PiDi-3811

User Guide

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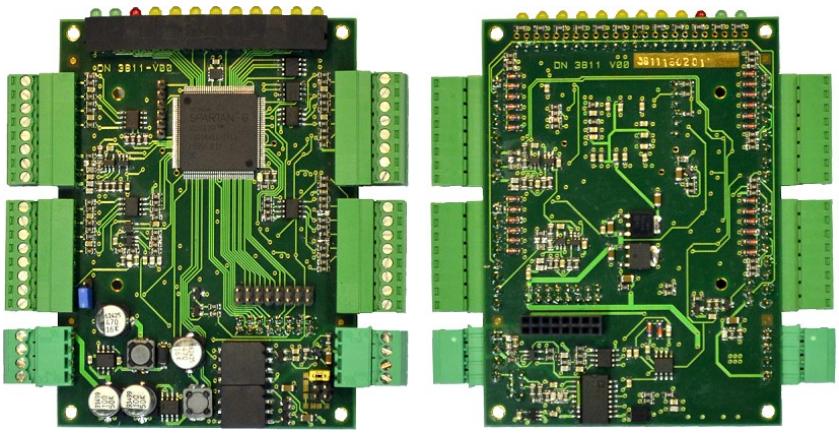
1. Control board PiDi-3811

Control board PiDi-3811 is designed for controlling servodrives by analog voltage on +/-10V level. Board carries inputs for encoders for position feedback. The card has an electrically isolated analog inputs and outputs to control different instruments (optional).
The card contains:

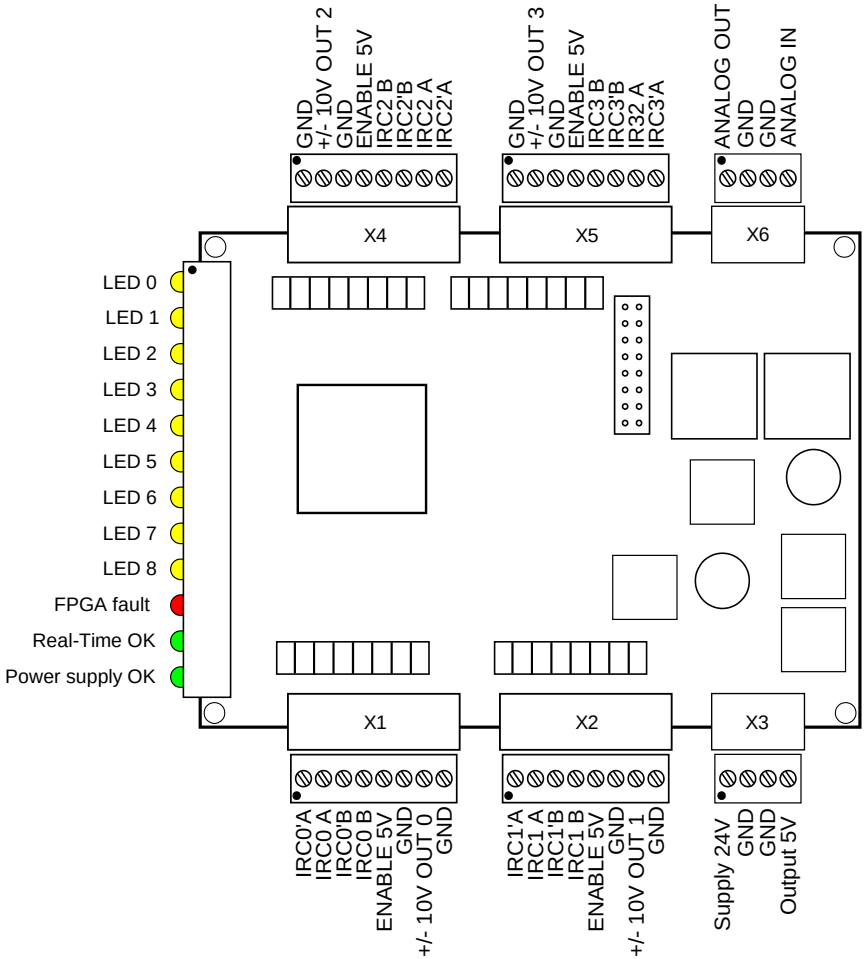
- 4x analog output +/-10V
- 4x a differential input to the encoder, various modes
- 1x galvanically isolated analog input +/-10V, +/-100V, +/-200V (optional)
- 1x galvanically isolated analog output +/-10V



Pic. 1: Control board PiDi-3811

1.1 Description of the connectors

The output for one servomotor consists of a number of signals which are for practical purposes grouped to a single connector.



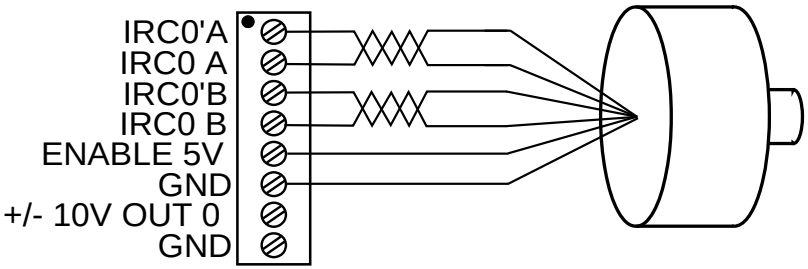
Pic. 2: Description of the connectors on the PiDi-3811

1.2 Servo motor output

Each motor output X1, X2, X4 a X5 consist of signals:

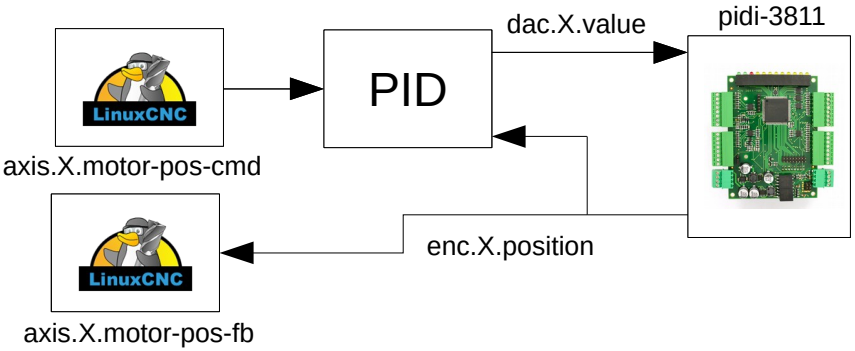
- Analog output +/-10V
- Encoder input
- Auxiliary power supply 5V ENABLE

Power supply ENABLE is the same for every motor output.



Pic. 3: Connection of encoder

1.2.1 Principle of using servomotor output



Motor speed control:

Output position calculated in LinuxCNC is connected to the input position of PID controller:

net Xpos axis.0.motor-pos-cmd => pid_x.command

PID output is connected to the DAC to control the engine speed

net Xvel pid_x.output => pidi-3811.0.dac.0.value

Feedback from Encoder:

Hardware calculates the position of the axis from the number of increments by which the engine is turned. Constant “scale” defines the relationship between rotation of encoder and mechanical axis shift:

$$scale = \frac{increments/rev.}{pitch}$$

For example:

increments/rev = 600p

pitch = 2mm/rev

scale = 300

setp pidi-3811.0.enc.0.scale 300

1.5 Signaling LEDs

Front side of the board carries signal LEDs which are protected by a transparent cover. LEDs are not strongly associated with specific IOs, but, based on their configuration, they can display any incoming or outgoing binary variable. Parameter „pidi-3811.N.bled.M.out“ is an output for displaying preferred status on the LED signaling.

Other LEDs that indicate the status of the device are:

- **Fault FPGA** – Faulty firmware gate arrays
- **Real-Time OK** – Cyclic communication OK
- **Supply OK** – Power supply OK

1.6 Summary of input-output variables and parameters

pidi-3811.N.adc.M.bit_weight

pidi-3811.N.dac.M.bit_weight

The smallest voltage step of analog converter output

pidi-3811.N.adc.M.hw_offset

pidi-3811.N.dac.M.hw_offset

Hardware calibration of output. It is used to compensate the error of the voltage output of analog converter.

pidi-3811.N.adc.M.hw_scale

pidi-3811.N.dac.M.hw_scale

Multiplier of analog converter value for hardware calibration

pidi-3811.N.adc.M.offset

pidi-3811.N.dac.M.offset

Shift of analog converter value

pidi-3811.N.adc.M.scale

pidi-3811.N.dac.M.scale

Multiplier of analog converter value

pidi-3811.N.adc.M.value

pidi-3811.N.dac.M.value

The desired input / output value. Value of analog converter is given by variables according to the following equation:

u[V] = (value + offset) * scale * hw_scale + hw_offset

pidi-3811.N.dac.M.enable

Enabling of analog output. If false, the output is set to 0V

pidi-3811.N.dac.M.high_limit

The maximum voltage of analog output

pidi-3811.N.dac.M.low_limit

The minimum voltage of analog output

pidi-3811.N.bled.M.out

Output variable for status displayed by LEDs

pidi.N.type

Type of board on desired position

pidi.estop

Emergency stop of actuator, output voltage of converter immediately drops to 0V

1.8 Table of variables and parameters

Typ	Smer	Názov premennej	Default
float	OUT	pidi-3811.1.adc.0.bit_weight	2,44E-004
float	IN	pidi-3811.1.adc.0.hw_offset	0.0
float	IN	pidi-3811.1.adc.0.hw_scale	0.0
float	IN	pidi-3811.1.adc.0.offset	0.0
float	IN	pidi-3811.1.adc.0.scale	0.0
float	IN	pidi-3811.1.adc.0.value	0.0
bit	IN	pidi-3811.1.bled.0.out	0
float	OUT	pidi-3811.1.dac.0.bit_weight	2,44E-004
bit	IN	pidi-3811.1.dac.0.enable	0
float	IN	pidi-3811.1.dac.0.high_limit	0.0
float	IN	pidi-3811.1.dac.0.hw_offset	0.0
float	IN	pidi-3811.1.dac.0.hw_scale	0.0
float	IN	pidi-3811.1.dac.0.low_limit	0.0
float	IN	pidi-3811.1.dac.0.offset	0
float	IN	pidi-3811.1.dac.0.scale	0.0
float	IN	pidi-3811.1.dac.0.value	0.0
s32	IN	pidi.1.type	3811
bit	IN	pidi.estop	0

Tab. 1: Table of variables and parameters