USER MANUAL

Z-D-IO

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MI002560

Seneca Z-PC Line module: **Z-D-IO**

The Z-D-IO module acquires up to 6 single-ended digital signals (IN1…IN6) and controls up to 2 relay digital signals (OUT1 and OUT2). It also allows to perform three alternative functioning modalities: pneumatic valve command modality, motor control modality, motorized valve command modality.

General characteristics

➢ It is possible to choose the Z-D-IO functioning modality by Dip-Switches
➢ Internal logic to control the motors, pneumatic valve, motorized valve
➢ 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

Features

INPUT	
Number	6
Type	REED, PROXIMITY PNP, NPN, contact, etc…
Protection	This module provides inputs and power supply (Vaux) protection against the overvoltage surge transient by transient suppressor TVS (600W/ms)
Sensor=closed	The sensor is detected «closed» if: acquired signal voltage >12 Vdc and acquired signal current > 3 mA. Minimum pulse width: 20ms
Sensor=open	The sensor is detected «open» if: acquired signal voltage <10 Vdc and acquired signal current < 2 mA
Discrimination limits	According to IEC1131.2 type 1
Internal supply Vaux	The #1 screw terminal: powers 24V with reference to a internal ground (if J1 jumper is in "Int")
OUTPUT	
Number	2
Type	Relays SPST (Single Pole Single Throw) normally open with common contact
Max current through screw terminals	Screw terminals 10,11: $2A_{AC1}$ with 250Vac
Max relay switching frequency	6 cycles/min(with resistive load); 1200 cycles/min(with no load)
Pick-up relay voltage	18V
Drop-out relay voltage	2.4V
No-load adsorbed current by a relay	9mA
Relay response time	5/2ms
CONNECTIONS	
RS485 interface	IDC10 connector
ISOLATIONS	
	1500Vac isolations between: power supply, ModBUS RS485, input. 3750Vac isolations between: output and other parts
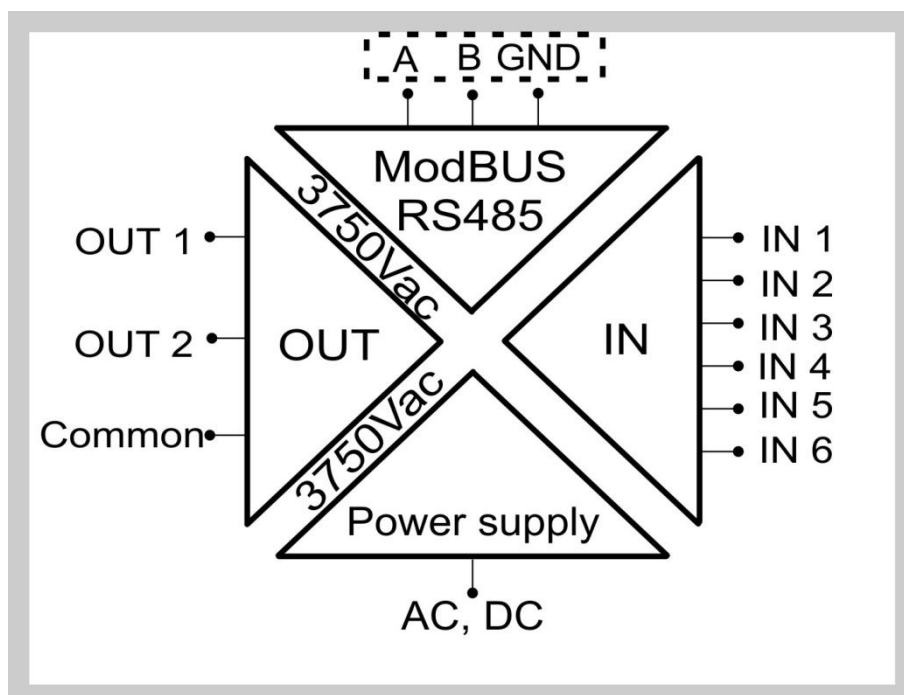
POWER SUPPLY	
Supply voltage	10 – 40 Vdc or 19 – 28 Vac (50Hz - 60Hz)
Power consumption	Max: 2.5W (@10Vdc)

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.

Functioning

I/O MODALITY

I/O functioning modality allows to have 6 digital inputs and 2 relay digital outputs.

FUNCTIONING MODALITY (Dip-Switches: SW2)					
1	2	3	4	Meaning	
				I/O modality	
INPUT					
Screw terminals	Meaning				Default
4-1	Input 1				Normally open
5-1	Input 2				Normally open
6-1	Input 3				Normally open
7-1	Input 4				Normally open
8-1	Input 5				Normally open
9-1	Input 6				Normally open
OUTPUT					
Screw terminals	Meaning				Default
10-12	Output 1				Normally no-excited
11-12	Output 2				Normally no-excited

To set Z-D-IO module it is necessary open the lateral panel of module case to modify Jumpers position.

In the following figure are shown the J1, J2, J3, J4 jumpers in default position: J1 in "Int" position, J2 in "NO" position, J3 in "NO" position, J4 in "OPEN" position.
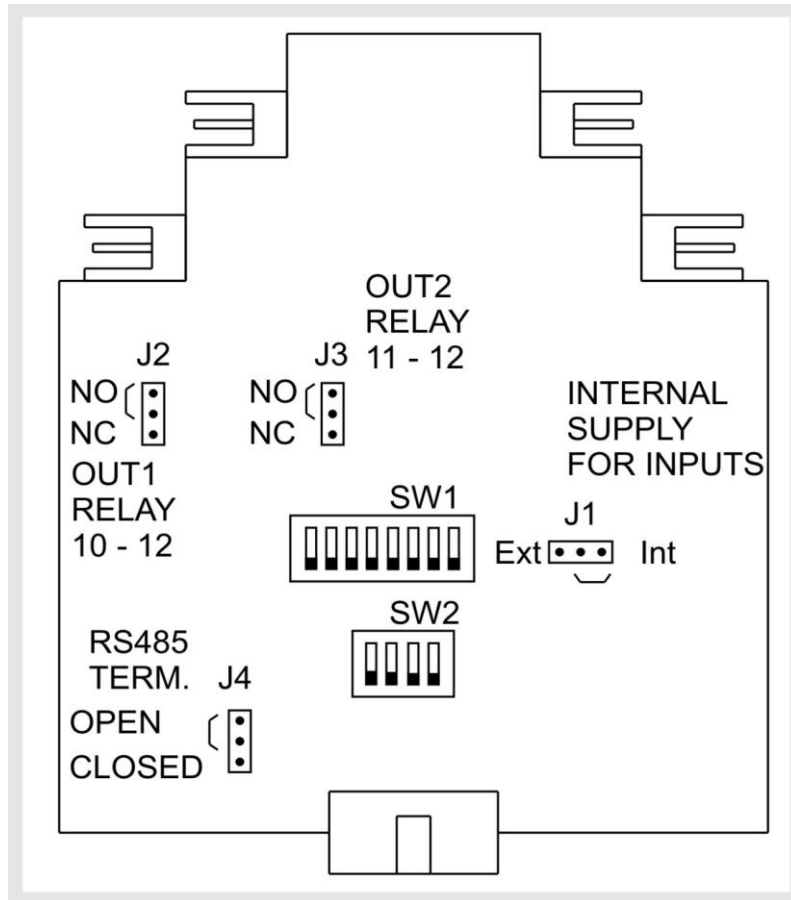
It is possible to connect the following type of sensors: REED, PROXIMITY PNP, NPN, contact, etc… To supply these inputs, a internal supply is available (if Jumper J1 is in "Int" position).

If jumper J1 is in "Int" position, input screw terminals configuration is shown in the following figure.
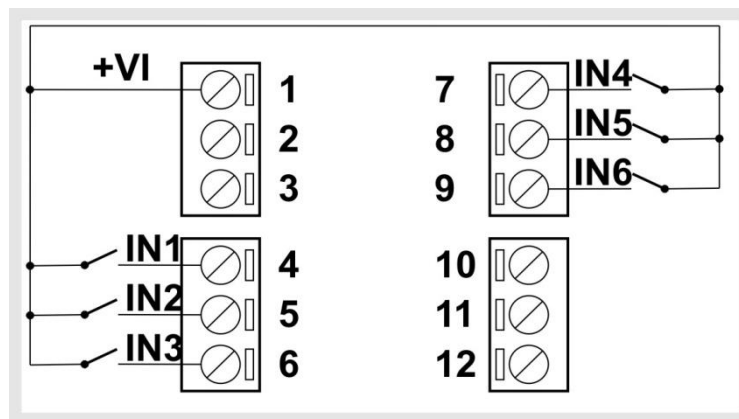
If jumper J1 is in "Ext" position, input screw terminals configuration is shown in the following figure. In this configuration, **a external voltage supply is necessary**.
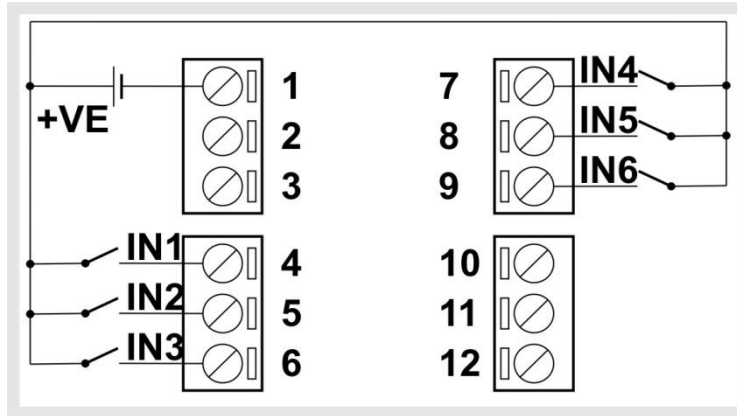
To configure output1 and output2, set J2 and J3 jumpers.
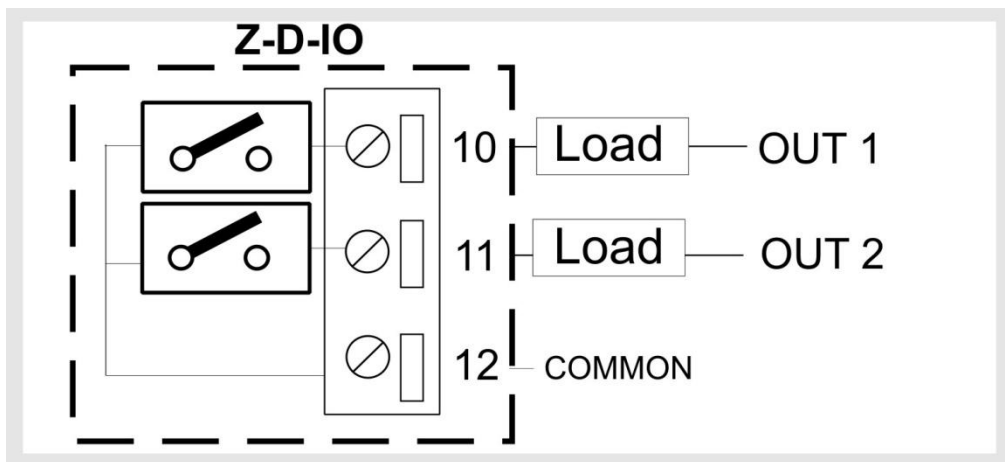
MOTOR CONTROL MODALITY

Before using Z-D-IO in motor control modality, set motor control delay (through reg.40005 or Dip-Switches SW2-3 and SW2-4).

FUNCTIONING MODALITY (Dip-Switches: SW2)				
1	2	3	4	Meaning
●				Motor command modality
INPUT				
Screw terminals	Meaning			Default
4-1	Local/Remote			Normally open
5-1	Start			Normally open
6-1	Stop			Normally closed
7-1	Thermal protection			Normally closed
8-1	Feedback			Normally open
9-1	Switch off alarm			Normally open
OUTPUT				
Screw terminals	Meaning			Default
10-12	Alarm			Normally excited
11-12	Start			Normally no-excited
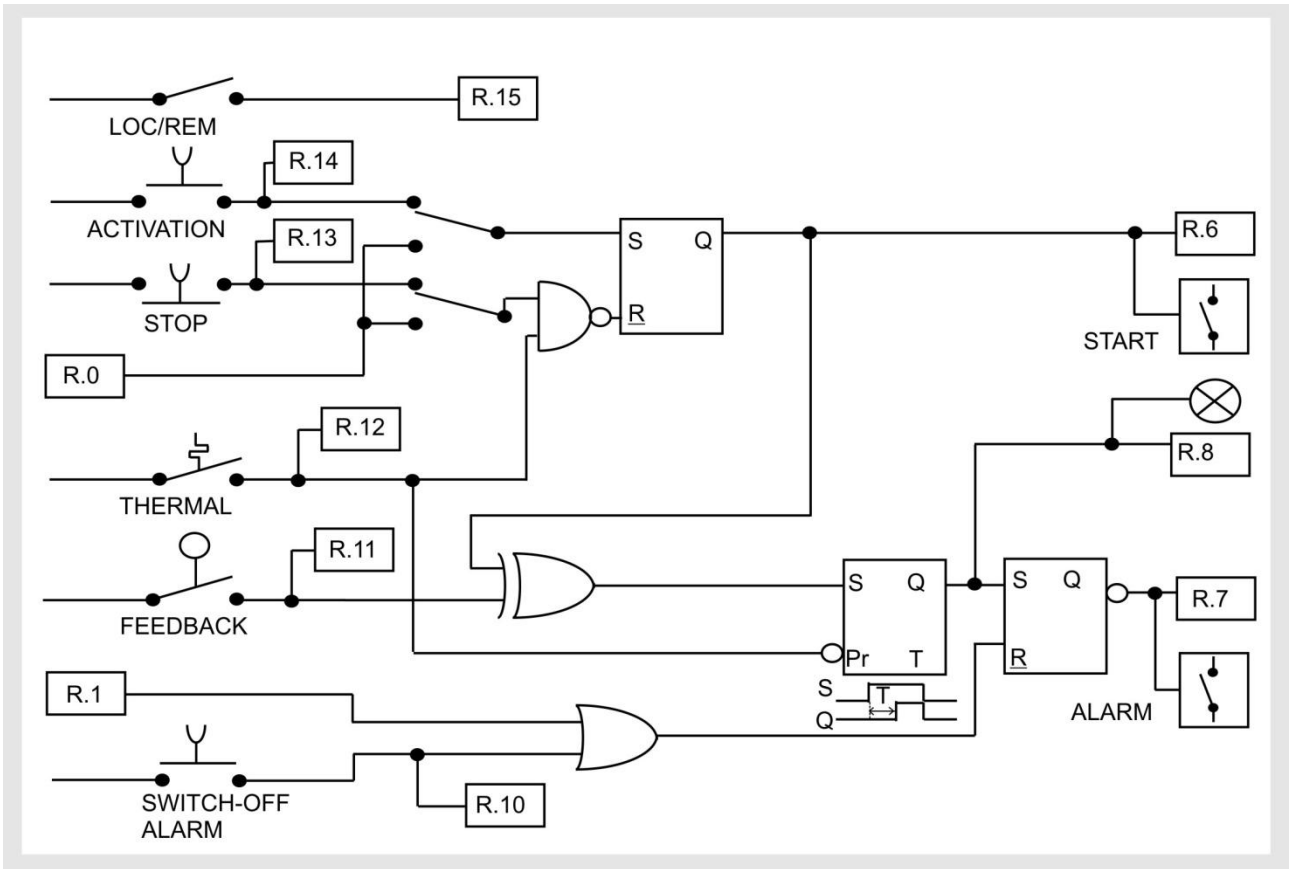
To start the motor, close "Start" input. Module controls the "Thermal protection" input and "Stop" input closing.

If "Thermal protection" input and "Stop" input are closed, Z-D-IO enables "Start" output. After motor command delay (see Dip-Switches SW2-3 and SW2-4 or reg.40005), closure of "Feedback" input is verified. If it is still open, "Alarm" output is enabled by module ("Start" output remains enabled).

If "Thermal protection" input opens during operation, "Alarm" output is enabled immediately, and "Start" output is disabled.

To switch off alarm, close "Switch off alarm" input.

To stop motor, open "Stop" input: the module disables "Start" output.

The "Feedback" input must open within motor command delay, otherwise the module enables "Alarm" output.

PNEUMATIC VALVE COMMAND MODALITY

Before using Z-D-IO in pneumatic valve command modality, set pneumatic valve delay (through reg.40006 or Dip-Switches SW2-3 and SW2-4).

FUNCTIONING MODALITY (Dip-Switches: SW2)					
1	2	3	4	Meaning	
	●			Pneumatic valve command modality	
INPUT					
Screw terminals	Meaning				Default
4-1	Local/Remote				Normally open
5-1	Activation				Normally open
6-1	Return				Normally closed
7-1	Return travel-limit				Closed in position
8-1	Activation travel-limit				Closed in position
9-1	#9 Screw terminal isn't used				/
OUTPUT					
Screw terminals	Meaning				Default
10-12	Alarm				Normally excited
11-12	Activation				Normally no-excited

To enable the pneumatic valve, close "Activation" input. Module controls the "Return" input closing.

If "Return" input is closed, Z-D-IO enables "Activation" output. After pneumatic valve command delay (see Dip-Switches SW2-3 and SW2-4 or reg.40006), opening of "Activation travel-limit" input is verified. If it is still closed, "Alarm" output is enabled by module ("Activation" output remains enabled).

To switch off alarm, close "Switch off alarm" input.

If you open "Return" input, Z-D-IO disables "Activation" output.

"Return travel-limit" input must open within pneumatic valve command delay, otherwise the module enables "Alarm" output.

If "Activation travel-limit" and "Return travel-limit" inputs are opened at the same time, "Alarm" output is activated and LED FAIL is on.

MOTORIZED VALVE COMMAND MODALITY

Before using Z-D-IO in pneumatic valve command modality, set motorized valve delay (through reg.40007 or Dip-Switches SW2-3 and SW2-4).

FUNCTIONING MODALITY (Dip-Switches: SW2)				
1	2	3	4	Meaning
●	●			Motorized command valve command modality
INPUT				
Screw terminals	Meaning			Default
4-1	Local/Remote			Normally open
5-1	Activation			Normally open
6-1	Return			Normally closed
7-1	Return travel-limit			Closed in position
8-1	Activation travel-limit			Closed in position
9-1	#9 Screw terminal isn't used			/
OUTPUT				
Screw terminals	Meaning			Default
10-12	Return			Normally no-excited
11-12	Activation			Normally no-excited
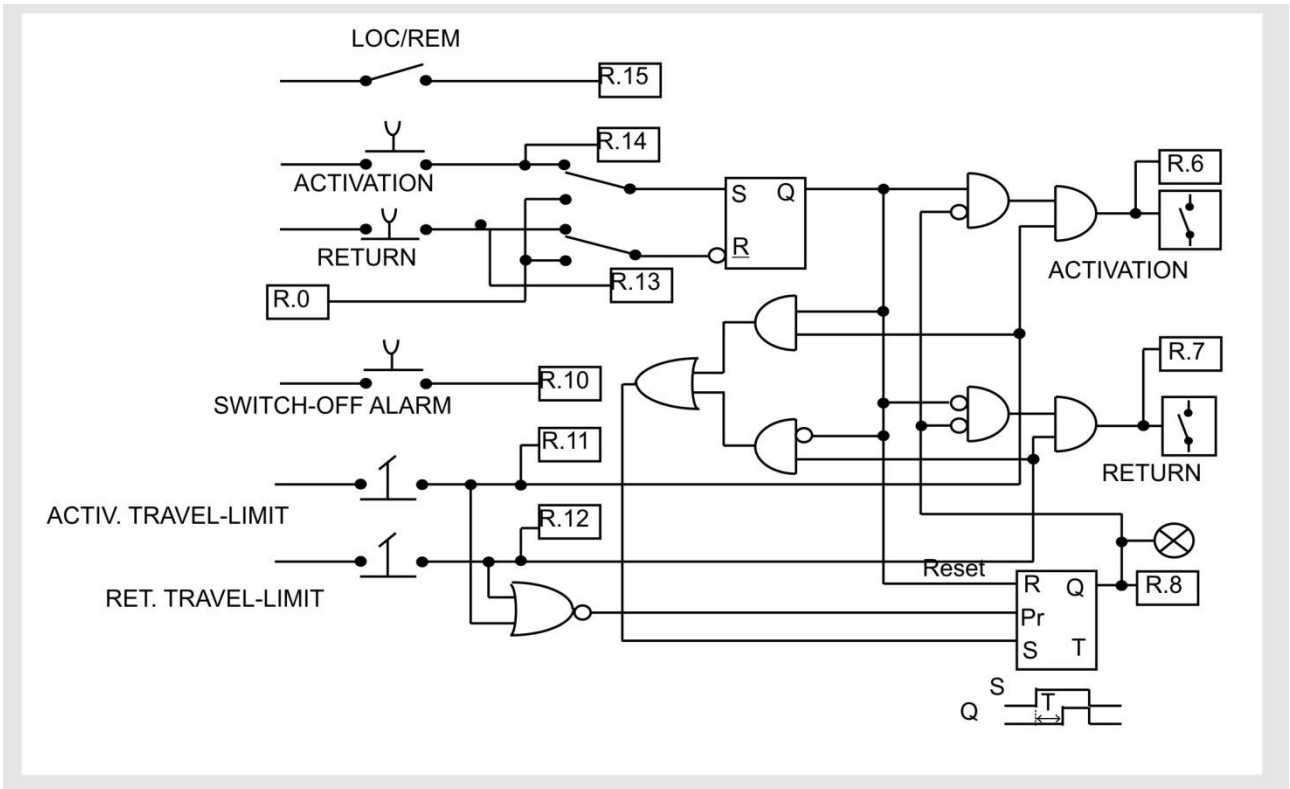
To enable the motorized valve, close "Activation" input. Module controls the "Return" input closing.

If "Return" input is closed, Z-D-IO disables "Return" output (if it was enabled) and enables "Activation" output. After motorized valve command delay (see Dip-Switches SW2-3 and SW2-4 or reg.40007), opening of "Activation travel-limit" input is verified. If it is still closed, "Activation" output is disabled and LED FAIL in on.

If you open "Return" input, Z-D-IO disables "Activation" output (if it was enabled) and enables "Return" output.

After motorized valve command delay, opening of "Return travel-limit is verified" (if it is closed), module enables the alarm.

If "Activation travel-limit" and "Return travel-limit" inputs are opened at the same time, LED FAIL is on.

Dip-switches table

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

☞ In the following tables: to change jumper status, it is necessary to open lateral panel because J1, J2, J3, J4 jumpers are placed into the module.

BAUD-RATE (Dip-Switches: SW1)		
1	2	Meaning
		Baud-rate=9600 Baud
	●	Baud-rate=19200 Baud
●		Baud-rate=38400 Baud
●	●	Baud-rate=57600 Baud

ADDRESS (Dip-Switches: SW1)						
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 (J4 JUMPER)		
Open	Closed	Meaning
●		RS485 terminator disabled
	●	RS485 terminator enabled

FUNCTIONING MODALITY (Dip-Switches: SW2)				
1	2	3	4	Meaning
				I/O modality
	●			Pneumatic valve modality
●				Motor command modality
●	●			Motorized valve command modality

ALARM DELAY (Dip-Switches: SW2)							
1	2	3	4	Meaning	Motor command modality	Pneumatic valve modality	Motorized valve comm. modality
				Delay is acquired from EEPROM memory	See reg. 40005	See reg.40006	See reg.40007
			●	Short alarm delay	2 sec	4 sec	15 sec
		●		Average alarm delay	5 sec	30 sec	120 sec
		●	●	Long alarm delay	30 sec	120 sec	300 sec

INTERNAL SUPPLY VAUX: screw terminal 1 (J1 JUMPER)		
Int	Ext	Meaning
●		Internal supply Vaux enabled (to power digital inputs)
	●	Internal supply Vaux disabled (to power digital inputs, use a external voltage Vext)

OUT1 TYPE: screw terminals 10-12 (J2 JUMPER)		
NO	NC	Meaning
●		OUT1 is normally open
	●	OUT1 is normally closed

OUT2 TYPE: screw terminals 11-12 (J3 JUMPER)		
NO	NC	Meaning
●		OUT2 is normally open
	●	OUT2 is normally closed

RS485 Register table

The function codes supported by Z-D-IO are shown in the following table.

Functional code	First register address	Name	Functional code	Name
01	00001	Read Coil Status	05	Force Single Coil
02	10001	Read Input Status	06	Preset Single Register
03	40001	Read Holding Register	15	Write Multiple Coils
04	30001	Read Input Register	16	Write Multiple Registers

Name	Range	Interpretation of register	R/W	Default	Address
MachineID	/	MSB, LSB	R		40001
	Id_Code (Module ID)			0x10	Bit [15:8]
	Ext_Rev (Module version)				Bit [7:0]
Dip Switches status	/	Bit	R		40003
	Switch1 of "SW2" state. Bit40003.15=0 corresponds to Switch1="0", bit40003.15=1 corresponds to Switch1="1"			/	Bit 15
	Switch2 of "SW2" state. Bit40003.14=0 corresponds to Switch2="0", bit40003.15=1 corresponds to Switch2="1"			/	Bit 14
	Switch3 of "SW2" state. Bit40003.13=0 corresponds to Switch3="0", bit40003.13=1 corresponds to Switch3="1"			/	Bit 13
	Switch4 of "SW2" state. Bit40003.12=0 corresponds to Switch4="0", bit40003.12=1 corresponds to Switch4="1"			/	Bit 12
	These bits aren't used			/	Bit [11:8]
	Switch1 of "SW1" state. Bit40003.7=0 corresponds to Switch1="0", bit40003.7=1 corresponds to Switch1="1"			/	Bit 7
	Switch2 of "SW1" state. Bit40003.6=0 corresponds to Switch2="0", bit40003.6=1 corresponds to Switch2="1"			/	Bit 6
	Switch3 of "SW1" state. Bit40003.5=0 corresponds to Switch3="0", bit40003.5=1 corresponds to Switch3="1"			/	Bit 5
	Switch4 of "SW1" state. Bit40003.4=0 corresponds to Switch4="0", bit40003.4=1 corresponds to Switch4="1"			/	Bit 4
	Switch5 of "SW1" state. Bit40003.3=0 corresponds to Switch5="0", bit40003.3=1 corresponds to Switch5="1"			/	Bit 3
	Switch6 of "SW1" state. Bit40003.2=0 corresponds to Switch6="0", bit40003.2=1 corresponds to Switch6="1"			/	Bit 2

	Switch7 of "SW1" state. Bit40003.1=0 corresponds to Switch7="0", bit40003.1=1 corresponds to Switch7="1"		/		Bit 1
	Switch8 of "SW1" state. Bit40003.0=0 corresponds to Switch8="0", bit40003.0=1 corresponds to Switch8="1"		/		Bit 0
Address Parity	/	MSB, LSB	R/W		40008
	Address for RS485 (address of module/node if parameters are configured by memory modality): from 0x01=1 to 0xFF=255		1		Bit [15:8]
	Parity for RS485: 0=there isn't; 1=even; 2=odd		0		Bit [7:0]
Baudrate Delay	/	MSB, LSB	R/W		40009
	Baud-rate for RS485 (baud-rate of module/node if parameters are configured by memory modality): 0=4800; 1=9600; 2=19200; 3=38400; 4=57600; 5=115200; 6=1200; 7=2400		38400		Bit [15:8]
	Delay for RS485 (delay of communication response: it represents the number of the pauses(*) between the end of Rx message and the start of Tx message): from 0x00=0 to 0xFF=255 (*)1 pause=6 characters		0		Bit [7:0]
IN and OUT	/	Bit	R/W		40002
	Input1 state (if I/O modality): 0=open; 1=closed Local/remote state (if motor control modality, motorized valve command modality, pneumatic valve command modality): 0=local control; 1=remote control		See note below		Bit 15
	Input2 state (if I/O modality): 0=open; 1=closed Start state (if motor control modality): 0=open; 1=closed Activation state (if motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		See note below		Bit 14
	Input3 state (if I/O modality): 0=open; 1=closed Stop state (if motor control modality): 0=open; 1=closed Return state (if motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		See note below		Bit 13
	Input4 state (if I/O modality): 0=open; 1=closed Thermal protection state (if motor control modality): 0=open; 1=closed Return travel-limit state (if motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		See note below		Bit 12
	Input5 state (if I/O modality): 0=open; 1=closed Feedback (if motor control modality): 0=open; 1=closed Activation travel-limit (if motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		See note below		Bit 11
	Input6 state (if I/O modality): 0=open; 1=closed Switch off alarm state (if motor control modality, motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		See note below		Bit 10
	These bits aren't used		/		Bit 9
	Alarm: 0=there isn't; 1=there is		See note below		Bit 8
	Alarm output state (if motor control modality, pneumatic valve command modality): 0=deactivated; 1=activated Return output state (if motorized valve command modality): 0=deactivated; 1=activated		See note below		Bit 7
	Start output state (if motor control modality): 0=deactivated; 1=activated Activation output state (if motorized valve command modality, pneumatic valve command modality):		See note below		Bit 6

	0=deactivated; 1=activated			
	These bits aren't used	/		Bit [5:2]
	Output1 state (if I/O modality): 0=OFF; 1=ON Alarm (if motor command modality, pneumatic valve command modality) Return (if motorized valve command modality)	/		Bit 1
	Output2 state (if I/O modality): 0=OFF; 1=ON Alarm (if motor command modality) Return (if motorized valve command modality, pneumatic valve command modality)	/		Bit 0

☞ To know default values, see "Functioning" for selected functioning modality.

IN and OUT state	/	Bit	R		40014
	Input1 state (if I/O modality): 0=open; 1=closed Local/remote state (if motor control modality, motorized valve command modality, pneumatic valve command modality): 0=local control; 1=remote control		See note below		Bit 15
	Input2 state (if I/O modality): 0=open; 1=closed Start state (if motor control modality): 0=open; 1=closed Activation state (if motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		See note below		Bit 14
	Input3 state (if I/O modality): 0=open; 1=closed Stop state (if motor control modality): 0=open; 1=closed Return state (if motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		See note below		Bit 13
	Input4 state (if I/O modality): 0=open; 1=closed Thermal protection state (if motor control modality): 0=open; 1=closed Return travel-limit state (if motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		See note below		Bit 12
	Input5 state (if I/O modality): 0=open; 1=closed Feedback (if motor control modality): 0=open; 1=closed Activation travel-limit (if motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		See note below		Bit 11
	Input6 state (if I/O modality): 0=open; 1=closed Switch off alarm state (if motor control modality, motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		See note below		Bit 10
	These bits aren't used	/			Bit 9
	Alarm: 0=there isn't; 1=there is		See note below		Bit 8
	Output1 state (if I/O modality): 0=OFF; 1=ON Alarm output state (if motor control modality, pneumatic valve command modality): 0=OFF; 1=ON Return output state (if motorized valve command modality): 0=OFF; 1=ON		See note below		Bit 7
	Output2 state (if I/O modality) Start output state (if motor control modality): 0=OFF; 1=ON Activation output state (if motorized valve command modality, pneumatic valve command modality): 0=OFF; 1=ON		See note below		Bit 6
	These bits aren't used	/			Bit [5:0]

To know default values, see "Functioning" for selected functioning modality.

Command state	/	Bit	R/W		40015
	These bits aren't used			/	Bit [15:2]
	Output1 state (if I/O modality): 0=OFF; 1=ON Alarm command (if motor command modality, pneumatic valve command modality): 0=OFF; 1=ON Return command (if motorized valve command modality): 0=OFF; 1=ON			/	Bit 1
	Output2 state (if I/O modality): 0=OFF; 1=ON Alarm (if motor command modality): 0=OFF; 1=ON Return (if motorized valve command modality, pneumatic valve command modality): 0=OFF; 1=ON			/	Bit 0

To know default values, see "Functioning" for selected functioning modality.

Delay DipSw	/	Word	R		40004
	Delay between input action and corresponding output effect [sec/10] (if delay is configurated by Dip-Switches)			/	
Motor control delay	/	Word	R/W		40005
	Delay between input action and corresponding output effect [sec/10] (if motor control modality)			100 (10sec)	
Pneumatic valve comm. delay	/	Word	R/W		40006
	Delay between input action and corresponding output effect [sec/10] (if pneumatic valve command modality)			100 (10sec)	
Motorized valve comm. delay	/	Word	R/W		40007
	Delay between input action and corresponding output effect [sec/10] (if motorized valve command modality)			100 (10sec)	

The «Input Status»-type registers used for Z-D-IO module are shown in the following table:

Name	Range	Interpretation of register	R/W	Default	Address
IN1 state	0-1	Word	R		10001
	Input1 state (if I/O modality): 0=open; 1=closed Local/remote state (if motor control modality, motorized valve command modality, pneumatic valve command modality): 0=local control; 1=remote control			/	
IN2 state	0-1	Word	R		10002
	Input2 state (if I/O modality): 0=open; 1=closed Start state (if motor control modality): 0=open; 1=closed Activation state (if motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed			/	
IN3 state	0-1	Word	R		10003
	Input3 state (if I/O modality): 0=open; 1=closed Stop state (if motor control modality): 0=open; 1=closed			/	

Name	Range	Interpretation of register	R/W	Default	Address
	Return state (if motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed				
IN4 state	0-1	Word	R		10004
	Input4 state (if I/O modality): 0=open; 1=closed Thermal protection state (if motor control modality): 0=open; 1=closed Return travel-limit state (if motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		/		
IN5 state	0-1	Word	R		10005
	Input5 state (if I/O modality): 0=open; 1=closed Feedback (if motor control modality): 0=open; 1=closed Activation travel-limit (if motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		/		
IN6 state	0-1	Word	R		10006
	Input6 state (if I/O modality): 0=open; 1=closed Switch off alarm state (if motor control modality, motorized valve command modality, pneumatic valve command modality): 0=open; 1=closed		/		
Alarm	0-1	Word	R		10008
	Alarm: 0=there isn't; 1=there is		/		
OUT1 state	0-1	Word	R		10009
	Output1 state (if I/O modality) : 0=OFF; 1=ON Alarm output state (if motor control modality, pneumatic valve command modality): 0=OFF; 1=ON Return output state (if motorized valve command modality): 0=OFF; 1=ON		/		
OUT2 state	0-1	Word	R		10010
	Output2 state (if I/O modality): 0=OFF; 1=ON Start output state (if motor control modality): 0=OFF; 1=ON Activation output state (if motorized valve command modality, pneumatic valve command modality): 0=OFF; 1=ON		/		

The «Coil Status»-type registers used for Z-D-IO module are shown in the following table:

Name	Range	Interpretation of register	R/W	Default	Address
OUT1 command	0-1	Word	R/W		00002
	Output1 state (if I/O modality) : 0=OFF; 1=ON Alarm output state (if motor control modality, pneumatic valve command modality): 0=OFF; 1=ON Return output state (if motorized valve command modality): 0=OFF; 1=ON		/		
OUT2 command	0-1	Word	R/W		00003
	Output2 state (if I/O modality): 0=OFF; 1=ON Alarm (if motor command modality): 0=OFF; 1=ON Return (if motorized valve command modality, pneumatic valve command modality): 0=OFF; 1=ON		/		

LEDs for signalling

In the front-side panel there are 12 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 described in RS485 Registers table
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
IN 1-6	Constant light	IN1-6 state equal to «1»
	No light	IN1-6 state equal to «0» (if the power is on)
OUT 1-2	Constant light	OUT1-2 state equal to «1»
	No light	OUT1-2 state equal to «0» (if the power is on)

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.