th Transmit PDO mapping parameter/	Max subindex number	UNSIGNED 8	RW	0

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		number of mapped object				
	1	1st object to be mapped	First object (default: counter 1)	UNSIGNED 32	RW	0x22100120 Object=0x2210 Subindex=1 Length=32bit
	2	2nd object to be mapped	Second object (default: counter 2)	UNSIGNED 32	RW	0x22100220 Object=0x2210 Subindex=2 Length= 32bit
0x1A05	0	6th Transmit PDO mapping parameter/ number of mapped object	Max subindex number	UNSIGNED 8	RW	0
	1	1st object to be mapped	First object (default: counter 3)	UNSIGNED 32	RW	0x22100320 Object=0x2210 Subindex=3 Length=32bit
	2	2nd object to be mapped	Second object (default: counter 4)	UNSIGNED 32	RW	0x22100420 Object=0x2210 Subindex=4 Length= 32bit
0x1A06	0	7th Transmit PDO mapping parameter/ number of mapped object	Max subindex number	UNSIGNED 8	RW	0
	1	1st object to be mapped	First object (default: counter 5)	UNSIGNED 32	RW	0x22100520 Object=0x2210 Subindex=5 Length=32bit
	2	2nd object to be mapped	Second object (default: counter 6)	UNSIGNED 32	RW	0x22100620 Object=0x2210 Subindex=6 Length= 32bit
0x1A07	0	8th Transmit PDO mapping parameter/ number of mapped object	Max subindex number	UNSIGNED 8	RW	0
	1	1st object to be mapped	First object (default: counter 7)	UNSIGNED 32	RW	0x22100720 Object=0x2210 Subindex=7 Length=32bit
	2	2nd object to be mapped	Second object (default: counter 8)	UNSIGNED 32	RW	0x22100820 Object=0x2210 Subindex=8 Length= 32bit

MANUFACTURER PROFILE AREA

INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x2001	0	Module address	Station address (only if dip switch	UNSIGNED 8	RW	0x7F=127

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			4,5,6,7,8,9,10 are OFF)			
0x2002	0	Baudrate	Station Baudrate (only if dip switch 1,2,3 are OFF) 1=20kbps 2=50kbps 3=125kbps 4=250kbps 5=500kbps 6=800kbps 7=1Mbps	UNSIGNED 8	RW	0x01
0x2003	0	Master firmware code		UNSIGNED 16	RO	1185
0x2030	0	Device temperature/ number of parameters	Max subindex number	UNSIGNED 8	RO	4
	1	Internal temperature	Station internal temperature [°C/10]	INTEGER 16	RO	0
	2	Hi Hi temperature	Critical hot temperature (all operations stop) [°C/10]	INTEGER 16	RO	950
	3	Hi temperature	Warning for too hot temperature [°C/10]	INTEGER 16	RO	900
	4	Low temperature	Critical low temperature (all operations stop) [°C/10]	INTEGER 16	RO	-250
0x2051	0	Command	Command to execute Supported commands: 0x5Cnn force preset for counter mask nn 0x5Dnn force reset for counter mask nn 0x5Enn force overflow for counter mask nn	UNSIGNED 16	RW	0
0x2052	0	Aux command	reserved	UNSIGNED 16	RW	0
0x2200	0	Input filter parameter/ number of parameters	Max subindex number	UNSIGNED 8	RO	3
	1	Filter lenght	Number of samples to evaluate	UNSIGNED 8	RW	40
	2	Counter threshold for high level	If counter >= threshold_high input is stated “high”	UNSIGNED 8	RW	20

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	3	Counter threshold for low level	If counter <= threshold_low input is stated “low”	UNSIGNED 8	RW	20
0x2210	0	Input counters/ number of counter	Max subindex number	UNSIGNED 8	RO	0x8
	1	Counter 1 value		UNSIGNED 32	RO	0
	2	Counter 2 value		UNSIGNED 32	RO	0
	3	Counter 3 value		UNSIGNED 32	RO	0
	4	Counter 4 value		UNSIGNED 32	RO	0
	5	Counter 5 value		UNSIGNED 32	RO	0
	6	Counter 6 value		UNSIGNED 32	RO	0
	7	Counter 7 value		UNSIGNED 32	RO	0
	8	Counter 8 value		UNSIGNED 32	RO	0
0x2211	0	Preset for input counters/ number of counters		UNSIGNED 8	RO	0x8
	1	Counter 1 preset value		UNSIGNED 32	RW	0
	2	Counter 2 preset value		UNSIGNED 32	RW	0
	3	Counter 3 preset value		UNSIGNED 32	RW	0
	4	Counter 4 preset value		UNSIGNED 32	RW	0
	5	Counter 5 preset value		UNSIGNED 32	RW	0
	6	Counter 6 preset value		UNSIGNED 32	RW	0
	7	Counter 7 preset value		UNSIGNED 32	RW	0
	8	Counter 8 preset value		UNSIGNED 32	RW	0
0x2520	0	Output status	Max subindex number	UNSIGNED 8	RO	1
	1	Output [1..8] status	1=output status error 0=output status error	UNSIGNED 8	RO	0
0x2521	0	Output fail type/ number of parameters	Max subindex number	UNSIGNED 8	RO	1
	1	Fail type output [1..8]	reserved	UNSIGNED 8	RO	0

STANDARD DEVICE PROFILE AREA

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INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x6000	0	8 bit digital input counter1 overflow/ number of input 8 bit	Max subindex number	UNSIGNED 8	RO	3
	1	Input [1..8] value	Read input [1..8] value	UNSIGNED 8	RO	0
	2	Input [9..16] value	Read input [9..16] value	UNSIGNED 8	RO	0
	3	Counter [1..8] overflow	Overflow status counter [1..8]	UNSIGNED 8	RO	0
0x6003	0	Filter mask enable/ number of input 8 bit	Max subindex number	UNSIGNED 8	RO	3
	1	Input [1..8] filter mask enable	Input [1..8] Filter enable Mask (only 0x00 or 0xFF allowed) 0x00 = Filter disabled (and Counters 1..8 Enabled) 0xFF = Filter enabled (and Counters 1..8 Disabled)	UNSIGNED 8	RW	0xFF
	2	Input [9..16] filter mask enable	Filter activation for inputs IN9-IN16 using a bit interpretation to mask the inputs: are always deactivated	UNSIGNED 8	RO	0x00
0x6005	0	Global interrupt enabled	0=TxPDO asynchronous disabled 1=TxPDO asynchronous enabled	BOOLEAN	RW	1
0x6007	0	Interrupt mask Low to High/number of input	Max subindex number	UNSIGNED 8	RO	3
	1	Mask interrupt input [1..8]	Input [1..8] rising interrupt mask enable Mask bit0=rising interrupt disabled Mask bit1=rising interrupt enabled	UNSIGNED 8	RW	0xFF

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	2	Mask interrupt input [9..16]	Input [9..16] rising interrupt mask enable Mask bit0=rising interrupt disabled Mask bit1=rising interrupt enabled	UNSIGNED 8	RW	0xFF
	3	Mask interrupt counter overflow	Counter [1..8] rising interrupt mask enable Mask bit0=rising interrupt disabled Mask bit1=rising interrupt enabled	UNSIGNED 8	RW	0x00
0x6008	0	Interrupt mask High to Low/number of input	Max subindex number	UNSIGNED 8	RO	2
	1	Mask interrupt input [1..8]	Input [1..8] falling interrupt mask enable Mask bit0= falling interrupt disabled Mask bit1=falling interrupt enabled	UNSIGNED 8	RW	0xFF
	2	Mask interrupt input [9..16]	Input [9..16] falling interrupt mask enable Mask bit0= falling interrupt disabled Mask bit1= falling interrupt enabled	UNSIGNED 8	RW	0xFF
0x6020	0	Read input 1 bit/ number of input bit	Max subindex number	UNSIGNED 8	RO	16
	1	Input 1 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	2	Input 2 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	3	Input 3 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	4	Input 4 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	5	Input 5 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	6	Input 6 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	7	Input 7 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	8	Input 8 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	9	Input 9 value	0=input is “low”	BOOLEAN	RO	

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			1=input is “high”			
	10	Input 10 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	11	Input 11 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	12	Input 12 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	13	Input 13 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	14	Input 14 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	15	Input 15 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	
	16	Input 16 value	0=input is “low” 1=input is “high”	BOOLEAN	RO	

0x6200	0	8 bit output/ number of output 8 bit	Max subindex number	UNSIGNED 8	RO	1
	1	Digital output [1..8]	Output [1..8] values	UNSIGNED 8	RW	0
0x6206	0	Error mode output/ number of output	Max subindex number	UNSIGNED 8	RO	1
	1	Output [1..8] error mode	1=load 0x6207 value 0=keep last	UNSIGNED 8	RW	0xFF
0x6207	0	Error value output	Max subindex number	UNSIGNED 8	RO	1
	1	Output [1..8] error value	Value to load in fail case	UNSIGNED 8	RW	0x00
0x6220	0	Single bit output	Max subindex number	UNSIGNED 8	RO	8
	1	Output 1 value		BOOLEAN	RW	0
	2	Output 2 value		BOOLEAN	RW	0
	3	Output 3 value		BOOLEAN	RW	0
	4	Output 4 value		BOOLEAN	RW	0
	5	Output 5 value		BOOLEAN	RW	0
	6	Output 6 value		BOOLEAN	RW	0
	7	Output 7 value		BOOLEAN	RW	0
	8	Output 8 value		BOOLEAN	RW	0

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