General Mechatronics

LinuxCNC based

Motion Control System

Servo applications

Milling machines

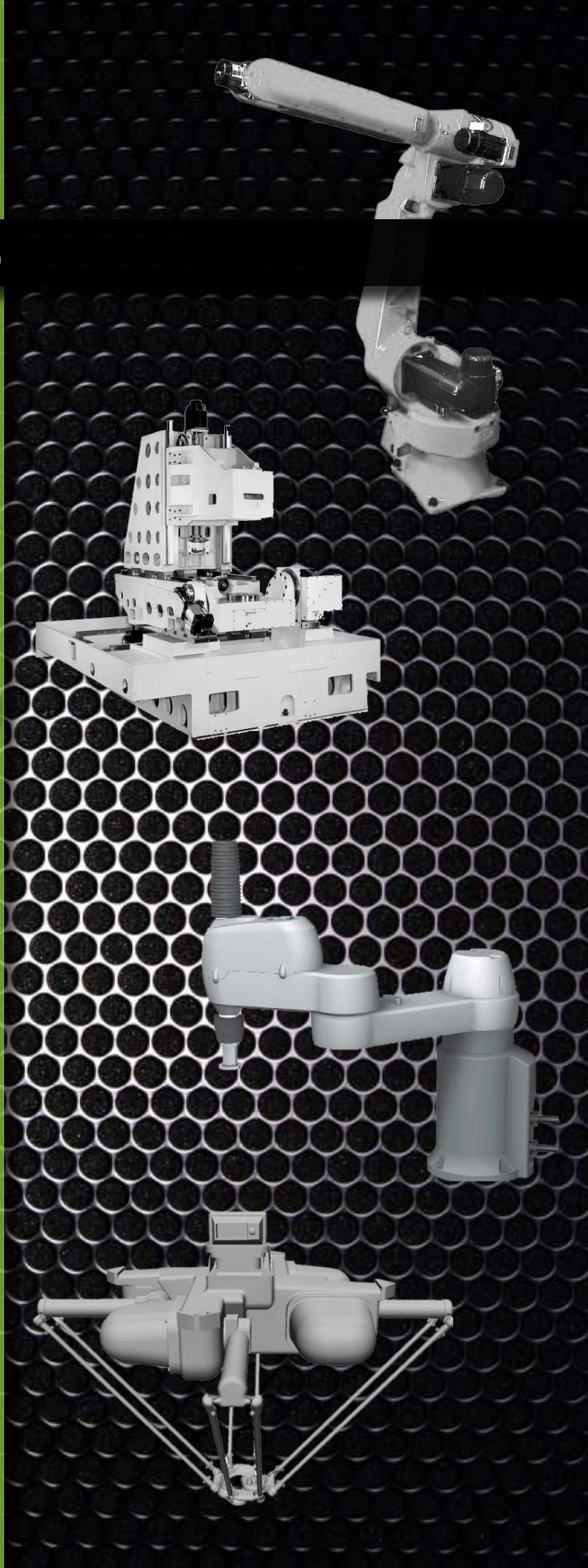
Cutting machines

Plasma cutters

Routers

Robots

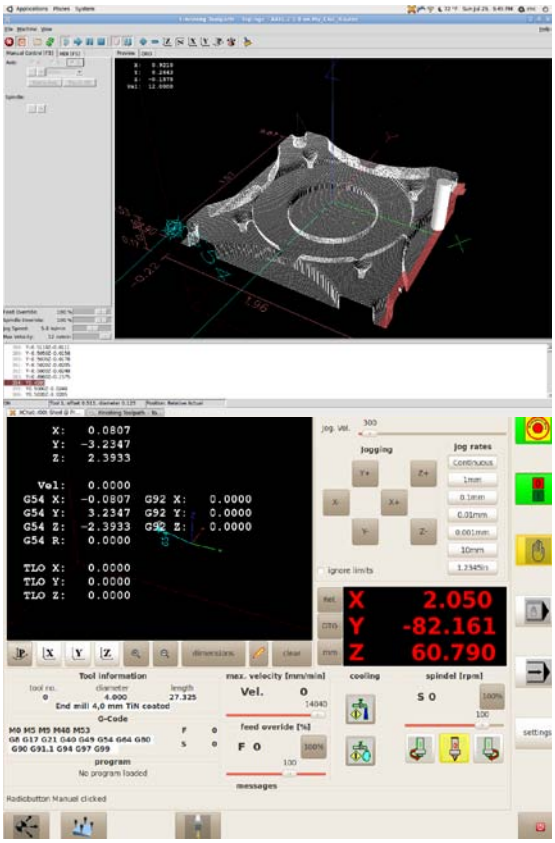
Lathes



INTRODUCTION

Any kind of servo driven machine and its environment can be controlled with General Mechatronics motion control system after a short time system integration procedure. Our system gives the most cost effective and easiest way to build up a complex industrial control, due to the fact that it is based on an open source and widely used software and user interface.

USER INTERFACE - LinuxCNC & PC



LinuxCNC is an open-source GNU/Linux software system that implements numerical control capability using general purpose computers to control servo driven machines.

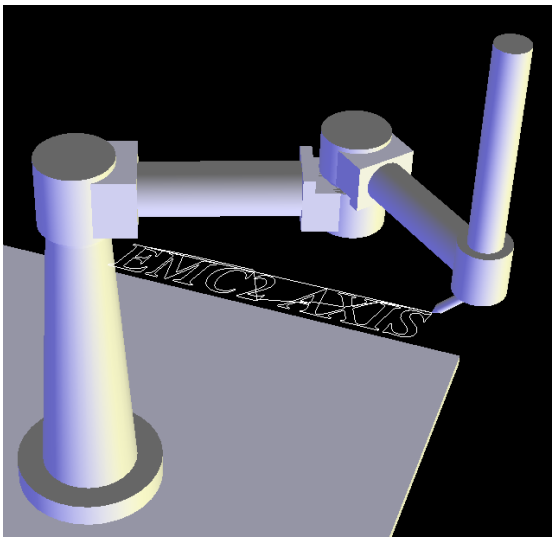
It uses Linux kernel with real time extensions (RTAI or RT-Linux), and can control up to 9 axes or joints of a machine using G-code (RS-274NGC) as input.

It can also handle the operation of all peripheral machine elements, ex. cooling, tool length measurement and tool-change procedure etc.

It has several graphical user interfaces suited to specific kinds of usage ex. touch screen or interactive development.

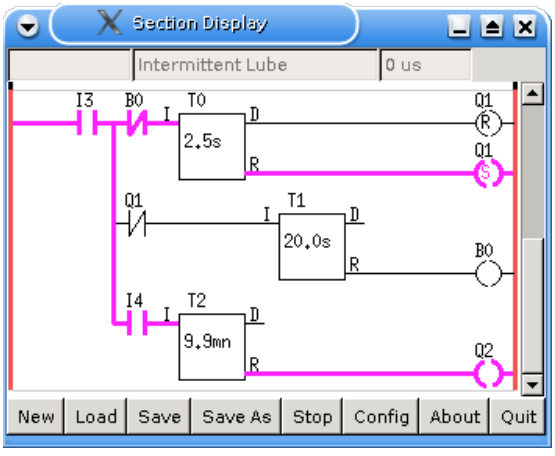
Programming features include: cutter radius and length compensation, path deviation limited to a specified tolerance, lathe threading, synchronized axis motion, adaptive feed rate, operator feed override, and constant velocity control.

EASY CONFIGURATION



LinuxCNC uses HAL (Hardware Abstraction Layer) to interconnect functions easily without altering C code or recompiling. HAL allows a multitude of configurations to be built while being flexible: one can mix & match various hardware control boards, output control signals through the ports - while driving stepper or servo motors, solenoids and other actuators.
LinuxCNC is suitable for non-Cartesian motion systems, as custom kinematics can be implemented. There are several kinematics implemented already, those need only parameterization for driving an exact robot, like SCARA, PUMA or Stewart platforms.

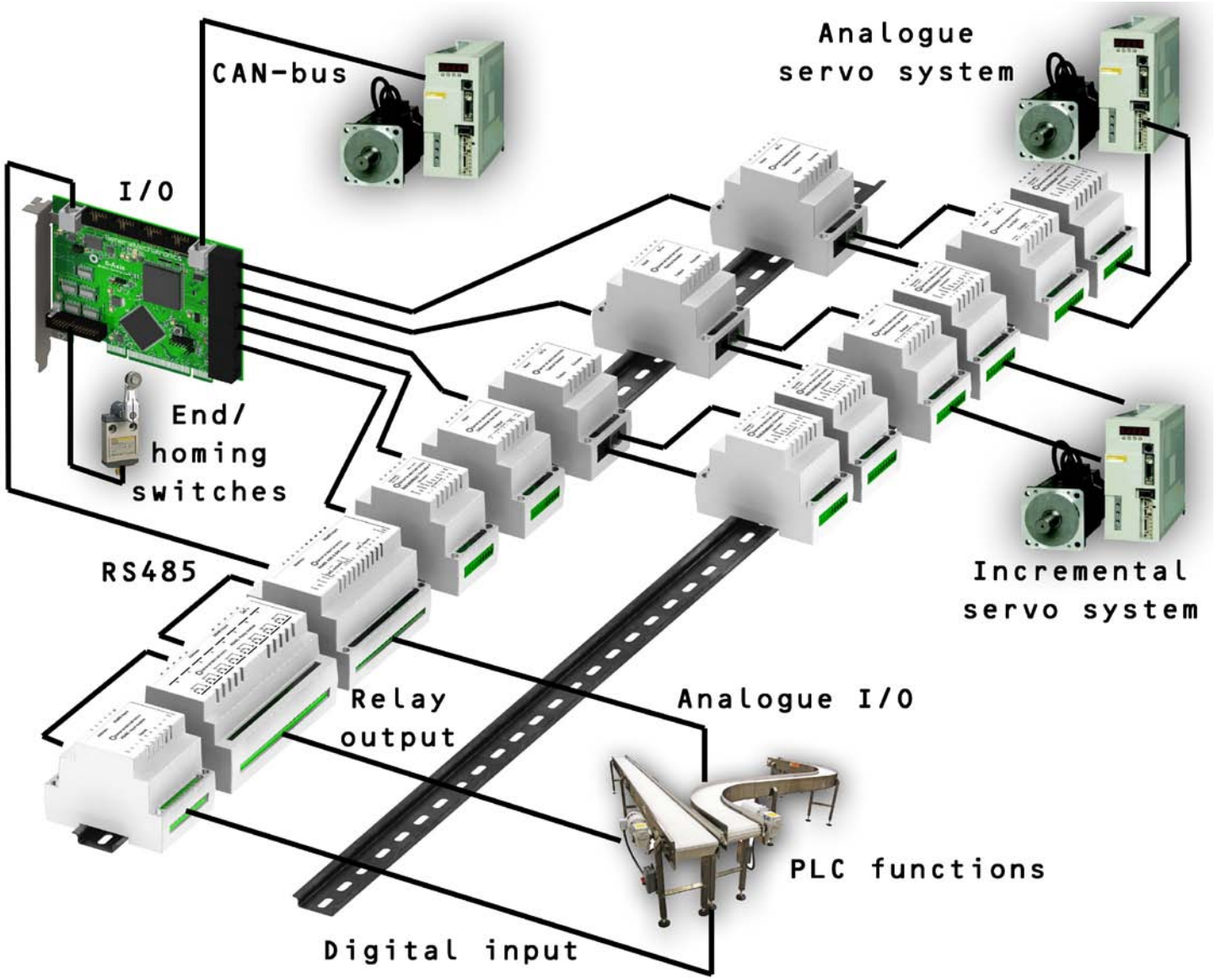
PLC FUNCTIONS



LinuxCNC also includes a software programmable logic controller (PLC) which is usually used in extensive configurations (e.g. complex machining centers). The software PLC is based on the open-source project Classicladder and runs within the real-time environment.
Our system gives extensible PLC solutions with its modular hardware elements which can be connected to a field-bus.

SYSTEM ARCHITECTURE

A typical control system layout consists of an embedded PC installed with our PCI motion control card and its hardware environment interfacing with the machine servos, sensors and other actuators. The open source, PC based LinuxCNC software is easily customizable and configurable for different types of applications.



SERVO INTERFACE - 6 axes / PCI card

There are **six axis** connectors at the inner edge of the card for driving incremental or classic analogue servos. Four different small DIN-rail mounted axis modules are available making it possible to drive six different types of servo configurations in a cost effective way. The interface can be made with an exact combination of the suitable axis modules for the actual servo configuration. A **CAN** interface can be seen at the top edge from the right side: this is for digital servo systems which communicate on CAN-bus.

GENERAL PURPOSE I/O - 4 x 8 pin & 20 pin isolated

Four times eight general purpose I/O pins are placed on standard flat cable headers. These bare I/O pins can be configured in LinuxCNC for any custom purpose. There are additional 20 optically isolated input pins for the direct connection of two end switch and one homing sensor for each axis and two optically isolated E-stop inputs.

PLC FUNCTIONS - along RS485 field bus

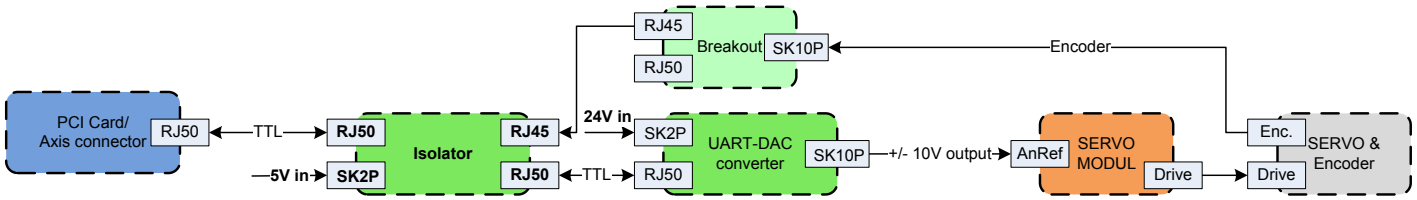
DIN-rail mounted optically isolated modules can be chained to the RS485 bus for expanding the I/O and function capability of the PCI card. Up to 16 modules can be connected to the bus altogether.

Plug & Play Controllers

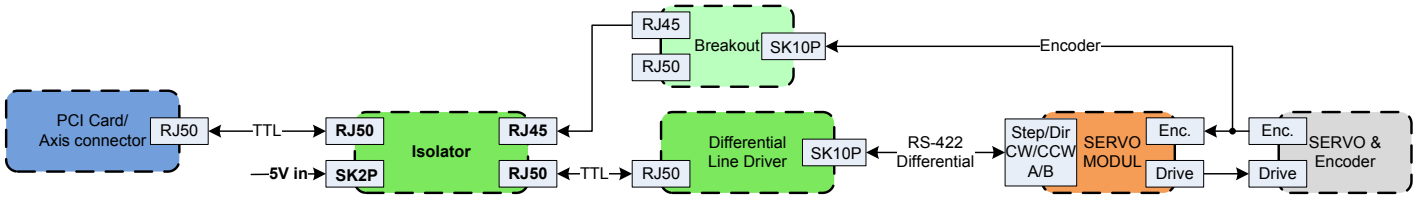
CONNECTING SERVO MODULES

Small sized DIN rail mounted interface modules gives an easy way of connecting different types of servo modules to the axis connectors. Several different typical system configurations can be set up: analogue servo modules which have voltage level reference signal input, incremental systems with Step/Direction or Clockwise/Counter-clockwise or Quadrant A/B type input signals, and also servo modules connected along CAN bus interface. Additional encoder feedback can be applied if needed.

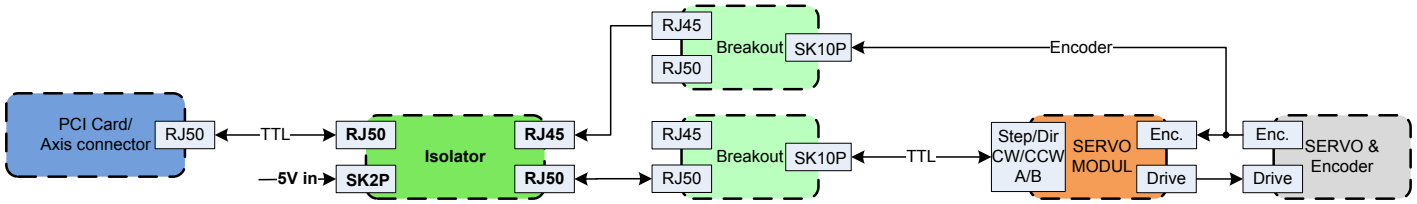
Analogue system with encoder feedback



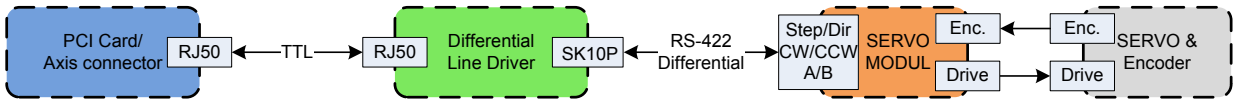
Incremental digital system with encoder feedback and differential output



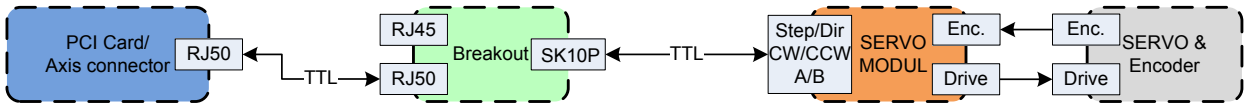
Incremental digital system with encoder feedback and TTL output



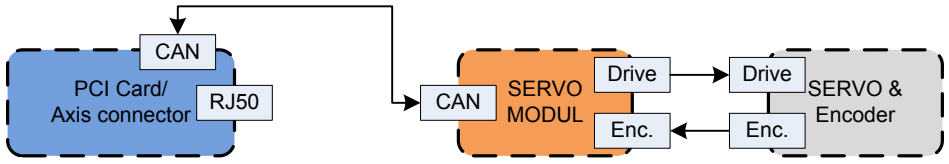
Incremental digital system with differential output



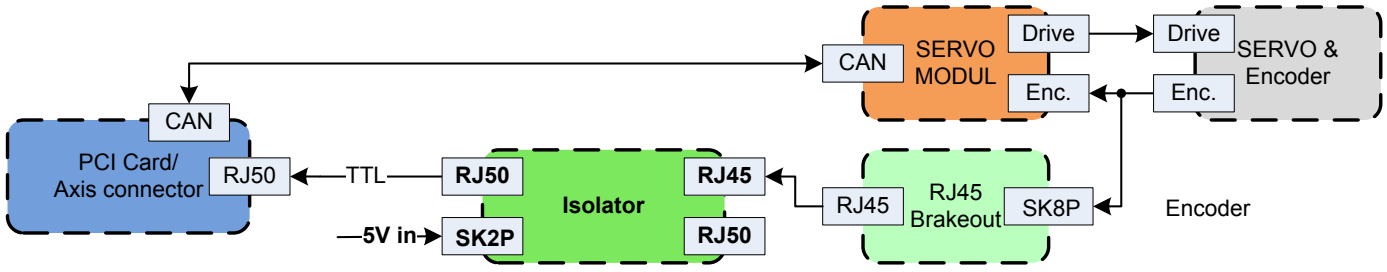
Incremental digital system with TTL output



Absolute digital (CAN based) system



Absolute digital (CAN based) system with conventional encoder feedback



RS485 EXPANDER MODULES

These modules were developed for expanding the I/O and function capability along an RS485 line of the PCI motion control card.

8-channel relay output module

The relay output module gives eight NO-NC relay output on a three pole terminal connector for each channel.

8-channel digital input module

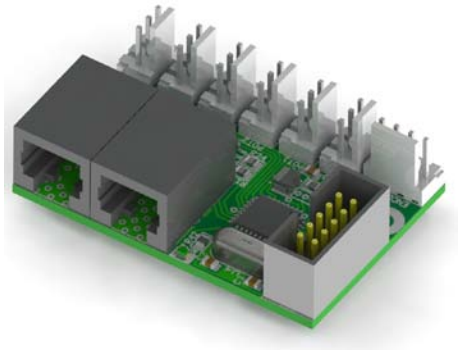
The digital input module gives eight optically isolated digital input pins.

8-channel ADC and 4-channel DAC

The ADC and DAC module gives four digital-to-analogue converter outputs and eight analogue-to-digital inputs. This module is also optically isolated from the PCI card.

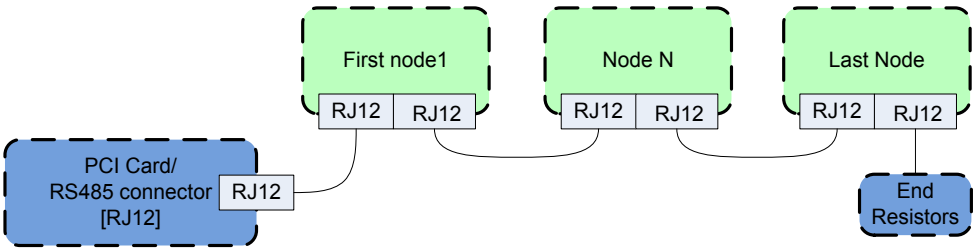
Teach pendant module

The teach pendant module gives 8 digital input channel for push buttons, 6 ADC input channels for joysticks or potentiometers and one encoder input for a handwheel.



Connecting the modules

The modules on the bus have to be connected in serial topology, with termination resistors on the end. The start of the topology is the PCI card and the end is the last module.

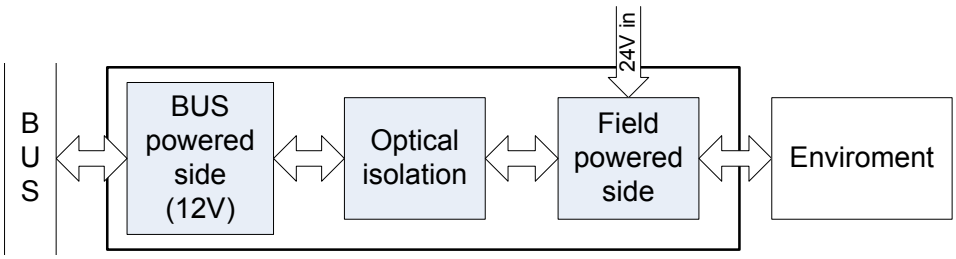


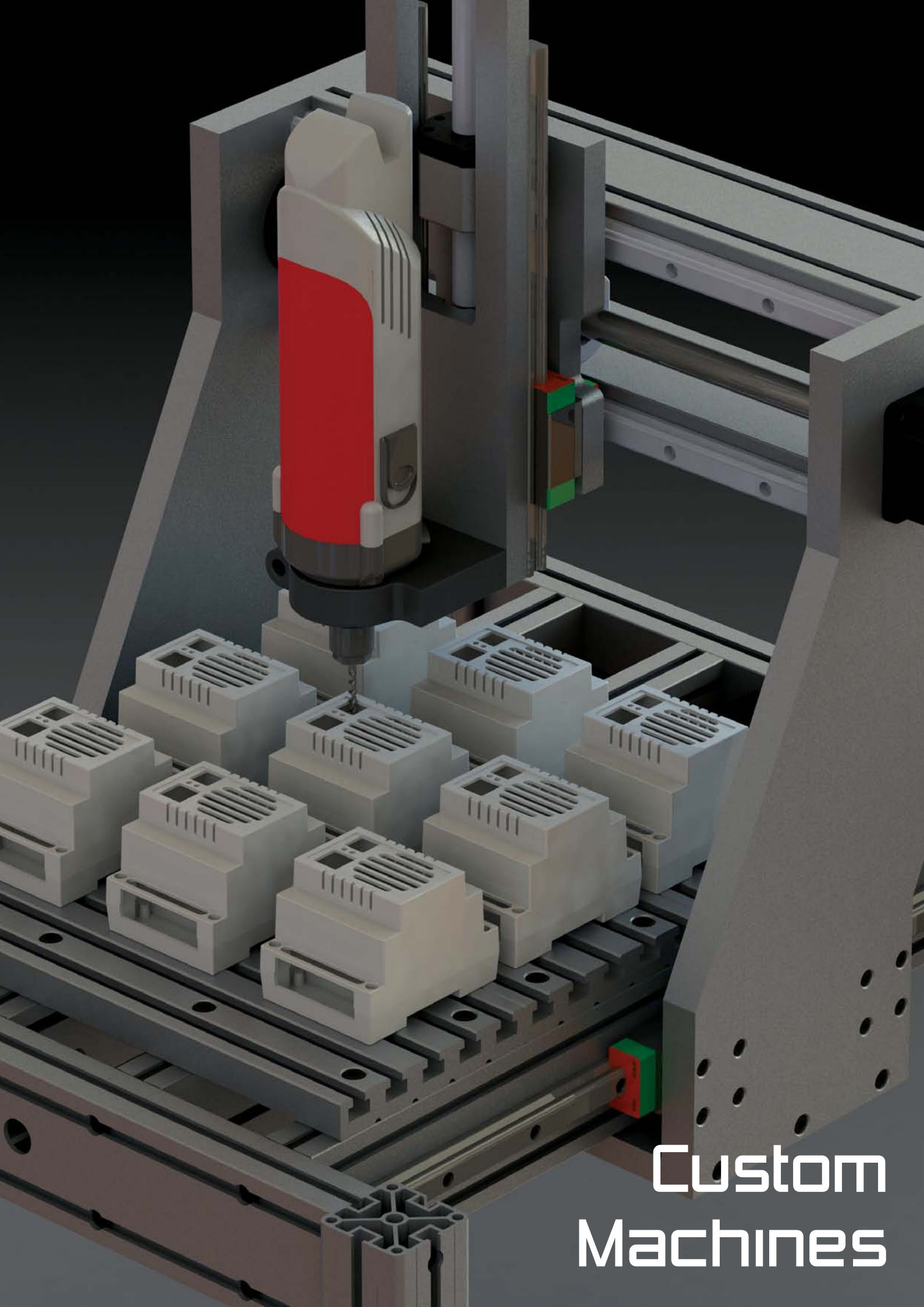
Automatic node recognition

Each node connected to the bus is recognized by the PCI card automatically. During starting LinuxCNC the driver exports pins and parameters of all available modules automatically.

Powering the nodes

Each module is electronically isolated from the bus, hence they have a bus powered side, and a field powered side. Except for the teach pendant module, which is not isolated.





Custom Machines

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