USER MANUAL

ZC-24DO

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MI002692-3

Seneca Z-PC Line module: **ZC-24DO**

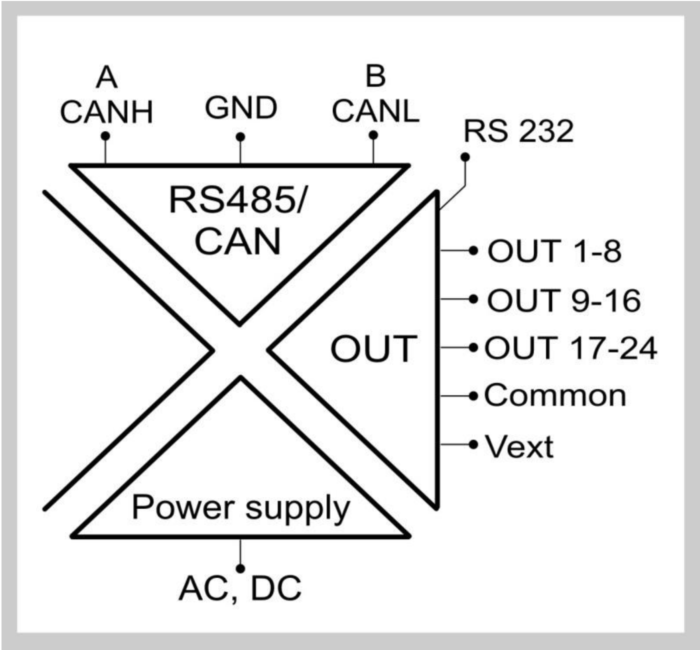
The module ZC-24DO controls 24 digital outputs (OUT1-OUT24), each of them (by MOSFET) actives/deactivates a output load.

General characteristics

- Outputs are available on 24 screw terminals or IDC 10/IDC 20 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

Features

OUTPUT	
Number	24
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):<12A, 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):<0.6A, using a fuse or equivalent protection (**if the connection is performed through IDC10, IDC20 connectors**). This solution is recommended to power 24V-relays
Max state-switching frequency for each load	2Hz
MOSFET protection	The MOSFETs are protected against: load short-circuited, overtemperature
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 output



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)

Output 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.

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

RS485 Register table

Name	Range	Interpretation of register	R/W	Default	Address
MachineID	/	MSB, LSB	R		40001
	Id_Code (Module ID)			0x21 (33 decimal)	Bit [15:8]
	Ext_Rev (Module version)				Bit [7:0]
FWREV	/	Word	R		40002
	Firmware Code				
OUTPUT 1-8 ERROR MANAGEMENT					
Errors Out1-8	/	Bit	R		40006
	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		40009
	These bits aren't used			/	Bit [15:8]
	Output 8 behavior if bit40006.7=1: 0=output is kept at the previous value; 1=bit40012.7 is overwritten on bit40003.7, bit 40301.7 and reg.00008			1	Bit 7
	Output 7 behavior if bit40006.6=1: 0=output is kept at the previous value; 1=bit40012.6 is overwritten on bit40003.6, bit 40301.6 and reg.00007			1	Bit 6
	Output 6 behavior if bit40006.5=1: 0=output is kept at the previous value; 1=bit40012.5 is overwritten on bit40003.5, bit 40301.5 and reg.00006			1	Bit 5
	Output 5 behavior if bit40006.4=1: 0=output is kept at the previous value; 1=bit40012.4 is overwritten on bit40003.4, bit 40301.4 and reg.00005			1	Bit 4
	Output 4 behavior if bit40006.3=1: 0=output is kept at the previous value; 1=bit40012.3 is overwritten on bit40003.3, bit 40301.3 and reg.00004			1	Bit 3
	Output 3 behavior if bit40006.2=1: 0=output is kept at the previous value; 1=bit40012.2 is overwritten on bit40003.2, bit 40301.2 and reg.00003			1	Bit 2
	Output 2 behavior if bit40006.1=1: 0=output is kept at the previous value; 1=bit40012.1 is overwritten on bit40003.1, bit 40301.1 and reg.00002			1	Bit 1

	Output 1 behavior if bit40006.0=1: 0=output is kept at the previous value; 1=bit40012.0 is overwritten on bit40003.0, bit 40301.0 and reg.00001			1	Bit 0
Errors Out1-8 safe values	/	Bit	R/W		40012
	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
OUTPUT 9-16 ERROR MANAGEMENT					
Errors Out9-16	/	Bit	R		40007
	These bits aren't used			/	Bit [15:8]
	Output 16 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 7
	Output 15 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 6
	Output 14 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 5
	Output 13 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 4
	Output 12 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 3
	Output 11 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 2
	Output 10 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 1
	Output 9 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 0
Errors Out9-16 behavior	/	Bit	R/W		40010
	These bits aren't used			/	Bit [15:8]
	Output 16 behavior if bit40007.7=1: 0=output is kept at the previous value; 1=bit40013.7 is overwritten on bit40004.7, bit 40301.15 and reg.00016			1	Bit 7
	Output 15 behavior if bit40007.6=1: 0=output is kept at the previous value; 1=bit40013.6 is overwritten on bit40004.6, bit 40301.14 and reg.00015			1	Bit 6
	Output 14 behavior if bit40007.5=1: 0=output is kept at the previous value; 1=bit40013.5 is overwritten on bit40004.5, bit 40301.13 and reg.00014			1	Bit 5
	Output 13 behavior if bit40007.4=1: 0=output is kept at the previous value; 1=bit40013.4 is overwritten on bit40004.4, bit 40301.12 and reg.00013			1	Bit 4
	Output 12 behavior if bit40007.3=1: 0=output is kept at the previous value; 1=bit40013.3 is overwritten on bit40004.3, bit 40301.11 and reg.00012			1	Bit 3
	Output 11 behavior if bit40007.2=1: 0=output is kept at the previous value; 1=bit40013.2 is overwritten on bit40004.2, bit 40301.10 and reg.00011			1	Bit 2
	Output 10 behavior if bit40007.1=1: 0=output is kept at the previous value; 1=bit40013.1 is overwritten on bit40004.1, bit 40301.9 and reg.00010			1	Bit 1

	Output 9 behavior if bit40007.0=1: 0=output is kept at the previous value; 1=bit40013.0 is overwritten on bit40004.0, bit 40301.8 and reg.00009			1	Bit 0
Errors Out9-16 safe values	/	Bit	R/W		40013
	These bits aren't used			/	Bit [15:8]
	Output 16 safe value: 0; 1			0	Bit 7
	Output 15 safe value: 0; 1			0	Bit 6
	Output 14 safe value: 0; 1			0	Bit 5
	Output 13 safe value: 0; 1			0	Bit 4
	Output 12 safe value: 0; 1			0	Bit 3
	Output 11 safe value: 0; 1			0	Bit 2
	Output 10 safe value: 0; 1			0	Bit 1
	Output 9 safe value: 0; 1			0	Bit 0
OUTPUT 17-24 ERROR MANAGEMENT					
Errors Out17-24	/	Bit	R		40008
	These bits aren't used			/	Bit [15:8]
	Output 24 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 7
	Output 23 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 6
	Output 22 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 5
	Output 21 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 4
	Output 20 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 3
	Output 19 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 2
	Output 18 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 1
	Output 17 over-temperature error or short-circuited: 0=there isn't; 1=there is			/	Bit 0
Errors Out17-24 behavior	/	Bit	R/W		40011
	These bits aren't used			/	Bit [15:8]
	Output 24 behavior if bit40008.7=1: 0=output is kept at the previous value; 1=bit40014.7 is overwritten on bit40005.7, bit 40302.7 and reg.00024			1	Bit 7
	Output 23 behavior if bit40008.6=1: 0=output is kept at the previous value; 1=bit40014.6 is overwritten on bit40005.6, bit 40302.6 and reg.00023			1	Bit 6
	Output 22 behavior if bit40008.5=1: 0=output is kept at the previous value; 1=bit40014.5 is overwritten on bit40005.5, bit 40302.5 and reg.00022			1	Bit 5
	Output 21 behavior if bit40008.4=1: 0=output is kept at the previous value; 1=bit40014.4 is overwritten on bit40005.4, bit 40302.4 and reg.00021			1	Bit 4
	Output 20 behavior if bit40008.3=1: 0=output is kept at the previous value; 1=bit40014.3 is overwritten on bit40005.3, bit 40302.3 and reg.00020			1	Bit 3
	Output 19 behavior if bit40008.2=1: 0=output is kept at the previous value; 1=bit40014.2 is overwritten on bit40005.2, bit 40302.2 and reg.00019			1	Bit 2

	Output 18 behavior if bit40008.1=1: 0=output is kept at the previous value; 1=bit40014.1 is overwritten on bit40005.1, bit 40302.1 and reg.00018			1	Bit 1
	Output 17 behavior if bit40008.0=1: 0=output is kept at the previous value; 1=bit40014.0 is overwritten on bit40005.0, bit 40302.0 and reg.00017			1	Bit 0
Errors Out17-24 safe values	/	Bit	R/W		40014
	These bits aren't used			/	Bit [15:8]
	Output 24 safe value: 0; 1			0	Bit 7
	Output 23 safe value: 0; 1			0	Bit 6
	Output 22 safe value: 0; 1			0	Bit 5
	Output 21 safe value: 0; 1			0	Bit 4
	Output 20 safe value: 0; 1			0	Bit 3
	Output 19 safe value: 0; 1			0	Bit 2
	Output 18 safe value: 0; 1			0	Bit 1
	Output 17 safe value: 0; 1			0	Bit 0

Command	/	Word	R/W		40201
	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]

Address Parity	Address: from 0x01=1 to 0xFF=255	MSB, LSB	R/W		40017
	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		40018
	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 OUT1-OUT8		Bit	R/W		40003
	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
State OUT9-OUT16		Bit	R/W		40004
	These bits aren’t used			/	Bit [15:8]
	Output OUT16 state: 0=LOAD16 is deactivated (there is no current through LOAD16); 1=LOAD16 is activated (there is current through LOAD16)			0	Bit 7
	Output OUT15 state: 0=LOAD15 is deactivated (there is no current through LOAD15); 1=LOAD15 is activated (there is current through LOAD15)			0	Bit 6
	Output OUT14 state: 0=LOAD14 is deactivated (there is no current through LOAD14); 1=LOAD14 is activated (there is current through LOAD14)			0	Bit 5
	Output OUT13 state: 0=LOAD13 is deactivated (there is no current through LOAD13); 1=LOAD13 is activated (there is current through LOAD13)			0	Bit 4
	Output OUT12 state: 0=LOAD12 is deactivated (there is no current through LOAD12); 1=LOAD12 is activated (there is current through LOAD12)			0	Bit 3
	Output OUT11 state: 0=LOAD11 is deactivated (there is no current through LOAD11); 1=LOAD11 is activated (there is current through LOAD11)			0	Bit 2
	Output OUT10 state: 0=LOAD10 is deactivated (there is no current through LOAD10); 1=LOAD10 is activated (there is current through LOAD10)			0	Bit 1
	Output OUT9 state: 0=LOAD9 is deactivated (there is no current through LOAD9); 1=LOAD9 is activated (there is current through LOAD9)			0	Bit 0
State OUT17-OUT24		Bit	R/W		40005
	These bits aren’t used			/	Bit [15:8]
	Output OUT24 state: 0=LOAD24 is deactivated (there is no current through LOAD24); 1=LOAD24 is activated (there is current through LOAD24)			0	Bit 7
	Output OUT23 state: 0=LOAD23 is deactivated (there is no current through LOAD23); 1=LOAD23 is activated (there is current through LOAD23)			0	Bit 6
	Output OUT22 state: 0=LOAD22 is deactivated (there is no current through LOAD22); 1=LOAD22 is activated (there is current through LOAD22)			0	Bit 5
	Output OUT21 state: 0=LOAD21 is deactivated (there is no current through LOAD21); 1=LOAD21 is activated (there is current through LOAD21)			0	Bit 4

	Output OUT20 state: 0=LOAD20 is deactivated (there is no current through LOAD20); 1=LOAD20 is activated (there is current through LOAD20)			0	Bit 3
	Output OUT19 state: 0=LOAD19 is deactivated (there is no current through LOAD19); 1=LOAD19 is activated (there is current through LOAD19)			0	Bit 2
	Output OUT18 state: 0=LOAD18 is deactivated (there is no current through LOAD18); 1=LOAD18 is activated (there is current through LOAD18)			0	Bit 1
	Output OUT17 state: 0=LOAD17 is deactivated (there is no current through LOAD17); 1=LOAD17 is activated (there is current through LOAD17)			0	Bit 0
State OUT1-OUT16		Bit	R/W		40301
	Output OUT16 state: 0=LOAD16 is deactivated (there is no current through LOAD16); 1=LOAD16 is activated (there is current through LOAD16)			0	Bit 15
	Output OUT15 state: 0=LOAD15 is deactivated (there is no current through LOAD15); 1=LOAD15 is activated (there is current through LOAD15)			0	Bit 14
	Output OUT14 state: 0=LOAD14 is deactivated (there is no current through LOAD14); 1=LOAD14 is activated (there is current through LOAD14)			0	Bit 13
	Output OUT13 state: 0=LOAD13 is deactivated (there is no current through LOAD13); 1=LOAD13 is activated (there is current through LOAD13)			0	Bit 12
	Output OUT12 state: 0=LOAD12 is deactivated (there is no current through LOAD12); 1=LOAD12 is activated (there is current through LOAD12)			0	Bit 11
	Output OUT11 state: 0=LOAD11 is deactivated (there is no current through LOAD11); 1=LOAD11 is activated (there is current through LOAD11)			0	Bit 10
	Output OUT10 state: 0=LOAD10 is deactivated (there is no current through LOAD10); 1=LOAD10 is activated (there is current through LOAD10)			0	Bit 9
	Output OUT9 state: 0=LOAD9 is deactivated (there is no current through LOAD9); 1=LOAD9 is activated (there is current through LOAD9)			0	Bit 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
State OUT17-OUT24		Bit	R/W		40302
	These bits aren’t used			/	Bit [15:8]
	Output OUT24 state: 0=LOAD24 is deactivated (there is no current through LOAD24); 1=LOAD24 is activated (there is current through LOAD24)			0	Bit 7
	Output OUT23 state: 0=LOAD23 is deactivated (there is no current through LOAD23); 1=LOAD23 is activated (there is current through LOAD23)			0	Bit 6
	Output OUT22 state: 0=LOAD22 is deactivated (there is no current through LOAD22); 1=LOAD22 is activated (there is current through LOAD22)			0	Bit 5
	Output OUT21 state: 0=LOAD21 is deactivated (there is no current through LOAD21); 1=LOAD21 is activated (there is current through LOAD21)			0	Bit 4
	Output OUT20 state: 0=LOAD20 is deactivated (there is no current through LOAD20); 1=LOAD20 is activated (there is current through LOAD20)			0	Bit 3
	Output OUT19 state: 0=LOAD19 is deactivated (there is no current through LOAD19); 1=LOAD19 is activated (there is current through LOAD19)			0	Bit 2
	Output OUT18 state: 0=LOAD18 is deactivated (there is no current through LOAD18); 1=LOAD18 is activated (there is current through LOAD18)			0	Bit 1
	Output OUT17 state: 0=LOAD17 is deactivated (there is no current through LOAD17); 1=LOAD17 is activated (there is current through LOAD17)			0	Bit 0
Timeout enabling		Bit	R/W		40019
	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		40020
	These bits aren’t used			/	Bit [15:8]
	Timeout [sec/10] (if reg.40019 is “1”): it is the interval time of RS485-bus communication failure, after which: - the bit 40012.X is overwritten in the bit 40003.X - the bit 40013.X is overwritten in the bit 40004.X - the bit 40014.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-24DO module are shown in the following table:

Name	Range	Interpretation of register	R/W	Default	Address
State OUT1	0-1	Word	R/W		00001

	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		R/W		00002
	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		R/W		00003
	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		R/W		00004
	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		R/W		00005
	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		R/W		00006
	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		R/W		00007
	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		R/W		00008
	Output OUT8 state: 0=LOAD8 is deactivated (there is no current through LOAD8); 1=LOAD8 is activated (there is current through LOAD8)			0	
State OUT9	0-1		R/W		00009
	Output OUT9 state: 0=LOAD9 is deactivated (there is no current through LOAD9); 1=LOAD9 is activated (there is current through LOAD9)			0	
State OUT10	0-1		R/W		00010
	Output OUT10 state: 0=LOAD10 is deactivated (there is no current through LOAD10); 1=LOAD10 is activated (there is current through LOAD10)			0	
State OUT11	0-1		R/W		00011
	Output OUT11 state: 0=LOAD11 is deactivated (there is no current through LOAD11); 1=LOAD11 is activated (there is current through LOAD11)			0	
State OUT12	0-1		R/W		00012
	Output OUT12 state: 0=LOAD12 is deactivated (there is no current through LOAD12); 1=LOAD12 is activated (there is current through LOAD12)			0	
State OUT13	0-1		R/W		00013
	Output OUT13 state: 0=LOAD13 is deactivated (there is no current through LOAD13); 1=LOAD13 is activated (there is current through LOAD13)			0	
State OUT14	0-1		R/W		00014
	Output OUT14 state: 0=LOAD14 is deactivated (there is no current through LOAD14); 1=LOAD14 is activated (there is current through LOAD14)			0	
State OUT15	0-1		R/W		00015

	Output OUT15 state: 0=LOAD15 is deactivated (there is no current through LOAD15); 1=LOAD15 is activated (there is current through LOAD15)			0	
State OUT16	0-1		R/W		00016
	Output OUT16 state: 0=LOAD16 is deactivated (there is no current through LOAD16); 1=LOAD16 is activated (there is current through LOAD16)			0	
State OUT17	0-1		R/W		00017
	Output OUT17 state: 0=LOAD17 is deactivated (there is no current through LOAD17); 1=LOAD17 is activated (there is current through LOAD17)			0	
State OUT18	0-1		R/W		00018
	Output OUT18 state: 0=LOAD18 is deactivated (there is no current through LOAD18); 1=LOAD18 is activated (there is current through LOAD18)			0	
State OUT19	0-1		R/W		00019
	Output OUT19 state: 0=LOAD19 is deactivated (there is no current through LOAD19); 1=LOAD19 is activated (there is current through LOAD19)			0	
State OUT20	0-1		R/W		00020
	Output OUT20 state: 0=LOAD20 is deactivated (there is no current through LOAD20); 1=LOAD20 is activated (there is current through LOAD20)			0	
State OUT21	0-1		R/W		00021
	Output OUT21 state: 0=LOAD21 is deactivated (there is no current through LOAD21); 1=LOAD21 is activated (there is current through LOAD21)			0	
State OUT22	0-1		R/W		00022
	Output OUT22 state: 0=LOAD22 is deactivated (there is no current through LOAD22); 1=LOAD22 is activated (there is current through LOAD22)			0	
State OUT23	0-1		R/W		00023
	Output OUT23 state: 0=LOAD23 is deactivated (there is no current through LOAD23); 1=LOAD23 is activated (there is current through LOAD23)			0	
State OUT24	0-1		R/W		00024
	Output OUT24 state: 0=LOAD24 is deactivated (there is no current through LOAD24); 1=LOAD24 is activated (there is current through LOAD24)			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
1-24	Constant light	OUT1-24 state equal to «1»
	No light	OUT1-24 state equal to «0» (if the power is on and the outputs are supplied)

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-24DO (CANOpen)**

In this chapter are described the features of ZC-24DO 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
Typical ON/OFF delay	1 ms (with filter disabled)
CANOpen TECHNICAL DATA	
NMT	slave
	Node guarding, heartbeat
Node ID	HW switch or software
Number of PDO	1RX
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

CANOpen PDOs mapping

OBJECTS FOR DEFAULT MAPPING				
PDO NR	COB-ID	MAPPED OBJECTS	INDEX	SUBINDEX
RPDO1	0x200 + NodeId	Digital output [1..8]	0x6200	1
		Digital output [9..16]	0x6200	2
		Digital output [17..24]	0x6200	3

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			

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.

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

The Object is Read Only.

Object 0x2520 is used to monitor outputs status: “1”=error; “0”=ok.

OUTPUT STATUS (Object 0x2520)	
Command code	**Description**
0x5C0n	Output [1..8] status
0x5D0n	Output [9..16] status
0x5E0n	Output [17..24] status

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

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
OUTPUT LED DESCRIPTION		
LED	**LED status**	**Meaning**
1-8	ON	Output [1..8] is high
	OFF	Output [1..8] is low
9-16	ON	Output [9..16] is high
	OFF	Output [9..16] is low
17-24	ON	Output [17..24] is high
	OFF	Output [17..24] is low

CANOpen digital output management

Object 0x6200 is used as 8 bit output.

8 BIT OUTPUT (Object 0x6200)	
Subindex	**Description**
1	Output [1..8] value
2	Output [9..16] value
3	Output [17..24] 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
2	Output [9..16] error mode
3	Output [17..24] error mode

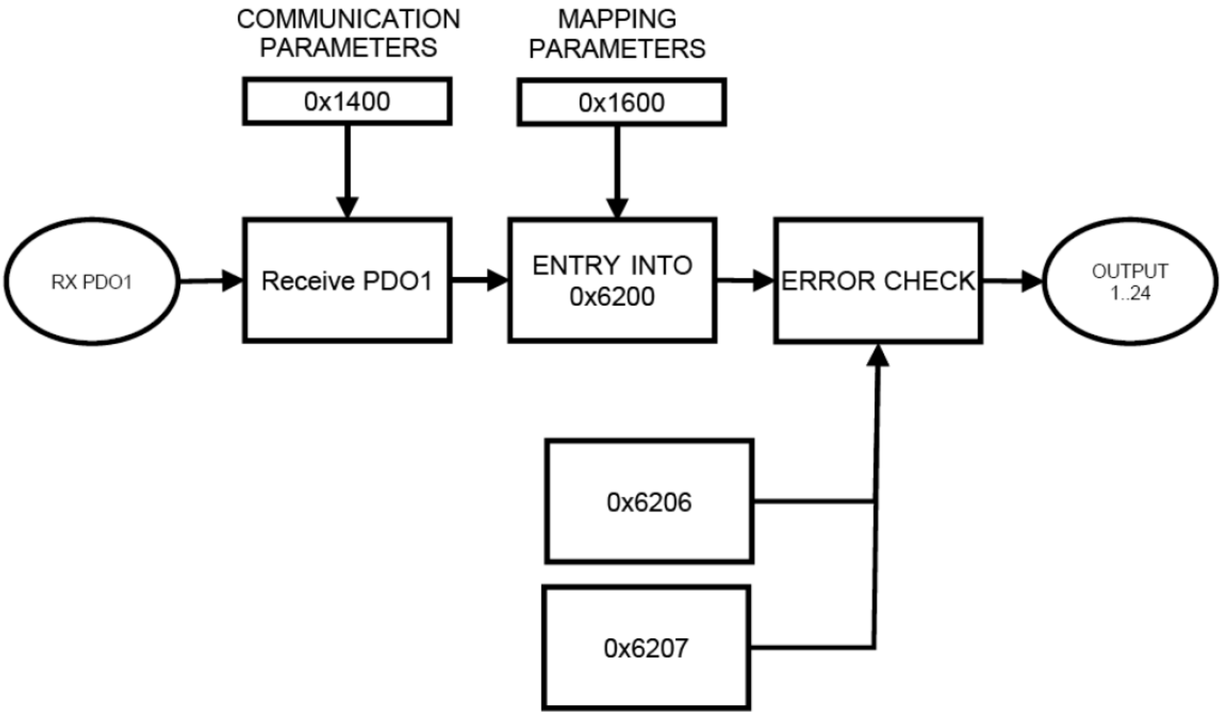
Object 0x6207 is used to store outputs values to load, in fault case (only if in output error mode the corresponding bit value is “1”).

OUTPUT ERROR VALUE	
Subindex	**Description**
1	Output [1..8] error value
2	Output [9..16] error value
3	Output [17..24] error value

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
9	Output 9 value
10	Output 10 value
11	Output 11 value
12	Output 12 value
13	Output 13 value
14	Output 14 value
15	Output 15 value
16	Output 16 value
17	Output 17 value
18	Output 18 value
19	Output 19 value
20	Output 20 value
21	Output 21 value
22	Output 22 value
23	Output 23 value
24	Output 24 value

CANOpen functional diagram

Digital output



CANOpen Object dictionary

COMMUNICATION PROFILE AREA						
INDEX	**SUB INDEX**	**NAME**	**DESCRIPTION**	**TYPE**	**ACCESS**	**DEFAULT**
0x1000	0	Device type	(profile 401=0x191)	UNSIGNED 32	RO	0x00020191
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	0x00000080
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-24DO"
0x1009	0	Manufacturer HW version	Hardware version	VISIBLE STRING	RO	"SC000000"
0x100A	0	Manufacturer SW version	Software version	VISIBLE STRING	RO	"SW001181"
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

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-24DO Machine ID Code	UNSIGNED 32	RO	0x00000021
	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

	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	3
	1	1st object to be mapped	First object (default output: 1..8)	UNSIGNED 32	RW	0x62000108 Object=0x6000 Subindex=1 Length=8bit
	2	2nd object to be mapped	Second object (default output: 9..16)	UNSIGNED 32	RW	0x62000208 Object=0x6000 Subindex=2 Length=8bit
	3	3rd object to be mapped	Third object (default output: 17..24)	UNSIGNED 32	RW	0x62000308 Object=0x6000 Subindex=3 Length=8bit
MANUFACTURER PROFILE AREA						
INDEX	**SUB INDEX**	**NAME**	**DESCRIPTION**	**TYPE**	**ACCESS**	**DEFAULT**
0x2001	0	Module address	Station address (only if dip switch 4,5,6,7,8,9,10 are OFF)	UNSIGNED 8	RW	0x7F=127
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	UNSIGNED 8	RO	4
	1	Internal temperature	[°C/10]	INTEGER 16	RO	0
	2	Hi Hi temperature	[°C/10]	INTEGER 16	RO	950
	3	Hi temperature	[°C/10]	INTEGER 16	RO	900
	4	Low temperature	[°C/10]	INTEGER 16	RO	-250
0x2520	0	Output status	Max subindex number	UNSIGNED 8	RO	3
	1	Output [1..8] status	1= output status ERROR 0= output status OK	UNSIGNED 8	RO	0

	2	Output [9..16] status	1= output status ERROR 0= output status OK	UNSIGNED 8	RO	0
	3	Output [17..24] status	1= output status ERROR 0= output status OK	UNSIGNED 8	RO	0
STANDARD DEVICE PROFILE AREA						
INDEX	**SUB INDEX**	**NAME**	**DESCRIPTION**	**TYPE**	**ACCESS**	**DEFAULT**
0x6200	0	8 bit output/ number of output 8 bit	Max subindex number	UNSIGNED 8	RO	3
	1	Digital output [1..8]	Output [1..8] values	UNSIGNED 8	RW	0
	2	Digital output [9..16]	Output [9..16] values	UNSIGNED 8	RW	0
	3	Digital output [17..24]	Output [17..24] 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
	2	Output [9..16] error mode	1=load 0x6207 value 0=keep last	UNSIGNED 8	RW	0xFF
	3	Output [17..24] 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
	2	Output [9..16] error value	Value to load in fail case	UNSIGNED 8	RW	0x00
	3	Output [17..24] error value	Value to load in fail case	UNSIGNED 8	RW	0x00
0x6220	0	Single bit output	Max subindex number	UNSIGNED 8	RW	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
	9	Output 9 value		BOOLEAN	RW	0
	10	Output 10 value		BOOLEAN	RW	0
	11	Output 11 value		BOOLEAN	RW	0
	12	Output 12 value		BOOLEAN	RW	0
	13	Output 13 value		BOOLEAN	RW	0
	14	Output 14 value		BOOLEAN	RW	0

	15	Output 15 value		BOOLEAN	RW	0
	16	Output 16 value		BOOLEAN	RW	0
	17	Output 17 value		BOOLEAN	RW	0
	18	Output 18 value		BOOLEAN	RW	0
	19	Output 19 value		BOOLEAN	RW	0
	20	Output 20 value		BOOLEAN	RW	0
	21	Output 21 value		BOOLEAN	RW	0
	22	Output 22 value		BOOLEAN	RW	0
	23	Output 23 value		BOOLEAN	RW	0
	24	Output 24 value		BOOLEAN	RW	0