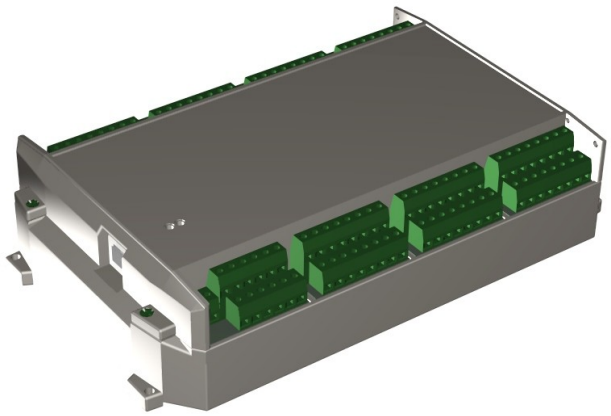
Technical specifications

DCU5610

DYNAMIC CONTROL UNIT



OVERVIEW

Compact, fully-featured, freely-programmable hard real-time control unit (controller). Suitable for industry, building, research and development as well as education or hobby control applications. Configurable with up to 56x inputs/outputs (16x analog inputs, 8x analog outputs, 32x digital inputs / outputs). Support RS485 Modbus RTU industrial bus. Networking of multiple units is via standard UDP / TCP/IP / Ethernet / Wireless technology. Software tools for design and programming, data recording, and visualization are free and open-source. They are based on modern, confirmed, and powerful platforms - Scilab/Matlab, Web, Java, MySQL. They support all versions of Windows, Linux, Mac OS X and can be installed on low-cost miniPC as well as large server.

ELECTRICAL SPECIFICATIONS

• **16x AI** (analog inputs) 0-10V / 0-20mA / NTC10k / NTC20k / PT100 /PT1000 / Ni1000 (other types of analog inputs on demand). Configurable in blocks of 8 inputs.

• **8x AO** (analog outputs) 0-10V / 0-20mA

• **32x DIO** (digital inputs or outputs) configurable in blocks of 8 channels as digital (binary) input or digital (binary) output. Digital input is sensing open/close contact. Digital output is either 24VDC 60mA output or normally open contact 50V 0.5A.

• Real-time clock and date with backup battery integrated (~10years)

• 10/100Mbit Ethernet RJ45 connector for TCP/UDP/IP connectivity.

• Serial line RS485 for MODBUS RTU connectivity.

• Auxiliary power supplies: 10VDC/10mA, 24VDC/0.2A

• Unit power supply: 12-24VAC or 13-36VDC

• Operational temperatures: from 0°C to 50°C

FUNCTIONAL DESCRIPTION

Control design, programming, and implementation

Scilab/Xcos (commercial Matlab/Simulink is supported as well) cutting-edge scientific computational platform is used for programming, design, validation, and implementation of control application. There are no translations of control algorithms into C/Assembler, no C/Assembler debugging, no code validations. Control algorithm is drawn inside simulation tool (Xcos/Simulink) as a functional diagram. The diagram is automatically processed and load directly into unit. Control unit embedded hard real-time system incorporates diagram interpret, which executes implemented control application. Other specific services are implemented within real-time system providing efficient communication with scientific tools. Using scientific simulation tools for design delivers maximum efficiency into control design, optimization and validation process. Complex dynamic models and simulations are available as well as hardware in the loop validation techniques. Library of control functions covering basic and advanced control system algorithms as well as process-control oriented functions such as alarms handling or scheduling.

User monitoring and visualization

Process data are on-line recorded by Java service (User Command Center) into MySQL database. Monitoring and visualization may be any software with access into MySQL database. Typically, web-based visualization using PHP / Apache web-server platform is used to access and display actual or historical process values and events. Building visualization is then a standard development of web-pages. Examples of web-page visualizations are provided.

Hardware and operating system requirements for control design, monitoring and visualization

Control design and process data recording and visualization software support any version of Windows, GNU/Linux, Mac OS X. The software can be installed on any hardware supporting any of these systems, such as mini PC, tablet, desktop computer, notebook, server, etc.

Embedded hard real-time system

Real-time control is executed inside Dynamic Control Unit. Sampling time is up to 1msec (1000 Hz) for entire control application execution (input reading - control application evaluation - output writing). Up to 32 different sampling times can be assigned to any I/O (input/output) and any control application functional block. All control functions are evaluated with scientific 64-bit floating-point computational precision (max. error 10^{-15}). Automated backup system of control application onto removable EEPROM is integrated. In case of control unit replacement, no need to re-program a new control unit, the removable EEPROM is replaced instead. DCU is permanently monitoring its internal temperature and power supply.

Networking

Real-time UDP/IP protocol is used for communication between Dynamic Control Units. TCP/IP protocol is used for communication of DCU with visualization server and designer computer. Each DCU disposes with one 10/100Mbit Ethernet RJ45 connector. Control network is a standard wireless/local/global area network. Ethernet, wireless Ethernet, Internet technology may be used for interconnection of DCU controllers, visualization/data recording servers, designer computers.

Serial line RS485 connector is integrated in each DCU for connection to standard MODBUS RTU industrial bus. DCU can act as master or slave. MODBUS RTU protocol is widely supported by many industry producers. MODBUS Input/output modules, intelligent sensors, panels, communication gateways, etc. may be connected to build complex control network.