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1. CSMIO-ENC general

The CSMIO-ENC is an expansion module for threading and it's used to connect spindle encoder. It can be used with CSMIO/IP-S (step/dir) and CAMIO/IP-A (+/-10V) Ethernet Motion Controllers.

1.1 Signs used in this guide



Potential danger, possible risk of injury.



Useful information, tips



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

1.2 Standards compliance

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

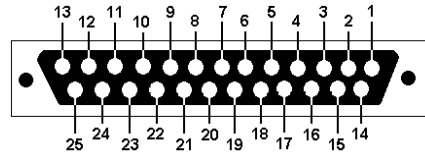
- Detailed requirements for programmable controllers: working characteristics, shock resistance, safety etc. EN61131-2 (IEC1131-2), CSA 22.2, UL508
- Compliance with European Guidelines (low voltage, the level of electromagnetic interference *Electromagnetic Compability*), the CE marking.
- Electrical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



2. CSMIO-ENC module signals connector

2.1 Encoders connector

PIN number	Description
1	+5V
2	encoder 1 - IN A+
3	encoder 1 - IN B+
4	encoder 1 - IN I+
5	+5V
6	encoder 2 - IN A+
7	encoder 2 - IN B+
8	encoder 2 - IN I+
9	+5V
10	encoder 3 - IN A+
11	encoder 3 - IN B+
12	encoder 3 - IN I+
13	NC
14	GND
15	encoder 1 - IN A-
16	encoder 1 - IN B-
17	encoder 1 - IN I-
18	GND
19	encoder 2 - IN A-
20	encoder 2 - IN B-
21	encoder 2 - IN I-
22	GND
23	encoder 3 - IN A-
24	encoder 3 - IN B-
25	encoder 3 - IN I-



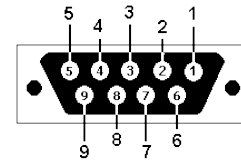
The encoder needs to have 5V differential outputs.



To use the CSMIO-ENC module on a lathe we use only encoder 1.

2.2 Connector for CSMIO/IP control connection

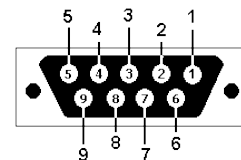
PIN no.	Description
1	CAN H
2	-
3	-
4	-
5	GND
6	CAN L
7	RS485 B-
8	RS485 A+
9	-



For correct module operation it is enough to connect the lines (CAN H ; CAN L ; GND). Lines (RS485 B- ; RS485A+) are used in other CSMIO modules and it may be required to connect them for correct operation of following modules.

2.3 Expansion modules connector

PIN no.	Description
1	CAN H
2	RS232 RxD
3	RS232 TxD
4	-
5	GND
6	CAN L
7	RS485 B-
8	RS485 A+
9	-



The connectors are designed only for extension modules by CS-Lab s.c. They cannot be used to connect any other devices , PC etc.

3. VisualBasic® macro use

3.1 GetInput – position (16 bit) and angle read out

With this command you can read position counter for each encoder inputs as well as the spindle angle (encoder inp. 1).

Syntax:

GetInput (*addr*)

Parameters:

addr - register addresses (look at the table below)

Register no.	Description
84	Spindle angle multiplied x10 (range 0-3600)
85	Encoder position counter 1 (spindle)
86	Encoder position counter 2
87	Encoder position counter 3

3.2 GetUserDRO – position read out (32 bit)

With this command you can read position counter in 32bit format.

Syntax:

GetUserDRO (*addr*)

Parameters:

addr - register address (look at the table below)

Register no.	Description
1501	32 bit encoder position counter 1
1502	32 bit encoder position counter 2
1503	32 bit encoder position counter 3

4. CSMIO-ENC module installation and configuration

4.1 Installation and connection of CSMIO-ENC module

An encoder should be mounted this way to get encoder- spindle ratio 1:1. The encoder must be firmly mounted and parts used for driveline must be finely made.

For instance if we have to use a belt drive for the encoder's drive we need to pay attention if gears and toothed belts are good quality.

Poorly made gears and toothed bars can distort spindle's current position readout what can directly affect on Z axis feed during threading.

It is not recommended to use an encoder of a servo motor that drives the spindle to avoid spindle position readout error.

CSMIO-ENC module connection

- The module should be connected to a motion controller (CSMIO/IP-S or CSMIO/IP-A) with the flat cable included.
- A power supply of the module should be connected the same way as the head controller's power supply.
- Spindle encoder signals should be connected to inputs described as "encoder 1" as only these inputs are supported by an algorithm for threading and revs reading.
During an encoder connection remember to keep proper signals' order.



CSMIO-ENC for proper operation requires all encoder signals (A+/A-/B+/B-/I+/I-). A shield of an encoder's wire should be connected only from one side to PE or in case of high noises to GND (0V). CSMIO-ENC power connector can be the place of connection.

4.2 CSMIO-ENC module configuration

The encoder module configuration is very easy and it comes down to only to operations:

- a) Encoder pulses number configuration
Go to „Config\Config Plugins\Config\Special Functions\Spindle” and enter encoder pulses number incl. all edges in the „Spindle Encoder (CSMIO-ENC)” area.
- b) Encoder pulses counting direction configuration
Sometimes it can be necessary to change encoder pulses counting direction. To verify if current direction is correct you should go to „PlugIn Control\CSMIO_IP plugin\Expansion modules\CSMIO-ENC”. Then - activate a spindle with M3 command and verify if RPM value is positive. If it will be negative you should go to „Config\Config Plugins\Config\Special Functions\Spindle” and select (check) „Inv. Direction” option.