



CSLAB s.c.
Electronic Laboratory

User * Manual *
Guide *

CSMIO-IO

Additional inputs/outputs module



Rev. 1

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1. General information

The CSMIO/IP-S control system has standard 32 digital inputs and 16 digital outputs. In more requiring applications the I/O number may be not enough. Coming up to expectations and requirements of our clients we designed the CSMIO-IO module. It offers additional 16 digital inputs and 8 digital outputs. The module communicate with CSMIO/IP through the CAN bus. To the expansion bus up to 16 CSMIO-IO modules can be connected, so it is easy to count that it's in the CSMIO/IP control system you can have max. 288 digital inputs and 144 digital outputs.

There is only one condition: fast signals e.g. HOME switches, LIMIT switches, etc. must be connected directly to the CSMIO/IP controller.

All module inputs and outputs work in standard industrial 24V power supply voltage and have full optical isolation with additional protection against short circuit and overheat.

The CSMIO-IO modules are ideal for dispersed systems e.g. –connecting the control panel you do not need any bundle of cables with separate cable for each button, it will be enough to lead the CAN bus to the panel with so called „twisted pair-cable”, place the CSMIO-IO in it and connect switches and controls with short wires.

1.1 Signs used in this guide



Potential danger, possible injury risk.



Useful information, tips



Warning, failure to comply with these warnings may lead to inappropriate functioning or damage of the device

1.2 Standards compliance

CSMIO-IO modules were designed and made in accordance with the national and international standards for industrial control systems based on electronic components:

- Detailed requirements for programmable controllers: working characteristics, shock resistance, safety etc. EN61131-2 (IEC1131-2), CSA 22.2, UL508
- Compliance with European Guidelines (low voltage, the level of electromagnetic interference *Electromagnetic Compability*), the CE marking.
- Electrical and non-combustible properties of insulation materials: UL 746C, UL 94, etc.
- The Product **made in lead-free technology**, RoHS compliant.



1.3 Specification

Parameter	Value
Number of digital inputs	16
Number of digital outputs	8
Supply voltage	24VDC +/-10%
Power consumption	2W
Maximum voltage on the in/out lines	30VDC
Maximum load of output line	250mA
Connection with CSMIO/IP	CAN 250kbps
Ambient temperature range	0°C do +60°C
Relative humidity	10% do 95% (without condensation)

2. Safety

The CSMIO-IO device is powered by 24V safe voltage. I / O control lines are optically isolated, also the PC connection is galvanically isolated. The device does not constitute a direct threat to the health and life of the user.

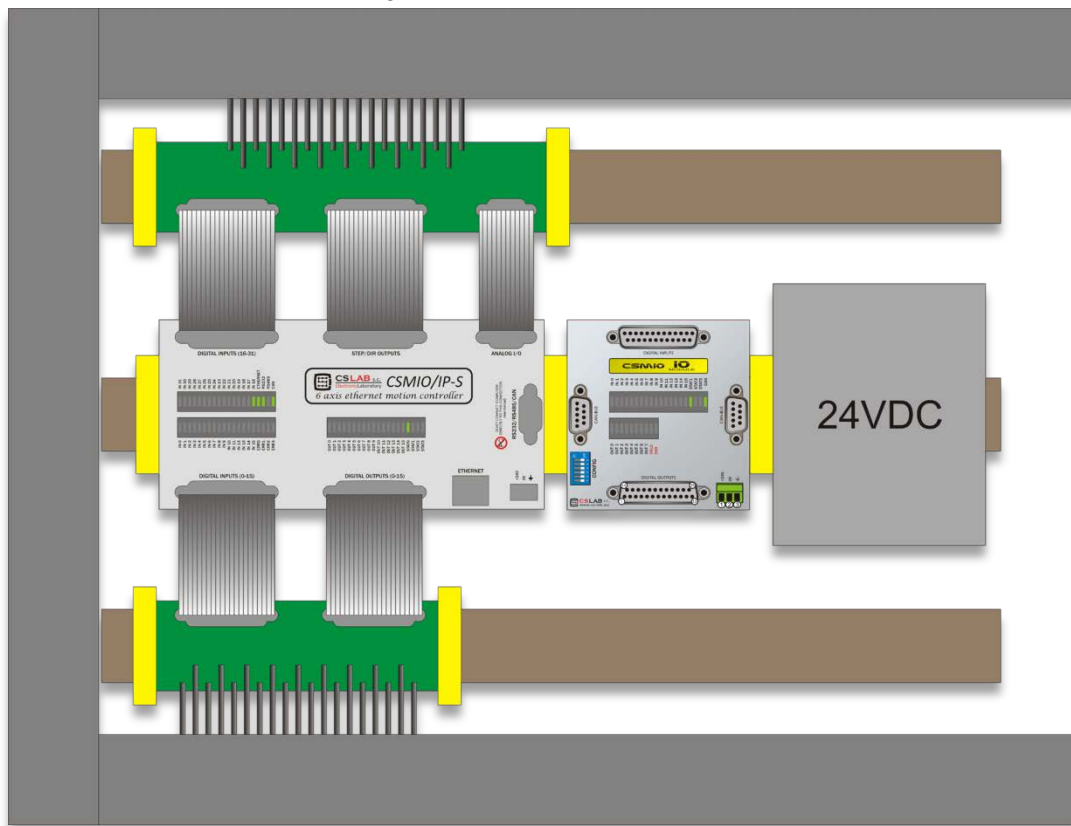
Designing a complete control system (control cabinet), you should draw attention to several issues, so that the entire system does not pose any hazard during use.



Pay special attention while connecting relays to the control of mains 230V AC. In case of breakdown on the connector of the module - high voltage may appear. The optical isolation will not let the voltage to appear on other signals however, you must remember to do all the installation/service activities while power is off.

3. Recommendations for mechanical installation

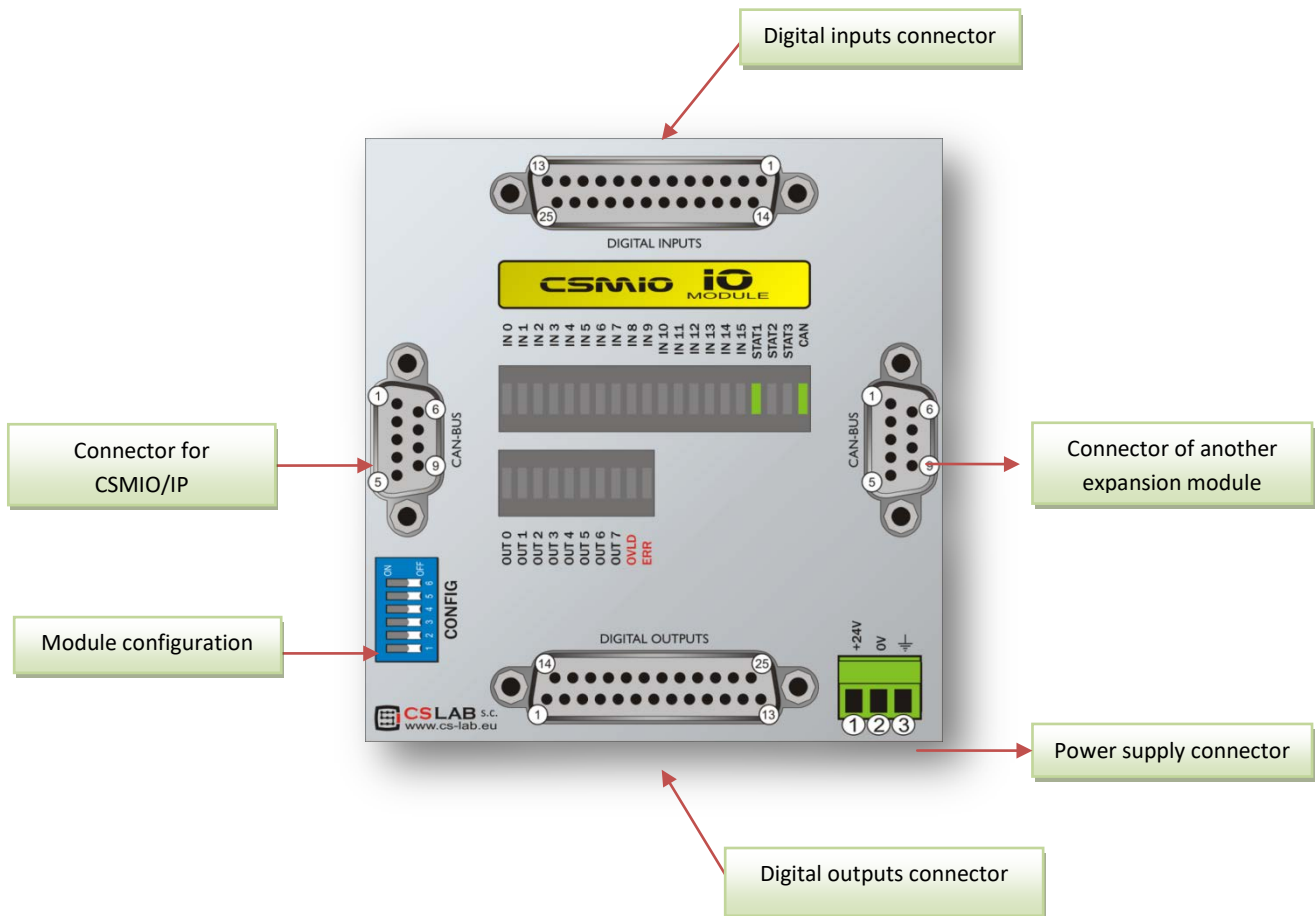
Here is an example - components arrangement in the control cabinet.



Caution is advised during the mechanical and electrical installation. Poorly tightened cable may cause many issues, it's also very difficult to find such a defect while launching/using the system.

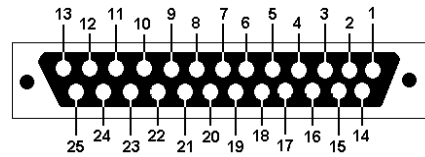
4. Connectors of the device

4.1 Arrangement of the connectors on the device



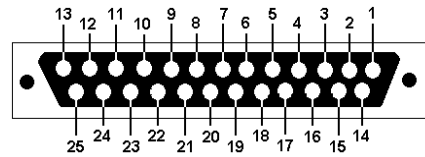
4.2 Digital inputs connector

PIN	Description
1	Input 0 (+)
2	Input 2 (+)
3	Input 4 (+)
4	Input 6 (+)
5	Input 0-7 (-)
6	Input 8 (-)
7	Input 9 (-)
8	Input 10 (-)
9	Input 11 (-)
10	Input 12 (-)
11	Input 13 (-)
12	Input 14 (-)
13	Input 15 (-)
14	Input 1 (+)
15	Input 3 (+)
16	Input 5 (+)
17	Input 7 (+)
18	Input 8 (+)
19	Input 9 (+)
20	Input 10 (+)
21	Input 11 (+)
22	Input 12 (+)
23	Input 13 (+)
24	Input 14 (+)
25	Input 15 (+)



4.3 Digital outputs connector

PIN	Description
1	Outputs 0-3 (+24V) power supply
2	Output 0
3	Output 2
4	Outputs 4-7(+24V)power supply
5	Output 4
6	Output 6
7	
8	
9	
10	
11	
12	
13	GND
14	Outputs 0-3(GND) power supply
15	Output 1
16	Output 3
17	Outputs 4-7(GND) power supply
18	Output 5
19	Output 7
20	
21	
22	
23	
24	
25	



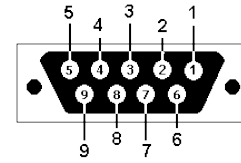
If the 0-3 and 4-7 output groups are going to be galvanically separated, you should first use separate power supply sources for these groups.



The outputs have 250mA permissible load. The outputs shouldn't be overload. Pay attention if large inductance are connected you may need to use an additional transient voltage suppression diode, preferably as close to the coil as possible.

4.4 CSMIO-IP connector

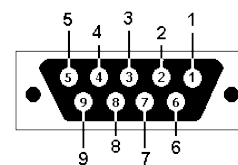
PIN	Description
1	CAN H
2	-
3	-
4	-
5	GND
6	CAN L
7	RS485 B-
8	RS485 A+
9	-



For proper module working it is enough to connect the lines (CAN H ; CAN L ; GND) lines (RS485 B- ; RS485A+) are used in other CSMIO modules and their connection may be required for modules proper working.

4.5 Expansion modules connector

PIN	Description
1	CAN H
2	RS232 RxD
3	RS232 TxD
4	-
5	GND
6	CAN L
7	RS485 B-
8	RS485 A+
9	-



Connectors are dedicated exclusively for CS-Lab expansion modules. Do not connect any other devices, PC, etc.

4.6 Power connector

PIN	Description
1	Module power supply (+24V)
2	Module power supply (GND)
3	Ground



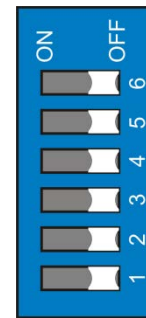
View of the plug from the cables connection side



Pay special attention to not exceed the permissible power voltage (30VDC). This could damage the device.

5. CSMIO-IO module configuration

CONFIG SWITCH	Description
1	CAN Address (Bit-0)
2	CAN Address (Bit-1)
3	CAN Address (Bit-2)
4	CAN Address (Bit-3)
5	CAN bus termination
6	RS485 bus termination



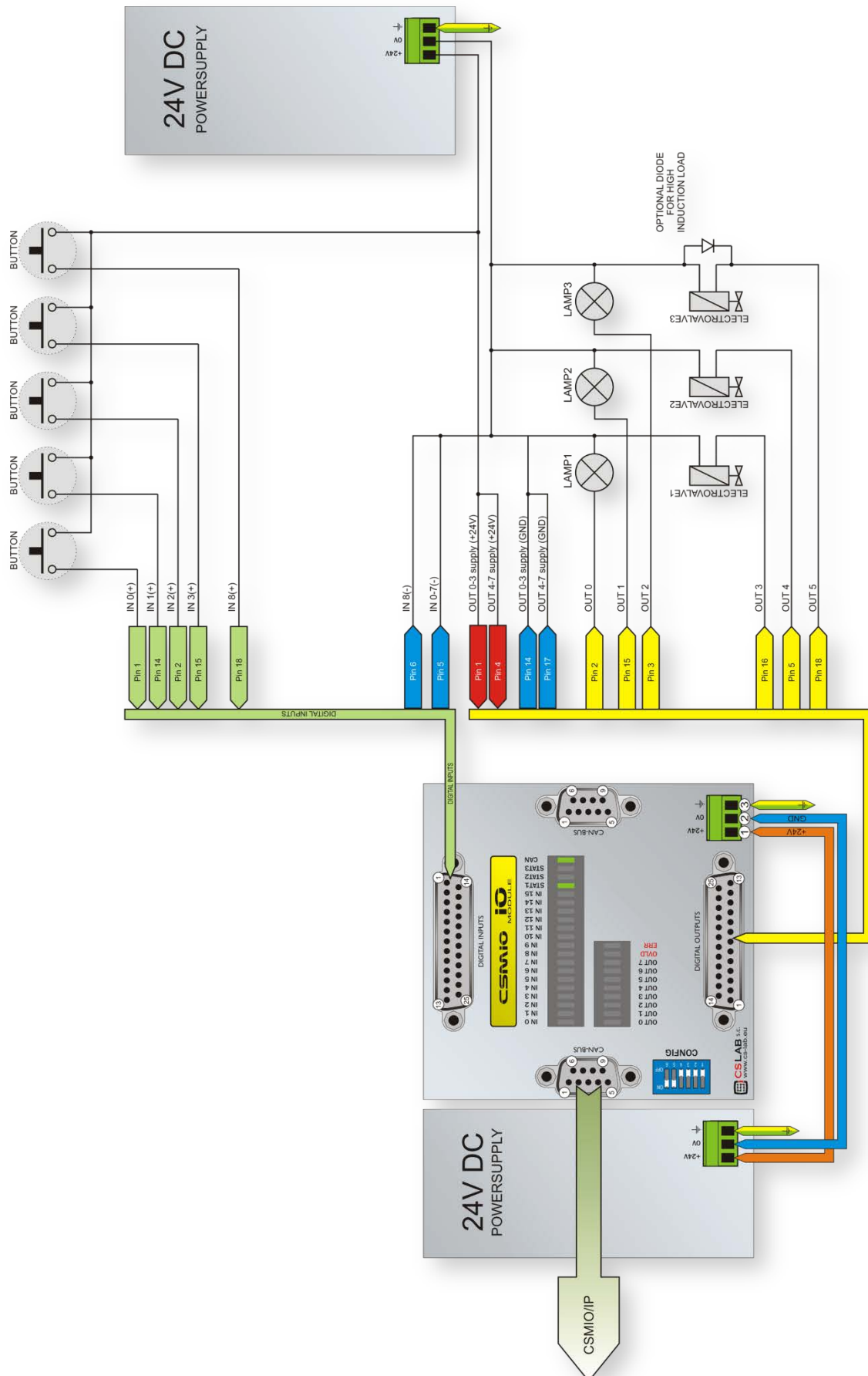
CAN and RS485 lines termination you connect only if it is the only or last device in the control branch.



CAN address is set in a binary system. Switch “Off” position setting correspond to logic „0”, and „On” to logic „1”.
CSMIO/IP-S controller adds to the set number – value of 16. In the table below are listed all possible switches settings and corresponded value and CAN address seen by the controller.

Switches of address selection position				Module number	CAN address (Mach3 PORT no.)
Dip-Sw [4]	Dip-Sw [3]	Dip-Sw [2]	Dip-Sw [1]		
off	off	off	off	0	16
off	off	off	on	1	17
off	off	on	off	2	18
off	off	on	on	3	19
off	on	off	off	4	20
off	on	off	on	5	21
off	on	on	off	6	22
off	on	on	on	7	23
on	off	off	off	8	24
on	off	off	on	9	25
on	off	on	off	10	26
on	off	on	on	11	27
on	on	off	off	12	28
on	on	off	on	13	29
on	on	on	off	14	30
on	on	on	on	15	31

6. Example connection scheme

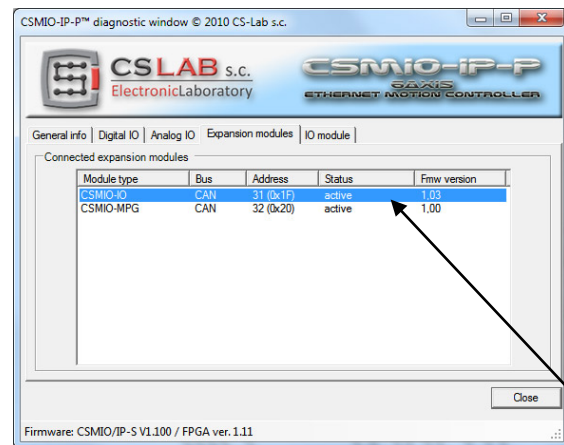



7. Mach3 configuration

One of the advantages of the CSMIO-IO module is that it practically doesn't require any configuration.

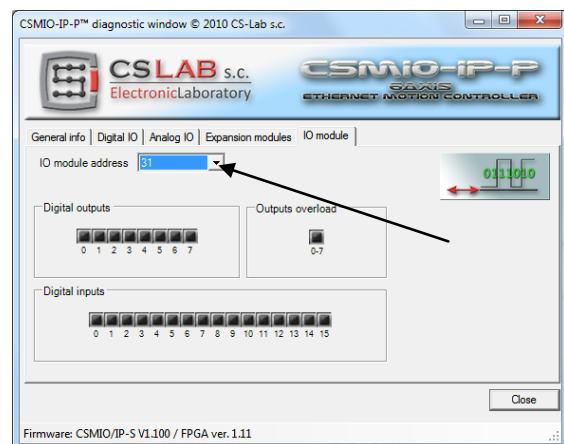
- After CSMIO/IP-S controller connection you should turn the power on and launch Mach3 program.
- In the „PlugIn Control” menu choose „CSMIO_IP_P_plugin”
- In the diagnostic window go to „Expansion modules” tab.

If connections are correct, the CSMIO-MPG module should appear on the list of modules detected by our controller.



 CAN address seen by the CSMIO/IP controller is a number set on module +16 configuration jumpers.

In the same window there is also „IO Module” tab. After selection of the module address from the list the preview of current I/O state on the module and information about eventual outputs overload will appear on the controls.



7.1 Mach3' ports and PIN numbers.

If you want to use the inputs/outputs of the module as standard Mach3 signals – eg. spindle switching or drives ENABLE signal control – you have to enter the correct port and pin in the Mach3 program configuration.

Let's assume that we want the ENABLE signal to show up on the module with address 31 on the 0 output. You should in the Mach3 program click on the „Config/Ports and pins” menu and go to the „Output Signals” tab. Next - at „Enable1” signal – activate the „Enable” box, as port number type 31 and as PIN – 0. As it was mentioned before the port number is just module CAN address and the pin is the I/O number in a module. In chapter 5 there is a table with all possible combinations of jumper sets and all CAN addresses – port number in the Mach3 program.

7.2 Support for inputs/outputs from the VisualBasic® macros level

CSMIO-IO module signals can be supported from the scripts level. To facilitate the programmer work they can be read/saved as VB macros with no need to configure it as standard Mach3 signals.

The signals were assigned to the „ModInputs” and „ModOutputs” registers. They are handled by using the instructions described below.

7.2.1 SetOutBit – single output switching on

The command causes a single output on the module switching on. You should pay attention if the output that you want to steer isn't defined as standard signal in the „Ports and Pins” menu. If so, the command won't work correctly.

Syntax:

SetOutBit (*addr, bit*)

Parameters:

addr - 100 + address jumpers setting on the module (100-115 range)

bit - output number (0-7 range)

7.2.2 ResetOutBit – single output switching off

The command causes a single output on the module switching off. You should pay attention if the output that you want to steer isn't defined as standard signal in the „Ports and Pins” menu. If so, the command won't work correctly.

Syntax:

ResetOutBit (*addr, bit*)

Parameters:

addr - 100 + address jumpers setting on the module (100-115 range)

bit - output number (0-7 range)

7.2.3 GetInBit – single input reading

The function turns back „0” or „1” depending on the input state of the CSMIO-IO module.

Syntax:

GetInBit (*addr, bit*)

Parameters:

addr - 100 + address jumpers setting on the module (100-115 range)

bit - input number (0-15 range)

7.2.4 SetModOutput –settings of all module outputs states

Sometimes it is more convenient or even necessary to set all CSMIO-IO module output states simultaneously. To do this you should use **SetModOutput** instruction, and enter as argument „*val*“ the number from the range of numbers 0-255. Bits number state corresponds to CSMIO-IO module outputs.

Syntax:

SetModOutput (*addr*, *value*)

Parameters:

addr - 100 address jumpers setting on the module (100-115 range)

value - output state (0-255 range)

7.2.5 GetInput –reading of all module inputs states

Analogously to the previous instruction there is possibility to read all inputs state of the CSMIO-IO simultaneously. The function turns back the number from the range 0-65535 – bits returned value corresponds to module inputs states.

Syntax:

GetInput (*addr*)

Parameters:

addr - 100 + address jumpers setting on the module (100-115 range)